

# DUMORTIERA

van de zaaddragers en de vorming van valse tussenschotten; 1 stijl en meestal 1 stempel. Vrucht: een vlezig steenvrucht of een vierdelige splitvrucht (*Verbena* e.a.). — Ca. 1.000 soorten, vooral in de tropische en de warm-gematigde streken.

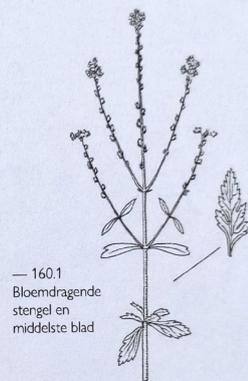
Opm. Behalve enkele *Verbena*-soorten, worden ook nog andere soorten uit deze familie als sierplanten gekweekt. Sommige daarvan zijn houtige planten, zoals *Lantana camara* L., andere kruidachtig, zoals *Glandularia aristigera* (S. Moore) Tronc. (syn.: *Verbena aristigera* S. Moore), *G. ×hybrida* (Grönland et Rümpler) Nesom et Pruski (syn.: *Verbena ×hybrida* Voss) en *Phyla nodiflora* (L.) Greene. Al deze planten zijn ook verwilderd aangetroffen.

## Verbena L. (Ijzerhard. Verveine. Eisenkraut, Verbene)

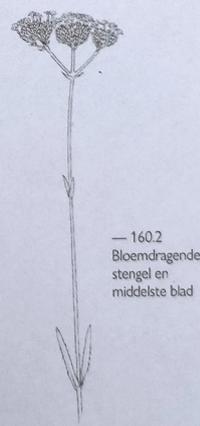
- Onderste bladen gesteeid en veerspletig, de bovenste smaller en soms gaafrandig. Bloemen in slanke, eendandige aren, verenigd in een pluim met uitstaande takken (fig. 160.1). Kroon lilaroze. . . . . 1. **Verbena officinalis**
- Alle bladen zittend en ongedeeld. Bloemen in gedrongen en korte bijschermen (fig. 160.2). Kroon purper. . . . . 2. **V. bonariensis**

Opm. Adventieven: *Verbena bracteata* Lag. et Rodr., *V. brasiliensis* Velloso [syn.: *V. litoralis* Kunth var. *brasiliensis* (Velloso) Briq.], *V. hastata* L., *V. incompta* Michael, *V. rigida* Spreng en *V. urticifolia* L.

1. **Verbena officinalis** L. (Ijzerhard. Verveine sauvage. Eisenkraut). — 25-75 cm. — Juli-okt. — Hemicrypt. — Wegbermen, taluds, braakland, ruderaal terreinen op eerder compacte bodems. — VA in Pic., Brabant, Loth., Champ., Tert. Par.; VZ in Mar., Vl.; Z in Boul., Ard., M-Eifel. — Gemat. Eur. en Azië; thans subkultuur. — Geneeskrachtig. — Handboek (1975) 146.
2. **V. bonariensis** Lamour. (Verveine de Buenos Aires. Argentinische ijzerhard). — 100-150 cm. — Juli-okt. — Hemicrypt. — Braakland, ruderaal terreinen, vooral in Mar., Vl., Kemp., Brab.; elders gekweekt als sierplant. — Z-Am. — Handboek (1975) 160.2.



— 160.1  
Bloemdragende  
stengel en  
middelste blad



— 160.2  
Bloemdragende  
stengel en  
middelste blad

DUMORTIERA publishes papers – in English, Dutch or French – on the flora and vegetation of Belgium and adjacent areas: vascular plants, bryophytes, lichens, algae and fungi. Themes that are discussed include changes in the indigenous and non-indigenous flora, revisions of ‘difficult’ or overlooked groups, identification keys, results of field surveys, short communications, etc. Each manuscript is refereed before publication.

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DUMORTIERA publiceert bijdragen – in het Nederlands, Frans of Engels – over de flora en vegetatie van België en de aangrenzende gebieden: vaatplanten, mossen, korstmossen, algen en paddenstoelen. De inhoud omvat de evolutie van de inheemse en niet-inheemse flora, revisies van moeilijke of miskende groepen, determinatiesleutels, resultaten van inventarisaties, korte mededelingen, enz. Elk aangeboden manuscript wordt door referenten beoordeeld.

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DUMORTIERA publie des contributions – en français, néerlandais ou en anglais – sur la flore et la végétation de la Belgique et des zones limitrophes : plantes vasculaires, mousses, lichens, algues, champignons. Les thèmes abordés incluent l'évolution de la flore indigène et non indigène, des révisions de groupes difficiles ou méconnus, des clés de détermination, des résultats d'inventaires de terrain, des communications brèves, etc. Chaque manuscrit est évalué par des *reviewers*.

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## DUMORTIERA 122

### Contents / Inhoud / Sommaire

F. Verloove – Introduction: an outlook after the completion of the seventh edition of the <i>Nouvelle Flore de la Belgique</i>	3-4
F. Verloove – The seventh edition of the <i>Nouvelle Flore de la Belgique</i> : chorological adjustments	5-98
F. Verloove – The seventh edition of the <i>Nouvelle Flore de la Belgique</i> : nomenclatural and taxonomic remarks	99-173
F. Verloove and G. Galasso – The seventh edition of the <i>Nouvelle Flore de la Belgique</i> : new nomenclatural combinations	174-176
A. Ronse – De sleutel voor bomen, heesters en lianen in de Belgische Flora: historiek, opzet en wijzigingen in de nieuwe editie van 2023	177-182
H. Devriese en A. van de Beek – De behandeling van het genus <i>Rubus</i> (Rosaceae) in de nieuwe editie van de <i>Nouvelle Flore de la Belgique/Flora van België</i>	183-191
F. Verloove, I. Hoste, L. Duistermaat en B. Odé – De zevende editie van de <i>Nouvelle Flore de la Belgique</i> : nieuwe Nederlandse namen	192-194
Index of genera mentioned in the notes on chorology (p. 5-98) and taxonomy and nomenclature (p. 99-173)	195-199

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Cover picture: a page from the new, Dutch-language edition of the *Nouvelle Flore de la Belgique/Flora van België* featuring *Verbena bonariensis*, with an added fresh specimen of the species. (Photo Ivan Hoste)



## Introduction: an outlook after the completion of the seventh edition of the *Nouvelle Flore de la Belgique*

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**ABSTRACT.** – Two new editions of the Belgian Flora are published in 2023, namely the 7<sup>th</sup> edition of the *Nouvelle Flore de la Belgique* and the 4<sup>th</sup> edition of the *Flora van België*. This prompts a brief reflection on the future team of authors, the delineation of the territory of the Flora and the challenge of a modularly structured Flora with printed and digital components.

**RÉSUMÉ.** – **Introduction : Une vue prospective après l'achèvement de la septième édition de la *Nouvelle Flore de la Belgique*.** Deux nouvelles éditions de la Flore belge sont publiées en 2023, à savoir la 7<sup>e</sup> édition de la *Nouvelle Flore de la Belgique* et la 4<sup>e</sup> édition de la *Flora van België*. Cela suscite une brève réflexion sur la future équipe d'auteurs, la délimitation du territoire de la Flore et le défi d'une structure modulaire avec des composantes imprimées et numériques.

**SAMENVATTING.** – **Inleiding: een vooruitblik na de voltooiing van de zevende editie van de *Nouvelle Flore de la Belgique*.** In 2023 worden twee nieuwe edities van de Belgische Flora gepubliceerd, namelijk de 7<sup>de</sup> editie van de *Nouvelle Flore de la Belgique* en de 4<sup>de</sup> editie van de *Flora van België*. Dit is aanleiding voor een korte beschouwing over de toekomstige auteursploeg, de afbakening van het gebied van de Flora en de uitdaging van een modulaire opbouw met gedrukte en digitale componenten.

In the course of 2023, two new editions of the Belgian Flora are published: the fourth Dutch edition of *Flora van België* (Verloove & Van Rossum 2023a) and, soon afterwards, the substantively identical seventh French edition of *Nouvelle Flore de la Belgique* (Verloove & Van Rossum 2023b), respectively 25 and 11 years after the publication of the previous editions (Lambinon *et al.* 1998, Lambinon & Verloove 2012). The rewriting of these two Floras was, for multiple reasons, a long and tedious process. Although the initial idea was to write a completely new Flora, by a partially renewed and younger team of authors and collaborators (as proposed by Lambinon *et al.* 2014), due to unforeseen technical reasons and subsequent lack of time, these new editions were eventually prepared in the tradition of and in line with previous editions of the *Nouvelle Flore/Flora van België*. The rewriting process was substantially done by two authors: Fabienne Van Rossum (FVR) and Filip Verloove (FV). The basis for the revision was the sixth French edition of the *Nouvelle Flore* (Lambinon & Verloove 2012; hereafter NF6) because this was the most updated version of the Flora. In a first phase, the classification was adapted to the APG (Angiosperm Phylogeny Group) consensus taxonomy, i.e. a modern, mostly molecular-based system of plant taxonomy. For this purpose, the text of NF6 was cut

up and rearranged by FVR to bring it in line with the APG classification. Subsequently, all chorological, taxonomic and nomenclatural corrections and additions were inserted by FV in the rearranged files of NF6. Finally, the new manuscript (in French) was translated into Dutch by Luc Allemeersch. This resulted in two new, simultaneous and identical versions of the Belgian Flora in two languages. Especially the new Dutch edition, published a quarter of a century after the previous one, has therefore undergone very substantial changes. As compared with NF6, several hundred new illustrations were added (original drawings by Sven Bellanger and Liliane Tytens); an attempt has been made to depict a representative species for almost all genera. Finally, a new, more modern layout was chosen (designed by Sven Bellanger).

This issue of *Dumortiera* is entirely dedicated to the publication of these two new Flora editions and deals with modifications, additions and corrections, as compared with the most recent French edition (NF6: Lambinon & Verloove 2012). The following items are dealt with:

- general introduction and outlook (FV);
- chorological adjustments (FV);
- nomenclatural and taxonomic remarks (FV);
- new nomenclatural combinations (FV & Gabriele GALASSO);

- notes on the new treatment of the genus *Rubus* (Rosaceae) (Hendrik DEVRIESE & Abraham VAN DE BEEK; in Dutch);
- a note on the history and design of the key for identifying trees, shrubs and lianas, mainly according to leaf characteristics, and changes therein in the new Flora edition (Anne RONSE; in Dutch);
- overview of new Dutch vernacular names (FV, Ivan HOSTE, Leni DUISTERMAAT & Baudewijn ODÉ; in Dutch).

With the publication of two new editions of the *Nouvelle Flore/Flora van België* the preparation of a next edition inevitably starts. However, the concerns that were already expressed by Lambinon *et al.* (2014) still apply, if not even more so today than a decade ago. There are many challenges: the team of authors urgently needs to be rejuvenated and expanded, taking into account what a Belgian Flora will look like or needs to look like in the future (see below). Since the publication of a modern, very solid French Flora (Tison & de Foucault 2014; a completely revised version is anticipated in 2025; pers. comm. J.-M. Tison) (a good and up-to-date Flora was missing for several decades in France), the question arises whether or not the *Nouvelle Flore* still needs to cover northern France. Alternatively, perhaps a (renewed) collaboration with the Naturalis Biodiversity Center in the Netherlands and the Luxembourg National Museum of Natural History, in order to compile a Flora that covers the Benelux countries (see also e.g. Siebel & During 2006 or van der Meijden *et al.* 2016), would be more appropriate. Such a cooperation would, however, inevitably raise other problems. Anyway, it is clear that the territory covered by the Flora must be thoroughly reconsidered.

It will also be necessary to consider to what extent a hardcopy of a book is still useful or, better, how a hardcopy could be optimally combined with digital sources. Artificial intelligence and image recognition apps will probably never – at least not in the near future – allow accurate identification of species from critical groups such as grasses or sedges; for such troublesome groups a Flora may always remain indispensable (quite apart from the fact that the satisfaction that comes with successfully identifying a plant after going through a key will always be missing). Yet, young botanists may prefer to identify a plant using a Flora that is also available as a smartphone application, rather than a hardcopy of the same Flora.

More or less in line with this, we should consider how to deal with the exponential increase of garden escapes and other non-native plants. In the new Flora edition, almost 100 additional (nearly exclusively non-native) taxa are treated in full detail as compared with the latest French edition (and several hundred as compared with the latest Dutch edition). However, many more species could have been added, especially ephemeral or only locally naturalized aliens. To prevent the Flora from becoming exces-

sively bulky, it seems advisable to have a core-Flora that includes all native and widely naturalized alien species. Detailed, unlimited information about all other alien species, including identification keys, could then be presented (and permanently kept up-to-date) online. This is actually already happening in Belgium (<https://alienplantsbelgium.myspecies.info/>), but can be further elaborated, also elsewhere in western Europe. Regarding the chorological data, and more specifically the frequency assessments, contemporary (local) databases probably will allow a more precise assessment, based on data rather than on a subjective assessment, as has always been the case in the past in the *Nouvelle Flore*. But here, too, serious problems need to be overcome: some regions that are covered by the Flora will undoubtedly have more complete and/or reliable data than others.

On the occasion of the publication of the sixth French edition of the *Nouvelle Flore*, Lambinon *et al.* (2014) referred to “the end of an era”. The seventh edition shows that this was a somewhat premature thought. There is, however, reason to believe that in the future the Flora of Belgium and the surrounding territories will indeed in all respects look different from previous Floras, including the seventh edition of the *Nouvelle Flore*.

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## The seventh edition of the *Nouvelle Flore de la Belgique*: chorological adjustments

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**Illustrations:** map (Fig. 1) by Wesley Tack and Sven Bellanger.

**ABSTRACT.** – During the past decade, numerous chorological data on the flora of vascular plants in Belgium and the neighboring areas have been gathered and published. This contribution gives an overview of altered distribution data in the seventh as compared with the sixth edition of the *Nouvelle Flore de la Belgique* which was published in 2012.

**RÉSUMÉ.** – La septième édition de la *Nouvelle Flore de la Belgique* : changements chorologiques. Au cours de la dernière décennie, de nombreuses données chorologiques sur la flore vasculaire de la Belgique et celle des régions voisines ont été obtenues et publiées. Cette contribution donne un aperçu des changements de distribution dans la septième par rapport à la sixième édition de la *Nouvelle Flore de la Belgique*, parue en 2012.

**SAMENVATTING.** – De zevende editie van de *Nouvelle Flore de la Belgique*: chorologische wijzigingen. In het recente verleden werden veel nieuwe chorologische gegevens met betrekking tot de vaatplantenflora van België en de aangrenzende gebieden verzameld en gepubliceerd. Deze bijdrage biedt een overzicht van de gewijzigde verspreidingsgegevens in de zevende ten opzichte van de zesde editie van de *Nouvelle Flore de la Belgique*, die dateert van 2012.

### Introduction

As with the publication of previous editions of the *Nouvelle Flore* (e.g. Delvosalle *et al.* 1988; Lambinon *et al.* 1994; Lambinon 1998; Lambinon 2005; Verloove & Lambinon 2014), an overview is presented of the chorological updates that have been carried out in the seventh edition of the *Nouvelle Flore* (Verloove & Van Rossum 2023a) as compared with the sixth (Lambinon & Verloove 2012). The same updates are also integrated in the fourth edition of the Dutch edition of the Belgian Flora (Verloove & Van Rossum 2023b), which is published a few months before and is identical with the *Nouvelle Flore*.

Since the publication of the sixth edition quite a lot has changed. The main author of the latest editions, Jacques Lambinon, passed away on 14 November 2015 (Fabri & Demoulin 2016, Verloove 2016a). He was the last surviving author of the original team (De Langhe *et al.* 1967). In the course of the preparation of the seventh edition an unprecedented amount of relevant new chorological data became available: several new national and regional Floras, atlases and checklists were published, important scientific (local) databases became publicly accessible and new online observation platforms arose (for details see below). As a result, the regional distribution of numerous taxa could be critically reassessed. For many taxa

the distribution data presented in the latest edition of the *Nouvelle Flore* (Lambinon & Verloove 2012) had not or hardly changed as compared with those of the first edition and thus had become seriously outdated.

### Materials and methods

During the preparation of the seventh edition, an extraordinary amount of new data became available, all of which were thoroughly checked in order to detect a potential impact on the distribution of taxa in the *Nouvelle Flore*.

Several important new Floras were published whose coverage coincides at least in part with the territory covered by the *Nouvelle Flore*. Table 1 gives a chronological overview of the most relevant publications and indicates their impact on the distribution of taxa.

The following journals were checked for the period 2010-2020 (or, in part, 2021):

- *Adoxa*.
- *Les Barbouillons*.
- *Bulletin de la Société des naturalistes luxembourgeois*.
- *Bulletin de la Société d'Histoire Naturelle de la Moselle*.
- *Bulletin de la Société d'Histoire naturelle des Ardennes*.
- *Bulletin de la Société linnéenne Nord-Picardie*.
- *Bulletin des Naturalistes de Charleroi*.
- *Dumortiera*.

**Table 1.** Chronological overview of Floras with at least some territorial coverage that proved relevant for updating the chorological information for certain districts in NF7.

Publication	Bibliographic reference	Main districts impacted
<i>Atlas de la Flore Lorraine</i>	FLORAINE (2013)	Lorr.
<i>Flora Gallica</i>	Tison & de Foucault (2014)	Mar., Boul., Pic., Brab. occ., Lorr., Champ., Ard., Mosan occ., Tert. Par.
<i>Flora der Region Trier</i>	Hand <i>et al.</i> (2016)	Eifel centr., Ard. or.
<i>Flora Zeelandica</i>	Meininger (2018)	Mar.
<i>Heukels' Flora van Nederland</i> (24 <sup>th</sup> edition)	Duistermaat (2020)	Mar., Camp., Brab. or., Fluv.
<i>Flora Lotharingia</i>	Vernier (2020)	Lorr.

- *Gorteria*.
- *Le Jouet du Vent*.
- *Natura Mosana*.
- *Les Naturalistes Belges*.
- *Les Nouvelles Archives de la Flore jurassienne et du nord-est de la France*.

At present, several online resources are available that have greatly improved the knowledge on the distribution of taxa. Florabank, a grid-based database on vascular plant distribution in the northern part of Belgium (Flanders and the Brussels Capital region), is now available online through GBIF (<https://www.gbif.org/dataset/271c444f-f8d8-4986-b748-e7367755c0c1>). Online platforms for the registration of observations such as [waarnemingen.be](http://waarnemingen.be) (Belgium) or [waarneming.nl](http://waarneming.nl) (the Netherlands) are mostly based on citizen science and thus subject to errors. However, if critically approached (e.g. only approved records, documented by photographs) these databases are a very valuable additional data source.

The following abbreviations are frequently used throughout the text:

- NF6: the sixth edition of the *Nouvelle Flore* (Lambinon & Verloove 2012).
- AFV: *Atlas van de Flora van Vlaanderen en het Brussels gewest* (Van Landuyt *et al.* 2006).
- AFW: *Atlas de la Flore de Wallonie* (<http://biodiversite.wallonie.be/fr/atlas-en-ligne.html?IDD=6056&IDC=807>).
- APB: *Manual of the Alien Plants of Belgium* (<https://alienplantsbelgium.myspecies.info/>).
- H24: the 24<sup>th</sup> edition of *Heukels' Flora van Nederland* (Duistermaat 2020).
- FG: *Flora Gallica* (Tison & de Foucault 2014).
- FT: *Flora der Region Trier* (Hand *et al.* 2016).
- AFL: *Atlas Flore Lorraine* (FLORAINE 2013; the online version was also checked but no longer available from mid-2021 onwards).
- FZ: *Flora Zeelandica* (Meininger 2018).
- wn.be: [waarnemingen.be](http://waarnemingen.be) (<https://waarnemingen.be>).
- wn.nl: [waarneming.nl](http://waarneming.nl) (<https://waarneming.nl>).
- Digitale2: database Conservatoire botanique national de Bailleul (<https://digitale.cbnbl.org/digitale-rft/site/Authentication.do>).
- database CBN Paris: database Conservatoire botanique

national du Bassin Parisien (<https://cbnbp.mnhn.fr/cbnbp/>).

- SI-Flore: database that merges data from the several different ‘Conservatoire botanique national’, thus presenting distribution maps for the entire French territory (temporarily unavailable online from mid-2021 onwards).
- MNHN-Lux: database Musée National d’Histoire Naturelle Luxembourg (<https://mdata.mnhn.lu/>).
- Atlas-NL: NDFV Verspreidingsatlas, Nederland (<https://www.verspreidingsatlas.nl/vaatplanten>)

#### Frequency:

- CC: très commun (very common).
- C: commun (common).
- AC: assez commun (rather common).
- AR: assez rare (rather rare).
- R: rare (rare).
- RR: très rare (very rare).

#### Phytogeographical districts (Fig. 1):

- Ard., district ardennais: Ardennes district.
- Boul., district boulonnais: Boulonnais district.
- Brab., district brabançon: Brabant district.
- Camp., district campinien: Campine district.
- Champ., district champenois: Champagne district.
- Eifel centr., district de l’Eifel central: central Eifel district.
- Fl., district flamand: Flemish district.
- Fluv., sous-district fluviale: Fluviale district.
- Lorr., district lorrain: Lorraine district.
- Mar., district maritime: Maritime district.
- Mosan, district mosan: Mosan district.
- Pic., district picard: Picardy district.
- Tert. Par., district du nord-est de l’Île-de-France: Paris Basin district.

#### The delimitation of the territory covered by the *Nouvelle Flore* and the boundaries of districts

The territory covered by the *Nouvelle Flore* is shown in Figure 1. In addition to Belgium and the Grand Duchy of Luxembourg it also covers adjacent parts of neighboring countries. In the north, in the Netherlands, the area reaches the (southern border of the) Maas river and is thus relatively straightforward. In the south, river Somme (in southern Picardy, France) is the natural border of the



**Figure 1.** Delimitation of the territory covered by the Nouvelle Flore/Flora van België and the boundaries of the phytogeographical districts. Aa: Aachen; An: Antwerp; Br: Breda; Bo: Boulogne-sur-Mer; Bx: Brussels; Ca: Calais; Ch: Charleroi; Du: Dunkerque; Ei: Eindhoven; Ge: Ghent; Ha: Hasselt; Ko: Kortrijk; Li: Liège; Lu: Luxembourg; Ma: Maastricht; Me: Metz; Na: Nancy; Pé: Péronne; Re: Reims; So: Soissons; SQ: Saint-Quentin; Tr: Troyes; Vo: Vouziers.

Flora area. However, upstream of Amiens the river turns north whereas the territory covered by the *Nouvelle Flore* extends in a southeastern direction. From there onwards, the southwestern (in Tert. par.) and southern limits (in Champ. and Lorr.) are very unclear, which seriously complicates things (species and/or localities to be added or not). Based on Figure 1, the extreme southern limits of the Flora area are near Troyes in Champ. and Charmes in Lorr. The same difficulties are encountered with the eastern boundaries of the territory. In Lorr. (in France) Lunéville, Château-Salins, etc. are supposed to be at the extreme eastern border. Further north, especially in the

(small) German part of the territory, the Eifel centr. is part of the Flora area but in the course of time the interpretation of this district by the successive authors of the *Nouvelle Flore* has changed, leading to species being included that only occur further east, in Osteifel, and thus beyond the territory. As currently understood, the Westeifel corresponds with the eastern part of the Ardennes district (incl. parts of Haute Ardenne, the Schneifel in Germany). Ideally, this northeastern part of Ardennes coincides with the limits of the igneous bedrocks. Further north, in North Eifel, limestone depressions prevail, characterized by a quite different flora. The Eifel centr. of the *Nouvelle Flore*

corresponds with the Prümer Kalkmulde which is in fact the westernmost part of the Osteifel. This Kalkmulde is rather clearly characterized by Devonian limestones surrounded by igneous rocks. Consequently, taxa mentioned for Eifel centr. usually are exclusively calciphilous. As a result of these ‘open’ eastern borders, species have been included in the *Nouvelle Flore* in the past that only occur beyond its limits, e.g. *Cuscuta gronovii* Willd. ex Schult. in the valley of river Moselle in Germany.

Already from the very beginning (De Langhe *et al.* 1967) the distribution and frequency of taxa in the *Nouvelle Flore* have been presented according to phytogeographical districts. See e.g. Tanghe (1975) for specifications on the Belgian districts and Delvosalle (2011) for the entire territory and even beyond. These have hardly changed in the course of time and are doubtlessly in need of adjustment. In the atlas of the flora of Flanders (AFV) ecoregions were applied rather than phytogeographical districts. Regardless of the fact whether these or ecoregions are used, the limits of some of these clearly need to be reassessed. For instance, in the *Nouvelle Flore* the Maritime district includes both genuine coastal regions (with e.g. sea dunes, slikke, schorre) and the polders, both with a quite characteristic flora. In the Netherlands (Duistermaat 2020) the former constitutes a separate district (Renodunaal), probably correctly so. The Flemish district (Fl.) consists of a very heterogeneous assemblage and in fact seems to be some kind of bin that covers regions that are not easily accommodated in neighboring districts like Mar., Brab. or Camp. For instance, it includes, between Bruges and Ghent, an area with a quite characteristic flora that in fact roughly corresponds with that found in Camp. Also, Van Landuyt *et al.* (2011) already convincingly demonstrated that the Brabant district south of river IJzer has always been incorrectly defined. (The authors of the new edition of the *Nouvelle Flore* were not aware of this publication and therefore it is not taken into account.) Because of the unclear boundaries of Eifel centr., some (calcifuge) species have been mentioned from that district that probably do not belong there. Also, as a result of the dense human population in some parts of the Flora area, the natural vegetation locally has almost completely disappeared and was replaced by a fairly characteristic ‘urban’ flora, for which purpose a new ‘urban district’ was suggested by Denters (1999), a district that was applied in contemporary Dutch Floras (Duistermaat 2020). This also appeared from the analysis of Van Landuyt *et al.* l.c.

## Results: chorological comments

The species are discussed in the order as they are treated in the Flora; the numbering of the families follows the Flora. The first entry of the name of a genus is in **bold**.

### 1. Lycopodiaceae

- ***Huperzia selago*** (L.) Bernh. ex Schrank et C.F.P. Mart.: for quite a long time this species was considered to be extinct in Camp. However, since 1999 it has been known

again from the Dutch part of that district (wn.nl) and it was reportedly increasing there recently (H24). Subsequently, this species was also rediscovered in the Belgian part of Camp. in 2000 (at the Zilvermeer in Mol). Since 2014 it is also known from a second locality, in Geel-Bel (wn.be). In Lorr. sept., on the contrary, the species seems to have disappeared (wn.be, FG, SI-Flore).

- ***Lycopodiella inundata*** (L.) Holub: this species is known since 2006 from several localities in the Dutch part of Mar. (FZ). It was historically known from several localities in Eifel centr. but has completely disappeared there (FT). It is much decreasing everywhere; in Tert. par., for instance, there is only a single extant locality, in the Laonnois area (Digitale2, database CBN Paris).

- ***Lycopodium clavatum*** L.: at present, this species is only R in Ard. and Eifel centr., everywhere else it has become RR or even extinct (wn.be, AFW, FT). It has disappeared from Pic. (Digitale2). The situation in Lorr. is unclear: it is certainly still present in Lorr. sept. (e.g. Châtilon, 2017; wn.be). In Lorr. occ. (Argonne) it was reported from two localities by Parent (2002) but a distribution map for France (SI-Flore) does not indicate any localities in Lorr. (idem for FLORAINE 2013). Finally, this species occurs in a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse, near the estuary of river Canche) (SI-Flore) along with, among others, *Rhynchospora alba*, *R. fusca*, *Trichophorum cespitosum*, *Drosera rotundifolia*, *Erica tetralix*, etc. (comm. B. Toussaint, 06.2021).

- *L. annotinum* L.: in Lorr. sept., there is only a single extant locality in the Grand Duchy of Luxembourg (Krippel & Massard 2019). Since 2004, this species is also known from Grandpré in Lorr. occ. (database CBN Paris).

- *L. tristachyum* Pursh: this species was rediscovered in Ard. (Hautes Ard.) in Ovifat in 2015 and its presence there was regularly confirmed subsequently (wn.be).

### 2. Isoetaceae

- ***Isoetes echinospora*** Durieu: this species is only surviving, albeit extremely rare (H24), in Camp. in the Netherlands. It was no longer seen in its unique Belgian site in Diepenbeek after 1995 (Florabank).

### 3. Selaginellaceae

- ***Selaginella kraussiana*** (Kunze) A. Braun: this species is no longer a mere ephemeral escape but tends to naturalize locally, especially in urban areas (e.g. Antwerp, Ghent) (wn.be).

### 4. Equisetaceae

- ***Equisetum pratense*** Ehrh.: previous claims from Lorr. (Grand Duchy of Luxembourg) and Eifel centr. are indeed not confirmed in recent Floras and checklists covering these areas (respectively Colling 2005 and FT). According to MNHN-Lux it was last seen in Luxembourg in 1961.

- *E. ×trachyodon* A. Braun (*E. hyemale* L. × *variegatum* Schleich.): a single Dutch locality (in Fluv.) probably still

exists (H24; most recently observed in 2010 according to wn.nl) but is located beyond the limits of the Flora area and thus not relevant. However, this hybrid is also known from the Belgian part of Lorr. (Étalle) where it grows together with the following hybrid (Pétrement *et al.* 2012).

- *E. ×moorei* Newman (*E. hyemale* L. × *ramosissimum* Desf.): the possible presence of this hybrid in Lorr. (Étalle) was already referred to in NF6, despite the absence of the second parent species in the area. However, its identity in this locality as well as in several others was subsequently confirmed by morpho-anatomical and cytological studies (Pétrement *et al.* 2012). This hybrid has also been found in several locations in Zeeland (Mar.) in the Netherlands (FZ, H24) and may have been overlooked elsewhere. According to de Winter & Lubienski (2012), *E. ×moorei* is in the northwestern part of the Netherlands even more frequent than *E. hyemale*.

- *E. ramosissimum* Desf.: this species is known since 2015 from the Braakman in Zeeland (Mar.), the Netherlands (FZ). It also occurs in several places in Fluv. but only beyond the limits of the Flora area (south of Nijmegen, Sliedrecht).

- *E. variegatum* Schleich. ex F. Weber et D. Mohr: a stable population with 500-1000 individuals was discovered in 2015 in Raimbeaucourt in northwestern France (Duhamel & Delaporte 2017), in Brab. occ., a district from where it was believed to have disappeared. These authors also provide an up-to-date overview of all extant populations in northwestern France. In northeastern France a new population was discovered in an abandoned quarry in Forêt de Morley in Lorr. occ. (Millarakis 2013, FLORAINE 2013).

## 5. Ophioglossaceae

- *Ophioglossum vulgatum* L.: this species was considered to be absent or doubtful from Ard.; there are, however, several recent verifiable records, for instance from the wide area south of Barvaux, near Bastogne, etc. (wn.be). From the French part of this district, it was also reported from Thilay by Bizot *et al.* (2016).

- *Botrychium matricariifolium* (A. Braun ex Döll) Koch: this species is long extinct in Belgium but still present in northeastern France (FG), just outside the Flora area. There are several recent localities in Saint-Avold and between Ham-sous-Varsberg and Haguenau (departments Moselle and Bas-Rhin) (SI-Flore, FLORAINE 2013).

## 6. Osmundaceae

- *Osmunda regalis* L.: this species was recorded again in Mosan (e.g. in Comblain-la-Pont: sablière de Larbois) and is still present in Lorr. as well (AFW, wn.be). In the latter district its presence was indeed no longer confirmed in Argonne (Millarakis 2013) but it is still present in several other places in Lorr. (AFL).

## 7. Hymenophyllaceae

- *Hymenophyllum tunbrigense* (L.) Smith: in Lorr. nord-or., this very rare species has also been known for decades

from Bollendorf in the German part of Gutland, near Echternach but on the other side of the border (FT, Nieschalk & Nieschalk 1964).

- *Vandenboschia speciosa* (Willd.) Kunkel: this species (exclusively occurring as gametophyte in the Flora area) is not only known from the Grand Duchy of Luxembourg in Lorr. nord-or., but also from adjacent territories in Germany (FT). In Luxembourg, by the end of 2017, it was known from not less than 150 localities (Krippel *et al.* 2018). Also in Ard. it was recently found in new localities. In Belgium, it is at present known from two areas, near Houffalize (valley of river Ourthe) and near Bouillon (valley of river Semois) (AFW, wn.be), whereas in France it is still relatively widespread between Charleville-Mézières and Chooz (valley of river Meuse) (SI-Flore, database CBN Paris). The northernmost localities (near Chooz) are in fact located in Mosan mér. This species is very inconspicuous and may have been overlooked in the past.

## 8. Salviniaceae

- *Salvinia auriculata* Aubl.: in addition to Brab., this species was recently also recorded in Mar. (Zeeland), Fl. and Camp. (the Netherlands) (wn.be, wn.nl., FZ). Recent claims of *S. natans* (L.) All. from the Netherlands probably also refer to this species (H24).

- *Azolla filiculoides* Lam.: in Fl., this species is no longer restricted to the alluvial plain of river Scheldt. It was recently also observed in Butgenbach in Ard. (wn.be), a district from where the species was not previously reported. In the Luxembourg part of this district, it was detected in several lakes in Bourscheid (Krippel & Colling 2010). Since a few years, it is also found in rather numerous localities in the valley of river Marne, in Champ. and Tert. par. (database CBN Paris). In Pic. mér., the species is confined to the valley of river Somme, where it is widespread (SI-Flore). Finally, in French Lorr. this species is no longer restricted to the Metz area but has extended to large parts of the Moselle valley (FLORAINE 2013).

## 9. Marsileaceae

- *Pilularia globulifera* L.: contrary to NF6, this species has not disappeared from Brab., Mosan and Ard. (AFW, wn.be). In many of the districts mentioned, however, it has doubtlessly become very rare. In Lorr., for instance, there are almost no records from the past decades (e.g. FLORAINE 2013, wn.be, MNHN-Lux), except for Montcheutin in Argonne, where it was last seen in 2001 (database CBN Paris).

## 10. Pteridaceae

- *Adiantum capillus-veneris* L.: in NF6, this exotic fern was only mentioned from Antwerp. In the past years it was discovered in a few other cities as well, especially in Fl. (e.g. in Bruges; wn.be).

## 12. Cystopteridaceae

- *Cystopteris fragilis* (L.) Bernh.: in Lorr., this species is

not AC but R and it is not less rare in the western part of the district (FLORAINE 2013).

- *Gymnocarpium robertianum* (Hoffmann) Newman: the localities in Ostend (Mar.) and Sint-Niklaas (Fl.) are on non-natural substrates (old walls) but just as well ‘wild’, not ‘introduced’. Otherwise, other native ferns found on walls, like *Asplenium ruta-muraria* L., should also be considered as introduced in parts of Flanders where natural rocks are lacking.

### 13. Aspleniaceae

- *Asplenium* ×*murbeckii* Dörfler [*A. ruta-muraria* L. × *septentrionale* (L.) Hoffmann]: this hybrid has also been found in Heid-des-Gattes in Aywaille since 2011 (Mosan or.; wn.be).

- *A. ceterach* L.: this species is apparently slightly expanding. Outside the Mosan and Lorr. districts, it is now considered to be R-RR rather than RR (wn.be).

- *A. scolopendrium* L.: this species has much expanded lately and its distribution and rarity were updated accordingly. It is now considered to be AC-AR in Mar., Boul., Fl., Camp., Pic., Brab., Mosan and Tert. par. (wn.be, SI-Flore, etc.).

- *A. septentrionale* (L.) Hoffmann: a well-known population in Bornem (Fl.), discovered in 1988 already (De Kesel 1991) was apparently overlooked in NF6. A small population consisting of 10-15 individuals persists well on an old wall and its presence there is regularly confirmed (wn.be). The species is also indicated from a single locality in Camp. in the Netherlands (Atlas-NL) from where it doubtlessly has disappeared again, the species being ephemeral in the Netherlands (Denters 2020).

- *A. ruta-muraria* L.: this species has much expanded lately. In Camp. and Ard., it is perhaps indeed slightly less common (as indicated in NF6) but then AC-AR rather than AR-R. The same applies to Champ., where it was considered to be RR in NF6 (wn.be, SI-Flore).

- *A. adiantum-nigrum* L.: also this species is slightly expanding lately. At present, it is not much rarer in many parts of Fl., Brab., etc. than in e.g. Mosan, thus R-RR rather than RR (wn.be).

- *A. trichomanes* L.: like the preceding species, it is expanding lately and is at most AC-AR in most districts. Its subsp. *pachyrachis* (Christ) Lovis et Reichst. has also been reliably recorded from multiple localities in Mar. and Fl. (wn.be), in Camp. (a large population known since 2016 in Rijen, the Netherlands; wn.nl), in Gerolstein in Eifel centr. (FT) and in Côtes de Moselle in French Lorr. (Vernier 2020). In Lorr., subsp. *trichomanes* is not limited to the north-eastern part of this district: there are widely scattered localities in the French part of this district as well (FLORAINE 2013, Vernier 2020).

- *A. fontanum* (L.) Bernh.: according to Vernier (2014), this species is a war adventive (“plante obsidionale”) in the Flora area that naturally occurs only to the south of it.

In all of Lorr., there is only a single extant population, at the Fort du Vieux Canton in Villey-Saint-Etienne (FLORAINE 2013, SI-Flore). The species has disappeared apparently from a locality between Metz and Briey that was mentioned in NF6. In the 19<sup>th</sup> century it was found in Saint-Denis-lez-Mons (Brab.), along with *A. foreziense* Legrand (Verloove *et al.* 2020c).

- *A. foreziense* Legrand: this species is still present on the quay wall of a canal in Eindhoven but barely survives (Hendrix 2017).

- *A. obovatum* Viv. subsp. *billotii* (F.W. Schultz) O. Bolòs, Vigo, Masalles et Ninot: in Lorr. sept., this taxon also occurred on the German side of the border, in Bollendorf. Its presence there was still confirmed in 1993 but it now perhaps also disappeared there (FT). A historical claim from the French Ardennes (between Aiglemont and Nouzon), as referred to in NF6, is not upheld in contemporary databases covering the area (e.g. database CBN Paris).

### 17. Thelypteridaceae

- *Oreopteris limbosperma* (Bellardi ex All.) Holub: in Lorr., this species is not restricted to the northern part of the district: it is also known from the central part of Argonne in Lorr. occ. (Saint-Val 2015; see also FLORAINE 2013).

- *Thelypteris palustris* Schott: this species is known from a few localities in Champ. (SI-Flore), a district from where the species was not mentioned in NF6.

### 18. Dryopteridaceae

- *Polystichum lonchitis* (L.) Roth: this species has been known from a quarry in ’t Rooth in Zuid-Limburg (the Netherlands) since 1998 (wn.nl), in Brab. or., a district from where it was not yet mentioned in NF6. The species may recently have disappeared from all its Walloon localities (Jacobs 2019).

- *P. aculeatum* (L.) Roth: this species is expanding lately in the Flora area, especially in areas where it was formerly very rare or even absent, for instance in Fl. It is increasingly often seen in recently planted woodlands, although slightly less regularly so than *P. setiferum* and *Dryopteris affinis* (Lowe) Fraser-Jenkins s.l. In recent years it was discovered in four districts from where it was not yet reported in NF6: Mar., Fl., Camp. and Champ. (wn.be, SI-Flore). The origin of these populations is uncertain: they could be resulting from a recent natural expansion and/or referring to plants escaped from cultivation.

- The same applies to *P. setiferum* (Forssk.) T. Moore ex Woynar. This species was newly recorded in Camp. (wn.be). In many districts, it has become R-RR rather than RR.

- *Cyrtomium* C. Presl: two species are more or less established now, *C. fortunei* J. Smith being the predominant species. In addition to the districts already mentioned in NF6, it is also known now from Camp. Whereas early records exclusively referred to urban habitats, the species is recently also increasingly seen in recently planted wood-

lands, along with other rare ferns such as *Dryopteris affinis* s.l., *Polystichum aculeatum* and *P. setiferum*.

- ***Dryopteris affinis*** (Lowe) Fraser-Jenkins: this species is expanding recently in the Flora area, especially in areas where it was formerly very rare or even absent, for instance in Fl. It is increasingly often seen in recently planted woodlands, often along with *Polystichum aculeatum* and *P. setiferum*. In recent years it was discovered in two districts from where it was not yet reported in NF6: Mar. and Champ. (wn.be, SI-Flore). The origin of these populations is uncertain: they could result from a recent natural expansion and/or refer to plants escaped from cultivation. In many districts it has become AR-R rather than R. The distribution of the subspecies of *D. affinis* in the Flora area remains to be critically assessed. As a rule, subsp. *borreri* (Newman) Fraser-Jenkins appears to be the least rare but in some regions, for instance in parts of north-western France, subsp. *affinis* is more frequent (Stien 2019). Subsp. *pseudodisjuncta* (Tavel ex Fraser-Jenkins) Fraser-Jenkins was recently reported from Ard. in the Grand Duchy of Luxembourg (Krippel *et al.* 2018).

- *D. filix-mas* (L.) Schott: in NF6, this species was said to be AR-RR in Mar. and Champ. It is perhaps slightly less common than in the rest of the Flora area but yet at most AC (wn.be, SI-Flore). For comparison, in Zeeland in the Netherlands (Mar.) it is said to be common (FZ).

- *D. carthusiana* (Vill.) H.P. Fuchs: this species is only slightly less common in Champ. In Pic. and Mar. it is not rarer than in the other districts (wn.be, SI-Flore, FZ).

#### 19. Polypodiaceae

- ***Polypodium interjectum*** Shivas: this species is not AR but completely absent from Eifel centr. (FT).

#### 20. Ginkgoaceae

- ***Ginkgo biloba*** L.: this ornamental tree is also very rarely recorded as an escape from cultivation (a few records; wn.be).

#### 22. Pinaceae

- ***Pinus sylvestris*** L.: in NF6, this species was said to be probably native in at least part of the Grand Duchy of Luxembourg. This is based on Diederich & Schwenninger (1990). FT doubts this, especially because of the complete lack of historical observations in an otherwise well-studied region.

- Several ornamental species from the Pinaceae family that were exclusively known in cultivation in the Flora area were recently observed to reproduce sexually: *Pinus wallichiana* A.B. Jackson (scattered records since 2012), *Picea omorika* (Pančič) Purkyně (regularly observed since 2013) and *Abies nordmanniana* (Steven) Spach (regularly observed since 2009) (all from wn.be).

#### 24. Cupressaceae

- ***Juniperus communis*** L.: in addition to populations found in the wild in the Flora area, this species is also

sometimes recorded as an escape from or relic of former cultivation (wn.be). In Camp., it is not confined to or less rare in the eastern part of this district than in the rest of it, it is more or less evenly spread in the entire district, both in Belgium and in the Netherlands (wn.be, wn.nl). Some of these populations may, however, refer to deliberate introductions as the species is sometimes planted by the Agency for Nature and Forests.

#### 25. Taxaceae

- ***Taxus baccata*** L.: this species is not ‘sometimes’ but ‘commonly’ planted as an ornamental. As a result, this species is now much more common as an escaped or naturalized exotic than as a native species.

#### 26. Cabombaceae

- ***Cabomba caroliniana*** A. Gray: in NF6, this American aquatic weed was said to be sometimes introduced in Brab. centr. and Fluv. (exclusively in the Netherlands). By now it has naturalized in several additional localities, not only in the aforementioned districts, but also in Fl. and Camp. (wn.be, wn.nl). It is considered to be an invasive species (Scheers *et al.* 2016, 2019).

#### 27. Nymphaeaceae

- ***Nymphaea alba*** L. subsp. *occidentalis* (Ostenf.) Hyl.: in NF6, this subspecies was mentioned from the French districts Pic., Lorr. and Tert. par. However, contemporary Floras and databases covering these areas do no longer refer to it (e.g. Filoche *et al.* 2010, FLORAINE 2013, SI-Flore, Digitale2), its presence – at least in Pic. – is therefore considered to be doubtful or erroneous. The question, above all, is whether or not this subspecies can be reliably distinguished from subsp. *alba*.

#### 28. Saururaceae

- ***Saururus cernuus*** L.: is no longer ‘rarely’ but increasingly seen as an escape from cultivation. In addition to the districts already mentioned in NF6, it is now also known from Camp. and Mosan (wn.be, wn.nl).

#### 33. Acoraceae

- ***Acorus calamus*** L. was said to be indigenous in NF6; it is, however, merely naturalized in the Flora area.

#### 34. Araceae

- ***Arum maculatum*** L.: in Mar., Fl. and Camp. this species has increased lately (although perhaps at least part of these new populations refer to escapes from cultivation): it is now AR-R rather than RR (wn.be).

- *A. italicum* Mill.: the increase of this alien is even more spectacular, it has become less rare in all districts. It is least rare now in Mar., Fl., Boul., Pic. and Brab. (AR) and R-RR in Camp., Mosan, Ard., Lorr., Champ. and Tert. par. (wn.be, wn.nl, SI-Flore).

- ***Wolffia columbiana*** H. Karst.: this American species of *Wolffia* Hork. ex Schleid. has been recorded recently in

Camp. and Brab. (Hendrickx & Verloove 2019, Lecron *et al.* 2021). It is locally naturalized, fast spreading (especially in the Dutch part of the Flora area) and probably often overlooked, owing to the confusion with the native species *W. arrhiza* (L.) Hork. ex Wimm.

- *Lemna turionifera* Landolt: there are various reliable records from Fluv. (Lanaken, Stokkem, Uikhoven, Kessenich; wn.be) and the species was recently also recorded in several localities in the Aisne valley in Champ. (Le Gloanec *et al.* 2019), two districts from where the species was not yet reported in NF6.
- *L. minuta* Kunth: this alien species is much expanding lately in the Flora area. In Mar., Fl., Camp. and Brab., it is now AC-AR (instead of AR), whereas in northern France it is also known from several localities in Champ. and Tert. par. (SI-Flore), two districts from where it was not yet known.
- *Spirodela polyrhiza* (L.) Schleid.: this species too is on the rise and much less rare than indicated in Ard. (see e.g. Krippel & Colling 2012 for the Grand Duchy of Luxembourg), AR-R rather than R-RR.

### 35. Alismataceae

- *Sagittaria latifolia* Willd.: this American ornamental is steadily increasing in the Flora area. It is now also known from Camp. and Brab. (wn.be) and is R-RR rather than RR throughout our territory. In Lorr., it does not only occur in the extreme south of the district but also further north, for example in Woëvre (Vernier 2020).
- *Luronium natans* (L.) Rafin.: this very rare species was recently discovered near Marche-en-Famenne in Mosan mér. and near the Luchy lakes in Ard., two districts from where it was not yet known. In all of Lorr., the species is currently only known from Belgium and the Grand Duchy of Luxembourg and possibly nearly extinct there as well (last seen in Luxembourg in 2002) (Saintenoy-Simon 2012, FLORAINE 2013, Vernier 2020, wn.be, AFW, MNHN-Lux). In Champ., this species persists in a few localities near Épernay (SI-Flore).
- *Baldellia repens* (Lam.) Ooststr. ex Lawalrée subsp. *cavanillesii* (Molina Abril, Galán de Mera, Pizarro et Sardinero) Talavera: claims from Mar. mér. are considered to be doubtful or erroneous (SI-Flore, Digitale2), whereas in Lorr. (in Belgium, the Grand Duchy of Luxembourg and France) this rare taxon has completely disappeared a long time ago already (wn.be, AFW, FLORAINE 2013, Vernier 2020, MNHN-Lux, SI-Flore). In 2018, it was discovered in Beernem in Fl. (Gevaerts nature reserve, presence confirmed in 2020; wn.be). It is also known from at least one extant locality in Tert. Par. (Mesnil-sur-Oger), from where it was already reported at the end of the 19<sup>th</sup> century (database CBN Paris).

### 37. Hydrocharitaceae

- *Egeria densa* Planch.: this exotic aquatic weed is not only found as a casual escape from cultivation: more or

less naturalized populations are currently known from scattered localities in the Flora area, especially in Fl. and Camp. (wn.be). The species has also been recorded elsewhere, for instance in the Marne valley near Châlons-en-Champagne in Champ. (SI-Flore) and in Montagne de Reims (Tert. par.) (database CBN Paris).

- *Hydrocharis morsus-ranae* L.: although the natural populations of this species are clearly declining, it is frequently cultivated nowadays and easily escapes, which can make it difficult to correctly estimate the natural distribution of the species.

- *Elodea callitrichoides* (L.C.M. Rich.) Caspary: although the genuine presence of this North American species in the Flora area was formally rejected by Vanderpoorten *et al.* (2000), it was recently reported again from Lorr. by FLORAINE (2013) for the Moselle river between Metz and Nancy (contrary to Vernier 2020). According to FG, the species has only been confirmed in northeastern France from Alsace.

- *E. canadensis* Michaux: this North American weed has become much rarer than *E. nuttallii* (Planch.) St John (wn.be, SI-Flore, etc.), which was not apparent from the description of their distribution in NF6. *E. canadensis*, previously said to be AC-AR in most of the Flora area, is now considered to be AR in Mar., Boul., Fl., Camp., Pic., Brab., Fluv., Lorr., Champ., Tert. par. and RR or absent elsewhere.

- *E. nuttallii* (Planch.) St John: this species was said to be absent in Eifel centr.; however, it is reported from there in FT.

- *Lagarosiphon major* (Ridley) Moss: this African aquatic weed was recently also recorded in several localities in Champ. and Tert. par. (Le Gloanec *et al.* 2019, SI-Flore), two districts from where it was not yet reported in NF6.

- *Stratiotes aloides* L.: this species is often introduced on purpose, which may make it difficult to correctly estimate the natural distribution of the species in the future. In Belgium, most occurrences outside the Scheldt alluvium are introductions and even within the historical range (re-)introductions are common (comm. W. Van Landuyt 11.2022).

- *Vallisneria spiralis* L.: this species is also known from Camp. (scattered populations, especially in the Mol area in Belgium and a few localities in the Netherlands as well; wn.be, wn.nl), a district from where it was not yet reported in NF6. The same applies to Champ. where it has become widespread in the valley of river Marne (database CBN Paris), doubtlessly as an expansion of the species' known distribution in this river valley in the adjacent Tert. par. district. Still in Champ., it is also known from the Aisne valley. In some of the districts enumerated in NF6 the species doubtlessly has disappeared. This certainly applies to Brab. occ. (Douai) where the species was last observed in 1952 according to SI-Flore. In areas where the species is increasing exotic lookalikes may be involved, especially *V. australis* S.W.L. Jacobs et Les (Mesterházy *et al.* 2021).

• *Najas marina* L.: this species is expanding lately and is now also known from a locality in Fl. (Vloetenveld in Zedelgem, since 2017; wn.be). In Fluv., it is no longer restricted to the northern (Dutch) part of this district: the species currently occurs more or less throughout the district, also in its Belgian part (wn.be).

• *N. minor* All.: in NF6, this species was reported from Lorr. or. However, in this district it was recently also found in Lorr. occ. (Argonne: Châtrices) (Saint-Val 2018). FLORAINE (2013) and SI-Flore even lists several locations spread across the district. The species is also still present in Tert. par. (SI-Flore), a district from where it was thought to have disappeared. In Camp., on the contrary, where it was known since 1992 from the Eindhovensch canal (the Netherlands), it may have disappeared recently (last seen there, in very small numbers, in 2017; comm. J. Bruinsma, 08.2021).

### 38. Scheuchzeriaceae

• *Scheuchzeria palustris* L.: this species was said to be RR in Camp. but this only applies to the Dutch part of this district where it is still known from a single locality in Noord-Brabant (Atlas-NL, H24; wn.nl, on the contrary, does not provide any records from that province, perhaps it has disappeared there as well lately). In the Belgian part of Camp., however, it was last seen in 1974 and is thus long extinct (Willems *et al.* 1975, AFV).

### 39. Aponogetonaceae

• *Aponogeton distachyos* L. f.: this African aquatic ornamental was mentioned in NF6 from a single locality in Ard. occ. (Couvin), where it was moreover introduced on purpose, and from Camp. Since then this species was recorded in several additional localities, also in Brab. (wn.be). In some localities, for instance in the valley of Zwarte Beek in Camp., it has persisted at least since 2012 (wn.be).

### 40. Juncaginaceae

• *Triglochin palustris* L.: this species was not mentioned in NF6 from Fl. In fact, since 1972, it has been recorded in at least 15 km<sup>2</sup> squares, recently for instance from Oostkamp (Leiemeersen nature reserve), Gent (Bourgoyen-Ossemers nature reserve) and Wachtebeke (Florabank, wn.be). In general, however, this species is declining: in Tert. par., it only survives in the Laonnois and it may have completely disappeared from Champ. (Digitale2, database CBN Paris).

• *T. maritima* L.: this species from saline soils is sometimes observed as an introduction, e.g. in Camp. (Eindhoven) and Brab. (Avelgem) (wn.be).

### 41. Zosteraceae

• *Zostera marina* L.: this species is indeed known from the Scheldt estuary (Mar.) but only from its Dutch part. The species is occasionally observed along the Belgian coast as well, washed up on the beach (especially between

Blankenberge and Knokke; wn.be), but this exclusively refers to detached plant fragments. In the estuary of river Somme in France, the species seems to have disappeared a long time ago already (SI-Flore, Digitale2).

• *Z. noltei* Hornem.: this species is indeed known from the Scheldt estuary (Mar.) but only from its Dutch part (FZ).

### 42. Potamogetonaceae

• *Groenlandia densa* (L.) Fourr.: in NF6, this species was said to be AR-R in Fluv. However, this only applies to the Dutch part of this district (there is not a single record in its Belgian part) and even in the Netherlands there are hardly any records (wn.be, wn.nl.).

• *Potamogeton compressus* L.: is decreasing, also in Fluv. in the Netherlands, where it has become R rather than AR (H24).

• *P. friesii* Rupr.: this species is much decreasing lately and seems to have completely disappeared in Mar., Fl. and Brab. (wn.be, FZ). The species is still present in northwestern France (SI-Flore), in scattered locations in Camp. and a few in Fluv. (wn.be, H24, Atlas-NL) from where it was not yet mentioned in NF6.

• *P. obtusifolius* Mert. et Koch: there are only a few localities left in Fl. (wn.be), only a fraction of the number of localities in Camp. Thus, in Fl. this species has become RR instead of R.

• *P. pusillus* L.: the species' distribution and frequency is comparable in Mar., Fl. and Camp. (AC-AR), it is not rarer in the latter two as indicated in NF6 (wn.be).

• *P. berchtoldii* Fieb.: this species was not mentioned from Fl. in NF6 although it is present in several localities around Bruges and Antwerp (wn.be).

• *P. perfoliatus* L.: this species is by far least rare in Camp. and Fluv., rather than in the valleys of the bigger rivers as stated in NF6 (wn.be, wn.nl).

• *P. alpinus* Balb.: this species has become RR everywhere, including in Ard. and Lorr. (SI-Flore, wn.be, MNHN-Lux). In Lorr., however, it is not restricted to the northern part of this district: there is a locality northwest of Toul (FLORAINE 2013). Similarly, in Brab., this species is no longer limited to the French part of this district since, for several years now, there is a confirmed population in Vorsdonkbos in Betekom (wn.be).

• *P. praelongus* Wulfen: this species has also disappeared from Fluv. in the Netherlands (H24, wn.nl) and only persists near Breda (Camp.) in the Dutch part of the Flora area.

• *P. lucens* L.: in the Flora area, this species is least rare in Fluv. However, this only applies to the Dutch part of this district; in the Belgian part there are only two recent records (wn.be).

• *P. gramineus* L.: this species was mentioned from Mar. mér. in NF6. It is indeed absent from the Belgian part of this district but has been known for several decades from Schouwen-Duiveland in the Netherlands (Mar. sept.;

FZ). In Fluv., it exclusively (not predominantly) occurs in the Dutch part of this district. There are also scattered records from Champ. (e.g. from Loisy-en-Brie; database CBN Paris), a district left unmentioned in NF6. In NF6, for Tert. par., this species was said to be RR/have disappeared. In reality, it is still present there, at least in the Laonnois (Digitale2).

- *P. ×angustifolius* J. Presl: in the entire Flora area there is only one extant location, in the 's Hertogenbosch area in the Netherlands (wn.nl); it is extinct from Belgium (Overmere) for decades already. At (or rather just beyond?) the Flora limits, in Champ. mér., it is still known from several localities at Lac d'Auzon-Temple (Parc Naturel de la Forêt d'Orient; database CBN Paris).

- *P. natans* L.: this species is not RR in Mar. In Belgium, the species is fairly widespread along the coast and also in Zeeland in the Netherlands it is not rare and even increasing (FZ). The same probably applies to Eifel. centr. where it is definitely less rare than indicated in NF6; in the entire Trier area, incl. Eifel centr., it is by far the most widespread *Potamogeton* species (FT).

- *P. coloratus* Hornem.: this species was thought to be extinct in Camp. but it is still present there. There are, for instance, several recent localities in the Lille area (wn.be).

- *P. nodosus* Poiret: this species was discovered in 2009 (and subsequently regularly confirmed) in Bachte-Maria-Leerne (Deinze) in Fl. In Camp., it is not restricted to the Dutch part of this district: there are several localities in the Belgian Noorderkempen (wn.be). In Champ., it is also known from river Marne, not only from river Aisne (database CBN Paris).

- *Stuckenia pectinata* (L.) Börner: this species is less rare than indicated in Fl., Camp. and Brab. (AC-AR, rather than AR) (wn.be).

- *Zannichellia palustris* L. subsp. *major* (Hartm.) v. Ooststr. et Reichg.: in NF6, a historical claim from Zeeland was said to be doubtful. However, there are apparently no doubts about this record but it was last observed in 1933 (H24, FZ).

### 43. Ruppiaceae

- *Ruppia maritima* L. and *R. cirrhosa* (Petagna) Grande: after having regressed sharply and even supposed to be probably extinct in the Flora area, these two species were recently found again in Mar., between Calais and Dunkerque (France), in Knokke (Zwin, Dievegatkreek; Belgium) and in several places in Zeeland (the Netherlands) as well (SI-Flore, Digitale2, FZ, wn.be).

### 45. Dioscoreaceae

- *Tamus communis* L.: in NF6, this species was said to be absent in Brab. east of river Dyle. There are, however, at least two localities in the Sint-Pietersberg area, in Brab. or. (AFW, wn.be). In addition to the districts enumerated, the species is very rarely seen elsewhere, e.g. in Ard. (Our; AFW).

### 49. Liliaceae

- *Erythronium dens-canis* L.: this species, merely cited as a cultivated ornamental in NF6, was recently also observed as an escape (Melle, 2019; wn.be).

- *Tulipa sylvestris* L.: near Antwerp, all populations, including the most northerly which is located in the Rivierenhof in Deurne (IFBL C4.27) (wn.be), are in Fl. and not in Mar. This species has possibly disappeared in Souastre in Pic. (last seen there in 1993 according to SI-Flore, no reports in Digitale2). There were several other localities in Pic. but the species was not confirmed there recently either. According to SI-Flore, the species also occurs in Brab. occ., near Saint-Omer, and here and there in Champ. (e.g. known since 1884 from L'Épine; database CBN Paris, see also Thévenin *et al.* 2008). The status and distribution of this species in the Flora area are complicated: current-day records are a mixture of (rather few) historical, naturalized populations and an increasing number of escapes or relics of cultivation.

- *Fritillaria meleagris* L.: this species was rediscovered in the wild in Belgium in 2021. A single plant was found in Warneton (wn.be), just opposite the well-known population of Frelinghien in France. Although almost extinct in the wild in Belgium, this species is sometimes introduced voluntarily (including in nature reserves) and could naturalize locally. As a result, it is not always easy to correctly assess the status (introduced vs. potentially wild) of newly discovered populations. A small population discovered in 2010 in the Kalkense Meersen, in a hay meadow in the valley of river Scheldt, might as well refer to a natural occurrence. The same may apply to recently detected populations in the Damvallei in Destelbergen (wn.be). However, even populations from unimproved floodplain meadows are considered doubtfully native, at least in the British Isles (Walker 2021).

- *F. imperialis* L.: this species, cited as a merely cultivated ornamental in NF6, is also regularly observed as an escape, at least since 1995 (wn.be).

- *Gagea pratensis* (Pers.) Dum.: this species is known from the Belgian part of Brab. (Zoutleeuw) since 1998. In the same district, it was also recorded in Zuid-Limburg in the Netherlands, in 2008 and 2009 (H24, wn.nl), but it is unknown whether or not it is still present there.

- *G. villosa* (Bieb.) Sweet: in NF6, this species was said to have disappeared from the Belgian part of Brab. There are, however, several localities east of Brussels (wn.be). The species probably disappeared from Champ. The only recent record in the wide area is located in Montagne de Reims (SI-Flore) and thus in Tert. par. Near Châlons-en-Champagne it was last seen in 1925 (database CBN Paris).

- *Lilium martagon* L.: in Pic. mér., near Amiens, the species was apparently last seen in 1998 and thus may have disappeared from that district (SI-Flore).

### 50. Orchidaceae

- The intergeneric hybrid *Dactylorhiza fuchsii* (Druce)

Soó × *Gymnadenia conopsea* (L.) R. Brown [*Dactylodenia st-quintinii* (Godf.) J. Duvigneaud] has recently also been recorded in two locations in the vicinity of the Sint-Pietersberg (Brab. or.), one in the Netherlands (Voerendaal), the other in Wallonia (Thier à la Tombe). These records were extensively documented by Baeten *et al.* (2011) and Meijrink & Engels (2009). In addition, this hybrid is also known for several years from the Torfbroek nature reserve in Nederokkerzeel in Brab. centr. (wn.be).

- *Cypripedium calceolus* L.: in Lorr., this species survives in a single locality in the southern part of the district, near Toul (FLORAINE 2013, Dirwimmer *et al.* 2016).

- *Cephalanthera rubra* (L.) L.C.M. Rich.: this species has completely disappeared in Eifel centr. (FT) and is also strongly declining in Tert. par. According to SI-Flore, there are no records in the last 20 years from the latter district and its actual presence there requires confirmation.

- *C. damasonium* (Mill.) Druce: this species is also known from a single locality in Fl. (Moerzeke, since 2014; wn.be). In Brab., it is not restricted to the eastern part of the district (Brab. or.): the species occurs in abandoned quarries in several places in the Mons area (Brab. occ.) and in Brab. centr. it is known for at least 20 years from Hoegaarden (e.g. Rosdel) (wn.be). In Mar., this species is no longer limited to the southern part of the district: Kreutz (2019) reports two localities in Zeeuws-Vlaanderen in the Netherlands and one on the Belgian coast.

- *C. longifolia* (L.) Fritsch: this species is also known from a single locality in Fl., in Tielrode, from where it has been known at least since the 1990s (wn.be; see also Kreutz 2019). Likewise, it also occurs in Champ. (e.g. Grandville; database CBN Paris), another district not yet mentioned in NF6. The species may have disappeared, on the contrary, from the northwestern portion of Fluv., from where it has no longer been recorded since 2000 (Kreutz 2019).

- *Epipactis dunensis* (T. and T.A. Steph.) Godf.: a reference in NF6 to this very narrow British endemic, that was formerly erroneously reported from the Flora area, was removed.

- *E. palustris* (L.) Crantz: in damp meadows in dunes in Mar., this species is currently not rare at all (hundreds of thousands of individuals; present in 30 km<sup>2</sup> squares on the Belgian coast alone; comm. M. Leten, 10.2022). It has become at most AR, rather than R (also compare with H24).

- *E. atrorubens* (Hoffmann) Besser: this species was discovered in Hoboken in Fl. in 2003 (Kreutz 2019, AFV).

- *E. microphylla* (Ehrh.) Swartz: this species is also known from the Épernay area in Champ. (Avenay-Val-d'Or; SI-Flore, database CBN Paris). According to Kreutz (2019) it is much declining lately. In Belgium there is probably only a single extant population (in Lavaux-Sainte-Anne) whereas it may have completely disappeared from the Grand Duchy of Luxembourg. Kreutz l.c. (distribution map) also indicated a record from Belgian

Camp. But this likely was an error (not mentioned in the accompanying text).

- *E. helleborine* (L.) Crantz subsp. *helleborine*: in Mar., this subspecies is rather R than AC-AR (comm. M. Leten, 10.2022).

- *E. helleborine* (L.) Crantz subsp. *neerlandica* (Verm.) Buttler: in NF6, this subspecies was said to occur in fixed coastal dunes. In fact, its preferred habitat is precisely in dynamic dunes, in or near the latest phase of development of thickets of *Salix repens*. The decrease in the dynamics in coastal dunes is a major threat for this taxon (comm. M. Leten, 10.2022).

- *E. purpurata* Smith: this species was already known from Brab. occ. It is interesting, however, that it has also been known for several years from at least three locations in the Flemish Ardennes (surroundings of Oudenaarde, Ronse and Geraardsbergen), from where it has been known since 1997 (Kreutz 2019). Previously, this species was completely absent from Flanders (AFV). In Mar. mér., it has disappeared a long time ago already, the latest record dating back to 1960 (Digitale2, SI-Flore).

- *E. muelleri* Godf.: in Brab. or., this species only occurs in the Netherlands (H24, Kreutz 2019). Kreutz l.c. also indicated a few records of this species from Haute Ard. but these are non-substantiated records from wn.be that require confirmation. There are a few records from Champ. (e.g. Sompuis; database CBN Paris), a district not yet mentioned in NF6.

- *E. leptochila* (Godf.) Godf.: this species has completely disappeared in Eifel centr. (it is still present in Osteifel on Devonian limestone but beyond the limits of the Flora area; FT). It is perhaps overlooked elsewhere: it has been known for some years from the southern cuesta of the Boulonnais, the Forêt de Guînes (Pic. occ.) and the Avesnois (Mosan occ.) (Digitale2). In Mosan. mér. the species occurs in two regions: the Viroin and the wider Rochefort area (wn.be). It is by far least rare now in the central Caestienne area in Mosan (Mariamé & Delforge 2013).

- *E. leptochila* subsp. *leptochila* var. *cleistogama* (C. Thomas) D.P. Young: this variety is not only known from the Grand Duchy of Luxembourg but also from Mosan occ. (Virelles) (Kreutz 2019).

- *Epipogium aphyllum* Swartz: there were uncertainties about the distribution of this species in Lorr. in NF6. It is still present in the Grand Duchy of Luxembourg (Colling 2005, Kreutz 2019), although it is not seen in some years (Krippel & Colling 2010), whereas it has disappeared from the French part of this district (FLORAINE 2013, Dirwimmer *et al.* 2016). In northeastern France it is present only to the south of Épinal, beyond the boundaries of the Flora area.

- *Spiranthes aestivalis* (Poiret) L.C.M. Rich.: this very rare species has completely disappeared from the Flora area, the most recent growing sites, in Mar. mér., dating

back to 1985 (SI-Flore). The nearest extant populations are in Normandie in France (Kreutz 2019).

- *S. spiralis* (L.) Chevall.: in 2015, this species was discovered in Sexey-aux-Forges, south of Nancy, in Lorr. mér. (Dirwimmer *et al.* 2016), a district from where it was assumed to have disappeared. Although this species is RR throughout the Flora area and much decreasing, it sometimes occurs in genuinely massive stands, e.g. at least 100,000 flowering individuals on the Hompelvoet island in Mar. sept. (comm. M. Leten, 10.2022).

- *Limodorum abortivum* (L.) Swartz: this species is not extinct in its unique locality in Mosan (Viroinval: Les Rivelottes; <http://biodiversite.wallonie.be/>), although the species is not seen every year (Delforge *et al.* 2011, Kreutz 2019).

- *Neottia nidus-avis* (L.) L.C.M. Rich.: this species is RR or even absent outside the enumerated districts. This applies, for example, to Fl. where the species was observed in 2019 in Sint-Niklaas (wn.be) and since 2016 it is also known from an abandoned coal mining site in Camp. or. (Eisden). Kreutz (2019) indicated a record from Oostduinkerke in Mar. This refers to a not-substantiated record from wn.be. The latest reliable record from Belgian Mar. dates back to 1913 (Kreutz l.c.).

- *N. cordata* (L.) L.C.M. Rich.: the potential presence of this species in the Flora area has been suggested for quite a long time. The most northerly localities in northeastern France are east of Epinal, just outside the Flora area (Dirwimmer *et al.* 2016).

- *Goodyera repens* (L.) R. Brown: this species does not mainly occur in the northeastern part of the Lorr. district, on the contrary. According to FLORAINE (2013) and Dirwimmer *et al.* (2016) it is mainly found at Côtes de Moselle and Meuse and the limestone plateaus between Nancy and Toul. This species may have disappeared in Ard., at least in its Belgian part, from where it has not been recorded after 1999 (Kreutz 2019). As mentioned in NF6, this species is much declining since the 1980s, probably because it is more likely to be found in secondary habitats in the Flora area. Older pine woods (i.e. over 60 years old) are less suitable for this species: the layer of pine needle litter becomes probably too thick and contact with groundwater or run-off rainwater is prevented (comm. W. Van den Bussche 10.2022).

- *Hammarbya paludosa* (L.) O. Kuntze: in Ard., this species is now restricted to a single locality, in Libin (Belgium) (Kreutz 2019). It has completely disappeared from the French and Belgian part of Lorr. (FLORAINE 2013, Dirwimmer *et al.* 2016, Kreutz 2019, Vernier 2020).

- *Liparis loeselii* (L.) L.C.M. Rich.: in Mar., this species also occurs in the Netherlands (FZ) and in the Belgian part of this district: since 2007, it is known from the Waasland harbor area in Verrebroek (wn.be). It recently also reappeared, in very small numbers, in the Berg nature reserve (Brab.) from where it was thought to have disappeared since the 1940s (comm. M. Leten, 10.2022).

- *Corallorrhiza trifida* Chatel.: this very rare species currently still occurs in two districts, in Ard. in the valley of the Wamme river (according to Kreutz 2019 the only extant Belgian population) and in Lorr. sept. in Bande (since 2010; in this district it was not confirmed recently in Stockem) (wn.be). In NF6, it was also said to have been recorded in the Metz area. However, according to SI-Flore it only occurs further south in northeastern France, beyond the Flora limits, and Dirwimmer *et al.* (2016) did not report the species either from that area.

- *Herminium monorchis* (L.) R. Brown: this species has completely disappeared from Zeeland (FZ) and is actually almost limited to a small area on the Belgian west coast and the adjacent dune belt in northern France. However, in that part of Mar. it is actually R rather than RR: in recent years, the species was observed in at least 15 km<sup>2</sup> squares between Bray-Dunes and Nieuwpoort with at least 20,000 flowering individuals (counts W. Van den Bussche 2022; comm. M. Leten, 10.2022). It is extinct, since the 1960s already, in Zuid-Limburg in the Netherlands (Brab. or.) (H24, Atlas-NL, Kreutz 2019). There is, on the contrary, at least one locality in Champ. (Allibaudières; database CBN Paris), a district not mentioned in NF6.

- *Pseudorchis albida* (L.) Á. et D. Löve: this species is still present in Schneifel in Germany (Haute Ard.) but has completely disappeared from Eifel centr. (FT).

- *Gymnadenia ×intermedia* Peterm.: hybrids between *G. odoratissima* and *G. conopsea* s.l. were known from Tert. par. in France but also occur in a single locality in Belgium, at the Tienne Pelé in Dourbes (Mosan occ.). In this locality, the second parent is *G. densiflora* (Kreutz 2019).

- *G. conopsea* (L.) R. Brown (s.str.): in Mar., this species is actually R rather than RR. It is present in various dune areas (Zuydcoote, Bray-Dunes, Westhoek, Bredene, ...) and is relatively frequent in the hinterland in the vicinity of Dunkerque in France (wasteland, roadsides, ...; data B. Bollengier, comm. M. Leten, 10.2022).

- *G. densiflora* (Wahlenb.) A. Dietr.: the distribution of this species, a segregate of *G. conopsea* (L.) R. Brown, was completely revised, solely based on confirmed data. In addition to the districts mentioned in NF6, it is also known from Brab. centr., where it is historically known (since the 19<sup>th</sup> century) from the Torfbroek nature reserve. In the 1980s, *G. conopsea* s.str. was also introduced there (on purpose) and apparently some genetic mixing between these two species has subsequently occurred (comm. M. Leten). In the same area, the species (or rather such intermediate plants?) has also been confirmed from Nederokkerzeel (Silsombos) (wn.be). Its presence was furthermore confirmed in Belgium from the Viroin (Mosan occ.). In neighboring territories, *G. densiflora* has only been confirmed so far from Boul. (so far only known from Desvres; Duluc 2019), Mosan (mostly Calestienne: Kreutz 2019), Lorr. (FLORAINE 2013, Dirwimmer *et al.* 2016, Kreutz 2019), Tert. par. (SI-Flore), Eifel centr. (FT;

Möseler & Patzke 1987) and Brab. or. (H24). It is probably R-RR everywhere.

- *G. odoratissima* (L.) L.C.M. Rich.: its frequency in Tert. par. was mentioned twice in NF6 (both R and RR). In reality, this species has become RR everywhere (“en forte régression en plaine” according to FG). Its presence in Lorr. (mér.) was recently confirmed in two localities in the Neufchâteau area (Dirwimmer *et al.* 2016). According to Kreutz (2019) it is only extant in Mosan occ. in the entire Benelux area.

- *Ophrys aranifera* Huds.: according to Digitale2, the species from the *O. sphagodes* aggregate in Boul. is *O. virescens* M. Philippe, not *O. aranifera*. In Brab. or., *O. aranifera* no longer occurs in the wild: a record in Zuid-Limburg in the Netherlands refers to a deliberate introduction (H24, Kreutz 2019) whereas in the Flemish part the species already disappeared in the 19<sup>th</sup> century (AFV). On the other hand, the species was recently discovered near Mons and in Moen (Zwevegem) in Brab. occ. and it also reappeared in coastal dunes in Oostduinkerke (Mar.) (wn.be). The species was still mentioned for the Mar. district in NF6 although the species had disappeared from the dunes since 1926 (AFV). Finally, Kreutz (2019) also reported at least two recent localities in Mosan, although the species probably disappeared again soon after its discovery.

- *O. virescens* M. Philippe: the genuine distribution of this species in the Flora area needs to be assessed. In NF6, it was said to be present in Boul., Pic., Lorr. and Tert. par. However, based on databases such as Digitale2 and SI-Flore, it is only known from Boul., Champ. and Tert. par.

- In addition, the latter two species are flowering earlier than was indicated in NF6, respectively until May and April (instead of June and May) (comm. W. Van den Bussche 10.2022).

- *O. apifera* Huds.: in Mar. (both the Belgian and French-Flemish parts and certainly also in the Netherlands, cf. FZ), this species actually has become at most AR instead of R-RR (and is still strongly increasing), both in the coastal dunes and in the polders nearest to the coast and especially in urban/industrial environments. On the Belgian coast, it is now present in at least 140 km<sup>2</sup> squares (data from 2005 to 2022) and in northern France it is perhaps even more common. In fact, it locally has become some kind of weed in this district (comm. M. Leten, 10.2022).

- *Himantoglossum hircinum* (L.) Spreng.: this species is definitely increasing in all districts and has recently also been observed in districts from where it was not yet mentioned in NF6. In Fl., it has been recorded e.g. in Tielt (since 2016), Sint-Amands, etc. and it also appeared in a few places in Camp. (e.g. Houthalen) and also in Ard. (e.g. Stoumont) (wn.be, Kreutz 2019). It was said to have disappeared from Eifel centr. in NF6 but it is still present in scattered localities there (FT). In Mar. (especially west of Wenduine), the species has become at most AR (almost as frequent as *Ophrys apifera*) and the same applies to

neighboring parts of this district in France where it locally can be considered as a weed. East of Wenduine and in the polders it is indeed still R, but the species is expanding strongly everywhere! It is often found in somewhat messy, often humanly influenced habitats (comm. M. Leten, 10.2022). It is clearly a species that benefits from global warming.

- *H. robertianum* (Loisel.) P. Delforge: this species, with a mainly Mediterranean distribution and ecologically rather indifferent, is expanding towards the north but is usually fairly ephemeral north of the middle Rhône basin in France (FG). Since 2005, it has been known from a few localities around Paris (outside the Flora area). However, in 2013 the species was detected for the first time in the Flora area: a small population was discovered in a quarry (on chalk) near Visé in Brab. or. (at present a dozen of individuals) and since 2019 the species has also been observed in Stella-Plage, Amiens and near Dunkerque (Mardyck) in northwestern France (Mar. and Pic.). In 2020 this species was even reported in the Netherlands (north of the Flora territory), a few hundred kilometers further north (sources: wn.be, wn.nl, Delforge *et al.* 2016, Kreutz 2019, Bollengier & Baldeck 2020). The origin of all these populations is unknown; given the large gaps between the more or less contiguous distribution area and the populations recently found in the Flora territory, is it uncertain whether this refers to a natural range expansion, in consequence of climate warming, (see also discussion in Delforge *et al.* l.c. and Kreutz l.c.).

- *Neotinea ustulata* (L.) R.M. Bateman, Pridgeon et M.W. Chase: since there are no recent observations in Boul. and Pic., the species may have disappeared from these two districts (Digitale2, SI-Flore). In the Benelux area, it is only extant in Mosan (Kreutz 2019). It has dramatically declined in the entire Flora area in recent times.

- The hybrid *Orchis anthropophora* (L.) All. × *militaris* L. (*O. ×spuria* Reichenb. f.) has reliably been recorded in Mosan, both in the Viroin area and the region around Rochefort (wn.be).

- *O. militaris* × *purpurea* Huds. (*O. ×hybrida* Boeningh. ex Reichenb.): this hybrid is RR or absent outside of Lorr., Champ. and Tert. par. It is reportedly known from Zuid-Limburg in the Netherlands (H24).

- *O. ×beyrichii* A. Kerner (*O. militaris* × *simia* Lam.) and *O. ×angusticuris* Franch. ex Humnicki (*O. purpurea* × *simia*) are also known from Valkenburg in the Netherlands, in Brab. or. (Kreutz 2019).

- *O. anthropophora* (L.) All.: although still mentioned from Mar. in NF6, this species had actually disappeared on the Belgian coast (AFV). However, it was found again in Oostduinkerke in 2016 (wn.be). In the same district, the species has also recently been found in a few places in Zeeland (FZ). In the French Mar. district, it is only extant in the southernmost part (Digitale2). There are several recent records of this species in the surroundings of Mons in Brab. occ. (Kreutz 2019; also wn.be).

- *O. purpurea* Huds.: this species was observed in 2020 in Wetteren in Fl. (wn.be). It had not been recorded from that district before. According to Kreutz (2019), it is also known from a few localities in Ard., both in Belgium and the Grand Duchy of Luxembourg.
- *O. simia* Lam.: this species is extinct in Mar. mér. where it was last seen in 1960 (SI-Flore). Also elsewhere in northwestern France it has deteriorated sharply; e.g., it was recently no longer seen in Artois and Boulonnais (Digitale2). In Lorr., it has disappeared from the Belgian and Luxembourg part of this district (Kreutz 2019) but probably is still present in France, albeit RR (Vernier 2020).
- *O. militaris* L.: this species was recently discovered in Mar., both in Belgium and the Netherlands, respectively in Oudenburg (since 2010; wn.be) and Terneuzen (since 2014; FZ). It has also been known from three additional districts: it was recorded in Fl. (Burchtse Weel, since 2017) and Camp. (Brecht: Groot Schietveld, since 2016; see also Kreutz 2019) and it also occurs on the southern cuesta of the Boulonnais in France (Digitale2). In Lorr., it is less rare than indicated (AR rather than R), according to FLORAINE (2013) even AC. In Ard., on the contrary, at least in its Belgian part, it is apparently completely lacking (Kreutz 2019).
- *Anacamptis pyramidalis* (L.) L.C.M. Rich.: this species is much expanding lately and now occurs in all districts, including four districts from which the species was not yet mentioned in NF6: Boul. (Digitale2), Fl. (numerous observations), Camp. (mainly in Camp. or.) and Ard. (various observations) (wn.be). In Mar., it has become R rather than RR, although its occurrences are often rather ephemeral (comm. M. Leten, 10.2022). It is clearly a species that benefits from global warming.
- *A. coriophora* (L.) R.M. Bateman, Pridgeon et M.W. Chase: this species is on the verge of extinction in the entire Flora area. It was probably last seen in Champ., near Épernay, in 2006 (SI-Flore). It has certainly disappeared from Lorr. (FLORAINE 2013, Dirwimmer *et al.* 2016) and from the Benelux countries (Kreutz 2019).
- *A. morio* (L.) R.M. Bateman, Pridgeon et M.W. Chase: from the districts where this species was considered to be RR, extinct or absent, its actual presence was confirmed in Mar.; however, there are notable regional differences within this district. In Belgium it was temporarily present in Oostduinkerke (Florabank) from 2015-2016 but has now again disappeared. It has also possibly recently disappeared in French Mar. (Digitale2). In the Netherlands it is obviously less rare: according to FZ it even used to be common and at present it still occurs with many tens of thousands of plants at various sites in the Delta area, all in Mar. sept. (Dijkwater, Zouten en Zoeten Haard, Brouwersdam, Hompelvoet, ...). It is not RR there and neither strongly decreasing (comm. M. Leten, 10.2022). The species is also present in a few localities east of Leuven, near the borders of the Brab. and Camp. districts (wn.be) and

it is also known from Zuid-Limburg in the Netherlands (Brab. or.) (H24).

- *A. laxiflora* (Lam.) R.M. Bateman, Pridgeon et M.W. Chase: the only more or less recent claim in the Flora area dates back to 1980 and probably refers to a plantation in Zeeuws-Vlaanderen (FZ, H24, Kreutz 2019). Elsewhere, it had already disappeared a long time ago (Digitale2, SI-Flore). However, this species actually occurs near Bar-le-Duc, in the southwestern part of Lorr., although the origin of this population is uncertain (Dirwimmer *et al.* 2016).
- *A. palustris* (Jacq.) R.M. Bateman, Pridgeon et M.W. Chase: according to SI-Flore, this species was recently only observed near Reims in Champ. and it is also still present in Mar. mér. (Merlimont-Cucq marshes; Digitale2). Its actual presence in Pic. and Tert. par. requires confirmation; it may have disappeared from these two districts. It formerly also occurred in Lorr. in the Grand Duchy of Luxembourg (Kreutz 2019).
- *Dactylorhiza sambucina* (L.) Soó: this species was reported from two locations in Gutland in Germany, west of Trier. However, these probably refer to deliberate introductions (FT) and they are moreover located just outside the Flora area. In Lorr. mér., in Autigny-la-Tour, at the southernmost border of the Flora area, a small population persists since 1998 (FLORAINE 2013, Dirwimmer *et al.* 2016). In NF6, historical claims from Lorr. were either said to be erroneous or located beyond the limits of the Flora area. However, according to Kreutz (2019) this species was formerly also present in two localities in the Grand Duchy of Luxembourg.
- Massive hybrid populations of *Dactylorhiza* are increasingly recorded, not only of *D. ×grandis* (as already mentioned in NF6) but also of e.g. *D. ×godferyana*, *D. ×wintoni* en *D. ×kerneriorum*. This is especially the case in the Flemish coastal area. It is, however, uncertain whether such hybridogenous populations will survive in the long term (comm. M. Leten, 10.2022).
- *D. incarnata* (L.) Soó var. *serotina* Hausskn.: this poorly known taxon was mentioned from Mar. mér. and Brab. occ. (France) in NF6. Its presence there was indeed confirmed, respectively from Dannes and Watten (Digitale2).
- *D. traunsteineri* (Sauter) Soó: in NF6, this species was only mentioned from Lorr. mér., more precisely from the Haute-Marne department, at the southern limits of the Flora area. Delforge (2011) thoroughly discussed these plants and their localities. All are located well beyond the limits of the territory covered by the NF (see also FLORAINE 2013, where none are mentioned from our territory). Similar-looking plants were also reported from Mar. mér. and Tert. par. but the identity of these populations should be critically re-assessed. A targeted search in the Dannes area (Mar. mér.) could not confirm the presence of *D. traunsteineri* there, only various hybrids of *D. incarnata* (Delforge & Mast de Maeght 2003). In Tert. par., on the contrary, typical plants of *D. traunsteineri* were recently observed in the Branges marsh in Arcy-Ste.-Res-

titue (Aisne) by J.-C. Hauguel and R. Coulombel (comm. B. Toussaint, 03.2021). In this locality the species was previously cited, in 2002, by N. Devos and D. Tyteca and it is close to the historical locality of Villeneuve-sur-Fère (Riomet & Bournérias 1952-1961).

- *D. praetermissa* (Druce) Soó: this species was surprisingly not mentioned from Fl. in NF6. However, it occurs in quite a few places, for example in the wider area of Bruges and Ghent (wn.be; see also map in Kreutz 2019). Also from Ard., it is known from several localities (Kreutz l.c.) and in Mar. it is slightly less rare than indicated in NF6, AR-R rather than R (comm. M. Leten, 10.2022). In Eifel centr., on the contrary, where it was said to be present (albeit RR), it is absent (FT).

- *D. praetermissa* (Druce) Soó subsp. *integrata* (E.G. Camus ex Fourcy) Soó: according to Kreutz (2019), this subspecies also occurs in Mosan and Lorr. (Grand Duchy of Luxembourg; see also Krippel & Colling 2014).

- *D. elata* (Poiret) Soó subsp. *sesquipedalis* (Willd.) Soó: in its unique locality in the Flora area, in Zeeland in the Netherlands, this subspecies was no longer seen since 2002 (or even earlier; it was “eradicated” according to H24). Most likely it was formerly deliberately planted there (see FZ, although Kreutz 2019 did not entirely rule out a natural range extension), a plausible explanation for its occurrence far beyond the taxon’s natural distribution area.

- *D. majalis* (Reichenb.) P.F. Hunt et Summerh.: in Mar. (sept.), the majority of the populations designated as *D. majalis* rather belong to the hybrid swarm *D. ×godferyana* (*D. majalis* × *praetermissa*). In this district, there are still ‘pure’ populations of *D. majalis* but these are RR rather than AR-R (comm. M. Leten, 10.2022).

- *D. fuchsii* (Druce) Soó: this species is said to be RR in all districts that are not specifically listed. This also applies to Eifel centr. However, *D. maculata* (L.) Soó (incl. *D. fuchsii*) is “relativ häufig” there and at least as common as *D. majalis* (Reichenb.) P.F. Hunt et Summerh., which is AR-R according to NF6. Thus, *D. maculata* s.l. is therefore at most AR in Eifel centr., but the exact identity of many populations is unclear (either *D. maculata* s.str. or *D. fuchsii*). Given the ecology of these two species, most records in Eifel centr. normally will rather belong to the latter species. In Mar., it is slightly less rare than indicated in NF6, AR-R rather than R (comm. M. Leten, 10.2022).

- *D. maculata* (L.) Soó subsp. *elodes* (Griseb.) Soó: according to Devillers-Terschueren *et al.* (2017), this taxon only occurs in Camp. (Buitengoor, Ronde Put) in Belgium, and even then there is some uncertainty about this identity. The distribution and identity of plants named as such in the Flora area (reportedly also known from Ard., Brab. occ. and Lorr. sept.) should thus be reexamined. Kreutz (2019) confirms its presence in Camp. and refers to its possible presence in Ard. Claims from northern France, on the contrary, are likely erroneous.

- *D. maculata* (L.) Soó subsp. *ericetorum* (E.F. Linton) P.F. Hunt et Summerh.: Kreutz (2019) identified this poorly known taxon from three places in Camp. (Turnhout, Mol), Brab. or. (the Netherlands: Brunssum) and one location in Ard.

- *D. maculata* (L.) Soó subsp. *arduennensis* (Zadoks) Tournay: the presence of this taxon – in fact a mere ecotype – in the Flora area was confirmed by Kreutz (2019) from Ard. and Lorr.

- *D. viridis* (L.) R.M. Bateman, Pridgeon et M.W. Chase: this species is also known (RR) from Boul. (Digitale2: « dans une pelouse marnicole du Boulonnais »). In Brab. or., this species is known since 2000 from one location in Haspengouw, in Gors-Opleeuw, where it grows on loam (thus, in Brab. or. it is not exclusively occurring on chalk stone) (Kreutz 2019). It is also still present in Ard. occ., from where it is historically known: Gernelle and Issancourt-et-Rumel (database CBN Paris).

## 51. Iridaceae

- *Gladiolus italicus* Mill.: this southern species had been recorded before in the Flora area, near Verdun in Lorr. (NF6, Vernier 2020). In 2012-2013 it was also seen in a roadside in Brussels (wn.be).

- *Iris pumila* L.: the only known naturalized populations in the entire Flora area are indeed located in the valley of river Meuse, more precisely in Waulsort (wn.be).

- *I. germanica* L.: in addition to the districts already mentioned in NF6, this ornamental is also more or less widely naturalized in Camp. (wn.be).

- *I. foetidissima* L.: in Mar., this species is no longer restricted to the southernmost part of this district: since 2008 it has also been known from a few localities in the Belgian and Dutch part of Mar. (Leten 2013, FZ). In Lorr., it is no longer limited to the southwestern part of this district: it is also known from the Metz area (FLORAINE 2013). Also in other parts of the Flora area this species is increasingly recorded recently (in Belgium especially in Fl. and Brab., to a lesser extent also in Camp., Mosan, etc.) (wn.be) and is doubtlessly naturalizing locally. In northern France, the species is at present also known from rather numerous localities in Pic. and Champ. (SI-Flore, database CBN Paris) but the status of these populations is hard to assess although a natural range extension seems likely there. The recent expansion of this species in the Flora area is difficult to interpret: a natural range extension, escaped individuals (the species is sometimes grown as an ornamental in gardens and its fleshy seeds are eaten and dispersed by birds) or a combination of both (see also Leten l.c.)?

- *Sisyrinchium montanum* E. Greene: most known populations of this American species in Belgium are located in Ard., especially in the northeastern part of this district; it is R rather than RR there. The species is also known from Fl. (wn.be). There is not a single established population in the Belgian and Dutch Mar. (FZ, wn.be); in that district the species only occurs in France (SI-Flore).

## 52. Asphodelaceae

• *Hemerocallis lilioasphodelus* L. and *H. fulva* (L.) L.: in NF6, these two ornamentals were both said to be ‘sometimes’ escaping. However, the latter is by far the commoner of the two (13 vs. 195 records respectively on wn.be on 11 March 2020). In fact, *H. lilioasphodelus* is only rarely observed as an escape of cultivation in the Flora area.

## 53. Amaryllidaceae

• *Allium sphaerocephalon* L.: this species has indeed disappeared from Eifel centr., a long time ago already (FT).

• *A. oleraceum* L.: in Mar., this species is not restricted to the northern (Dutch) part of the district, there are several records from the Belgian part as well (wn.be).

• *A. carinatum* L.: this species was thought to have disappeared from the Flora area, where it was formerly naturalized. In recent years, however, it was rediscovered in several localities in Mosan occ. (Viroin; wn.be). In addition, the species is also known from a few localities in Lorr. and Tert. par. (Montagne de Reims) (FLORAINE 2013, database CBN Paris). In these two districts, the species is believed to be native. There are also scattered records from the Dutch part of the Flora area (Camp., Fluv.; wn.nl) but these probably refer to deliberate introductions or escapes from cultivation.

• *A. scorodoprasmum* L.: this species is also known from Pic. (west of Péronne) and Tert. par. (west of Laon) (SI-Flore).

• *A. angulosum* L.: in addition to the well-known populations in the valley of river Marne in Champ. mér. (the only hitherto known in the Flora area), this species is also present in a single locality in Lorr. occ., in the valley of river Aisne, where it was first observed in 1997 already (Challerange; database CBN Paris).

• *A. ursinum* L.: this species was said to be present in Mar. in the northern (Dutch) and southern (French) parts of the district. In reality, there are numerous records from the Belgian part as well (wn.be). This species has much expanded lately but many recent records refer to plants that escaped from cultivation.

• *A. paradoxum* (Bieb.) G. Don: this alien species is slightly expanding and has locally shown some invasive tendencies (Graulich 2017). In Belgium, it is still limited to Brab. but there are also scattered records from the Dutch part of Camp. (wn.nl).

• *Galanthus nivalis* L. var. *scharlockii* Caspary: there are several locations for this variety in Brab., even more than in Camp. and Fl. (wn.be).

## 54. Asparagaceae

• *Yucca* L.: escaped individuals from this genus are not only observed in Mar. but also increasingly on sand in Camp.

• *Convallaria majalis* L.: this species has expanded lately but nearly all new records refer to plants that escaped

from cultivation. In Fl., for instance, it is now AC-AR rather than RR (wn.be). Identifying the species’ natural and introduced ranges has become increasingly difficult.

• *Polygonatum verticillatum* (L.) All.: this species is not rare at all in Eifel centr., where it is at most AC-AR (FT). Its distribution and frequency there are in fact similar to *P. multiflorum* (L.) All., which is considered to be AC in NF6. In Lorr., this species does not mostly but exclusively occur in the northern part of this district, it is completely missing in French Lorr. (SI-Flore, FLORAINE 2013). In addition to the districts mentioned (where it occurs naturally), this species is occasionally observed elsewhere as an escape from cultivation, for instance in Loppem (Fl.) in 2016 (wn.be).

• *P. odoratum* (Mill.) Druce: this species has apparently not disappeared from Pic. mér.: there is at least one recent locality, immediately southeast of Amiens (SI-Flore).

• *P. multiflorum* (L.) All.: this species is slightly more common than indicated although at least part of the new localities may refer to plants that escaped from cultivation. It is considered to be AC everywhere, except in Fl., Camp., Champ. (AC-AR) and Mar., Haute Ard. (R).

• *Ornithogalum umbellatum* L. (s.str.): in NF6, Lorr. was not mentioned, suggesting that the species is RR there. In reality, however, it is at most AR-R in this district (FLORAINE 2013). This species is also present, albeit RR, in Eifel centr. (FT).

• *O. divergens* Boreau: the possible indigenosity of this species is evidently most likely in the southern part of the Flora area, where it is known from Mar. mér., Pic. and Tert. par. (SI-Flore). Even there, however, this species was most likely (formerly) introduced (FG).

• *Loncomelos pyrenaicum* (L.) Holub: in NF6, this species was mentioned from Ranst, where it was believed to be introduced. This locality is in Fl. and the species was discovered in similar circumstances in Boortmeerbeek, in Brab., in 2011 (wn.be). In both localities this species is apparently fully established.

• *L. brevistylus* (Wolfner) Dostál: in NF6 (as *Ornithogalum pyramidale* L.), this ornamental was said to escape occasionally. In one such locality, in Yvoir, this species persists very well since 2012 (wn.be).

• *Scilla bifolia* L.: this species was not mentioned from Eifel centr. in NF6, suggesting that it is at most occasionally escaped or naturalized there. However, it naturally occurs in Eifel centr., which is confirmed by historical data (FT).

• *Hyacinthoides ×massartiana* Geerinck and *H. hispanica* (Mill.) Rothm.: these two ornamentals are often confused. The former is by far the commoner of the two. In fact, more or less ‘pure’ populations of the latter are only exceptionally recorded, for instance in the Westhoek nature reserve in De Panne (<https://waarnemingen.be/observation/214159961/>). In this area, where native *H. non-scripta* (L.) Chouard ex Rothm. also occurs (although

the genuine indigenoussness of coastal populations of this species is uncertain), introgression has been observed (comm. M. Leten, 05.2021).

- *Muscari comosum* (L.) Mill.: this species is much rarer in Lorr. than indicated in NF6. In all of French Lorr., for instance, there are only two locations left (FLORAINE 2013). It is thus RR rather than AR-R.

- *M. neglectum* Guss. ex Ten.: this species is very much declining in the Flora area. There is not a single reliable record in the wild in Belgium on wn.be and only a few more or less recent claims from Wallonia in AFW (ID not verifiable). Hauteclair & Lambinon (2012) reported the species from a new locality in bois d'Oppagne near Barvaux-sur-Ourthe (Mosan; Famenne Centrale). In addition to the districts mentioned in NF6, the species has also been recorded in Pic. but may have disappeared there (last seen in 2000) (SI-Flore).

- *M. botryoides* (L.) Mill.: this species is also known from Champ., a district not mentioned in NF6. In the valley of river Marne, in the surroundings of Châlons-en-Champagne, there are several populations, including historical ones that date back to the 19<sup>th</sup> century (database CBN Paris). *M. botryoides* is likely native in that area.

- *M. armeniacum* Leichtlin ex Baker: this is by far the most common representative of *Muscari* nowadays and it is naturalized in many places (and probably in all districts), not only in Mosan mér. as indicated in NF6.

- *Anthericum liliago* L.: this species is admittedly RR in Lorr. but not restricted to the Moselle valley near Nancy. It is currently known from at least five locations, of which only one near Nancy (FLORAINE 2013).

- *A. ramosum* L.: in NF6, this species was said to have disappeared from Mosan, where it was considered moreover to be doubtfully native. However, in this district the species still occurs near Givet (SI-Flore) where it is likely native.

## 56. Pontederiaceae

- *Pontederia cordata* L.: this aquatic ornamental is locally naturalizing and has meanwhile been observed in several districts, but predominantly in Camp. and Brab. centr. (wn.be, wn.nl, SI-Flore).

## 58. Typhaceae

- *Sparganium erectum* L. subsp. *oocarpum* (Čelak.) Domin: this poorly known subspecies, hitherto unknown in the Flora area, probably has been overlooked. Its presence was recently noticed, in 2020, in the Champ./Lorr. bordering area in France (Vanault-les-Dames, Vivier-au-Court; database CBN Paris).

- *S. natans* L.: this species is also known from scattered localities in Champ., a district from where it was not mentioned in NF6 (SI-Flore, database CBN Paris).

- *S. angustifolium* Michaux: this very rare species is known from Charmes (Lorr. mér.) in the Moselle valley (FLORAINE 2013, SI-Flore), at the extreme southern border of the Flora area.

- *Typha ×glauca* Godr.: this hybrid is probably more widespread than previously thought; it is also found in other districts (e.g. in Fl., Mar.) and potentially can occur everywhere where both parent species grow together.

- *T. minima* Funck: this ornamental species was re-discovered in Belgium: there are at least four records since 2016: Boortmeerbeek, Lontzen, Oostkamp and Waregem (wn.be). In NF6, it was suggested that this species was in the process of naturalization in Brab. or. in the Netherlands and in the Grand Duchy of Luxembourg but this requires confirmation. In both countries the species is probably merely ephemeral. There are no recent records from the Dutch part of the Flora area and the species was only seen once recently (in 2005) in Luxembourg (wn.nl, Atlas-NL, MNHN-Lux).

- *T. laxmannii* Lepechin: this escaped ornamental is currently naturalized in Mar., Fl., Camp. and Brab. (R-RR) (wn.be, wn.nl, SI-Flore).

## 59. Juncaceae

- *Luzula pilosa* (L.) Willd.: this species is rather AR-R instead of AC in Eifel centr. (FT) where the soil is predominantly calcareous while the species is more likely to occur on slightly acidic soils.

- *L. forsteri* (Smith) DC.: this species is also known from Ard. in France (e.g. Haulmé, Saint-Laurent) (database CBN Paris). It is sometimes found as an introduction, as already mentioned in NF6. In addition to its well-known population, as a stinzenplant, in the domain of Meise Botanic Garden, the species has also been recorded in Honsem (Brab.) where it is claimed to have germinated from the exposed seed bank (wn.be).

- *L. luzuloides* (Lam.) Dandy et Wilmott: this species occurs all over Lorr. (not predominantly in the western and northern parts of the district); the species in fact seems even more frequent in the eastern part of it (FLORAINE 2013).

- *L. sylvatica* (Huds.) Gaudin: this species is increasing in Fl. and Camp. (doubtlessly predominantly as an escape from cultivation), especially in Camp. where it has become relatively widespread. In these districts it is R-RR rather than RR.

- *L. pallescens* Swartz: this species was formerly reported from the Netherlands but this claim was considered to be very unlikely in NF6. The record is from Tegelen in Fluv. and dates back to 1943. It is referred to in H24 and thus likely to be reliable although no longer relevant anymore since the species was not confirmed recently in this locality. It does not occur in France either (FG).

- *L. congesta* (Thuill.) Lej.: this taxon is now accepted as a species distinct from *L. multiflora*. Its distribution in the Flora area remains uncertain, however. It seems to be most frequent in Camp. (see also H24 and map wn.be, insofar as reliable) and mainly occurs on the more acidic sandy soils, which corresponds with the species' ecology.

- *Juncus squarrosus* L.: in Lorr., this species is not mostly but exclusively occurring in the northern part of this district (FLORAINE 2013, wn.be). In the Flora area, this species is only absent from Champ. and this was added.
- *J. tenuis* Willd. subsp. *tenuis*: this subspecies is increasing and more common in some districts than was indicated in NF6, e.g. in Fl. and the entire Lorr. district (rather AC than AR-R). In Mar., it is certainly not RR or absent, rather AR-R (according to FZ even AC) (FLORAINE 2013, wn.be).
- *J. tenuis* subsp. *dudleyi* (Wiegand) P. Fourn.: this subspecies was discovered in an additional locality in the Flora area in 2018, in Houthulst (Fl.) (wn.be, BR!). In NF6, this subspecies was said to be naturalized in Europe in Scotland. By now, it has become more widely naturalized in Europe (e.g. in the Netherlands; see also E+M Plantbase).
- *J. tenuis* subsp. *anthelatus* (Wiegand) Verloove et Lambinon: in addition to Camp. this subspecies was also discovered in Brab. centr. and Ard. (wn.be).
- *J. tenuis* subsp. *dichotomus* (Elliott) Verloove et Lambinon: this newly added subspecies was recently observed in Fl., Camp., Brab., Mosan and Ard. (Hoste & Verloove 2016). It is RR but probably often overlooked, although its separation from the other subspecies is rarely straightforward.
- *J. compressus* Jacq.: this species seems to be on the rise in Fl., especially around the bigger cities (Antwerp, Ghent, etc.); it is no longer RR, rather R, there.
- *J. gerardi* Loisel.: in Mar., this species is much less rare than indicated in NF6 (it is even considered to be CC in Zeeland; FZ): AC-AR rather than AR. As a roadside halophyte in the interior, it is mostly found in Fl., Camp. and Brab.
- *J. ranarius* Song. et Perr.: this poorly known species is less rare than indicated in NF6, especially in Mar. where it is AC-AR, rather than AR-R (it is even said to be C in Zeeland in FZ; see also H24). Also in Fluv., it is rather R than RR (wn.be, H24). This species closely resembles *J. bufonius* L. and may have been misunderstood. There are also several claims from Camp. and Brab. occ., especially from industrial areas, but these require confirmation.
- *J. foliosus* Desf.: there are at least two confirmed finds in Mar. (De Haan, Zeeland: wn.be, wn.nl) and the species was also found at the Kranepoel in Aalter and in Wintam (both in Fl.) in 2014 and 2012 respectively. In Camp., it is no longer limited to the eastern part of this district but now also occurs in the Netherlands. This species resembles *J. bufonius* and is perhaps underestimated.
- *J. tenageia* Ehrh. ex L. f.: it is unclear whether or not this species is still present in Argonne (Lorr. occ.). FLORAINE (2013) does not report the species from French Lorr., while Vernier (2020) does (from Woëvre).
- *J. inflexus* L.: this species is less rare than indicated in NF6, especially in Fl. (AC-AR rather than AR). In Camp. (AR-R) and Ard. (R-RR), it is indeed rarer than in the other districts.
- *J. conglomeratus* L.: this species was said to be R-RR in Mar. in NF6 but it is hardly less common in Mar. than in other districts (rather AC-AR). For comparison, in Zeeland it is considered to be C (FZ).
- *J. filiformis* L.: this rare species was considered to be extinct in Fl. There are some recent observations from that district but these require confirmation (no photos or material seen; wn.be).
- *J. balticus* Willd.: this very rare species persists well in its unique Belgian population that was discovered in 2000 (wn.be; Leten & Fasseaux 2008).
- *J. maritimus* Lam.: this species is slightly less rare than indicated in NF6, rather AR-R than R. For comparison, in Zeeland it is considered to be AR (FZ).
- *J. capitatus* Weigel: this species has become particularly rare (RR instead of R). There is only one extant location in Belgium (in Molenstede-Dassenaarde) and one in the Netherlands (near Weert) (wn.be, wn.nl).
- *J. pygmaeus* L.C.M. Rich.: the survival of this species in Camp. in the Netherlands (from where the only populations in the entire Flora area are known) was questioned in NF6. The species is still present there in North Brabant province, though RR (H24, wn.nl).
- *J. subnodulosus* Schrank: there is a very remarkable cluster of observations of this species (several dozen locations) east of Brussels, where it is not rarer than in e.g. Mar. (AR). It occurs in valleys in the loamy area between Brussels and Liège; it is locally more numerous than *J. acutiflorus* Ehrh. ex Hoffmann because of the presence of calcareous groundwater (comm. R. Guelinckx, 12.2020). In Eifel centr., this species has completely disappeared (FT) and in Lorr. it is RR instead of AR (FLORAINE 2013).
- *J. acutiflorus* Ehrh. ex Hoffmann: this species does occur, although very rarely, in Champ., e.g. around Châlons-en-Champagne (SI-Flore).
- *J. anceps* Laharpe: the history of this rare species in Belgium is complicated. It was formerly incorrectly reported for the area between Oostduinkerke and Nieuwpoort because of the misleading title of the article by De Raeve *et al.* (1983); its unique population was in Knokke (Leten in prep.) where it was last observed in the 1920s. After a reappearance in another locality in Knokke in 1983, from where it probably disappeared, the species has been found again since 2008 in several localities, first in Oostduinkerke, then also in Zeebrugge, Koksijde and again in Knokke. It is also present in Zeeland where it is less rare (R rather than RR; FZ). An old record in the interior was located along the Willebroekse Vaart at Marly, thus in Brab., not in Fl. as incorrectly indicated in NF6 (comm. M. Leten). This very rare species was recently also discovered in Tert. par. (Everly, Jaulnes), just outside the Flora area (database CBN Paris).

- *J. canadensis* J. Gay ex Laharpe: in Wingene (Fl.), this American species turned out to be merely casual, not naturalized as indicated in NF6. It was only seen in 1996-1997. The species is only naturalized (and expanding) in Camp.
- *J. bulbosus* L.: the distribution of this species in some districts is very uneven. However, in some parts of e.g. Fl., Brab. and Mosan, it is at most AR, not RR. In Lorr., this species is not restricted to the northern part of this district: there are at least four localities further south (FLO-RAINE 2013). The species also occurs in some parts of Pic., for instance near Amiens (SI-Flore), a district from where it was not mentioned in NF6.
- *J. ensifolius* Wikstr.: this alien species is increasing and locally naturalized in Mar., both in France and the Netherlands (Dunkerque, Zeeland; FG, FZ) and from multiple locations in Fl. and Camp. (wn.be; see also Verloove *et al.* 2017). SI-Flore further indicates a record from the Lille agglomeration in northwestern France (Brab. occ.). Records from French Lorr. (Antoine *et al.* 2019) are located outside the Flora area.

## 60. Cyperaceae

- *Eriophorum angustifolium* Honck.: in the districts where this species is considered to be either RR, extinct or absent, it was recently observed, among others, in Fl. (Leiemeersen in Oostkamp, Gulke Putten in Wingene, Berlare, etc.), Brab. occ. (Stambruges), Mar. (Zeeland), etc. (wn.be, FZ).
- *E. latifolium* Hoppe: a single individual of this species was (re-) discovered in 2019 in the Leiemeersen in Oostkamp (Fl.). Its presence there was confirmed in 2020 (comm. I. Jacobs, 12.2020). This species is also known from Ard., at least in France (Parc Naturel Régional des Ardennes): there are rather numerous historical records and it was recently confirmed from Thilay (database CBN Paris).
- *E. gracile* Koch ex Roth: this very rare species is much declining in the Flora area. It has definitely disappeared from Mar. mér. (Digitale2), very likely also from Tert. par. (most recently observed there in 1977 according to SI-Flore, database CBN Paris, Digitale2).
- *Eleocharis acicularis* (L.) Roem. et Schult.: this species is at most AR, not R, in Mar. mér., Camp. and Fluv. (the Netherlands) (see also H24).
- *E. ovata* (Roth) Roem. et Schult.: this species is also known from Champ. (e.g. south of Épernay) (database CBN Paris).
- *E. obtusa* (Willd.) Schult.: this American species was recently discovered in Luzancy (Tert. par.) (Larregle *et al.* 2014), south of Bruges (Fl.) and at several places in Ard. where it is no longer restricted to the eastern part of the district (wn.be). Meanwhile this species is also found in Camp. in the Netherlands (Simons *et al.* 2020).
- *E. engelmannii* Steud.: this newly added North American alien has been recorded in Fl., Camp. (Neth.), Brab. and Ard. (Verloove 2015, Simons *et al.* 2020; wn.be, wn.nl). It is still RR but probably slightly increasing.
- *E. multicaulis* (Smith) Desv.: this species possibly also occurs in Ard. (or.), to be confirmed (wn.be). It was recently (re-)discovered in Mar. mér., in Quend (Coulombel 2019). Although the species had been known from that area (in Rue, up to 1974), this district was not mentioned in NF6.
- *E. palustris* (L.) Roem. et Schult.: this species is at most slightly less common in Fl. (AR, not R).
- *Blysmus compressus* (L.) Panzer ex Link: this species is also known from the Torfbroek nature reserve in Berg (Brab.) and it also exists in Tert. par. (Laonnois) (SI-Flore), two districts from where it was not mentioned in NF6. In Mar. in Belgium, there is only a single extant population (in Hannecartbos); in Zeeland, it is slightly less rare (FZ). Overall, this species is much declining in the Flora area, especially in its inland localities.
- *B. rufus* (Huds.) Link: this species was reported in NF6 from Goeree in Zeeland (the Netherlands). This claim was highly unlikely and eventually indeed turned out to be incorrect (FZ).
- *Isolepis setacea* (L.) R. Brown: the species' rarity in Mar., Camp., Mosan and Ard. was probably exaggerated (AC-AR, rather than AR). It is probably slightly increasing or is otherwise often overlooked. It nowadays even locally occurs on heavy clay in the central part of West-Flanders. In 'suitable circumstances' it can be AC (see also H24, FZ).
- *I. cernua* (Vahl) Roem. et Schult.: a recent update on this species' local distribution and rarity was presented by Duhamel & Delaporte (2017). The species is still found in three locations in the Flora area, all in Mar. mér.: Anse Bidart + dunes of Marqueterre and Cambron marshes (all in the Somme valley near its estuary) and the Cucq-Villiers marshes, further north.
- *Trichophorum cespitosum* (L.) Hartm.: this species has been known from a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse, near the estuary of river Canche) since quite a long time (SI-Flore) along with, among others, *Rhynchospora alba*, *R. fusca*, *Hypericum elodes*, *Drosera rotundifolia*, *Erica tetralix*, etc. (comm. B. Toussaint, 06.2021). It is very surprising that these data had been overlooked until now in NF.
- *T. alpinum* (L.) Pers.: this species was reported in NF6 from Mar. mér. (France), though considered to be suspect. Its presence there is indeed very unlikely and not mentioned in local databases and Floras.
- *Bolboschoenus* (Aschers.) Palla: this genus now includes four distinct species in the Flora area, each with a different distribution pattern. *B. maritimus* (L.) Palla s.str. is the widespread species in Mar. (it is much rarer in Fl. and in Lorr. in saline habitats and occasionally observed elsewhere), whereas *B. laticarpus* Marhold, Hroudová, Zákavský et Ducháček is the widespread species in the

interior, especially on riversides [it is AR-R in Fl., Camp., Brab., Fluv. (especially in the Netherlands); R-RR in Mosan and very occasionally elsewhere, e.g. in Châttrices in Argonne, Lorr. occ.; Bizot & Labroche 2018]. The two other species are only very locally found. *B. yagara* (Ohwi) Yung C. Yang et M. Zhan is confined to Camp. (Vijvergebied Midden-Limburg, where it was first seen in 2015; wn.be), Champ. and French Lorr. from where several localities have been detected since 1999 (database CBN Paris, AFL, Bizot & Labroche 2018, Labroche 2020). *B. planiculmis* (F. Schmidt) T. Egorova is known from Fluv. (valley of Maas river, since 2017; Simons & Gonggrijp 2019) and since 2018 from two localities in the bordering area of Champ. and Lorr. (Chapelle-Felcourt, Vanault-les-Dames) (database CBN Paris).

- *Scirpus sylvaticus* L.: this species is less rare in Fl. than indicated in NF6 (AR rather than R), although at least part of the populations refer to escapes from or relics of cultivation (the species is often used nowadays in projects of nature development).

- *S. georgianus* R.M. Harper: in addition to the known locations in Mosan mér. and Tert. par., this American species was found in Nivelles in 2016 (Brab.; wn.be) and in Eindhoven (Camp.) in the Netherlands, also in 2016 (Bruinsma *et al.* 2021). Herbarium material from both localities was seen.

- *S. hattorianus* Makino: this American species was recently also discovered in several localities in Argonne (Lorr.; AFL).

- *S. cyperinus* (L.) Kunth: this newly added North American alien was recently discovered in Camp., both in Belgium and the Netherlands (Spronk 2016, wn.be).

- *Scirpoides holoschoenus* (L.) Soják: in Mar., this species is now also present in Koksijde (Fluithoekduinen nature reserve) and in Brab. occ. it is also known from two locations east of Tournai (wn.be, AFW, Anrys & Saintenoy-Simon 2013). In Lorr., this species is no longer confined to the Moselle valley: Krippel & Colling (2010) reported several localities from other parts of this district. The species was also observed in a locality in Pic. or., southeast of Saint-Quentin (SI-Flore, François *et al.* 2015, François *et al.* 2017). The least rare taxon in the Flora area is subsp. *holoschoenus*. However, a plant found in 2014 in Mechelen belongs to subsp. *australis* (L.) Soják (wn.be).

- *Schoenoplectus* × *kuekenhalianus* (P. Junge) D.H. Kent [*S. tabernaemontani* (C.C. Gmel.) Palla × *triqueter* (L.) Palla]: this hybrid was said to occur in the absence of the second parent in Fl. However, *S. triqueter* still occurs in Fl., along river Scheldt between Antwerp and Ghent (Florabank).

- *S. mucronatus* (L.) Palla: this southern species was formerly indicated for Lorr. according to NF6. However, the only record of this species in northeastern France is from near Vesoul, (far) outside the Flora area (SI-Flore). A claim from northwestern France (Brab. occ.) was in-

correct according to Digitale2. Surprisingly, this species was recently observed in two locations in Camp. in the Netherlands, at first in Reusel (1999) and since 2015 near Tilburg. At least in this last locality the species looks more or less established (wn.nl).

- *S. pungens* (Vahl) Palla: this species is also recorded in Fluv. in the Netherlands, e.g. 200 individuals in Stevensweert in 2007-2008 (wn.nl; also H24). In Mar., it is also known since 2017 from Zeeland (FZ). There are several claims from the Champ.-Lorr. bordering area as well (database CBN Paris), but these require confirmation.

- *S. triqueter* (L.) Palla: this species is not exclusively found upstream of Antwerp along river Scheldt. It was recently also observed downstream of Antwerp, in Kallo (wn.be). In the French part of the Flora area, it is also known from Champ. (Marne) (database CBN Paris, FG).

- *S. lacustris* (L.) Palla: this species is not absent from but RR in Eifel centr., where it is moreover considered to be non-native (FT).

- *Cyperus fuscus* L.: this species was said to be declining in NF6 but this is no longer true, on the contrary: in some areas it tends to increase slightly. This applies to parts of Fl. (especially around Antwerp), Camp. or. (Zonhoven and its surroundings) and Fluv. (the entire valley of river Maas) where it is R and no longer RR. For comparison: the species is said to be R in Fluv. in H24. In all these regions the species is even much less rare than in Brab. (in the latter district it was considered to be merely R).

- *C. flavescens* L.: this species is not RR but extinct in Champ. where it was last seen around 1900 (SI-Flore).

- *C. esculentus* L.: this weed is nowadays at least as common in Fl. (especially between Ghent and Bruges) as in Camp. (in the latter district it is widely dispersed now and no longer confined to the eastern part of the district). It is also known from several localities in Brab. (R-RR) and is also present in Mar., both in Belgium and the Netherlands (wn.be, Atlas-NL). In 2012, this species was discovered in Nouvion-sur-Meuse and its surroundings in French Lorr., where the species was subsequently noticed to expand strongly (Bizot 2012b, Bizot *et al.* 2016, Labroche 2020). It is also known in Tert. par. from the area west of Compiègne (SI-Flore).

- *C. longus* L.: this southern species is increasing and now also known from Camp. and Mosan. In Lorr., it is not limited to the northeastern part of the district (e.g. Bizot & Bouillard 2011). This species is at most R in many districts. For an overview of recent records in northwestern France, see Duhamel & Delaporte (2017).

- *C. eragrostis* Lam.: this New World weed is much increasing, especially in Mar., Fl., Camp. and Brab. In these districts, it has become at most AR now. More recently, it was also found in various other districts (Pic., Champ., Tert. par. where it is R and Ard. and Lorr. where it is RR) (FLORAINE 2013, Digitale2, FZ, wn.be, etc.; see also Bonassi *et al.* 2017).

- *Rhynchospora alba* (L.) Vahl and *R. fusca* (L.) Ait.: these two species have both been known from a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse, near the estuary of river Canche) since quite a long time (SI-Flore) along with, among others, *Trichophorum cespitosum*, *Hypericum elodes*, *Drosera rotundifolia*, *Erica tetralix*, etc. (comm. B. Toussaint, 06.2021). It is very surprising that these data had been overlooked until now in NF.
- *Cladium mariscus* (L.) Pohl: in Camp., where it was considered to be RR in NF6, this species is clearly less rare (R-RR) than in the other districts. The species also occurs in Sint-Gillis-Waas (since 1940!), located in Fl., a district from where the species was thought to be absent.
- *Schoenus nigricans* L.: this species is still known in Camp.; it was discovered in the Buitengoor nature reserve in 2014.
- *Carex ×timmiana* P. Junge [*C. nigra* (L.) Reichard × *trinervis* Degl.]: the presence of this hybrid was confirmed from several localities in Mar. in Belgium since 2012. It is in fact much more common there than *C. nigra*. A few years ago, it was also found in northwestern France in this district (Pré Communale d'Ambleteuse) and it apparently also occurs south of Boulogne (Mar. mér.). In a single locality in the Belgian dunes this hybrid grows together with both parent species and covers several tens of m<sup>2</sup> (comm. M. Leten, 07.2020).
- *C. dioica* L.: there is only one extant population left in Camp. in Belgium and the Netherlands (Buitengoor nature reserve). The species may still be present in Hautes Fagnes (AFW). In Brab. (Berg), it was not seen since 1952 and it has also disappeared in Lorr. sept. (Colling 2005, AFL). This species is very much declining in the Flora area.
- *C. davalliana* Smith: this rare species is known in the Netherlands from two localities. The species was first found in 2006 in Zuid-Limburg (Brab. or.; Weeda *et al.* 2006). Subsequently, since 2012, it has also been known from one place near Breda (Camp.; wn.nl, H24). This species had never been reported before in the Netherlands. Yet, it is considered native and not adventitious, as it is a species found in almost all of Europe, with the exception of Scandinavia. It is characteristic of limestone marshes.
- *C. bohémica* Schreb.: in both Camp. and Tert. par., this very rare species was recently rediscovered: in Camp. in Bokrijk in 2010 (as already mentioned in NF6; its presence was regularly confirmed subsequently but the species was apparently no longer observed after 2019; wn.be) and since 2009 it has repeatedly been observed in Festigny (database CBN Paris).
- *C. pulicaris* L.: in Lorr., this species is only known from the northern part of the district, with only a single locality, near Toul, in the French part of the district (FLORAINE 2013, wn.be).
- *C. divisa* Huds.: this rare species was rediscovered at the Belgian coast in 1999 (AFV). In the meantime at least four locations are known (comm. M. Leten, 07.2020 and 01.2021): three in coastal dunes between Koksijde and Nieuwpoort (Doolaeghe, Oostvoorduinen and Groenedijk) and one in the polders in Middelkerke. There are also several locations in Zeeland (FZ). It is now equally rare in the entire Mar. district and hardly less rare in Mar. mér. In NF6, *C. divisa* was still indicated as being extinct in Belgium, erroneously so.
- *C. arenaria* L.: this species is less rare than indicated in NF6 in Brab., where it is R rather than RR (wn.be).
- *C. colchica* J. Gay: in the Flora area, this species only occurs in the Netherlands. In addition to Fluv., it has also been known from Camp. (H24).
- *C. pseudobrizoïdes* Clavaud: according to FG, the presence of this species in Somme (France) is erroneous. Delay *et al.* (2016), however, have recently confirmed its presence there (in Crécy-en-Ponthieu; Pic. occ.) based on morphological and anatomical studies. Lecron & Duluc (2019) moreover demonstrated that in fact both *C. pseudobrizoïdes* and *C. brizoïdes* L. are present there.
- *C. brizoïdes* L.: this species is slightly expanding (or has been long overlooked?), especially in Camp. and Mosan where it is rather R than RR (see also H24). Lecron & Duluc (2019) recently also confirmed its presence in Pic. occ., from where it was not yet mentioned in NF6. Some authors still question the indigeneous of this species in Belgium (e.g. Vernier 2014).
- *C. praecox* Schreb. subsp. *curvata* (Knaf) Vollm.: in its unique Belgian locality near Dinant, this taxon was last seen in 1991. Despite a targeted search at the site, it was no longer seen in 2017. Judging from its 'habitat' (the concrete border of river Meuse) it was undoubtedly introduced there (comm. J. Koopman, 05.2017).
- *C. vulpinoïdea* Michaux: this North American alien was discovered in several additional districts in Belgium and the Netherlands: Mar., Camp. and Fluv. (Koopman 2015, Verloove 2016b).
- *C. spicata* Huds.: this species was said to be RR in Fl. and Mar. in NF6, which is exaggerated. It is found in the dunes, inner dunes and polders of the coast (often commonly so, for example in the Zwin nature reserve in Knokke). At least on the Belgian and Dutch coast, it is at most AR-R (comm. M. Leten, 01.2021). For comparison, according to FZ it is even C in Zeeland. The same applies to most parts of Fl. (wn.be). In Eifel centr., on the contrary, this species is indeed RR (FT).
- *C. muricata* L.: this poorly known species also occurs in the northeastern corner of Lorr. in Germany (Gutland; FT) and may have been overlooked just across the border in the Grand Duchy of Luxembourg. It has also been known from Lorr. mér. and Tert. par. (Montagne de Reims) (database CBN Paris).
- *C. pairae* F.W. Schultz: this species is not AR in Eifel centr. as stated in NF6; in reality, it is completely absent

from that area (FT), although it occurs further east, in the Osteifel.

- *C. diandra* Schrank: this rare species is also present at several locations in Brab.: Torfbroek, Vorsdonkbroek, Malendriesbeekvallei and Vaarttaluds Moen (verified data from wn.be). There are also several localities in the valley of river Somme west of Amiens in Pic. mér. (SI-Flore, Digitale2, see also Coulombel *et al.* 2016). In Tert. par., its actual presence needs to be confirmed: it seems to have disappeared from most (or all?) of its former localities (Digitale2, database CBN Paris).
- *C. appropinquata* C.F. Schumach.: this very rare species is also known from Fluv. in the Netherlands (H24, Atlas-NL).
- *C. leporina* L.: in Brab., this species is equally rare in the central and eastern part of the district; in the western part, on the other hand, it is almost missing (wn.be).
- *C. crawfordii* Fernald: this North American alien is expanding and is now also known from ten localities in Camp. in the Netherlands (Koopman 2015) and in 2008 it was discovered in Argonne (Cornay) in Lorr. occ. (Lecron 2014, Labroche 2020). It was also observed in two locations in Belgian Mar. (Koksijde) in 2010 but apparently disappeared soon afterwards (Verloove 2016b).
- *C. canescens* L.: this species also occurs in Mar. in the Netherlands where it is known from Schotsman in Zeeland (FZ). In Fl., Brab., Lorr., Tert. par. and Eifel centr., it is perhaps slightly less rare, R-RR rather than RR. In Lorr., it is moreover also known from scattered localities in the French part of this district (FLORAINE 2013), the species not being limited to the northern (Belgian) part of this district.
- *C. echinata* Murray: this species is known from a single locality in Mar. (Doolaege nature reserve in Koksijde), where a few plants grow in a damp meadow (best interpreted as *Rhinantho-Orchietum morionis*). In this locality this species persists well; it is certainly the only known population on the Flemish coast (comm. M. Leten, 01.2021).
- *C. elongata* L.: in Eifel centr., this species is neither absent, nor extinct; there are in fact a few recent localities according to FT.
- *C. depauperata* Curt. ex With.: this species is extinct in both Belgium and the Grand Duchy of Luxembourg (Colling 2005, AFW, wn.be, etc.). The same applies to northwestern France (Digitale2) and northeastern France (FLORAINE 2013). However, the species was recently rediscovered in Gutland in Germany (Lorr. nord-or.; Reichert 2014, FT) and it is also still present in some parts of Tert. par. (Laonnois and west of Soissons; SI-Flore).
- *C. strigosa* Huds.: in Brab., this species is noticeably rarer in the eastern and equally distributed in the western and central part of the district. In Fl., there are several recent localities (e.g. in the wide area of Bruges), but most of these populations are likely non-native (e.g. deviating

ecology; the species is nowadays also planted as an ornamental). However, it is sometimes also found in natural habitats, e.g. in Drongengoed in Ursel, where its recent occurrence is less easily explained. This species also naturally occurs in several localities in Champ. (Labroche 2020).

- *C. sylvatica* Huds.: this species is increasing but, like for the preceding species, its origin is partly unclear. In some of the districts where it was considered to be RR in NF6 it is at most R. This applies to Fl. and also to parts of Mar. For comparison, it is said to be merely R in Zeeland (FZ).
- *C. pseudocyperus* L.: in Camp. and Brab., this species is not noticeably more common in the western than in the other parts of these districts (wn.be).
- *C. laevigata* Smith: there are four locations in Zuid-Limburg in the Netherlands (Brab. or.; H24, Atlas-NL) where it occurs naturally. Claims from Brab. and Camp. in Belgium (wn.be) require confirmation. The species is also known, rather isolated from the other sites, from Lac de Bairon in Lorr. (Labroche 2020). In Tert. par., on the contrary, it is completely absent (it only occurs northwest of Paris, outside the Flora area) (SI-Flore).
- *C. distans* L.: in Mar., this species is less rare than indicated in NF6, AC-AR rather than AR-R (wn.be). In the Dutch part, it is even said to be C (FZ, H24) and it is hardly any rarer in its Belgian part. In Pic., it is not limited to the western part of this district: it also occurs in the southeastern part, in the valley of river Somme (François *et al.* 2017).
- *C. punctata* Gaudin: this species was first seen in Belgium in 1993 (two localities in Mar.). There are several locations between Zelzate and Antwerp now. These are located on the border of the Mar. and Fl. districts but at least some definitely in the latter, e.g. those in the Stropersbos and along the E34 motorway (on sand; IFBL squares C3.34, C4.11, C3.27). The species is usually found in slightly acidic grasslands in this area. In coastal Mar., it is also known since 2009 from Koksijde. In 2020, *C. punctata* was also found in Muno in Ard. (La Roche à l'Appel), in a very different, deviating habitat (wn.be). The status of this latter locality is difficult to assess. [Erratum: this population was reidentified as *C. laevigata* by Indra Jacobs in July 2023. Unfortunately, this correction could not be included in the Dutch edition of the Flora.]
- *C. mairei* Coss. et Germ.: this species was thought to be possibly extinct in Tert. par. However, its presence there has been confirmed lately in Laonnois (Digitale2, SI-Flore; see also Messean *et al.* 2015).
- *C. flava* L.: except for a single location in French Lorr., this species is restricted to the Belgian (northern) part of Lorr. (FLORAINE 2013, wn.be). Its presence in Pic. (valley of river Somme) was recently confirmed (Watterlot & Coulombel 2018). Previous claims from that area have often been considered false or questionable (Duluc 2019).
- *C. lepidocarpa* Tausch: this species is certainly present in Camp., for instance in the Buitengoor nature reserve in

Mol and near Neerpelt and Lommel (ID confirmed by J. Koopman). The species is also known from several locations on the Ardennes plateau in France where it may have been introduced (Labroche 2020). In Lorr., where it was said to be AR in NF6, its frequency probably needs to be revised: according to FLORAINE (2013) it is RR in the French part of this district.

- *C. demissa* Hornem.: this species also occurs here and there in Mar. (wn.be, FZ, H24), although the separation from *C. viridula* Michaux is not always straightforward.
- *C. rostrata* Stokes: in Mar., this species is not restricted to Mar. mér. In Belgium a stable population is present in the Hannecart nature reserve (in a very wet peat bog) (comm. M. Leten, 01.2021) and the species has also been recorded in Zeeland in the Netherlands (FZ), although it is rather ephemeral there.
- *C. riparia* Curt.: this species has completely disappeared in Eifel centr. (FT), where the species has always been RR.
- *C. acuta* L.: this species is hardly found in Eifel centr. and is thus R-RR, rather than AC-AR (FT).
- *C. umbrosa* Host: this species also occurs in Eifel centr., where it is known from at least one locality, in Oberbettingen (Kalkeifel; FT). There are also several localities in Champ. mér., northeast of Troyes (database CBN Paris).
- *C. tomentosa* L.: this species has been known since 2001 from one location in Zuid-Limburg in the Netherlands (Brab. or.) where the species may once have been introduced; it is, however, expanding lately (H24).
- *C. humilis* Leyss.: this species is much rarer than indicated in NF6 (AR) in Lorr. (even RR according to FLORAINE 2013) and moreover almost limited to the southwestern part of the district, roughly in the area Verdun-Toul-Neufchâteau.
- *C. ornithopoda* Willd.: this species is also known from the Givet area in Mosan (database CBN Paris).
- *C. pendula* Huds.: this species naturally occurs in Champ., although RR (Labroche 2020). It is much expanding lately, especially as an escape from cultivation. At least part of these escaped plants belong to subsp. *agastachys* (L. f.) Ljungstrand, although the separation of this subspecies is rarely straightforward in the Flora area. As a consequence, its distribution remains obscure and requires further study.
- *C. pilosa* Scop.: this species is known for at least 20 years from Overloon in Fluv. in the Netherlands where it is considered to be a naturalized alien (H24). In Lorr., although RR, this species occurs at several locations throughout the district (FLORAINE 2013), it is not restricted to the southern and northeastern parts of the district as stated in NF6.
- *C. flacca* Schreb.: in parts of Fl., this species is not RR, rather R-RR (wn.be).
- *C. halleriana* Asso: in NF6, this species was said to reach its northern limit in French Lorr. Indeed, according

to AFL the species' most northerly locality was in Saulny, north of Metz. In 2016, however, this southern species was discovered even further north, in Tagnon in Champagne, possibly as a result of global warming and it is thus expected to occur elsewhere in the region in suitable locations, for instance on Pre-Ardennes ridges or at Pointe de Givet (Labroche 2020).

- *C. pallescens* L.: there is a reliable record from Belgian Mar. (Doolaege nature reserve in Koksijde) (comm. M. Leten, 01.2021). The species was found once in a somewhat drier, decalcified zone.
- *C. limosa* L.: this rare species is much declining in the Flora area and may have disappeared from some of the districts mentioned in NF6. This applies, among others, to Tert. par. (Laonnois) where its actual presence requires confirmation (it was most recently observed in 1972 according to SI-Flore).

## 61. Poaceae

- With respect to alien species not treated in detail: *Cortaderia selloana* (Schult. et Schult. f.) Aschers. et Graebn.: this ornamental is no longer rarely but increasingly escaping, especially in Mar., Fl., Camp. and Brab. (e.g. Lemoine 2017, wn.be).
- The intergeneric hybrid *Festuca rubra* L. × *Vulpia myuros* C.C. Gmel. (×*Festulpia* Melderis ex Stace et Cotton) is not restricted to Brab. occ. (France) and Mar. sept. It has also been found several times in Belgium and can potentially be formed wherever both parent species occur (i.e., in all districts; wn.be).
- *Panicum miliaceum* L. subsp. *agricola* H. Scholz et Mikoláš: this taxon has also been recorded on several occasions in Fl. (wn.be).
- *P. hillmanii* Chase: a habitat type was added (“ballast des voies ferrées”). More or less established populations of this species, particularly those in the port of Antwerp, are located in or near railway infrastructure (wn.be).
- *P. schinzii* Hack.: this South African alien is now also strongly increasing and established in large parts of Brab. and it was recently also reported from maize fields in various parts of Mosan (Wastiaux 2019).
- *P. dichotomiflorum* Michaux var. *dichotomiflorum*: this weed is not exclusively naturalized in Fl.; it has also become established in Camp. where it is as widespread now as in Fl. (wn.be). It is also, at least locally, established in Brab., Mar., Ard. and Lorr. (Bizot 2012c, Bonassi *et al.* 2017), etc.
- *Echinochloa crus-galli* (L.) Beauv.: this species is lacking in Eifel centr. (FT).
- *E. muricata* (Beauv.) Fernald: this American weed has much increased lately in Fl., Camp. and Brab. (wn.be). In the first two districts it has become rather AC, in Brab. rather AR, although there are important local differences (e.g. it is much rarer in the central part of the province of West-Flanders). In Brab., it is also established

in the wider area of Kortrijk (Brab. occ.) and Brussels (Brab. centr.) and no longer predominantly so in Brab. or. In Mar., it is clearly less rare (AR-R) than in the rest of the remaining districts. Elsewhere, this species is occasionally recorded as an alien, recently for instance for the first time in Lorr. near Metz (Bonassi *et al.* 2017). Its var. *wiegandii* (Fassett) Mohlenbr. is now separated but it is still poorly known and its distribution uncertain. According to verifiable data from wn.be it has been confirmed from at least Fl., Brab. occ. and or. and Mosan or.

- *Setaria parviflora* (Poiret) Kerguelen: this alien is more or less established in two places. It was known in the port of Ghent between 1975-85 (Robbrecht & Jongepier 1986). This location was lost, but since 2001 the species has been growing permanently on the other side of the canal. Since 2017, it is also known from a canal bank in Genk (Camp. or.) where it grows together with two other 'southern' exotic grasses, *Paspalum dilatatum* and *Sporobolus indicus* (wn.be).

- *S. pumila* (Poiret) Roem. et Schult.: this species has much increased lately, especially (but not exclusively) in maize fields, and it is less rare than indicated in NF6 (wn.be).

- *S. verticillata* (L.) Beauv. var. *verticillata*: this taxon is lacking in Eifel centr. (FT).

- *S. verticillata* (L.) Beauv. var. *ambigua* (Guss.) Parl.: this variety is much rarer than var. *verticillata* and is locally (!) naturalized only in Fl. and Camp. and still at least AR (wn.be). It was also found a few times in Mar. This variety is not as rapidly expanding as indicated in NF6.

- *S. viridis* (L.) Beauv.: this species is lacking in Eifel centr. (FT).

- *S. faberi* R.A.W. Herrmann: this Asian weed is expanding and no longer restricted to Fl. It is now also present in Mar., Camp., Brab. and Mosan (surroundings of Rochefort). Northeast of Rochefort, *S. faberi* occurs in several places in and along fields since 2018 (wn.be); it was not previously recorded in Wallonia.

- *Digitaria sanguinalis* (L.) Scop.: this species has become AC in Lorr., instead of AR-R (FLORAINE 2013).

- *D. ischaemum* (Schreb.) Muhlenb.: in Mar., this species is not RR at all, rather AC-AR (wn.be). In Zeeland, it is even C (FZ) and also north of Antwerp it is very widespread (wn.be). It is evidently much rarer in the polders in this district.

- *D. aequiglumis* (Hack. et Arechav.) Parodi: this South American weed has further expanded and is no longer restricted to the area north and east of Ghent. It now roughly occurs in an area from Ruiselede to Overmere and from Eeklo to Deinze (wn.be).

- *Bothriochloa ischaemum* (L.) Keng: this species has not been observed in Belgium for over a century (Verloove 2006a). The species' distribution in the remainder of the Flora area was clarified: it only occurs in Tert. par. and very locally in the southernmost part of Lorr. (Jailon, since 2014; Bonassi *et al.* 2017) (Digitale 2, AFL,

SI-Flore). In Tert. par., this species is localized on the warmest limestone grasslands in the Soisson area (just beyond the Flora limits also in the Vallée de l'Automne and in Valois). Although relatively isolated, these populations could result from a changing climate and therefore considered as a natural range extension.

- *Sorghum bicolor* (L.) Moench: this species is now locally cultivated on a large scale as fodder in the southeastern part of the Flora area (Lorr.) and as an experimental crop elsewhere.

- *S. halepense* (L.) Pers.: this thermophilous weed is naturalized around Antwerp, Brussels, Ghent, the southern part of West Flanders and along several motorways (i.e., rather in and near the larger cities and no longer restricted to the Ghent area) (wn.be). It is much rarer elsewhere and, surprisingly, almost absent from the southern flora districts in northern France (SI-Flore, Digitale2, AFL). As already indicated in NF6, it indeed hardly seems to expand: the distribution map for Flanders from 2006 (AFV) hardly differs from the current one (wn.be).

- *Cynodon dactylon* (L.) Pers.: this thermophilous species is expanding and slightly less rare than indicated in the districts listed in NF6. In Fluv., it is restricted to the Netherlands and completely missing in Belgium. It is not RR in Camp. or. (at most R), particularly in the mining region. In Lorr., on the contrary, it is apparently much rarer than indicated (RR instead of R), both in Belgium and France (wn.be, FLORAINE 2013).

- *Eleusine tristachya* (Lam.) Lam.: this South American weed is sometimes temporarily persisting (e.g. railway yard Melle near Ghent, 2005-2013; wn.be) but probably not really established anywhere.

- *Spartina maritima* (Curt.) Fernald: this species is still present in Zeeland in the Netherlands where it was formerly AC, now RR. There are two extant populations at the Volkerakmeer (Hellegatsplaten) (FZ, H24). In contrast to FG, this species never occurred along the French North Sea coast (Digitale2).

- *Sporobolus indicus* (L.) R. Brown: this pantropical species was not yet keyed-out in NF6 but is much expanding lately. It has been known since the 19<sup>th</sup> century in the Flora area, especially as a wool alien. In the past decades it gradually extended from southern Europe to the north and the current northern limit of its more or less contiguous area is set around the Paris Basin. However, the plant is clearly expanding and is now increasingly observed north of this limit, including in the Flora area. The species is already present there in apparently stable populations, especially in Mar., Fl., Camp., Brab. and Tert. par. (wn.be, Digitale2, SI-Flore; for an overview of populations in northwestern coastal France, see Facon 2017).

- *Eragrostis minor* Host: this species is much more frequent than indicated (rather AC; wn.be), especially in urban agglomerations (H24: AC, FZ: C). In the extreme southwestern part of the territory it is, indeed, largely missing (Digitale2), as indicated in NF6.

- *E. cilianensis* (All.) Vign.-Lut. ex Janchen: this is a very rare and ephemeral alien, it is not naturalizing anywhere (wn.be).
- *E. curvula* (Schrud.) Nees: the species' actual distribution was added. It is established locally in the port of Antwerp since the 1990s and is also more or less consistently occurring to the south of Ghent. In addition, it was recently also detected here and there along the E17 motorway between Ghent and Antwerp, in Koksijde (dunes), in Camp. (south of Breda in the Netherlands and near Genk in Belgium) and near Trier (Germany) (wn.be, wn.nl, FT). At least some of the new growing sites refer to escaped (the species is also grown as an ornamental grass) rather than adventive individuals.
- *E. multicaulis* Steud.: the species' distribution was updated. It is AC in Mar., Fl., Camp. and Brab., especially in urban agglomerations. It is also increasing (but still R-RR) in Mosan (especially valleys), as well as around Paris (outside the Flora area; FG). The species is almost absent beyond these districts, e.g. recorded a few times in Lorr. (Virton, Lagarde) and Ard. (AFL, Digitale2, wn.be, FT).
- *E. mexicana* (Hornem.) Link: this alien is much rarer than indicated in NF6, it is at least as rare as *E. virescens* J. Presl (i.e., RR) (wn.be).
- *E. virescens* J. Presl: this remains a very rare and ephemeral alien that is not naturalizing anywhere. Subsp. *verloovei* Portal has never been recorded again since 2009 when it was found in Gierle (Camp.). It is also long gone in Ghent, from where it was formerly described (wn.be).
- *Tragus racemosus* (L.) All.: a population with more than 100 individuals on a railway site in Melle near Ghent (Fl.) was destroyed after the redevelopment of the site (2011-2013; wn.be). Thus, this species is probably only established in northern France, especially in Tert. par. (e.g. north of Soissons) (Digitale2) and near Metz (FLO-RAINE 2013).
- *Leersia oryzoides* (L.) Swartz: in Fluv., this species is indeed remarkably less common downstream of Roermond (wn.be, wn.nl) as indicated in NF6. In the Flora area it is clearly least rare in Camp. and the Belgian part of Fluv., where it is AR-R rather than R-RR. The species seems on the rise and may also have been overlooked (see also Dijkhuis 2020).
- *Phragmites australis* (Cav.) Trin. ex Steud.: in Brab., this species is not or hardly less common than in Fl., Camp., etc. (C rather than AC) (wn.be).
- *Danthonia decumbens* (L.) DC.: Champ. was not listed in NF6; the species occurs there, although it is RR (SI-Flore).
- *Nardus stricta* L.: this species is in parts of Brab. certainly not RR. It is scattered east of Brussels (roughly from Leuven to Tongeren) and also occurs east of Ypres and around Brussels itself. Its distribution in Brab. actually is comparable to that in Fl.: there too the species is R on the sandy soils and completely absent elsewhere in the district (wn.be).
- *Milium vernale* Bieb. subsp. *scabrum* (L.C.M. Rich.) K. Richt.: this taxon only occurs from South Holland (Voorne) further north, i.e. outside the Flora area, and therefore not really relevant for the Flora area.
- *Phalaris canariensis* L.: this alien is less rare than indicated, AC-AR rather than AR-R (compare with H24: "vaak", FG: "fréquent").
- *Anthoxanthum aristatum* Boiss.: the first Belgian record of this long-naturalized alien species dates back to 1840, not 1881 (Verloove 2006a).
- *Hierochloa odorata* (L.) Beauv.: in Mar. in the Netherlands, the southernmost localities are in Voorne, i.e. outside the Flora area (wn.nl, FZ). Other localities in the southern part of the Netherlands are located in Camp. and Fluv. In its unique Belgian growing site, near Sint-Niklaas (Verloove & Opstaele 2004), the species is still present (wn.be).
- *Koeleria macrantha* (Ledeb.) Schult.: in Eifel centr., this species is less rare than *K. pyramidata*, at most AR instead of RR (FT). In parts of the Flora area, it is locally much increasing since ca. 2010, including on roadsides of motorways (A19, E17, E34, etc.), for instance in the southern part of the province of West-Flanders, etc., often in populations with 1000s of individuals (wn.be). The species is now present in grass seed mixtures and may have been partly sown at some point.
- *Rostraria cristata* (L.) Tzvelev: this thermophilous species was not yet keyed-out in NF6 but is much expanding lately. It is now naturalized locally, especially in Mar. and Boul., and in urban agglomerations (Fl., Brab., etc.) (wn.be, SI-Flore, Digitale2; see also Saintenoy-Simon 2016, Verloove *et al.* 2020a).
- *Holcus ×hybridus* K. Wein: in NF6, this hybrid was said to be possibly overlooked. According to FG it can indeed be found throughout France.
- *Gaudinia fragilis* (L.) Beauv.: in Belgium, this species has only been known since 2001 (Saintenoy-Simon 2004). It was first found in Houyet (Mosan), then, in 2020, in Oudenaarde (Brab.) and Esneux (Mosan) (wn.be). All of these localities appear "natural" (hay meadows) and it is not known whether the species has been neglected before or if it is actually expanding. Since 2012, it has also been known from the Biesbosch (Fluv.) in the Netherlands, just north of the Flora area (H24). Finally, it is also present in Champ., for instance near Châlons-en-Champagne (database CBN Paris), a district not yet mentioned in NF6.
- *Ventenata dubia* (Leers) Coss.: this rare species has indeed disappeared from Mosan and Eifel centr. and is, as a native species, extinct now in the entire Flora area (AFW, FT). However, the species was collected in June 2002 by David Mercier on a coal mining slag heap (terril 116-117) in Dourges (dep. Hauts-de-France; France). In 2010 its presence there could no longer be confirmed (comm. B. Toussaïnt, 01.2021).

- *Arrhenatherum elatius* (L.) Beauv. ex J. et C. Presl subsp. *bulbosum* (Willd.) Schübl. et Martens: in Belgium, this subspecies is apparently least rare in the wider area of Bruges. It perhaps also occurs here and there in Mar., in Belgium as well as in the Netherlands (wn.be, wn.nl; to be confirmed, however). In France, this taxon is also known from Champ., for instance near Vaudesincourt (database CBN Paris).
- *Helictochloa pratensis* (L.) Romero Zarco: in addition to natural occurrences, this species is rarely introduced, e.g. in the Wateringen nature reserve in Lommel (Camp.; wn.be), where it may have been sown a long time ago (just like *Campanula rhomboidalis* and a few other Central European species).
- *Avena barbata* Pott ex Link: this southern species used to be a very rare and ephemeral alien but a large population has persisted since 2017 on the edge of an abandoned railway yard in Wondelgem (Ghent; Fl.) (wn.be). The species is abundantly naturalized on and near railway yards and -tracks in the port of Dunkerque in France where it was already common around 2010 (Stien 2018, pers. obs. author). In identical circumstances, it also occurs in the port of Antwerp (pers. obs. author). In these two areas, both located in Mar., *A. barbata* is clearly naturalized and has probably been overlooked for some time. It is occasionally seen in other districts as well, e.g. at some drive-outs of the A1 motorway near Lille in France (Brab.; pers. obs. author).
- *A. fatua* L. subsp. *septentrionalis* (Malzev) Malzev: the presence of this subspecies in the Flora area is confirmed. There are recent, reliable records from Mar. and Brab. (wn.be).
- *A. strigosa* Schreb.: this species was formerly cultivated for livestock feed but now increasingly as green manure.
- *Deschampsia cespitosa* (L.) Beauv.: this species is in much of Fl. much less common than indicated in NF6 (AC-AR, rather than C-AC). In some regions (e.g. the central part of West Flanders), it is even almost absent. The widespread taxon, at least in the northern part of the Flora area, is probably subsp. *cespitosa*. Two further subspecies, subsp. *parviflora* (Thuill.) Dum. and subsp. *subtriflora* (Lag.) Ehr. Bayer et G. López, are poorly known and possibly overlooked. In France, the former is present at least in Brab. occ., Ard., Lorr., Champ. and Tert. par. (Digitale2, database CBN Paris). In French Lorr., subsp. *parviflora* is not rare at all (AFL), even more common than subsp. *cespitosa*. It could be inferred from FG that the latter is not *a priori* the most widespread subspecies in France. Subsp. *subtriflora* is much rarer and probably limited to Champ. mér. and Lorr. mér. Duluc (2019) checked claims of it from Avesnois (Baives, Trélon; Mosan occ.) and these could not be confirmed as subsp. *subtriflora*.
- *Avenella flexuosa* (L.) Drejer: this species is not absent but RR in Mar. and Champ. It occurs in decalcified dunes in Zeeland (FZ) and is also present in Champ. (SI-Flore).
- *Aristavena setacea* (Huds.) F. Albers et Butzin: this rare species is still present at several locations in Camp., both in Belgium and the Netherlands (wn.be, wn.nl). In Tert. par., it is still known from two locations south of Épernay in Brie: Oger and le Mesnil-sur-Oger (comm. B. Toussaint; also: <https://inpn.mnhn.fr/docs/ZNIEFF/znief/pdf/210000723.pdf>).
- *Aira caryophyllea* L. (subsp. *caryophyllea*): the distribution of this species is similar to that of *A. praecox*. In Fl. and Mar., it is hardly, if at all, rarer than in Camp. (wn.be; see also FZ). In Lorr. sept. and occ., this species was said to be AR in NF6. However, this only applies to the Belgian (northern) part of this district; in French Lorr. this species is RR and even completely absent in the western part of the district, contrary to NF6 (FLORAINE 2013).
- *A. multiculmis* (Dum.) Bonnier et Layens: the exact residence status of this poorly known species is difficult to determine with certainty, but there are certainly arguments to consider this as an indigenous (or at least archaeophytic) species. There are several historical records (much more than current ones) and these were not treated as 'adventive' (Durand 1899). Moreover, the species was originally described by Dumortier in his *Florula Belgica*, supposedly on the basis of Belgian material (see also Eichhorn & Brinkkemper 2018). It occurs at least in Lorr. and historically also in Brab. or. in the Netherlands (Zuid-Limburg). However, in the French part of the Flora area it is apparently missing (SI-Flore).
- *Parapholis incurva* (L.) C.E. Hubbard: the genuine presence of this species was recently confirmed in several places between Calais and Dunkerque (comm. B. Toussaint, 01.2021; pers. obs. author) and also further south, south of the estuary of the Somme river (beyond the limits of the Flora area). In our territory it is thus naturally occurring in France whereas in Belgium it is only adventitious: the species was discovered in Rekem (Camp. or.) in 2009 and has persisted well ever since (along with *Polygonum arenarium*) (wn.be). It was introduced there with talk (a soft inert mineral powder) from Egypt or Pakistan (comm. R. Barendse, 09.2020).
- *Elytrigia* Desv. hybrids: *E. acuta* (DC.) Tzvelev × *juncea* (L.) Nevski subsp. *boreoatlantica* (Simonet et Guinochet) Hyl. is R according to FG on the North Sea coast, whereas according to H24 it is C in the foredunes. The situation on the Belgian coast is unclear. *E. juncea* subsp. *boreoatlantica* × *repens* (L.) Desv. ex Nevski is very common along river Scheldt north of Antwerp (comm. D. De Beer, 10.2019).
- *E. acuta* (DC.) Tzvelev: the distribution and frequency of this species is similar in Camp. and Fl. (introduced in both districts). It occurs naturally only in Mar. (compare with H24, FG).
- *E. campestris* (Godr. et Gren.) Kerguelen ex Carreras (subsp. *campestris*): the genuine presence of this taxon and its distribution in the Flora area remain quite controversial. According to SI-Flore and Digitale2, this species is absent from Tert. par. in the Flora area (although the

database of CBN Paris presents several records from both Champ. and Tert. par.!). In northwestern France its most northerly locality appears to be in Fécamp, north of the Seine estuary (i.e., far beyond the limits of the Flora area). The whole issue requires further study.

- *Lolium temulentum* L.: in recent decades, this weed was only observed as an adventive in port areas (wn.be). It may be extinct in the wild in the Flora area, just like *L. remotum* Schrank. See also FG and H24.

- *Hordeum murinum* L. subsp. *murinum*: this taxon is indeed a little less common in Camp. than in e.g. Fl. but at most AC. It is much commoner there than in e.g. Mosan (wn.be).

- *H. murinum* L. subsp. *leporinum* (Link) Arcang.: this southern subspecies is increasing lately and in the process of local naturalization, especially in Mar., Fl. and Brab. (Verloove & Vercruyse 2020).

- *H. marinum* Huds.: in the whole Flora area, this species only occurs naturally in the Netherlands, both to the north and south of the Scheldt estuary (FZ). It is extinct in Belgium for decades and also disappeared in northwestern France (Digitale2, SI-Flore), except as an introduction (pers. obs. author: Lille, 2021). The northernmost natural locality there is just south of the mouth of the Somme river, at Cap Hornu (Duhamel & Delaporte 2017), i.e. beyond the limits of the Flora area.

- *H. secalinum* Schreb.: this species is omnipresent in Fl. in meadows in the Scheldt and Leie valleys (surprisingly not yet indicated in NF6). Outside of the Mar. district, these appear to be the main distribution centers of the species in Belgium (wn.be).

- *H. jubatum* L.: this alien species is certainly not more common in Mar. sept. than in the rest of Mar., rather on the contrary: at present, the species only occurs as an ephemeral alien in Zeeland (FZ). It is globally least rare in Mar. and Camp. (especially on slag heaps) and indeed is established there, albeit R rather than AR (wn.be). Elsewhere it may be mostly ephemeral.

- ×*Calammophila baltica* (Flügge ex Schrad.) Brand: this intergeneric hybrid is R north of the Scheldt estuary (FZ). Elsewhere in this district, it is RR throughout and it has even completely disappeared in northwestern France (wn.be, Digitale2). It is certainly not in expansion as suggested in NF6, on the contrary.

- *Alopecurus rendlei* Eig: this species was recently (re-) discovered in Pic. (Malzy; Watterlot *et al.* 2009). According to Digitale2, populations in Boul. probably are not natural: « Les populations du Boulonnais constituent un noyau isolé de leur aire générale de répartition (d'indigénat [sic] serait peut-être à confirmer). Presque strictement inféodé à des habitats agropastoraux, il est extrêmement dépendant des méthodes d'exploitation agricole ».

- *A. pratensis* L.: in Mar., this species is at most AC, certainly not AR (compare with FZ: CC; the heatmap of

wn.be shows that the species is just as common there as in Fl., Camp., etc.).

- *A. bulbosus* Gouan: in Mar., at present, this species exclusively occurs in Mar. sept. (the Netherlands: Walcheren and Schouwen). The most important current locality is in Yerseke (FZ). It is extinct elsewhere in Mar. (wn.be).

- ×*Agropogon lutosus* (Poir.) P. Fourn. (*Agrostis stolonifera* × *Polypogon monspeliensis*): this intergeneric hybrid was formerly recorded in Mar. in northwestern France by Bouly de Lesdain (<http://herbariaunited.org/specimen/319611/>). There are two recent locations in the same district in Belgium, from where it is known since 2015, in Kallo (Fort Sint Marie) and Doel (Arenbergpolder) (wn.be). For convenience, a morphological description of this hybrid was added.

- *Polypogon monspeliensis* (L.) Desf.: this alien is also locally established in Brab. and Camp. and in overall expansion in the Flora area (wn.be).

- *P. maritimus* Willd.: this recent newcomer has been established for some time in the Antwerp port area (Verloove & al. 2008) and seems to be increasing lately elsewhere in the Flora area: at present it is known from Mar., Fl., Camp. and Brab. (wn.be).

- *P. viridis* (Gouan) Breistr.: this southern weed is much increasing in urban areas where it has become locally AC (FZ, H24; e.g. in Bruges, Ghent, etc.); it has become much less rare than indicated in NF6 and now also occurs in Camp. (wn.be).

- *Lagurus ovatus* L.: this thermophilous species is less common northward in Mar.: it is much more frequent on the Westcoast in Belgium (this is very obvious from the heatmap of wn.be) and becomes much rarer (and often ephemeral) in Zeeland (FZ). FG also indicates that the species is progressively expanding north in France. Outside of the Mar. district, it is sometimes recorded as an escape from cultivation, rather than as a genuine alien. Moreover, in inland districts (Pic. or. and Tert. par., as mentioned in NF6), it is a mere ephemeral, not a naturalized species (database CBN Paris, Digitale2).

- *Phleum arenarium* L.: in NF6, this species was claimed to be merely R in Tert. par. However, it has completely disappeared from this district (it was formerly present in the Laon area; Digitale2, database CBN Paris). In addition, current inland populations probably always refer to introductions, the species being native only in Mar.

- *P. phleoides* (L.) Karst.: this species appears to have strongly declined in Belgium (Mosan occ.). There are still many records on wn.be, but from only a few locations. Similarly, in Lorr. it is much rarer than indicated in NF6, RR rather than AR (FLORAINE 2013), although it is slightly less rare in some areas, e.g. in the Meuse department (Millarakis 2013).

- *Crypsis alopecuroides* (Pill. et Mitterp.) Schrad.: this rare species has reappeared in the Flora area where it was considered to be extinct. It is still known from Lac du

Der-Chantecoq in French Lorraine and in the same district it was also found in Réchicourt-le-Château east of Nancy (Pax 2018a), the latter locality just beyond the limits of the Flora area. Near (or rather just beyond) the Flora limits it is also known from Champ. mér. (Forêt d'Orient) and Tert. par. (e.g. from Pont-sur-Seine) (database CBN Paris). This species is flowering later than indicated in NF6 (from June to September). According to FG, it flowers from July onwards but further north it only starts flowering from August onwards (see also Pax 2018a).

- *Calamagrostis arundinacea* (L.) Roth: in Eifel centr., this species is slightly less rare than indicated in NF6, R-RR rather than RR (FT). It is also sometimes introduced in the Flora area. There are some recent reports of escaped individuals in urban areas in Fl. (Ghent, Boom; wn.be). The species is sometimes offered for sale in the horticultural trade as *C. brachytricha* Steud., a heterotypic synonym.

- *C. canescens* (Weber) Roth: in NF6, this species is explicitly mentioned from Fluv. as being least rare there (AR). However, this does not appear at all from the actual distribution map, rather on the contrary. H24 also does not mention the species specifically for Fluv. and there are hardly any observations from there (wn.nl).

- *C. epigejos* (L.) Roth: this species is said to be C in Mar. (especially in coastal dunes) in NF6. Strangely enough, this is not apparent from the map of wn.be (heatmap). The species is actually more common in Camp. and even in Brab. centr.; in Mar., it is more common north of Antwerp than on the coast. However, H24 also indicates the species to be most common in coastal dunes.

- *C. pseudophragmites* (Haller f.) Koeler: this rare species formerly occurred in Fluv. in the Netherlands but it is extinct for more than a century now. However, H24 reports that the species “may still be present” but not recognized. The southernmost growing place was in Gorinchem, at the northern border of the Flora area (or rather just outside of it).

- *Agrostis scabra* Willd.: this American weed was observed in 2015 at a railway yard in Haren (Brussels; Brab.) (wn.be), but it is unclear whether the species is naturalized there. Since 2014, the species is also known from a railway site in Nuth in Zuid-Limburg in the Netherlands (wn.nl; BR!).

- *A. vinealis* Schreb. (subsp. *vinealis*): this (sub-) species occurs in Mar at least since the 1980s, especially north of the estuary of the Scheldt river (FZ). In this district it is also known in Belgium, at least from the Hannecartbos (comm. M. Leten) and perhaps also in D'Heye in Bredene (decalcified dunes). In France it is apparently missing in Mar. (Digitale2).

- *A. vinealis* Schreb. subsp. *ericetorum* (Préaubert et Bouvet) Valdés et H. Scholz: the distribution of this subspecies in the Flora area was not given in NF6, mostly because it is poorly known. It is certainly present in France, more precisely in the districts Brab. occ. (e.g. around

St.-Omer and Valenciennes) and Ard. (Vouziers, Sedan) (SI-Flore, FG, Digitale2). According to Portal (2009) it is certainly also present in Belgium (without further details). Two collections in the herbarium of Meise Botanic Garden (BR) were annotated by him as “proche de [FV: close to] la sous-espèce *ericetorum*”: Gelrode, 08.07.1938, *E. Michiels* s.n. (BR 1144825) and Aarschot, ‘s Hertogenheide, 14.06.1937, *E. Michiels* s.n. (BR 1144889).

- *A. ×fuilladeana* Lambinon et Verloove: this hybrid appears to be much rarer than initially thought (RR rather than R). There are hardly any recent observations of it and most of them are from Camp. from which district the hybrid was not yet reported in NF6. It is also possible that the plant is overlooked.

- The presence of *A. castellana* Boiss. et Reuter, one of the parents of the aforementioned hybrid, is likely. According to Portal (2009), it also occurs in Belgium. A collection from a railway site in Kortemark (FV 5665; BR!) from 22.06.2004 “semble correspondre à *Agrostis castellana*” according to R. Portal.

- *Apera spica-venti* (L.) Beauv.: this species is in Mar. and Lorr. clearly less rare than in e.g. Mosan, AC-AR rather than AR-R (wn.be).

- *A. interrupta* (L.) Beauv.: the distribution of this alien was specified (no distribution details were given in NF6). It is primarily found in Mar., Fl., Camp., Brab. occ., Mosan and Lorr. (R-RR). Outside these districts it is RR or missing (wn.be, H24, FG).

- *Sesleria caerulea* (L.) Ard.: in Brab. or., this species is at present restricted to Belgium, it apparently disappeared from Zuid-Limburg (the Netherlands) in 1986 (H24). The species is also increasingly planted in public green and was found as an escape from such plots in Mechelen and Mol since 2015 (wn.be).

- *Melica ciliata* L.: this species is nowadays often planted as an ornamental in public green and very easily escapes in urban areas (Ghent, Brussels, Antwerp, etc.; wn.be). It is possible, however, that escaped plants belong to non-native infrataxa. In Lorr., this species is much rarer than indicated in NF6 (RR instead of AR-R; FLORAINE 2013).

- *M. uniflora* Retz.: this species does occur as a stinzenplant (e.g. FZ; also in arboreta, parks, etc.). Yet, there may also be populations beyond its known native distribution range (e.g. in Camp.) that could as well be native, e.g. in the Pulderbos in Zandhoven (wn.be), where the species is found in conditions identical with those found in its native area.

- *Brachypodium pinnatum* (L.) Beauv.: this species is sometimes found as an introduction. In Camp., there are several localities and in at least some places the species even seems well established (e.g. in Lommel; wn.be).

- *B. sylvaticum* (Huds.) Beauv.: this species appears to be slightly expanding lately and is in parts of e.g. Fl., Camp. and even Ard. slightly less rare than indicated, AR-RR rather than R-RR (wn.be).

- *B. phoenicoides* (L.) Roem. et Schult.: this thermophilous grass species was discovered on a slag heap in Genk in 2016 and is well naturalized there (Verloove & Barendse 2019). Subsequently, the species was also observed in a mesophilic calcareous grassland in Warnant-Dreye in Hesbaye (Brab. or.) (comm. Jean-Yves Baugnée, 06.2018). The presence of this alien species in a natural habitat is very surprising. In 2021, it was also observed in a disturbed chalk grassland in La Veuve in Champ. (database CBN Paris; comm. P. Amblard, 01.2022); its status (naturalized?, ephemeral?) in the latter locality requires additional observations.
- *Cynosurus cristatus* L.: the distribution as given in NF6 largely contradicts the current distribution map (wn.be). In Mar. (polders) it is not at all rarer than elsewhere, according to FZ it is even CC. Also in Brab. occ., it is not rarer than elsewhere in Brab. (the species is C-AC throughout the district). In the main part of Camp., it is much rarer than in other districts, far from C-AC (see also H24: R). In reality, the distribution is very uneven. In Fl., for instance, it is locally quite common (e.g. around Ghent) but completely absent elsewhere. Thus, it is C-AC in Mar., Brab. and AR-R in Camp. (wn.be).
- *Sclerochloa dura* (L.) Beauv.: this species naturally occurred only in the Grand Duchy of Luxembourg where it is indeed extinct (Colling 2005). In northern France, it is completely absent from the Flora area, the most northerly current locality is in the Seine valley (in La Cerlangue; Digitale2, AFL), far beyond the Flora limits.
- *Dactylis glomerata* L. subsp. *oceanica* G. Guignard: this taxon was already known from coastal halophilous habitats in northwestern France [as var. *abbreviata* (Link) Lange in NF6]. It has also been confirmed from Zeeland in the Netherlands (H24, wn.nl). This record was not yet included in FZ because the determination only took place after publication, although the find dates back to 2009 already.
- *Briza maxima* L.: these days, this species is rather an escape from cultivation than a genuine adventive.
- *B. minor* L.: this species was said to be RR in Tert. par. However, it has completely disappeared from the French part of the Flora area (SI-Flore). The last remaining location is in Verneusses, south of the Seine river (Digitale2) and thus far beyond the Flora limits.
- *Poa infirma* Kunth: this thermophilous species was only recently detected in the Flora area where it probably passed unnoticed for some time. It was first found in camp sites (Verloove & al. 2020a), subsequently also in other suitable habitats, especially in Mar. and Fl. where it is at most R (wn.be, wn.nl; FZ).
- *P. palustris* L.: this species is by far least rare in Camp. and hardly rarer in large parts of Brab. (not only in occ.) and Fluv. (both in Belgium and the Netherlands). In Fl., it is certainly not rarer than in e.g. Mosan and Ard., especially between Ghent and Antwerp but also e.g. around Bruges (wn.be). In Fl., it is more often found in disturbed places, including railway yards (see also H24), than elsewhere in the Flora area.
- *P. trivialis* L. subsp. *sylicola* (Guss.) Lindb. f.: this taxon was reported in NF6 as probably occurring in Mar. This was surprising, given the subspecies' main distribution in the Mediterranean area. R. Portal has seen the corresponding herbarium material and it rather belongs to an intermediate form, perhaps even to subsp. *trivialis* (Portal 2005). The original record from Belgium was published by Duvigneaud & Lambinon (1963).
- *P. nemoralis* L.: this species is found throughout Camp. and is hardly rarer in much of Fl.; in both districts it is AC-AR rather than AR (wn.be). It is indeed much less common in Mar. but RR is exaggerated; it is at most R there (e.g. AR according to FZ).
- *P. pratensis* L. subsp. *angustifolia* (L.) Gaudin: this subspecies is widely distributed in Camp. (wn.be), where it may have previously been overlooked.
- *P. pratensis* L. subsp. *irrigata* (Lindm.) Lindb. f.: in Camp., this subspecies is not rare at all (wn.be) although, just like for subsp. *angustifolia*, some observer bias may be involved (a local botanist, R. Barendse, is familiar with these two taxa).
- *P. chaixii* Vill.: this species is still reported for Zuid-Limburg in H24, but it may have disappeared there (absence of recent observations; wn.nl). The species did occur there historically and, most likely, naturally (contrary to the assumption in NF6). Jansen (1951) only reported finds from "country estates" further north in the Netherlands as probably introduced.
- *P. compressa* L.: this species is often much more frequent in urban environments than in the surrounding countryside, also in districts where it is otherwise R-RR. In Fl., for instance, it is rather common in Antwerp and Ghent. In Camp. it is at most AR everywhere, even outside urban areas. In Mar., on the contrary, its frequency may have been overestimated in NF6, even in the polders (wn.be).
- *Bromus arvensis* L.: according to H24, this species is naturalized in Brab. or. (Zuid-Limburg) and Fluv. in the Netherlands.
- *B. racemosus* L.: this species is said to be AR-R in most districts in NF6 but this could be a gross overestimation since the species appears to have declined a lot lately (wn.be). It is often difficult to distinguish from *B. commutatus* Schrad. and, as a result, the genuine distribution and frequency of these two species in the Flora area are badly understood.
- *B. commutatus* Schrad.: this species was formerly found in Eifel centr. but it has disappeared from that area (FT). It is certainly present in Ard. occ., where at least subsp. *decipiens* (Bomble et H. Scholz) H. Scholz occurs (wn.be). The overall distribution of the latter subspecies is unknown. It is sometimes seen as a casual alien in port areas but also occurs as a weed in cereal fields, especially in

Lorr. sept. and Ard. occ. (numerous records by I. Jacobs, ID confirmed by U. Amarell; see also FT).

- *B. secalinus* L.: in NF6, this species was said to be absent or gone from Champ.; however, it is still present there, albeit R-RR (SI-Flore, database CBN Paris). The current distribution maps, especially those of wn.be, actually give a very distorted picture. The species is not rare at all in Flanders (the region, not the district), but all these records refer to casual occurrences in ports and other disturbed areas (roadsides, rough ground, etc.). Only in Lorraine the species still seems to occur quite often in fallow fields, at least in the Belgian part (to a lesser extent also here and there in Mosan). Thus, the sharp decline of the species, as indicated in NF6, relates to its occurrence in fields; as an alien, the species is increasingly being found.
- *B. grossus* Desf. ex DC.: according to wn.be and AFW, this rare species is still present in Belgian Lorraine, Mosan, Ard. and Brab. or. (only in Belgium, in Eben-Emael; it has disappeared in Zuid-Limburg in the Netherlands for almost a century, H24). The species has also disappeared in all of northern France (SI-Flore, Digitale2), including in Boulonnais. Formerly, it was also known from Eifel centr. (FT).
- *B. bromoideus* (Lej.) Crépin: this Belgian semi-endemic species was in 1883 also found in Gulpen in Zuid-Limburg in the Netherlands (H24). The record is considered to be part of the natural distribution area (Atlas-NL). Jansen (1951), on the other hand, referred to the endemic nature of the species in Belgium (occurring in a small region southwest of Liège), implicitly indicating that the Dutch record was not part of it (introduced?).
- *B. lepidus* Holmberg: the native area of this species remains uncertain. In NF6, it was said to be from southwestern Europe whereas FG says it is from northwestern Europe.
- *B. hordeaceus* L. subsp. *thominei* (Hardouin) Br.-Bl.: this subspecies is slightly less common than indicated in NF6, AC-AR rather than AC. It is considered to be R in northwestern France (Digitale2) and the same applies to Zeeland (FZ). Also on the Belgian coast there are areas where it is lacking (wn.be). In the interior, as an adventive, it is very exceptional; recently (2020) it was observed, for instance, in a sandy lawn in Ghent (wn.be). According to FG, this taxon mainly occurs from Caen southwards, which implies that more northern populations, including those in the Flora area, are relatively isolated and their nativity uncertain.
- *B. pseudothominei* P.M. Smith: this poorly known species is also known from Brab. (wn.be), a district not mentioned in NF6. In fact, most of the records are from this district, mainly from the wider area around Kortrijk, although there is undoubtedly an observer bias (a local botanist, D. Derdeyn, being familiar with this species). Its genuine distribution in the Flora area remains unknown.
- *Bromopsis ramosa* (Huds.) Holub: this species is much less common than indicated in NF6 in Eifel centr., AR rather than AC. It is in fact more rare than *B. benekenii*

(Lange) Holub in the Trier area (FT). It is also sometimes introduced, including in Mar. (Hannecartbos) and Camp. (multiple locations) (wn.be). However, in most of such cases it is unclear whether *B. ramosa* s.str. or *B. benekenii* is involved. To be checked.

- *B. benekenii* (Lange) Holub: in Eifel. centr., this species is slightly less rare than *B. ramosa*, at most AR instead of RR (FT). Its presence or absence in Tert. par. in the Flora area remains uncertain: it is absent judging from the map provided by SI-Flore, whereas according to FG it is present in the Paris Basin. The CBN Paris database also confirms its present in this district, e.g. in Montagne de Reims.
- *B. inermis* (Leyss.) Holub: in Brab., this species was said to be restricted to the central and western part of the district. However, there are hardly any fewer locations in Brab. or., mostly between Tongeren and Maastricht (wn.be). This species is also present in Boul., where it is known from at least two localities (SI-Flore).
- *Anisantha tectorum* (L.) Nevski: in NF6, this species was said to be R in Camp. but it is at most AR there and thus falls within the first rarity category (AC-AR). The species occurs in a large part of the district with dense distribution centers around Mol and Genk (heatmap wn.be). In Pic., Ard. and Eifel centr. it is indeed remarkably rarer (R) (wn.be, FT, Digitale2).
- *A. diandra* (Roth) Tutin ex Tzvelev: in NF6, this species was said to be merely R in Champ. In reality, it is almost absent there and thus much rarer. In fact, in inland parts of northern France, it is much less rare in Tert. par. than in Champ. (database CBN Paris).
- *A. rigida* (Roth) Hyl.: this species and *A. diandra* (Roth) Tutin ex Tzvelev are very poorly known in the Flora territory. It seems that only *A. diandra* is naturalized there, while *A. rigida* is much rarer and probably merely ephemeral. The issue requires further study.
- *A. madritensis* (L.) Nevski: this southern species is now locally naturalized in the Flora area where it is known from at least four districts. In Mar., it was recently found in several locations around Ostend and between Zeebrugge and Knokke-Heist (wn.be) and in Dunkerque (France; Stien 2018) and it is also found in Zeeland (the Netherlands) although it is probably not yet fully established there (FZ). In the port of Ghent it occurs since about 20 years by railway tracks. In Brussels (Brab.) it is locally common on gravel of the tramway, especially in Jette (wn.be). The species also occurs in Fluv. in the Netherlands (H24, wn.nl).
- *Ceratochloa cathartica* (Vahl) Herter: this American weed is indeed locally naturalizing in the Flora area, especially in Fl. and Brab. (wn.be).
- *C. sitchensis* (Trin.) Cope et Ryves: this species is more widely distributed in the Flora area than indicated in NF6. It is naturalized now in Fl., Camp. and Brab. (wn.be). It is also established in Tert. par. but only outside the Flora area (SI-Flore). It is sometimes observed as a casual alien

elsewhere, for instance in Mosan and Mar. (France) (wn.be, Digitale2).

- *Catabrosa aquatica* (L.) Beauv.: this species is clearly the least rare in Brab. and Lorr. sept., and only somewhat rarer in Mosan. Yet, it is also relatively widespread in Fl. where it is R-RR rather than RR (wn.be). In Lorr., it is much less rare in the northern (Belgian) part of the district than further south in France where it is RR (FLORAINE 2013).

- *Catapodium rigidum* (L.) C.E. Hubbard: in addition to the districts mentioned in NF6, this species is sometimes found elsewhere as an introduction (either ephemeral or locally naturalized), e.g. in Fl. (port area north of Ghent) and Camp. (former coal mining area) (wn.be). In Brab., it is native in the eastern part (on chalk), whereas in the central part (Brussels) it is established in several places along tramway tracks (wn.be).

- *C. marinum* (L.) C.E. Hubbard: in NF6, this species was said to be sometimes found as an introduction outside of Mar. However, there are hardly any indications for this whatsoever. The species was found along tracks in the port of Antwerp, but this area also belongs to Mar.

- *Micropyrum tenellum* (L.) Link: there is a clear distinction between a series of records in Camp. in the Netherlands (railway yard in Weert, 1983-89; wn.nl, Bruinsma 1989), from where it was not confirmed in the past 30 years, and the populations in the former coal mining region in northwestern France where this species is widely distributed and established. In the Flora area, this species is perhaps only naturally occurring in the Moselle valley in Lorr., at present solely between Épinal and Nancy, so in the extreme southeastern part of the Flora area (comm. S. Antoine & M. Voirin, 02.2021). In its historical localities in Lorr. (Fliche & Le Monnier 1883, synthesizing previous data of Berher, Mougeot, etc., Petitmengin 1907 and Duvigneaud & Mullenders 1965), the species has not been recorded for quite a long time. Finally, there is also a record from northwest of Soissons in Tert. par. (ephemeral?) (Digitale2).

- *Glyceria notata* Chevall.: this species was said to be RR in Fl. in NF6 which is certainly not correct (except perhaps on sand) (wn.be). In comparable regions in the Netherlands it is considered to be AC (H24). However, this species and *G. declinata* Bréb. are still very often confused and their genuine distribution in the Flora area should be reviewed.

- *G. canadensis* (Michaux) Trin.: in 2008, this North American species would have been discovered in a second location in Ard., near Bra (AFW). To be confirmed. In Waimes, from where it was first reported in Belgium, it was recently reported to be expanding (Wastiaux & Gérardy 2019).

- *G. striata* (Lam.) A.S. Hitchc.: this North American invasive species is much expanding lately, especially in northern France. In addition to the districts from where it was already known, it is also naturalized in Pic. (west of Arras) and Champ. It is known since quite a long time

from the Paris area (Tert. par., including the territory covered by the Flora; also in Montagne de Reims) (Digitale2, database CBN Paris) although this district was apparently left out in NF6. In 2017, it was also recorded for the first time in Belgium: several populations are known now in the Rochefort area in Mosan (Weyembergh 2017). Vernier (2015) and Bonassi *et al.* (2017) provide an overview of records in French Lorraine (see also FLORAINE 2013 and Saint-Val 2018). The species is thought to have been introduced in the Flora area by American troops during World War I (Vernier 2014).

- *Puccinellia capillaris* (Liljeb.) Jansen: this species was said in NF6 to be restricted to Mar. sept., i.e. north of river Scheldt in the Netherlands. However, there are also records south of the Scheldt estuary in the Netherlands, although the species has become much rarer in recent years in the whole of Zeeland (FZ). Moreover, the species is also found in Belgium (AFV; comm. M. Leten 02.2021), at present for instance in the Zwin nature reserve, Baai van Heist, Uitkerkse Polders, Lissewege, etc. The first records date back to 1977 already (D'hose & De Langhe 1977). In France, *P. capillaris* is missing (FG). Compared with *P. distans* (Jacq.) Parl., it is more often found on sand (FZ).

- *P. fasciculata* (Torr.) E.P. Bicknell: this species has decreased lately in the Netherlands (Zeeland) and now has become R rather than AR (FZ, H24). The species apparently has also completely disappeared in northwestern France (SI-Flore, Digitale2). In Belgium, it mainly occurs on the East coast (comm. M. Leten 02.2021), adjacent to the populations in Zeeland; it is slightly less rare there than elsewhere in Mar. (wn.be).

- *Pseudosclerochloa rupestris* (With.) Tzvelev: as a native, this species is extinct now in the entire Flora area. It was last seen in Zeeland in 1954 (FZ) and is also long gone in northwestern France (FG, SI-Flore, Digitale2), where it was last recorded in 1965. In recent years, it was only observed a single time, in the Antwerp port area, doubtlessly as an alien.

- *Vulpia fasciculata* (Forssk.) Fritsch: this species is considerably rarer in Zeeland in Mar. than in Belgium and France, R (FZ) or even RR (H24). In Belgium, it is also clearly more common on the West coast than further north (wn.be).

- *V. membranacea* (L.) Dum.: this is still rarer than the previous species in Zeeland (RR). In Pic., it is apparently completely missing at present (SI-Flore, Digitale2); previous claims (as mentioned in NF6) perhaps referred to ephemeral records there.

- *V. bromoides* (L.) S.F. Gray: in Eifel centr., this species probably has disappeared, it was no longer seen after 1980 (FT).

- *V. myuros* (L.) C.C. Gmel.: this species was said to be AC-AR in the entire Flora area in NF6. However, it is almost completely lacking in Eifel centr. (RR; FT).

- *V. ciliata* Dum. subsp. *ciliata*: in Mar., this taxon is no longer restricted to France: there are also confirmed finds on the West coast in Belgium (De Panne, Nieuwpoort; wn.be) and even in Zeeland, although most of the claims are poorly documented there (FZ). This subspecies has been present in the Ghent port area (Fl.) for many years, sometimes with thousands of plants (wn.be). It is probably largely overlooked elsewhere and seemingly in recent expansion.

- *V. unilateralis* (L.) Stace: in NF6, ‘Champ.’ occurred twice in the enumeration of districts (as R and RR). According to SI-Flore, there has been a sharp decline, only a few locations are left there (rather RR thus). In Brab. occ., this species is no longer restricted to France: it has been known since 2005 from several quarries between Tournai and Mons as well (AFW, wn.be).

- *Festuca heterophylla* Lam.: this species has apparently disappeared completely in Eifel centr. (FT). It has also been reported from other districts (Pic., Champ., Brab. or.) (SI-Flore, H24) but it is unclear whether these claims are reliable. In these regions, the species occurs on lime, while the species is usually rather confined to (slightly) acidic soils.

- The potential presence of *F. microphylla* (St-Yves) Patzke in the Flora area was indicated in NF6 (as *F. rubra* L. subsp. *microphylla* St-Yves). This is rather unlikely on the basis of current insights (SI-Flore, Digitale2, FG, etc.). According to FG, this species doubtfully occurs in France outside of the Massif Central and the Pyrenees.

- *F. trichophylla* (Ducros ex Gaudin) K. Richt.: this species from the *F. rubra* group was recently discovered in the southeastern part of the Flora area, where it may have been overlooked before. It is found in hygrophilous grasslands and its presence was confirmed from Champ. (Sompuis) and Tert. par. (Cormicy, le Mesnil-sur-Oger) (database CBN Paris; comm. P. Amblard & R. Boeuf 12.2021).

- *F. ovina* L. subsp. *guestfalica* (Boenningh. ex Reichenb.) K. Richt.: in Belgium and adjacent territories in the Netherlands and Germany, this taxon is confined to zinciferous soils in Mosan or. These populations belong to a particular race (“subsp. *calaminaria*”) that is a mere ecotype and thus of no taxonomic value. In fact, subsp. *guestfalica* occurs on various types of soils, although probably predominantly on calcareous substrates (like in the type locality). In northern France it has been documented from various areas (Mosan, Ard., Champ.; SI-Flore) and populations of subsp. *hirtula* (Hack. ex Travis) M.J. Wilkinson, a taxon typically found on acidic soils, from Boul. (as mentioned in NF6) possibly also rather belong to subsp. *guestfalica*. According to Jauzein & Nawrot (2011) populations of *F. heteropachys* (St-Yves) Patzke ex Auquier in Île de France (beyond the limits of the Flora area) in part also belong to *F. ovina* subsp. *guestfalica*.

- *F. ovina* L. subsp. *hirtula* (Hack. ex Travis) M.J. Wilkinson: this taxon from acidic substrates was mentioned from

Boul. in NF6. This claim requires confirmation. However, this subspecies occurs in quantity in decalcified dunes near Ostend in Belgium (nature reserve D’Heye), at least since the 1980s (comm. M. Leten 06.2017, ID confirmed by R. Haveman). The locality harbored a horse racing track in the 1930s and, on that occasion, this taxon may have been sown as a lawn grass. However, the abundance of this grass in an otherwise very natural habitat (with e.g. *Danthonia decumbens*, *Calluna vulgaris*, *Jasione montana*, ...) and the former presence of the very same taxon in other relict dune grasslands in De Haan (Verboven 1980), suggest that it may as well be a remnant of a historic and therefore possibly indigenous population.

- *F. ovina* L. subsp. *ovina*: according to Ronse & Arndt (2014) some of the Belgian herbarium specimens of *F. valesiaca* Schleich. ex Gaudin from zinciferous soils (collected in 1912 and 1936 in Pepinster and Plombières) belong to this taxon.

- *F. heteropachys* (St-Yves) Patzke ex Auquier: this species is recorded in an area northeast of Paris (Tert. par., but only outside the Flora area; SI-Flore). It is unclear whether these populations indeed belong to this species or rather to *F. ovina* subsp. *guestfalica* (as suggested by Jauzein & Nawrot 2011).

- *F. lemanii* Bast.: this species is indeed sometimes found outside the districts mentioned in NF6, for instance in Fluv. in the Netherlands (Haveman 2005b).

- *F. valesiaca* Schleich. ex Gaudin: in addition to the confirmed historical presence of this Central European species on zinciferous soils in Mosan or. (before 1830), a naturalized population was recently also reported from the domain of Meise Botanic Garden (Ronse & Arndt 2014). It was hypothesized that this species has probably been introduced as wood lawn neophyte during the 19<sup>th</sup> century.

- *F. pallens* Host: this species formerly also occurred in Brab. or. in the Netherlands (Haveman 2005a).

- *F. marginata* (Hack.) K. Richt.: according to the map of SI-Flore, this species is not rare just north of Paris but evidently outside the Flora area.

- *F. patzkei* Markgr.-Dann.: in Lorr., this species is RR instead of AR-R. FLORAINE (2013) only indicates two nuclei, one north of Thionville, the second south of Nancy. In the Grand Duchy of Luxembourg the species is considered to be ‘endangered’ (Colling 2005).

- *F. polesica* Zapal: in NF6, this species was said to reach its southwestern limits in Belgium and the Netherlands. However, it never occurred in the Netherlands (Haveman 2005a).

- *Schedonorus arundinaceus* (Schreb.) Dum.: this species is in Fl. and Camp. hardly rarer than in e.g. Brab., at most AC-AR (wn.be).

- *S. pratensis* (Huds.) P. Beauv.: this species is a little less rare in Fl. than stated in NF6, AC-AR rather than AR (wn.be).

## 62. Ceratophyllaceae

• *Ceratophyllum submersum* L.: in Brab., this species is not restricted to the western part of this district: there is at least one confirmed record from Sint-Truiden (wn.be) and it is also known from Hollogne-sur-Geer (Wastiaux 2019). In Lorr., where it was thought to be limited to the eastern portion of the district, the species was recently also reported from the Grand Duchy of Luxembourg, thus in Lorr. sept. (Krippel & Colling 2016, Krippel *et al.* 2020).

## 63. Papaveraceae

• *Meconopsis cambrica* (L.) Vig.: this ornamental is increasingly escaping and will probably naturalize in the near future. In addition to the districts already mentioned in NF6, it was recently also observed in Mar., Camp. and Ard. (wn.be).

• *Corydalis cava* (L.) Schweigg. et Körte: this species has completely disappeared from Eifel centr. (FT). In Mosan, it was already known from Entre Sambre et Meuse and Aix-la-Chapelle; there are, in addition, also several localities near Esneux (wn.be). This species is also known from several localities in Zuid-Limburg (Brab. or.) in the Netherlands (wn.nl) where it is even considered to be possibly native (H24).

• *Ceratocarpus claviculata* (L.) Lidén: this species is slightly expanding and has also been recorded in Lorr. (both in Belgium and the Grand Duchy of Luxembourg; Krippel & Colling 2012) and Ard. (wn.be), two districts from where it was not yet reported in NF6.

• *Pseudofumaria lutea* (L.) Borkh.: in Fl., this species is AC-AR rather than R-RR (wn.be).

• *P. alba* (Mill.) Lidén: this species has also been recorded in Camp. (wn.be) and Champ. (SI-Flore, database CBN Paris).

• *Fumaria capreolata* L.: this species is slightly expanding in some parts of the Flora area, for instance in Mar. and Fl. where it has become AR-R, rather than RR (wn.be).

• *F. muralis* Sond. ex Koch: the same applies to this species that is least rare in Mar., Fl. and Camp. (AR) (wn.be). It has also been recorded in Ard. and Champ., two districts from where it was not yet known (database CBN Paris). In Lorr., it is restricted to the northern (Belgian) part of this district (FLORAINE 2013).

• *F. officinalis* L. subsp. *wirtgenii* (Koch) Arcang.: the distribution of this subspecies in the Flora area, as far as distinguishable, remains unknown. It was recently reported from Ard. and Eifel centr. in FT.

## 65. Berberidaceae

• *Berberis aquifolium* Pursh: this invasive ornamental shrub is by far least rare in Mar., Fl. and Camp. (AC-AR) (wn.be).

## 66. Ranunculaceae

• *Caltha palustris* L. var. *araneosa* v. Steenis: this variety, as far as distinguishable, also occurs in Mar. sept., in

the Netherlands (FZ). The species itself (var. *palustris*) is R rather than RR in Mar. (wn.be, FZ).

• *Helleborus foetidus* L.: this species also occurs in Fl., Camp. and Ard., districts from where it was not mentioned in NF6, although it is doubtfully native there (wn.be).

• *H. viridis* L. subsp. *occidentalis* (Reut.) Schifff.: this taxon is not RR but completely missing in Belgian and French Lorr. (FLORAINE 2013, Vernier 2020, wn.be) and has also disappeared from Lorr. in the Grand Duchy of Luxembourg (comm. G. Colling May 2021).

• *Eranthis hyemalis* (L.) Salisb.: this species is also more or less naturalized in Mar. and Fl. (wn.be, FZ) and in Lorr. it is not restricted to the northern part of this district (FLORAINE 2013, Antoine 2020a). It recently gained in popularity again as an ornamental and doubtlessly also occurs in other districts (e.g. in Athis in Champ.; database CBN Paris).

• *Nigella arvensis* L.: in NF6, this very rare and much declining species was said to be RR in Lorr., Champ. and Tert. par. However, the most recent records in northern France date back to the 1980s and 1990s according to SI-Flore (see also Digitale2, database CBN Paris). Yet, in Lorr., Vernier (2020) still mentioned the species for Côte de Moselle and FLORAINE (2013) for the region around Toul. It may have disappeared almost completely from the Flora area.

• *Aquilegia vulgaris* L.: in addition to the districts where this species naturally occurs, it is frequently observed as an escape elsewhere (including cultivars) (wn.be).

• *Aconitum lycoctonum* L.: in addition to the districts where this species naturally occurs, it is occasionally observed as an escape or introduction elsewhere. A more or less established population is known for instance from Forêt de Soignes in Uccle (Brab.) since 2008 (wn.be).

• *A. napellus* L. subsp. *lusitanicum* Rouy: in Lorr., this subspecies is not only known from the northern part of the district: it also occurs in Gondrecourt in Lorr. mér. (FLORAINE 2013).

• *Anemone ranunculoides* L.: in addition to the districts where this species naturally occurs, it is occasionally observed as an escape or introduction elsewhere (wn.be).

• *A. apennina* L.: this ornamental is historically known from Beaumont in Mosan occ. where it is naturalized for many decades. It has gained in popularity again and is now increasingly observed in other parts of the Flora area as well, as a casual or locally naturalizing escape (wn.be).

• *A. hepatica* L.: a small naturalized population of this species was discovered in Ganshoren (Brab.) in 2013 (wn.be). Antoine & Dardaine (2016) presented an overview of its actual presence and foliar variation in Lorr.

• *A. pulsatilla* L.: in addition to the districts where this species naturally occurs, it is occasionally observed as an escape or introduction elsewhere (wn.be).

• *Clematis tangutica* (Maxim.) Korsh.: in NF6, this ornamental was already reported from the banks of river

Scheldt north of Antwerp. It has occasionally been observed elsewhere (wn.be) but appears to be strictly ephemeral in the Flora area.

- *C. recta* L.: it is uncertain whether or not this species still occurs in the Flora area. In NF6, it was mentioned from three localities (Fraipont, valley of river Moselle and Mailly-le-Camp in France). In Belgium, it seems to have not been observed in the past decades, not even in Fraipont (wn.be, AFW). According to SI-Flore and the CBN Paris database, there are no reports from northern France either and the species was last seen in the Grand Duchy of Luxembourg in 1899 (MNHN-Lux). Vernier (2020) still mentioned the species from Côte de la Moselle but it is unknown if this also refers to recent records (the species was not mentioned in FLORAINE 2013).
- *C. vitalba* L.: this species is increasing lately, at least in parts of the Flora area where it was considered to be rare in the past, for instance in Camp. where it is AC-AR rather than RR (wn.be). In Mar., it is not more frequent in the southern part of the district (R vs. RR): in Zeeland, for instance, it is even considered to be AC (FZ).
- *C. viticella* L.: this ornamental is rarely naturalized in the Flora area, especially in river valleys (although it may have disappeared from some of them). In addition to those already mentioned in NF6, the species is also naturalized along river Moselle in Wincheringen (Lorr.) in Germany (FT). It is occasionally seen elsewhere as an escape and might naturalize locally, for instance along river Leie where it was recently observed in two nearby localities (Marke and Wevelgem; wn.be) and near Maastricht in the Dutch part of Fluv. (H24, wn.nl).
- *Myosurus minimus* L.: this species is less rare in some districts than indicated in NF6: in Mar. and Camp. it is R rather than RR (wn.be). In Zeeland, for instance, it is even considered to be AC (FZ).
- *Adonis flammea* Jacq.: according to SI-Flore, this species was only observed more or less recently in Lorr., whereas it has disappeared elsewhere in northern France (see also Digitale2).
- *A. aestivalis* L.: according to SI-Flore, this species was only observed more or less recently in Lorr., whereas it has disappeared everywhere else in northern France (see also Digitale2).
- *A. annua* L.: according to SI-Flore there are only historical records for this species in Tert. par., its actual presence there requires confirmation.
- *Ranunculus lingua* L.: in addition to the districts where this species naturally occurs, it is occasionally observed as an escape or introduction elsewhere (wn.be).
- *R. ophioglossifolius* Vill.: in addition to the very rare occurrences in northwestern France, this species is also known since the 1990s from exposed pond margins southwest of the village of Villeret, at the limit of Hampigny (Lorr. sud-occ.), quite disjunct from its main area of distribution (database CBN Paris). In the same site, *Trifolium*

*melchianum* Savi occurs (<https://inpn.mnhn.fr/docs/ZNI-EFF/znieffpdf/210000165.pdf>), an equally unexpected record.

- *R. sceleratus* L.: this species is least rare in Mar., Fl., Camp. and Brab. where it is C-AC. In Camp., where it was considered to be AR-R in NF6, it is only less common on the poorest soils (wn.be). In Eifel centr., where it was thought to have disappeared, there is at least one extant locality, in Oberbettingen (FT).
- *R. parviflorus* L.: in the Flora area, this species historically occurs in Tert. par., the only district where it is possibly native. In addition, it is well-established at several campsites, especially in Mar. (Verloove *et al.* 2020a). In this district, it is also known since at least the 1950s from lawns in a cemetery in De Panne and it is also established as a lawn weed since 2008 in the Botanic Garden in Meise (Ronse 2011). In the past years, it has increasingly been recorded in newly detected localities, mostly in turf, where it seems to have naturalized recently, e.g. in Bruges (Assebroek), Obourg, Schaffen, Châlons-en-Champagne, etc. (wn.be, database CBN Paris; also comm. P. Dupriez 05.2021).
- *R. acris* L. subsp. *friesianus* (Jord.) Syme: assessing the genuine distribution of this subspecies in the Flora area remains problematic. According to FG, it is at most naturalized, except perhaps in northeastern France. However, according to SI-Flore, it is not rare at all in parts of Ard., Mosan, Tert. par., Champ. and, to a lesser extent, Pic. Vernier (2020) reported it from the whole of Lorr. where it is relatively common. There are a few recent claims from Belgium as well (Berchem, Peer; wn.be).
- *R. hederaceus* L.: in Mar., this species is not restricted to the southern part of the district. There are several records from the polders near Bruges (wn.be). It was also known from Zeeland in the Netherlands although it may have disappeared there (FZ). The species has also disappeared from Tert. par. (Digitale2, database CBN Paris).
- *R. ololeucos* Lloyd: this species still occurs in several places in northeastern Brab. in the Netherlands (H24, Atlas-NL), in the subcentreurop (sub-)district.
- *R. peltatus* Schrank: this species is R rather than RR in Mar. (see e.g. FZ). In Lorr., on the contrary, where it was said to be AC-R in NF6, it is RR (FLORAINE 2013).
- *R. rionii* Lager: in Lorr., this species is also found in several locations between Saint-Dizier and Vitry-le-François (Le Gloanec *et al.* 2019). According to FLORAINE (2013), it also occurs southeast of Verdun.
- *R. penicillatus* (Dum.) Bab.: the distribution of this species is indeed poorly known in the Flora area, as stated in NF6. In addition to the districts already mentioned, it has also reliably been recorded in Champ. and Tert. par. (database CBN Paris).
- *Ficaria verna* Huds. subsp. *fertilis* (A.R. Clapham ex Laegaard) Stace: this subspecies is poorly known but probably absent in Belgium, at least in the wild (possibly

as an escape from cultivation) (Veldkamp 2014-2015). Zonneveld (2014-2015) considered it to be rare in Belgium and the Netherlands but it is unclear on what this is based; no Belgian or Dutch accessions were included in his study. In northwestern France, Toussaint *et al.* (2008) referred to localities between Guînes and Aire-sur-la-Lys; however, according to Digitale2, this subspecies now also occurs much nearer to the Belgian frontier, around Ghyvelde. It thus should be sought in neighboring areas in Belgium.

- *Thalictrum minus* L.: this species is also/still present in Camp. and Brab. or. in the Netherlands (wn.nl, H24) but it is unknown which subspecies is involved (and whether these records refer to wild occurrences).

### 67. Platanaceae

- *Platanus ×hispanica* Mill. ex Muenchh.: the naturalization of this tree is mostly observed along watercourses.

### 68. Buxaceae

- *Buxus sempervirens* L.: accidentally introduced into Europe via plants imported from Asia in 2007, *Cydalima perspectalis* Walker, a moth native to the Far East, quickly became invasive (e.g. Kenis *et al.* 2013). Its caterpillars feed almost exclusively on boxwood leaves and the invasion of the species causes heavy damage in European populations of boxwood, both ornamental and wild. The species is present in the native area of *Buxus sempervirens* in the Flora area and natural buxus woodlands are already affected, for instance in the Solière valley near Huy (comm. E. Branquart, E. Fabrice and S. Krickx, 10.2020; see also: Bizot & Coppa 2018).

### 72. Grossulariaceae

- *Ribes alpinum* L.: this species is slightly less rare as an escape than indicated, R-RR rather than RR. In some parts of Fl. and Camp., for instance, there is an increasing number of observations (wn.be).

- *R. rubrum* L.: in NF6, this species was said to be R in Fl. and Camp. In reality, it has become almost omnipresent and is at most AC-R (wn.be). Most, if not all, records evidently refer to plants escaped from cultivation, the berries easily being dispersed by birds.

- *R. spicatum* E. Robson: it is very unclear whether or not this northern species occurs in the Flora area. There is a recent claim from Champ. (Cernon; database CBN Paris) but this is very unlikely, especially because according to FG French records of this species are erroneous. Putatively native occurrences are known from the Biesbosch in the Netherlands (H24), just north of the Flora area.

- *R. aureum* Pursh: this North American ornamental shrub recently managed to naturalize locally in the Flora area. It is mostly found in Mar. (coastal dunes), Fl. and Camp. and is R-RR (wn.be).

- *R. sanguineum* Pursh: this North American ornamental shrub recently managed to naturalize locally in the Flora

area. It is mostly found in coastal shrub- and young woodland in Mar., Fl., Camp. and Brab. and is AR-R (wn.be).

### 73. Saxifragaceae

- The ornamental *Tolmiea menziesii* (Pursh) Torr. et A. Gray was already known as an (exceptional) escape. In Camp., however, it tends to naturalize locally in woodlands in the area between Schilde and Lier (Zoerselbos, Kloosterheide), where it was first seen in 2015 (wn.be).

- *Saxifraga tridactylites* L.: this species has much expanded lately, at least in parts of the Flora area. This applies for instance to Fl. and Camp. where it is at most AR, no longer R (wn.be).

- *Tellima grandiflora* (Pursh) Dougl. ex Lindl.: this North American ornamental is now completely naturalized and rather expansive in some parts of the Flora area, especially in Fl., Camp. and Brab. (wn.be).

### 74. Crassulaceae

- *Umbilicus rupestris* (Salisb.) Dandy: this is a recent newcomer in the Flora area that was initially known from a single locality in Brab. centr. In the past years it was recorded in several additional localities in Fl. and Brab. (wn.be).

- *Crassula tillaea* Lester-Garland: this very rare native species (known in Belgium from a single extant locality in Stambruges) was detected as an introduction in several districts from where it was not known: Mar. (Belgium and the Netherlands, previously only known from the southern, French part), Fl., Camp. (wn.be) and Fluv. (particularly common between Maaseik and Roermond; wn.nl, H24). It is found on gravel or sand, especially (but not exclusively) in campsites where it can produce extraordinary stands (Verloove *et al.* 2020a). It starts flowering much earlier than indicated in NF6, in April rather than in June (see also H24, FG).

- *C. helmsii* (T. Kirk) Cock.: this invasive weed is least rare in Mar., Fl., Camp. and Brab. where it is at present at most AR (rather than R) (wn.be). It has also been reported from several localities in Pic. (Digitale2).

- *Sedum rubens* L.: this very rare species is also known from a single locality in Boul. (Desvres, railway station, July 2012, *F. Verloove* 9591 in BR, LG) and at least one in Champ. (Oiry; database CBN Paris). In Brab., it has not disappeared: there are several confirmed relatively recent records (AFW).

- *S. cepaea* L.: in NF6, this species was mentioned from a single extant locality, in Pic. (Tortefontaine). It was last seen there in 1999 according to SI-Flore (which is in fact when it was first observed there; Dupont in Toussaint 2001) and thus its actual presence requires confirmation. It has indeed (also) disappeared from the other districts where it was known in the past (Brab. or., Mosan and Tert. par.; AFW, H24, wn.be). The species was recently observed near Meaux in Tert. par. (SI-Flore), close to but beyond the Flora limits.

- *S. dasyphyllum* L.: this ornamental was very rarely naturalized in the Flora area but probably has disappeared almost everywhere. It is now occasionally observed as an (ephemeral) escape from cultivation, especially in cemeteries (wn.be, H24).
- *S. hispanicum* L.: this species, a recent newcomer in the Flora area, is slightly expanding and was recently reported also from Lorr. (de Faÿ & Weiss 2016). It is increasingly cultivated and easily escapes.
- *S. sarmentosum* Bunge: this ornamental is now fully naturalized, especially in Mar. and Fl., where it is most often seen on river and canal banks (Dender, Scheldt, etc.; wn.be).
- *Hylotelephium maximum* (L.) Holub: according to NF6, this species naturally occurs just outside the Flora area, along river Waal in the Netherlands. There are several localities in Pic. and Tert. par. as well, roughly in an area between Saint-Quentin, Soissons and Vervins (SI-Flore). It is unknown whether or not these populations refer to wild populations. Moreover, Digitale2 nor the CBN of Paris database refer to populations of this species in that area. According to FG, it also occurs in northeastern France but possibly beyond the area covered by the Flora. It is obvious that the species is poorly understood and that this issue requires further study.

#### 75. Haloragaceae

- *Myriophyllum alterniflorum* DC.: this species is not rarer in Camp. than in Ard., it is R in both districts (wn.be). In Mar., it is restricted to the area south of Boulogne, i.e. to Mar. mér. (wn.be, FZ, Digitale2, SI-Flore). The species also occurs east of Soissons in Tert. par. (SI-Flore).
- *M. heterophyllum* Michaux: this North American aquatic weed is a recent newcomer in the Flora area. In few years' time it has much expanded and was recently also observed in Pic., Lorr. sud-occ. and Champ. In some water courses, e.g. Aisne and Somme, it is now considered to be an invasive species (Blottière 2018, Le Gloanec *et al.* 2019, Gross *et al.* 2020).
- *M. aquaticum* (Velloso) Verdc.: this aquatic South American ornamental is expanding in the Flora area and has become less rare: AR in Fl., Camp. and Brab. and R-RR in the other districts (wn.be, SI-Flore).

#### 76. Vitaceae

- *Vitis vinifera* L. subsp. *vinifera*: the area where grapes are grown has considerably extended lately, the regions mentioned in NF6 are at most the more important ones. Grapes are also grown again around Montmédy and in the Meuse valley in Belgium. The species also regularly germinates from discarded seeds and is also dispersed by birds.
- *Parthenocissus quinquefolia* (L.) Planch.: in Lorr., according to FLORAINE (2013), the distribution and rarity of this species are comparable to that of *P. inserta* (A. Kerner) Fritsch, and it is even considered to be invasive

there. But is this correct? According to FG, this species is “à rechercher hors culture”.

#### 78. Fabaceae

- *Glycine max* L.: this species is locally grown as a forage crop in southern Lorraine in France, as stated in NF6. In recent years, it is also grown further north in the Flora area, since 2017 also in Belgium (several online sources).
- *Caragana arborescens* Lam.: this ornamental shrub is rarely escaping from cultivation in French Lorr. (Pays-Haut, Côte de Moselle; FLORAINE 2013, Vernier 2020).
- *Cytisophyllum sessilifolium* (L.) O.F. Lang: this ornamental shrub is locally very well-established in the Tert. par./Champ. border area, northwest of Troyes (database CBN Paris), on the verge or just outside the Flora area. It may as well further expand and enter our area.
- A note was added regarding the American ornamental shrub *Amorpha fruticosa* L. (with small dark purple flowers, with a single petal and imparipinnate leaves, provided on the underside with red glands with an annular rim). It is in the process of local naturalization on road and railway embankments and in wasteland, especially in Fl., Camp. and Brab. (wn.be). More worrying is its presence in riparian habitats: since 2016 it has been known from a few localities in the Meuse valley in Limburg (Fluv.; wn.be) and the species has also been recorded in the Moselle valley in Pont-à-Mousson (French Lorr.; FLORAINE 2013, Vernier 2020); in such habitats this species is considered to be invasive in southern Europe.
- *Cytisus striatus* (Hill) Rothm.: there is a remarkable concentration of observations in Camp. or., from where this species was not yet reported. Part of these records moreover refer to nature reserves such as Park Hoge Kempen, Kikbeekbron and Schotsven-Bergerven. Apparently, this species was deliberately and inconsiderately introduced in these moors and heathlands (actions for nature management), where it subsequently spread. Occasionally, it is also observed in other districts than those where it is naturalized, e.g. in Fl. and Brab. At least in Zwartberg (Genk) the species also occurs on slag heaps (wn.be).
- *C. hirsutus* L.: this shrub is only known from natural habitats in France in the Flora area. As an introduction, in Belgium, it was only known in the 19<sup>th</sup> century, when it was last seen in 1888 (Verloove 2006a). The genuine distribution of this species is uncertain and requires further study since it has been confused up to the present with *C. lotoides* Pourr. in the Flora area. As a rule, *C. hirsutus* s.str. seems to be restricted to northeastern France where its presence has been confirmed from several localities in Côte de Meuse (Lorr.), mostly south of Verdun (Coulot & Rabaute 2016). In the same district, in Côte de Moselle, its actual presence needs to be confirmed. This species is usually found in thermophilous heathlands and forest margins, often on marly or even slightly acidic substrates. *C. lotoides*, in turn, occurs further to the west and has

been confirmed from several localities between Soissons and Reims (Champ., Tert. par.). It is found in xero-thermophilous forest margins, generally on stony, calcicolous substrates, and often in more hilly areas. In the Marne and Aube departments both species may occur but this requires confirmation.

- *Genista tinctoria* L.: this species also occurs on slag heaps and in roadsides, e.g. near Mons but also in Pic. (pers. obs.). It is occasionally planted and naturalized in the Flora area, outside the districts indicated in NF6 (see also FZ).

- *G. anglica* L.: this species occurs in a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse, near the estuary of river Canche) (SI-Flore) along with, among others, *Rhynchospora alba*, *R. fusca*, *Trichophorum cespitosum*, *Drosera rotundifolia*, *Erica tetralix*, etc. (comm. B. Toussaint, 06.2021). It was formerly also known from Prüm in Eifel centr. where it is extinct now (FT).

- *G. germanica* L.: in Belgium, this species had only been observed since 1940 in a single locality in the Lorraine district from where it disappeared a long time ago already. In 2021, however, a small population was rediscovered in Etalle (Lorr. sept.), in an old spruce plantation that was cut for nature development, on sandy limestone of Orval (wn.be). This species has also been known since the 19<sup>th</sup> century from a loam quarry in Groesbeek south of Nijmegen in Fluv. in the Netherlands (Garjeanne 1958, H24), where it is considered to be native.

- *Spartium junceum* L.: in NF6, this species was explicitly mentioned from the Liège area where it is locally naturalized on motorway embankments. By now, this species has been observed in rather numerous localities throughout the Flora area (wn.be).

- *Ulex minor* Roth: this species is perhaps under-recorded in the Flora area. It is naturalized in at least two localities. In one of them, in Oudenburg (Mar.), it was recognized only in 2017, although it should have been present there for several decades already. The species is also known since 2014 (probably longer) from Lommel in Camp. or. (wn.be).

- *Galega officinalis* L.: this species is increasing lately. At least in Fl., Camp. and Mosan it is no longer RR, at most R, and this may also apply to other districts, e.g. Mar. (R in Zeeland according to FZ). In Brab., it is not more frequent in occ. than in the other parts of this district (wn.be).

- *Colutea arborescens* L.: the possible indigenoussness of this species in the Flora area has always been a point of discussion. However, even in the southernmost parts of our territory, this species is most likely at most a naturalized escape from cultivation: our populations are usually ascribed to subsp. *gallica* Browicz, which is now often treated as a separate species, *C. breviaolata* Lange (FG), although plants with intermediate features sometimes occur. *C. breviaolata* is *a fortiori* a southern taxon (confined to the French “Midi” according to FG), which renders a

potential native status in the Flora area even more unlikely.

- *C. ×media* Willd.: this hybrid mostly but not exclusively occurs in Mar. and Lorr. (wn.be). One of its parents, *C. orientalis* Mill., with which it is often confused, may also occur in the Flora area although its presence requires confirmation.

- *Astragalus cicer* L.: this species is sometimes recorded as an introduction outside its native distribution range in the Flora area, recently for instance on a slag heap in Germignies (Brab. occ.) in northwestern France (Stien 2011).

- *A. glycyphyllos* L.: this species is on the rise: it is in parts of Mar., Fl. (especially in and near Antwerp and Ghent) and Camp. or. at most R-RR. In Brab., it occurs almost exclusively east of Brussels (wn.be).

- *Vicia pisiformis* L.: in Lorr., this species is not confined to the eastern and southern parts of the district. It occurs, along a north-south axis in the Moselle valley, from near to the Grand Duchy of Luxembourg to Nancy (Bonassi *et al.* 2017). In Champ., it has disappeared quite a long time ago already, most records date back to the second half of the 19<sup>th</sup> century (SI-Flore, database CBN Paris).

- *V. tenuifolia* Roth subsp. *dalmatica* (A. Kerner) Greuter: in 2016, this subspecies was also observed in Arcis-le-Ponsart in Tert. par. (database CBN Paris). It is unknown whether or not this refers to a naturalized population.

- *V. dumetorum* L.: this species is not mentioned by FLO-RAINE (2013) and Fournier (2020) from Lorr., not even as an adventive. According to SI-Flore, the northernmost populations in France, near Belfort, are located (far) beyond the limits of the Flora area. Claims from Mosan or., as mentioned in NF6, apparently refer to a few historical observations from the area around Verviers (Lawalrée 1963), from where it has not been confirmed lately (AFW, wn.be).

- *V. dasycarpa* Ten.: this species is expanding lately and is now also present in Fl., Camp., Mosan, Ard. and Lorr. (wn.be). In all districts it is R-RR.

- *V. sepium* L.: in NF6, this species was said to be C everywhere, except in Mar., Fl., Camp. and Champ. where it was considered to be R. In some of these districts, e.g. in Fl., it is locally not R, in others on the contrary even rarer than R (e.g. RR in Zeeland; FZ) (wn.be).

- *V. lathyroides* L.: in NF6, this species was classified as RR or absent in Fl. and Camp. It is, however, at most R in these two districts (it is particularly well-represented in and near Ghent for instance) (wn.be). It is also a regular introduction throughout the Flora area.

- *V. lutea* L.: this species is by far least rare in Brab. and Fl. in the Flora area (wn.be); from the latter district it was not mentioned in NF6.

- *Ervum tetraspermum* L.: in Fl., this species is AC-AR, rather than AR-R (wn.be).

- *E. gracile* (Loisel.) DC.: the distribution of this poorly known species is indeed uncertain, as stated in NF6. In addition to the cited districts and according to our current data, it does occur in northwestern France (Digitale2) but perhaps not at all in Belgium (wn.be). It is critically endangered in the Grand Duchy of Luxembourg (Colling 2005). In the Netherlands, it still occurs in Zeeland, possibly also in Zuid-Limburg (FZ, H24) although the most recent observations there date back to the early 2000s (wn.nl).
- *Ervillea hirsuta* (L.) Opiz: this species was said to be AR in Mar. However, it is not rarer in Mar. than in most other districts (C-AC) (wn.be). In Zeeland, for instance, it is even classified as CC (FZ).
- *Lathyrus japonicus* Willd. subsp. *maritimus* (L.) P.W. Ball: this taxon is not only known from the French and Belgian part of Mar., but has also been reported from Zeeland in the Netherlands (FZ). However, everywhere in the Flora area it is strictly ephemeral.
- *L. vernus* (L.) Bernh.: outside its native distribution area, this species is sometimes found as an introduction. For instance, since 2020 a small population is known along river Leie near Ghent (wn.be). SI-Flore also indicates a locality in Montagne de Reims (Tert. par.), without further details (correct?, native?; this record is not included in the CBN Paris database).
- *L. niger* (L.) Bernh.: this species has disappeared from its unique locality in Birresborn in Eifel centr. (FT).
- *L. pannonicus* (Jacq.) Garcke subsp. *asphodeloides* (Gouan) Bässler: according to NF6, this taxon is only known from a single extant locality in French Lorr., in Moussay (Verloove & Lambinon 2014; moreover, it is unclear where this village is located. The village Moussey exists in Lorr. but it is located well beyond the Flora limits, in Vosges). Recent local Floras and databases provide conflicting information about this species. In Lorr., it is still present in Lagarde (at least up to 2019; AFL) but this locality is beyond the limits of the Flora area. The same applies to the single record from SI-Flore, near Réchicourt-le-Château. FLORAINE (2013) and Vernier (2020) presented records that fall within the Flora limits, respectively from southeast of Verdun and from the northern Plateau Lorrain. It is unknown whether or not this taxon is still present in these areas and how many populations are involved.
- *L. linifolius* (Reichard) Bässler: in Lorr., this species was said to be present mostly in the western and northern part of the district. It is actually more or less evenly distributed throughout the district and even more frequent in the eastern than in the western part of it (FLORAINE 2013).
- *L. pratensis* L.: this species is in Camp. indeed a bit less common but its frequency is comparable with that in e.g. West Flanders. AR is exaggerated, especially when compared to a large part of Wallonia (wn.be).
- *L. tuberosus* L.: this species is certainly not RR in most parts of Fl., especially in the wider area of Ghent and Antwerp (wn.be). It is at most R in this district.
- *L. sylvestris* L.: in Fl., this species is significantly less rare than in e.g. Mar. or Camp. (R rather than RR) (wn.be).
- The distribution and frequency of *L. latifolius* were specified: it mostly occurs in Mar., Fl., Pic., Brab. and Mosan (wn.be, Digitale2).
- *L. hirsutus* L.: as an introduction, this species mainly occurs in Fl. and Brab. (wn.be). In the latter district (for instance in Zuid-Limburg in the Netherlands), it is locally at most R (H24). It seems to slightly expand lately.
- *L. nissolia* L.: in several districts (Mar., Fl., Pic., Brab., Lorr.) this species is no longer RR, rather AR-R. In Zeeland for instance it has become C according to FZ. It also occurs in Camp., a district from where it was not yet known, although it is RR there (wn.be).
- *Pisum sativum* L. var. *arvense* (L.) Poiret: in NF6, this taxon was said to be AC in Mar. sept., both as a cultivated and escaped plant. This, however, does not appear at all from FZ, where it is known only from “a few finds”.
- *Ononis natrix* L.: in NF6, this species was said to be AC-R in Lorr. It has much declined there lately and is now considered to be even RR (FLORAINE 2013).
- *O. spinosa* L. subsp. *spinosa*: this subspecies is not R but entirely absent from Eifel centr. (FT).
- *Trigonella alba* (Med.) Coulot et Rabaute: this species is at least as common in Fl. and Brab. as in e.g. Camp. and thus AC rather than AR-R (wn.be).
- *T. altissima* (Thuill.) Coulot et Rabaute: in Fl. and Camp., this species is no longer RR, rather AR. It is clearly expanding lately (although it is still by far the rarest of the three native or archaeophytic melilots). In Zeeland, in the Netherlands, it is now considered to be even common (FZ).
- *Medicago littoralis* Rohde ex Loisel.: this species was reported from Mar. mér. in NF6. Meanwhile it also occurs elsewhere in Mar., in Belgium as well as in the Netherlands. Like in France, this species is confined to campsites (Verloove *et al.* 2020a, FZ).
- *M. lupulina* L. var. *willdenowiana* Koch: according to van Ooststroom & Reichgelt (1958), this variety is “quite often” occurring in Belgium and the Netherlands. However, there are very few observations, nearly all from the Belgian and Dutch valley of river Maas (wn.be, wn.nl).
- *M. sativa* L. subsp. *falcata* (L.) Arcang.: this subspecies was not mentioned at all from Fl. in NF6. In reality, it is not rarer in Fl. than in e.g. Brab. or Camp. (AR), especially in and near the bigger cities (Antwerp and Ghent) (wn.be).
- *M. arabica* (L.) Huds.: this species is not markedly rarer in the eastern portion of the Brab. district. It is fairly scattered, for example, in the wider area of Leuven (wn.be).

- *M. polymorpha* L.: this species is increasing and tends to naturalize locally, for instance on gravel banks of river Maas and in campsites, especially in Fluv. and Mar. respectively (Verloove *et al.* 2020a, H24).
- *M. minima* (L.) L.: this species also occurs on gravel banks of rivers, especially of river Maas (wn.be, Flora-bank).
- *Trifolium spadiceum* L.: in NF6, this species was mentioned, based on historical data, from Hautes Ard. and Eifel centr. However, there is only a single old record from the Eifel, from Stadtkyll, which is located in the Westeifel and thus corresponds with the Ard. district (FT).
- The casual alien *T. pannonicum* Jacq. is, in the Flora area, not only known from the Grand Duchy of Luxembourg. It was recorded in Brussels in 2006, without further details (herb. L. Delvosalle).
- Some of the casual alien species of *Trifolium* (especially *T. glomeratum* L., *T. nigrescens* Viv. and *T. tomentosum* L.) have recently been observed in campsites, especially in Mar., where they could naturalize locally (Verloove *et al.* 2020a). A further alien, *T. strictum* L., previously reported once from Ghent (Verloove & Heyneman 2012), was observed in 2012 in ruderalized dunes in Ghyvelde in French Mar. (Blondel 2013), rather remote from its natural area and thus probably as a mere ephemeral alien. Its persistence there was not confirmed lately (comm. B. Bollengier, 09.2020).
- *T. ornithopodioides* L.: this species was reported from Zeeland in NF6. In fact, the species had disappeared from Zeeland since 1981 already (FZ). However, it has recently reappeared in several campsites (wn.nl, Verloove *et al.* 2020a). The species was recently recorded for the first time in Belgium as well (reclaimed land in the Waasland port area; comm. G. Spanoghe), but its status is unclear there (introduced by migrating birds?). Its presence there could not be confirmed subsequently.
- *T. hybridum* L. var. *hybridum*: this variety is as common in Mar. and Fl. as in e.g. Camp. or Brab. (i.e., AC-AR, rather than AR-RR) (wn.be). In Zeeland, for example, it is even common (FZ). It is on the rise everywhere in the Flora area.
- *T. michelianum* Savi: this species was discovered in 1996 in Mar. mér. and, based on this single record, included in the key and a full account provided; it was no longer observed in this locality afterwards (Digitale2, SI-Flore). However, this species by now also occurs in several localities in the southeastern part of the Flora area, at the limits of Champ. and Lorr., between Saint-Dizier and Troyes (SI-Flore). It was already known from that region but further south, outside the Flora area (Didier 1998). In addition, it occurs, exceptionally, as an ephemeral (grain) alien elsewhere (pers. obs. author).
- *T. fragiferum* L.: this species is at most AR-R in Fl. (ubiquitous, for instance, in the Scheldt valley upstream from Ghent) and Brab. (wn.be, Florabank), rather than R-RR.
- *T. resupinatum* L.: this alien is locally in the process of naturalization, especially in campsites in coastal areas (Verloove *et al.* 2020a).
- *T. patens* Schreb.: this rare species was discovered in a second locality in French Lorr., in Juvelize, near Metz (Pax 2015), close to Moncourt from where the species had been recorded in the past. According to Coulot & Rabaute (2020), it is abundant in this locality and it is the only one recently observed in Lorraine. In northwestern France it actually only occurs south of the Seine river (Digitale2, SI-Flore), way beyond the Flora limits, and the nearest localities (from the Eure department) moreover turned out to be erroneous (Coulot & Rabaute 2014). It thus has disappeared apparently from Pic. and also from Tert. par. (SI-Flore, database CBN Paris). In Champ., there is a single extant locality in Vésigneul-sur-Marne, near Châlons-en-Champagne (SI-Flore).
- *T. campestre* Schreb.: this species is hardly any rarer in Camp. than in e.g. the province of West Flanders in Fl., AC-AR, rather than AR-R. It is indeed much less common in Ard., as correctly indicated in NF6 (wn.be).
- *T. micranthum* Viv.: in Brab., this species is much rarer in the central part of this district, certainly when compared to the cluster of records in its western part. In Mar., it is not more common in the northern part of this district (where it is considered to be R; FZ): it is also occurring in most of the Belgian part of Mar. This species is slightly increasing everywhere (or perhaps it is better known now?): in Mar., Fl., Camp. and Fluv. sept. it is R rather than RR at present (wn.be, wn.nl).
- *T. striatum* L.: the main distribution of this species is nowadays in Mar. (both in Belgium, France and the Netherlands) and in Mosan, where it is at most AR-R (wn.be, wn.nl, Digitale2). There are also some recent, reliable records from Camp. (Bocholt, Genk and others; wn.be), a district from where it had not been reported so far.
- *T. scabrum* L.: this species occurs in and near Ghent (Fl.) in nutrient-poor lawns, often in cemeteries (along with e.g. *T. striatum* and *T. subterraneum* L.; wn.be). It may have been overlooked there before.
- *T. alpestre* L.: in Lorr., this species predominantly but not exclusively occurs in the southern and northeastern part of the district. There is at least one locality near Verdun, in the western part (SI-Flore).
- *T. rubens* L.: in the Eifel in Germany, this species only occurred in the Osteifel (i.e., beyond the Flora limits) and it is, moreover, long extinct there (FT). There are, on the contrary, some recent records from Champ. (near Vitry-le-François; database CBN Paris), a district not yet mentioned in NF6.
- *T. alexandrinum* L.: this alien species seems to be increasing lately, it is R rather than RR these days (wn.be).
- *T. subterraneum* L.: the main distribution of this species obviously is in Mar. (R) where the species is much less rare than elsewhere (RR) (wn.be; see also FZ: R).

In Brab. occ., this species is not limited to France: there are at least three recent records from near Kortrijk and it is also found elsewhere in this district. There are also several observations in Camp. (wn.be). It may have been overlooked before. In Tert. par., on the contrary, its current presence requires confirmation: according to SI-Flore there are only historical records.

- *T. suffocatum* L.: this species has been observed since the 1990s in Mar., at first in its southern part (Le Touquet-Paris-Plage), then also in a more northern locality in France (Calais). From 2015 onwards, it was also discovered in Belgium and Zeeland (the Netherlands) but, given the importance of some populations, the species has probably been neglected for some time. It is confined to campsites and its presence there is clearly the result of an unintentional introduction by tourists (Verloove *et al.* 2020a).

- The alien species *Lotus hispidus* Desf. ex DC. has been known since the 1990s from Mar. mér. but its persistence there apparently has not been confirmed lately. A more or less stable population was discovered in Wondelgem (Ghent; Fl.) in 2019 (wn.be).

- *L. corniculatus* L.: this species is not or hardly any rarer in Camp. than in other districts (AC rather than AR), only on the poorest soils it is perhaps a little less common (wn.be).

- *L. tenuis* Waldst. et Kit. ex Willd.: this species is a component of wild flower seed mixtures and sometimes forms a monospecific vegetation in recently ‘redeveloped’ areas (reclaimed areas, slag heaps, etc.). As a perennial, after sowing, it persists very well and easily naturalizes. It is much less rare than indicated in some districts: in Mar., Fluv. nord-occ. (Pays-Bas) and Lorr. it is at most AC-AR (wn.be, wn.nl; for comparison, in Zeeland it is even CC; FZ), in Fl., Brab., Champ. and Tert. par. AR-R.

- *L. pedunculatus* Cav.: this species is indeed somewhat less common in Mar. but still AC-AR (according to FZ: AC). In Brab., it is not rarer than in e.g. Fl. or Camp. It is surprisingly rarer in Mosan, where it is AR and definitely not C-AC as indicated in NF6 (wn.be).

- *L. maritimus* L.: in Brab. or., this species only occurs in the Netherlands (Zuid-Limburg; wn.nl). It has also been reported from Eifel centr. but all localities are in fact located further east, in Osteifel (FT). The distribution of the varieties of this species is unclear. According to Fl. Iberica, var. *maritimus* is the widespread variety (in the species’ general area), whereas according to FG, it is limited to the Midi in France.

- *Anthyllis vulneraria* L.: this species occurs in several places in Ard., from where it was not yet reported in NF6 (wn.be). These are apparently natural populations, there are no indications that they refer to adventive plants.

- *Ornithopus compressus* L.: this adventive species is, although still RR, probably locally naturalized and slightly increasing in the Dutch part of the Flora area, especially in the northeastern part of Camp. (H24, wn.nl).

- *O. perpusillus* L.: this species is evenly distributed in Camp., it is not more frequent in the western part of the district (heatmap wn.be). In Lorr., this species is RR in the entire district, except in its northern (Belgian) part (FLORRAINE 2013).

- The possible naturalization of *Coronilla scorpioides* (L.) Koch in the southern districts of the Flora area has been anticipated for quite a long time (NF6). However, judging from recent maps (AFL, Digitale2, SI-Flore, database CBN Paris) this is not yet applying.

- *C. vaginalis* Lam.: in the entire Flora area, this species is only mentioned from Eifel centr. in NF6. However, all localities are located outside the Eifel centr., in Osteifel (FT). The species does not actually occur in the Flora area.

- *Hippocrepis emerus* (L.) Lassen: in addition to the areas in Lorr. or. already mentioned in NF6 (Luxembourg, valley of river Moselle between Nancy and Metz) this species is also known from a few further localities in this district (FLORRAINE 2013).

- *H. comosa* L.: according to H24, this species was last seen in 1987 in Zuid-Limburg (Brab. or.), but that is not correct: the species is still present at several locations, especially south of Valkenburg (wn.nl).

- *Onobrychis viciifolia* Scop.: in the northern part of Lorr., this species is much rarer than indicated, R rather than C-AC (Champluvier & Saintenoy-Simon 2014).

## 79. Polygalaceae

- *Polygala vulgaris* L. subsp. *oxyptera* (Reichenb.) Schübl. et Martens: this subspecies, in so far distinguishable, is confined to the eastern part of the Flora area, as indicated in NF6. From Eifel centr., however, it has completely disappeared (FT) and claims from France are erroneous according to FG.

- *P. comosa* Schkuhr: there is a recent, reliable record from Brab. occ. (east of Mons; wn.be). This record falls within “ailleurs: RR” but is nonetheless worth mentioning, since quite disjunct.

- *P. calcarea* F.W. Schultz and *P. amarella* Crantz: there are several recent claims for both species from Mosan (wn.be), but their identity is difficult to assess correctly, solely based on photos. The presence of these two species in Mosan is possible but requires confirmation.

## 80. Rosaceae

- *Aruncus dioicus* (Walter) Fernald: this species was reported by FLORRAINE (2013) from two localities in the northern half of Lorr. However, in this region it only occurs naturally in the Vosges (Vernier 2020, comm. S. Antoine 19.05.21) and thus only beyond the Flora limits. Records further north doubtlessly refer to escaped garden plants.

- *Eriobotrya japonica* (Thunb.) Lindl.: in NF6, some uncertainty was expressed about the status of this shrub in the Flora area: merely planted as a curiosity or adventive? In fact, spontaneous seedlings (or even several years

old shrubs) are regularly observed in urban environments. These doubtlessly refer to plants germinated from thrown away pits (comparable with e.g. figs and date palms; see e.g. Keil *et al.* 2003).

- *Sorbaria sorbifolia* (L.) A. Braun: in Mar., Fl. and Camp., this escaped ornamental is slightly less rare than indicated, R rather than RR (wn.be).
- *Physocarpus opulifolius* (L.) Raf.: there are several locations on sandy soils in Fl., e.g. in the surroundings of Beernem and Waasmunster (wn.be), from where it was not yet mentioned in NF6. However, the species is by far the least rare in Camp., where it is R rather than RR (wn.be).
- *Spiraea tomentosa* L.: this ornamental shrub was mentioned from Fl. in NF6. However, it is only naturalized in Camp. (in heaths), there are apparently no confirmed records from Fl. (wn.be).
- *S. douglasii* Hook.: this North American shrub is equally rare in Fl., Brab., Mosan and Lorr., it is not more frequent in Mosan (wn.be). It is very rarely recorded in other districts, for instance between Amiens and St.-Quentin in Pic. (SI-Flore).
- *S. chamaedryfolia* L. subsp. *ulmifolia* (Scop.) J. Duvi-gneaud: this taxon is in fact least rare in the Flora area in Camp. (wn.be), from where it was not yet mentioned in NF6. In Eifel centr., on the contrary, it is completely missing (FT).
- *Rubus* L.: see Devriese & van de Beek (2023).
- *Geum urbanum* L.: the distribution of this species was updated: it is at least as common in Fl. and Camp. as in e.g. Brab., Mosan, etc. (C-AC) (wn.be). Only in the polders (Mar.) and Ard. it is indeed possibly somewhat less common (wn.be), although the species is said to be CC in Zeeland (FZ).
- *G. rivale* L.: in Camp., this species also occurs in Belgium, not only in the Netherlands. It has been known from the Groot Schietveld military training area since at least 2014 (wn.be), although its residence status is uncertain there. It may have been unintentionally introduced. It is occasionally observed as an introduction in districts where it is not native, for instance in Fl. (Hanewee; wn.be).
- *G. macrophyllum* Willd.: this species is naturalized now and slightly expanding; it is AR-R in Fl., Camp. and Brab. (wn.be), RR or absent elsewhere. In France, for instance, it is completely lacking (FG, SI-Flore, Digitale2).
- *Potentilla sterilis* (L.) Garcke: in parts of Fl. and Camp., this species is R rather than RR (wn.be).
- *P. supina* L.: this species is known from many districts but RR throughout the Flora area and often merely ephemeral. Only in Fluv., it seems to be present more or less permanently (see also H24), perhaps also in Brab. occ. (in the surroundings of Mons) (wn.be).
- *P. argentea* L.: in Fluv., this species is much rarer than indicated in NF6, R rather than AC-AR (wn.be). According to H24, it is even RR in that district.
- *P. inclinata* Vill.: this rare alien species is very locally naturalized in the Flora area, mostly in Brab. occ. (Mons area) and Camp. (wn.be).
- *P. recta* L.: in Fl. and Brab., this species is certainly not rarer than in Ard. and Lorr. sept., thus R rather than RR (wn.be).
- *P. norvegica* L.: the distribution of this alien in the Flora area was specified: it is predominantly found in Fl., Camp. and Brab. (wn.be).
- *P. intermedia* L.: the distribution of this alien in the Flora area was specified: it is predominantly found in Fl., Camp., Brab. and Lorr. (wn.be, SI-Flore).
- *P. reptans* L.: in Camp., this species is indeed slightly less frequent but certainly not AR (rather AC-AR). In Brab., there are also some gaps in the distribution west of Brussels, but overall the species is C-AC in that district (wn.be).
- *P. incana* P. Gaertn., B. Mey. et Scherb.: in NF6, this species was said to be doubtfully present in Eifel centr. Its presence there has indeed never been confirmed and no corresponding 19<sup>th</sup> century specimens turned up so far. The site in the Prümer Kalkmulde, where it was said to be found, is well researched since 150 years. It would be a surprise, if this subcontinental taxon ever occurred in the rainy heart of the Eifel (comm. R. Hand, 09.2020).
- *P. leucopolitana* P.J. Muell.: in the entire Flora area, this species was only known from the Grand Duchy of Luxembourg, where it was considered to be RR. By now, however, it is extinct (Colling 2005). It was probably last seen in 1994 (MNHN-Lux).
- *P. indica* (Andrews) Th. Wolf: the distribution of this alien in the Flora area was specified: it is predominantly found in Fl., Camp. and Brab. where it is AC-AR. Elsewhere, it is AR-RR, although there are major regional differences: in some districts it is rather widespread (e.g. parts of Pic. and Tert. par.), while it is almost absent in others (wn.be, SI-Flore).
- *Comarum palustre* L.: at least part of the recent records in regions where the species previously did not occur (or was very rare) relates to deliberate introductions, e.g. in the center of West-Flanders (wn.be).
- *Fragaria viridis* Weston: this species has also been observed in a single locality in Brab. occ., near Tournai (Les Vignobles) (AFW; comm. S. Carbonnelle 09.2020). In Pic. mér., on the contrary, where it was said to occur in the valley of river Somme, the species either has disappeared or never occurred (SI-Flore, Digitale2).
- *F. vesca* L.: in Mar. and Camp., this species is indeed slightly less common but it is not RR at all (although at least part of the records probably refer to plants escaped from cultivation, but this also applies to areas where the species commonly occurs as a native species) (wn.be). In Zeeland, for instance, it is considered to be AC (FZ).
- *F. moschata* Weston: this species has disappeared from its only known locality in Birresborn in Eifel centr. (FT).

Likewise, it seems to have disappeared from many of its former localities: for instance in Pic., there are apparently only historical records and it is much declining elsewhere in the Flora area as well (SI-Flore).

- *Filipendula vulgaris* Moench: in addition to the districts already mentioned in NF6, this species has also been known from single localities in Mar. mér. (valley of river Canche, near to its estuary) and Pic. mér. (valley of river Somme, east of Amiens) (SI-Flore).
- *F. ulmaria* (L.) Maxim.: in NF6, this species was said to be common throughout the Flora area, except in Mar. where it was said to be rare. It is indeed less common in Mar. but at most AC-AR (wn.be). It is AC in Zeeland according to FZ.
- *Agrimonia procera* Wallr.: in parts of Fl., Camp. and Brab., this species is slightly less rare than indicated, R-RR rather than RR (wn.be).
- *Alchemilla acutiloba* Opiz var. *acutiloba*: in Eifel centr., this taxon is not R-RR but completely absent (FT).
- *Alchemilla acutiloba* Opiz var. *micans* (Buser) B. Bock: the native status of this variety in the Flora area has always been considered doubtful. However, at least in a few localities in Mosan and Ard. (e.g. surroundings of Aywaille and Trois-Ponts) it is found in perfectly natural conditions (wn.be).
- *A. mollis* (Buser) Rothm.: this ornamental is naturalized here and there (near houses, cemeteries, old walls, embankments), especially in Mar. (polders), Fl., Camp., Brab. and Mosan where it is AR-R; elsewhere it is RR (wn.be, SI-Flore).
- *Aphanes arvensis* L.: this species is not at all RR in Mar. and also in some other districts (Boul., Camp. and Ard. nord-or.) it is at most R (wn.be, FZ, SI-Flore).
- *A. australis* Rydb.: this species is not at all RR in Mar. (wn.be), according to FZ it is even AC there. Also according to H24, this species is common in the dunes. This species and the preceding are undoubtedly confused and poorly known.
- *Rosa<sup>1</sup> majalis* J. Herrmann: this ornamental was mentioned in NF6 as an escape from cultivation (without further details). FLORAINE (2013) reported several records from near Toul in Lorr. mér. but these claims are probably erroneous (comm. S. Antoine, 11.2021). In the entire Flora area, this species has only been reliably reported (incl. historical records) from the Dutch part of Mar. but even there, recent records are lacking (FZ).
- *R. agrestis* Savi: this species is sometimes introduced on slag heaps, especially in northwestern France, and is locally naturalizing (Digitale2).
- *R. ×inodora* Fr. (*R. agrestis* × *elliptica*): the distribution of this hybrid (not yet mentioned in NF6) is poorly known in the Flora area because it is often confused with

*R. elliptica*. Its presence has been confirmed at least from Mar. (the Netherlands), Brab. or. (idem) and Tert. par. (scattered occurrences between Soissons and Reims) (FZ, H24, Bakker *et al.* 2011, database CBN Paris).

- *R. arvensis* Huds.: this species is absent from Fl. and Camp. and RR in Mar. and Champ. (wn.be).
- *R. ×deseglisei* Boreau (*R. arvensis* × *corymbifera*): the distribution of this hybrid (not yet mentioned in NF6) is poorly known in the Flora area. It is known at least from Mar., Brab., Mosan and Tert. par. and R-RR throughout (Maes *et al.* 2021, wn.be, database CBN Paris, etc.). Although not mentioned in H24, it is known from the Netherlands as well (Maes *et al.* 2021).
- *R. caesia* Sm.: no distribution for this species was given in NF6. It is RR in Mar. and Fl. (wn.be, FZ, Zwaenepoel 2019) and has been recorded as an escape in Camp. (comm. B. Van Puyenbroeck).
- *R. ×margerisonii* (Wolley-Dod) Wolley-Dod (*R. caesia* × *spinosissima*): this rare hybrid (not yet mentioned in NF6) is only known from Mar. (Oostduinkerke) in the Flora area (Zwaenepoel 2019).
- *R. ×subcollina* (H. Christ) Vukot. (*R. caesia* × *corymbifera*): no distribution for this hybrid was given in NF6. It is RR in Mar., Fl. and Brab. (FZ, Bakker *et al.* 2011, Zwaenepoel 2019, wn.be; obs. A. Zwaenepoel).
- *R. ×dumetorum* Thuill. (*R. canina* × *tomentella*): this rare hybrid is only known from Mar. in the Flora area (Zwaenepoel 2019).
- *R. ×grovesii* (Baker) Maskew (*R. canina* × *spinosissima*): this very rare hybrid (not yet mentioned in NF6) is only known from Mar. in the Flora area (Zwaenepoel 2019).
- *R. ×nitidula* Besser (*R. canina* × *rubiginosa*): no distribution for this hybrid was given in NF6. It is RR in Mar. and Fl. (Zwaenepoel 2019; obs. A. Zwaenepoel). Although not mentioned in H24, it probably also occurs in the Netherlands.
- *R. ×subcanina* (H. Christ) Vukot. (*R. canina* × *vosagiaca*): this very rare hybrid (not yet mentioned in NF6) is known at least from Mar., Fl. and Lorr. (Taily) in the Flora area (Zwaenepoel 2019, database CBN Paris, FZ; obs. A. Zwaenepoel).
- *R. ×insignis* Déségl. (*R. canina* × *squarrosa*): this is a rather common hybrid in most of Europe. In the Flora area it is AC in Mar., Fl., Pic., Brab., Mosan, Lorr., Ard., Champ. and R in Camp. (Maes *et al.* 2021; obs. A. Zwaenepoel).
- *R. corymbifera* Borkh.: no distribution for this species was given in NF6. It is C-AC in Mar., Boul., Fl., Pic., Brab., Mosan, Ard., Lorr., Champ., Tert. par. and RR in Camp. (database CBN Paris, Maes *et al.* 2021).
- *R. ×hibernica* Templeton (*R. corymbifera* × *spinosissima*): this very rare hybrid (not yet mentioned in NF6) is only known from Mar. in the Flora area (Zwaenepoel 2019).

<sup>1</sup> The genus *Rosa* was entirely revised by A. Zwaenepoel and F. Verloove.

- *R. corymbifera* × *tomentella*: this poorly known hybrid is only known from Mar. where it is R (Zwaenepoel 2019). It should be looked for elsewhere and is presumably less rare than hitherto assumed, but easily overlooked as an intermediate form.
- *R. elliptica* Tausch: although RR throughout the Flora area, this species is more widely spread than indicated in NF6. In addition to Brab., Lorr. and Champ., it has also been recorded from Mar. and Tert. par. (Zwaenepoel 2019, database CBN Paris).
- *R. gallica* L.: this species is historically known from Lorr. or. according to NF6. These claims, however, require confirmation. It certainly exists in Alsace (i.e. beyond the Flora limits) although at least some of these plants may rather belong to *R. ×polliniana* Spreng., its hybrid with *R. arvensis* Huds. A population from Ommeray in Lorr. or. (but also just outside the Flora area) was recently identified as *R. marginata* Wallr. (comm. S. Antoine, 11.2021; Simon & Antoine 2021).
- *R. ferruginea* Vill.: this widely grown ornamental is increasingly observed as an escape and is locally naturalizing. It has been known at least from Mar., Fl., Camp., Brab., Mosan (wn.be) and should be looked for elsewhere.
- *R. ×gremlii* (Christ) Christ (*R. micrantha* × *rubiginosa*): although not yet mentioned in NF6, this hybrid is locally not quite rare in the Flora area. In Mar., it is rather common, at least in Belgium and France (Zwaenepoel 2019, Digitale2; less so in the Netherlands, see FZ) and R in Mosan, Lorr., Champ. and Tert. par. (database CBN Paris).
- *R. ×avrayensis* Rouy (*R. rubiginosa* × *tomentosa*): this very rare hybrid (not yet mentioned in NF6) is only known from Mar. (Oostduinkerke) in the Flora area (Zwaenepoel 2019).
- *R. ×biturigensis* Boreau (*R. rubiginosa* × *spinosissima*): this rather rare hybrid (not yet mentioned in NF6) is only known from Mar. (west of Nieuwpoort) in the Flora area (Zwaenepoel 2019). Although not mentioned in H24, it also occurs in the Netherlands (wn.nl).
- *R. ×timbalii* Crépin (*R. rubiginosa* × *tomentella*): this very rare hybrid (not yet mentioned in NF6) is only known from Mar. in the Flora area (Zwaenepoel 2019) but should be looked for elsewhere.
- *R. sherardii* Davies: as expected, this poorly known species is – although very rare throughout the Flora area – more widely spread. Its presence has been confirmed now from Mar. (not only in its southern part), Boul. and Lorr. (Zwaenepoel 2019); it possibly also occurs in Brab., although confusion with *R. ×suberectiformis* cannot be ruled out there (photos wn.be).
- *R. ×suberectiformis* Wolley-Dod (*R. sherardii* × *tomentosa*): this hybrid is poorly known and much confused with the previous species. As a result, its distribution in the Flora area needs to be reassessed. Its presence has been confirmed from Mar. and Tert. par. (Zwaenepoel 2019, database CBN Paris). Given the presence of both parental species in Lorr., it probably also occurs there. The same applies to Fl., Brab. occ. and Ard. or. (Oesling), as already mentioned in NF6.
- *R. spinosissima* L.: this species may have disappeared from some of its inland localities. For example, from Pic. mér. (valley of river Somme) there are no observations from the past decades (Digitale2).
- *R. ×andrzejowskii* Boreau (*R. spinosissima* × *tomentosa*): no distribution for this hybrid was given in NF6. It is RR in Mar. (Zwaenepoel 2019) and Mosan (Viroinval) (comm. B. Van Puyenbroeck).
- *R. spinosissima* × *vosagiaca*: this very rare hybrid (not yet mentioned in NF6) is only known from Mar. (Oostduinkerke) in the Flora area (Zwaenepoel 2019).
- *R. squarrosa* (Rau) Boreau: this poorly known species (not separated from *R. canina* in NF6) is known at least from Mar. (Zwin nature reserve) (Zwaenepoel 2019). It is likely more widespread and probably also present in France (Mosan, Ard., Lorr., Champ. and Tert. par.; database CBN Paris) and in Brab. or. (Zuid-Limburg) in the Netherlands (H24). It is probably overlooked because the diagnostic glands on the side veins of the lower leaf surface are usually not very noticeable.
- *R. ×dumalis* Bechst. (*R. squarrosa* × *vosagiaca*): this very rare but poorly known hybrid (not yet mentioned in NF6) is only known from Mar. (Oostduinkerke) in the Flora area (Zwaenepoel 2019). It should be looked for elsewhere.
- *R. squarrosa* × *stylosa*: this very rare hybrid (not yet mentioned in NF6) is only known from Mar. and Brab. in the Flora area (Zwaenepoel 2019; comm. B. Van Puyenbroeck).
- *R. ×andegavensis* Bastard (*R. stylosa* × *canina*): no distribution for this hybrid was given in NF6. It is RR in Mar., Boul., Lorr. and Tert. par. (Zwaenepoel 2019, Digitale2, database CBN Paris). It is, however, a very poorly known taxon and its genuine distribution certainly needs to be reassessed.
- *R. tomentosa* Smith: this species is also known from Tert. par. (database CBN Paris), a district not mentioned in NF6. In Mar., it is much less common in the Netherlands (Bakker *et al.* 2011).
- *R. tomentella* Léman: no distribution for this hybrid was given in NF6. It is AC in Mar. and Brab., R in Fl., Camp., Mosan and Lorr. (Bakker *et al.* 2011, Zwaenepoel 2019, wn.be; obs. A. Zwaenepoel) and should be looked for elsewhere.
- *R. villosa* L.: this rare native species is known from at least one locality in Champ. (database CBN Paris), a district not mentioned in NF6. In addition, it is occasionally grown as an ornamental in parks and gardens.
- *R. vosagiaca* N.H.F. Desp.: the distribution of this poorly known species is insufficiently known. Its presence has been confirmed from Mar. and Brab. or. (Zuid-Limburg) (Bakker *et al.* 2011, Zwaenepoel 2019, H24). It

is RR throughout the Flora area although perhaps slightly less rare in the French part of Mar. (Digitale2). There are several claims from Wallonia as well but it is uncertain whether these indeed refer to this species or to *R. ×dumalis* Bechst., its hybrid with *R. squarrosa*.

- ***Prunus serotina*** Ehrh.: this invasive exotic is not rarer in Brab. than in Fl. (AC-AR) (wn.be). Also in Mar. (especially in the coastal dunes), it is not very rare, according to FZ even AC.

- *P. padus* L.: this species is present in all districts (wn.be, SI-Flore). In some of them, it is (as a native species) indeed RR but it is rather frequently observed as an escape from cultivation (e.g. in Fl.), greatly blurring the line between native and introduced populations.

- *P. virginiana* L.: this ornamental shrub is not only known to escape in Mar.; according to H24 it also occurs in Zuid-Limburg in the Netherlands (Brab. or.).

- *P. armeniaca* L.: this tree is not only cultivated but was recently also observed as an escape from cultivation (especially in coastal dunes in Mar., probably germinating from discarded stones; wn.be).

- *P. spinosa* L.: in NF6, this species was said to be C-AC throughout the Flora area, except in Fl. and Camp. where it was said to be AR. It is, however, hardly any rarer in these two districts (wn.be), thus at most AC-AR.

- *P. ×fruticans* Weihe: this hybrid is poorly known but probably overlooked. Most present-day records are from Brab. occ. (wn.be), a district from where it was not mentioned in NF6 (doubtlessly because an observer who is familiar with this taxon, D. Derdeyn, botanizes in that region).

- *P. cerasifera* Ehrh.: as an escape from cultivation, this species is more common than indicated in NF6 where it was said to be rare throughout the Flora area. In fact, it is AC-AR, especially in Fl., Camp. and Brab. (wn.be, SI-Flore), but its genuine distribution remains poorly known.

- *P. mahaleb* L.: in Eifel centr., this species is not RR but completely missing. There is a locality in Osteifel, beyond the Flora limits, but it is considered to be subspontaneous there, not native (FT).

- *P. avium* (L.) L.: as a native species, this tree is indeed RR in e.g. Fl. but it is rather frequently observed as an escape from cultivation (wn.be), greatly blurring the line between native and introduced populations.

- *P. laurocerasus* L.: this ornamental shrub is increasingly naturalizing in woodlands in the Flora area. It is AR in Boul., Fl., Camp., Pic., Brab., Mosan and Tert. par. and RR elsewhere (wn.be, SI-Flore).

- ***Cotoneaster integerrimus*** Med.: in NF6, this native species was reported from Brab. or. (Zuid-Limburg), where it recently would have appeared. This is incorrect and at most refers to escaped plants or – much more likely – incorrect identifications (see also H24). There are no documented records from Zuid-Limburg (wn.nl).

- *C. horizontalis* Decaisne: this Chinese shrub, by far the most invasive representative of the genus in the Flora area, is not only naturalized in Mosan. It is also widely established in Mar., Boul., Fl., Pic. and Brab. (wn.be, SI-Flore).

- ***Pyrus nivalis*** Jacq.: this species was mentioned in NF6 from Lorr. (Moselle). However, contemporary Floras and databases covering that area (e.g. SI-Flore, FLORAINE 2013, Vernier 2020) do not refer to it. It either disappeared or was formerly erroneously reported from there.

- ***Amelanchier ovalis*** Med.: this rare native shrub has been found for decades on steep rocks along the Meuse near Givet in Mosan (Colcy & Graitson-Schmitt 2018, Graitson-Schmitt *et al.* 2019) and it is also known from at least a single locality in Tert. par. (Mesnil-sur-Oger) (database CBN Paris). It was not mentioned from these two districts in NF6.

- *A. lamarckii* F.G. Schroeder: the species' distribution was updated based on data from wn.be and SI-Flore. It is most common in Camp. (AC-AR) but also not rare in Mar., Brab. and Fl. (see also FZ: AC) (at most AR-R). It also occurs in most other districts (Mosan, Ard., Lorr., etc.) but is much rarer there.

- *A. spicata* (Lam.) K. Koch: this ornamental shrub was mentioned as an escape from cultivation in NF6. In NF7, it was added that this refers to a single clone that has been known in coastal shrubland in De Panne (Houtsaegherduinen nature reserve) in Mar. for several decades (wn.be, comm. M. Leten).

- ***Crataegus rosiformis*** Janka: this species is also known from Lorr. (FLORAINE 2013), form where it was not yet mentioned in NF6.

- ***Aronia prunifolia*** (Marshall) Rehd.: in addition to the two districts where this shrub is naturalized (Fl. and Camp.), this species is occasionally observed elsewhere as an escape from cultivation. There is at least one confirmed record from Mosan (Anhée, 2019; wn.be), but this may refer to a (one-off) escape, not a naturalized population.

- *A. arbutifolia* (L.) Pers.: in the entire Flora area, this species is only known with certainty from Mar. in the Netherlands, from where it was recently confirmed again (FZ).

- ***Sorbus aucuparia*** L. subsp. *glabrata* (Wimm. et Grab.) Hedl.: this taxon was said to possibly occur in the Flora area, especially in Ard. and Eifel centr. Based on the distribution map in Kurtto *et al.* (2018) this seems to be rather unlikely. The taxon is also not mentioned in FT.

- *S. ×thuringiaca* (Nyman) Fritsch: in NF6, this hybrid was mentioned from Ard. or. and Eifel centr. It also occurs in other districts (e.g. Fl., Camp., Brab., Champ.; wn.be, SI-Flore), without a clear pattern.

- *S. domestica* L.: in Lorr., this species is slightly less rare than indicated in NF6, R-RR rather than RR (FLORAINE 2013). Also elsewhere in northeastern and north-central

France, this species is more widespread than previously thought: there are several records from Champ. and Tert. par. (two districts not mentioned in NF6) and in Ard. it is not restricted to Oesling but also occurs in the French part of this district (database CBN Paris). Moreover, in at least some of these localities it is possibly native.

- *S. torminalis* (L.) Crantz: the indication AR-R for Eifel centr. is a gross overestimation. The species is rare and may have even disappeared (Salmwald) there (FT).

- *S. ×tomentella* Gandoger: this hybrid also occurs (and is apparently not rare) in the wide area around Reims (Champ. and Tert. par.) (SI-Flore).

- *S. latifolia* (Lam.) Pers.: according to NF6, the presence of this species in Pic. mér. required confirmation. It was recently indeed observed there but south of the Somme river and thus outside the Flora area (SI-Flore).

- *S. remensis* Cornier: this micro-endemic species was described from Champagne and initially thought to be confined to a small area south of Montagne de Reims, Merfy and the surroundings of Chalons-en-Champagne. More recently, it was also found south of Paris (FG, SI-Flore) and, in the Flora area, in Tert. par. (Pouillon, northwest of Reims) (database CBN Paris).

- *S. intermedia* (Ehrh.) Pers.: this ornamental tree has also been observed as an escape in Mar. and Camp., two districts from where it was not mentioned in NF6. In Eifel centr., on the contrary, where it was considered to be rare, it has completely disappeared from two known areas (FT).

### 81. Elaeagnaceae

- *Elaeagnus umbellata* Thunb.: this ornamental has naturalized locally in the Flora area, especially in Mar. (more precisely in the Antwerp port area). It is occasionally seen elsewhere as well (wn.be, SI-Flore).

- *E. angustifolia* L.: this ornamental has naturalized locally in the Flora area, especially in Mar. (in coastal areas as well as in the Antwerp port area). It is occasionally seen elsewhere (wn.be, SI-Flore).

### 82. Rhamnaceae

- *Frangula alnus* Mill.: in NF6, this species was said to be RR in Mar. In fact, it is not at all RR there but doubtfully indigenous. According to FZ it is AC in Zeeland.

### 83. Ulmaceae

- *Zelkova serrata* (Thunb.) Makino: this ornamental tree was already mentioned in NF6 as being cultivated; in recent years it has also repeatedly been observed as an escape from cultivation since 2015. Nearly all records are from the Antwerp area (wn.be).

- *Ulmus laevis* Pallas: like all other species of *Ulmus* L., this species is often cultivated for ornamental purposes in parks, more rarely also on canal banks and at the inner limit of coastal dunes. From such plantations it is rather regularly escaping or locally even naturalizing, severely obscuring the species' natural distribution.

- *U. minor* Mill.: this species is not RR but completely absent from Eifel centr. (FT).

### 84. Cannabaceae

- *Celtis australis* L.: this ornamental tree was already mentioned in NF6 as being cultivated; in recent years it has also occasionally been observed as an escape from cultivation (e.g. in Leuven and Bruges, since 2020; wn.be).

### 85. Moraceae

- *Ficus carica* L.: this species is not rarely but increasingly observed as an escape from cultivation, especially in urban habitats (wn.be).

- *Morus alba* L. and *M. nigra* L.: both these species are not only cultivated but have recently also been recorded as escapes (wn.be).

### 86. Urticaceae

- *Parietaria officinalis* L.: this species is slightly expanding in the Flora area (R-RR throughout, rather than RR). There are several records from coastal woodlands (wn.be, H24), a habitat not mentioned in NF6.

- *P. judaica* L.: like the preceding, this species is recently expanding (wn.be, SI-Flore). In Fl. and Brab. it is at most R now. Also in Fluv., it is not very rare, both in Belgium and the Netherlands (AR according to H24).

- *Soleirolia soleirolii* (Req.) Dandy: this escaped ornamental is now fully established, in urban areas even fairly commonly so, certainly in the Netherlands (H24, Denters 2020). In addition to the districts already cited in NF6, it now also occurs in Mar. (in Zeeland even AC; FZ), Camp. (at least in the Netherlands, e.g. in Breda, Tilburg, etc.; wn.nl) and in Tert. par. (e.g. northwest of Soissons; Digitale2).

### 88. Fagaceae

- *Quercus ilex* L.: this southern species seems to be in the process of local naturalization in coastal dunes (Mar.) and saplings are also increasingly observed elsewhere, especially in recently planted woodlands (Fl., Brab.) (wn.be).

- *Q. suber* L.: in NF6, this species was said to have been introduced in coastal dunes south of Boulogne-sur-Mer. In fact, a trial in the Forêt Domaniale d'Écault was unsuccessful, by 1984 the species had already completely disappeared (comm. D. Laille, Office Nationale des Forêts, 06.2021).

- *Q. cerris* L.: in addition to the districts mentioned in NF6 (where it is said to be naturalized), this species is occasionally observed as an (ephemeral?) escape from cultivation. SI-Flore indicates localities in Mar. mér. and Pic. and the species has been observed rather regularly in various parts of Belgium as well (wn.be).

### 90. Juglandaceae

- *Juglans nigra* L.: this tree is increasingly escaping and possibly naturalizing locally, especially in riparian habi-

tats, not only in Belgium (Verloove 2011) but also e.g. in northeastern France, along river Moselle between Metz and Nancy (FLORAINE 2013).

- *Pterocarya fraxinifolia* (Poir.) Spach: this invasive tree is also known from river Marne in Champ., between Épernay and Vitry-le-François (database CBN Paris; see also Hendoux 2019).

#### 91. Betulaceae

- Two frequently planted species of *Corylus* L., *C. colurna* L. and *C. maxima* Mill., are also increasingly found as escapes (wn.be).

- *Alnus cordata* (Loisel.) Duby: this ornamental tree is also known as an escape from Tert. par. (Montagne de Reims; database CBN Paris), a district not mentioned in NF6.

#### 92. Cucurbitaceae

- *Bryonia dioica* Jacq.: in Eifel centr., this species is lacking, it only occurs in Osteifel (FT), beyond the Flora limits.

- *Cucurbita maxima* Duchesne: this species is not only cultivated, it very rarely also occurs as an adventive or escape, e.g. in Kieldrecht in 2017 (wn.be).

#### 94. Celastraceae

- *Euonymus europaeus* L.: in addition to the areas where this species naturally occurs, it is frequently cultivated and increasingly observed as an escape, thus heavily obscuring its natural distribution (wn.be).

- *E. latifolius* (L.) Mill.: in NF6, this species was said to be least rare in Mosan (R, elsewhere RR). However, also in Mosan it is only known from a single locality (wn.be, AFW, SI-Flore, database CBN Paris). It is thus RR throughout the Flora area.

- *Parnassia palustris* L.: in Camp., this species is also present in the Belgian part of this district (wn.be). It is also known from Ard. (e.g. Libin, Vielsalm) from where it was not yet reported in NF6 (wn.be, AFW). From Eifel centr., on the contrary, it has disappeared (FT). In some of the localities where this species recently occurred, it is doubtfully native (lack of historical records), e.g. around Ieper and Kortrijk in West-Flanders.

#### 95. Oxalidaceae

- *Oxalis debilis* Kunth: this weed is now naturalized and slightly increasing lately. It is still RR in most districts, except in Fl. and Camp. where it is merely AR-R (wn.be).

- *O. corniculata* L.: the geographical origin of this species was recently elucidated. It originates from eastern Asia (Groom *et al.* 2019), not the Mediterranean area as assumed in NF6.

- *O. dillenii* Jacq.: this recently naturalized North American species is increasingly recorded in the Flora area, although it remains very rare. It has been known from most districts by now: Mar., Fl., Camp., Pic., Brab., Lorr.

and Tert. par. (wn.be, SI-Flore, Digitale2, FZ, H24, FLO-RAINE 2013; see also Watterlot 2010).

#### 96. Hypericaceae

- *Hypericum androsaemum* L.: this is a very rare native species in some parts of the Flora area. However, it is frequently grown as an ornamental, is increasingly escaping from cultivation and has been able to naturalize in recently planted woodlands and urban habitats, especially in Fl., Brab. and Camp. where it is at most AR-R at present (wn.be).

- *H. elodes* L.: this species occurs in a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse, near the estuary of river Canche) (SI-Flore) along with, among others, *Rhynchospora alba*, *R. fusca*, *Trichophorum cespitosum*, *Drosera rotundifolia*, *Erica tetralix*, etc. (comm. B. Toussaint, 06.2021).

- *H. humifusum* L.: this species from slightly acidic soils hardly occurs in the calcareous Eifel centr.; it is RR there, not AC-AR (FT).

- *H. perforatum* L. subsp. *veronense* (Schrank) Cesati: narrow-leaved forms of *H. perforatum* were already referred to in NF6 but these were believed to be mere ecotypes from dry substrates. However, the genuine presence of this southern taxon in the Flora area was recently confirmed: a large population was detected in 2021 on an embankment along the Canal de la Deûle à l'Escaut in Roubaix (Brab. occ.), where it may be a mere introduction (pers. obs. author; ID confirmed by J.-M. Tison). However, the same subspecies is apparently also known from scattered localities in Champ. and Tert. par. (database CBN Paris) and should be looked for elsewhere, especially in the southern districts.

- *H. desetangii* Lamotte: this species was not mentioned from Eifel centr. in NF6 although it is hardly any rarer than *H. maculatum* Crantz subsp. *obtusiusculum* (Tourlet) Hayek and much more common than *H. tetrapterum* (FT). It is at most R there.

- *H. maculatum* Crantz subsp. *maculatum*: this subspecies is much rarer than the next and, as for its ecology, much more demanding (trophy/pH: Nardaies, acidophilic clearings and wood margins) than subsp. *obtusiusculum* (mesotrophic meadows, roadsides, hems,...). In its typical habitat, it was discovered in Oostkamp (Fl.) in 2019 (wn.be; comm. I. Jacobs, 05.2022), a district from where it was not known.

- *H. maculatum* Crantz subsp. *obtusiusculum* (Tourlet) Hayek: in NF6, this taxon was said to be rarer towards the western part of the Flora area. This actually turns out not to be true at all. According to SI-Flore, this subspecies occurs throughout the entire northwestern part of France, while it is virtually absent in northeastern France. The distribution pattern in Belgium is fairly diffuse. It is obvious that in reality this taxon is poorly known and its genuine distribution therefore uncertain.

- *H. montanum* L.: in Eifel centr., this species is only

known from a single locality and thus RR instead of AR. It is occasionally observed outside its natural distribution range. In Averbode (Camp.), for instance, a small persisting population has been known since 2012 (wn.be) and the species was recently also observed in Brussels (Saintenoy-Simon 2013).

- *H. linariifolium* Vahl: recently, a new Belgian location for this very rare species was discovered, ca. 13 km away from the unique one known so far, in Viroinval (Clesse 2014).

- *H. pulchrum* L.: the indication AC in Eifel centr. is very unlikely for an acidiphilous species. In reality it is absent there (comm. R. Hand, 03.2021; FT).

## 97. Elatinaceae

- *Elatine alsinastrum* L.: the status of this very rare species in the Flora area remains uncertain. In (relatively) recent times it has only been recorded from Lorr. Vernier (2020) left this species unmentioned and the same applies to SI-Flore, while the AFL still indicates a single location. Indeed, the species is said to still be found in Forêt de la Reine et Caténa de Rangéval ([https://www.terrestouloises.com/wp-content/uploads/2018/07/PLUi\\_Etat-initial-de-lenvironnement.pdf](https://www.terrestouloises.com/wp-content/uploads/2018/07/PLUi_Etat-initial-de-lenvironnement.pdf)). There are indeed no records from Champ. and Tert. par. (database CBN Paris, Digitale2).

- *E. triandra* Schkuhr: in NF6, this very rare species was mentioned from the southeastern part of Lorr. The few present-day records in that part of Lorr. are all located well beyond the Flora limits, near Sarrebourg (SI-Flore). FLORAINE (2013) indicates a locality in the western part of the district.

## 98. Violaceae

- *Viola odorata* L.: in Eifel centr., this species is completely lacking instead of being AR (FT).

- *V. mirabilis* L.: this species is also known from Givet in Mosan mér. In Lorr., it is also known from other regions than those indicated in NF6, e.g. from Argonne in Lorr. occ. (La Neuville-aux-Bois) (SI-Flore, database CBN Paris).

- *V. alba* Besser: this species is also known from Givet in Mosan mér. and the region around Rethel in Lorr. occ. (SI-Flore, database CBN Paris).

- *V. rupestris* F.W. Schmidt: the occurrence of this species near Givet is considered to be doubtful in NF6, although its presence there is confirmed by the CBN Paris database. This species disappeared from Zeeland a long time ago already (FZ).

- *V. lactea* Smith: this very rare species was recently discovered in a new locality in Fl., in Drongengoe between Aalter and Maldegem (Hoste *et al.* 2021).

- *V. stagnina* Kit.: in NF6, this species was mentioned from Champ. However, the few growing places are located near the border of the Lorr. and Champ. districts, south of Vouziers (SI-Flore) and therefore still in Lorr., not in Champ. *V. stagnina* is found in exactly the same

area as *V. pumila* Chaix, which is correctly indicated for Lorr. occ. in NF6.

- *V. pumila* Chaix: this rare species occurs in two areas in northeastern France. In addition to Lorr. occ. (as indicated in NF6), it also occurs in Champ. (near Châlons-en-Champagne). The populations in Lorr. occ. are located south of Vouziers and near Rethel (SI-Flore, database CBN Paris).

- *V. elatior* Fries: in addition to the known localities in Lorr. mér. (Antoine & Voirin 2015), this rare species also occurs in several places in Champ., especially in the valley of river Marne southeast of Reims (SI-Flore, database CBN Paris), from where it was not mentioned in NF6.

- *V. palustris* L.: according to SI-Flore, this species has completely disappeared in Tert. par. The CBN Paris database also only lists records outside the Flora area (Yvelines and further south).

- *V. tricolor* L. subsp. *saxatilis* (F.W. Schmidt) Arcang.: see Verloove (2023) for details.

## 100. Salicaceae

- *Salix*<sup>2</sup> × *capreola* A. Kerner ex Anderss.: this very rare hybrid is also known from Pic. (SI-Flore).

- *S.* × *straehleri* Seemen: this triple hybrid (*S. aurita* × *cinerea* subsp. *cinerea* × *repens* subsp. *repens*) was not mentioned in NF6. It is very rarely found in heaths in Fl. and Camp.

- *S.* × *mollissima* Hoffm. ex Elwert: in addition to the (few) districts mentioned in NF6, this hybrid is also known from Mar., Pic. and Lorr. in France (SI-Flore, Digitale2).

## 101. Euphorbiaceae

- *Mercurialis annua* L.: in NF6, this species was said to be AR in Camp. It is, however, hardly any rarer there than in e.g. Fl., at most AC-AR (wn.be). In Eifel centr., where it was said to be R, it is RR (known from a single locality; FT).

- *Euphorbia amygdaloides* L.: this species is no longer RR in Eifel centr., it has completely disappeared there (FT).

- *E. exigua* L.: in Eifel centr., this species is limited to two localities (FT). It is RR there, not AC-AR as indicated in NF6.

- *E. seguieriana* Neck.: outside its native area, this species is occasionally observed as an introduction. In a single locality in Mar. (Middelkerke) a small naturalized population has been observed (Vercruyssen *et al.* 2017).

- *E. palustris* L.: this is a very rare native species in the Flora area. However, in the past years it has increasingly been used in nature restoration projects and very easily escapes. It is increasingly naturalizing, especially in Fl. (as already indicated in NF6) but also in Brab. (wn.be). As a native species, it is also present in several localities in Champ., south of Épernay (SI-Flore).

<sup>2</sup> The genus *Salix* was entirely revised by A. Zwaenepoel.

- *E. dulcis* L. subsp. *incompta* (Cesati) Nyman: this taxon is known from at least one locality in Champ., in Sompuis, a district not mentioned in NF6 (database CBN Paris).
- *E. flavicoma* DC. subsp. *verrucosa* (Fiori) Pignatti: this taxon also occurs between Amiens and Péronne in Pic. mér. (SI-Flore).
- *E. stricta* L.: this species also occurs in a few localities in the valley of river Authie in Pic. mér. (SI-Flore, Digitale2), a district from where it was not mentioned in NF6. Outside its native distribution range, this species is sometimes observed as an introduction, for instance in Roesselare (Fl.) since 2019 (wn.be) or in Zuid-Limburg (Brab. or.) in the Netherlands (H24, wn.nl).
- *E. maculata* L.: this North American species is much expanding and now AR rather than R throughout, especially in the southern part of the Flora area (SI-Flore) and Flanders (wn.be).

## 102. Linaceae

- *Radiola linoides* Roth: this rare species is recently much declining in the Flora area. In Belgium, it is known from a few extant localities in Mosan and Camp. and from solitary growing places in Fl. and Mar. (it is less rare in Mar. mér. in France and Mar. sept. in the Netherlands; SI-Flore, FZ). It apparently has disappeared from Ard. (wn.be) and the same applies to Lorr., both from its Belgian, Luxembourg and French part (FLORAINE 2013, SI-Flore, wn.be, MNHN-Lux).
  - *Linum hirsutum* L.: this species has not only been introduced in Champ. as stated in NF6; according to FG, it is even naturalized there in a single locality (Mourmelon), although the CBN Paris database surprisingly does not refer to it at all. It is easily recognizable by its pubescent leaves.
  - *L. tenuifolium* L.: this species is not R-RR in Eifel centr., it is completely absent there (FT). Several localities are known from the valley of river Somme near Amiens in Pic. mér. (SI-Flore), a district that was not mentioned in NF6.
  - *L. austriacum* L.: this ornamental is doubtlessly also present in other districts than those indicated in NF6 (cf. SI-Flore, wn.be), but usually ephemeral or only temporarily persisting.
  - *L. bienne* Mill.: this very rare species is not only known from Tert. par. but also from adjacent parts of Champ., e.g. near Mourmelon (SI-Flore).
- ## 104. Geraniaceae
- General remark on the distribution of species of the genus *Geranium* L.: an increasing number of species are in recent expansion and this applies to both native and introduced taxa. Several native species with a rather limited natural distribution in the Flora area are increasingly often observed in regions where they were absent before (e.g. *G. columbinum* L., *G. lucidum* L., *G. pratense* L., *G. rotundifolium* L., *G. sanguineum* L. and *G. sylvaticum* L.). For these species, the nuclei of natural and secondary distribution are sometimes difficult to distinguish from one another these days.
  - *G. pratense* L.: in areas where this species does not occur naturally, it is increasingly escaping, often not RR and clearly increasing (wn.be).
  - *G. endressii* J. Gay: this is one of the most widely cultivated and escaped *Geranium* species (especially and incl. *G. ×oxonianum* Yeo). In many districts, it has become at most R now, no longer RR (wn.be).
  - *G. nodosum* L.: in addition to the districts already mentioned in NF6, this species has also been recorded as an escape in Mar. mér. (SI-Flore), Fl., Camp. and Ard. (wn.be).
  - *G. macrorrhizum* L.: this species is increasingly grown as an ornamental and easily escapes. In addition to the districts already mentioned in NF6, this species has also been recorded as an escape in Camp., Pic., Lorr. and Tert. par. and in Brab. it is not limited to the eastern part of the district (wn.be, SI-Flore, FLORAINE 2013).
  - *G. columbinum* L.: this native species is increasingly observed outside the area where it naturally occurs. Outside the districts that are listed, it is now R-RR rather than RR. In NF6, Champ. was not mentioned, suggesting that it is RR there. In fact, it is as common as in e.g. Tert. par. or Lorr., thus C (database CBN Paris).
  - *G. dissectum* L.: this species is commoner now than indicated in NF6. It is now almost everywhere AC (or even C), except on the nutrient-poor soils in Camp. (AR) and in Ard. (R) (wn.be).
  - *G. rotundifolium* L.: this native species is in expansion lately, especially in Mar., Fl., Camp. and Fluv. (wn.be).
  - *G. molle* L. var. *aequale* Bab.: despite the papers by Aedo *et al.* (1998), Lawalrée (2000) and Veldkamp (2008), who all reported this taxon from Belgium and adjacent territories, this variety remains largely unknown in the Flora area (wn.be, wn.nl, FG, H24).
  - *G. lucidum* L.: this native species with a rather limited natural distribution in the Flora area is in recent expansion, especially in urban agglomerations (Fl., Camp., Brab.) (wn.be).
  - *G. robertianum* L.: this species is not rarer in Camp. than in the other districts, C-AC throughout (heatmap wn.be).
  - *G. purpureum* Vill.: no distribution was presented yet in NF6 for this fast spreading alien species. It is mostly found in Mar., Fl., Camp., Brab. and Mosan (wn.be).
  - *Erodium moschatum* (L.) L'Hérit.: this thermophilous species is recently increasing. It is now also naturalized locally in Mar. in Belgium and the Netherlands and is also present in Fl. (wn.be). It typically occurs in dry "grasslands" on campsites (Verloove *et al.* 2020a). The species was indicated for Mar. mér. in NF6 but it is uncertain if

it still occurs there (there are no records according to SI-Flore and Digitale2).

- *E. lebelii* Jord.: this species was said to be AC throughout the Mar. district. However, it is less frequent for instance in Zeeland in the Netherlands where it is considered to be AR (FZ).

### 105. Lythraceae

- *Lythrum portula* (L.) D.A. Webb: the frequency of this species in Ard. is comparable with that in e.g. Fl., i.e. R instead of AR (wn.be).

- *L. junceum* Banks et Soland.: most recent records of this species are from exposed banks and dried-out ponds (wn.be), a habitat that was not yet mentioned in NF6.

- *L. hyssopifolia* L.: this species is also known from Fl. and Camp. (wn.be). The habitats in which it is found in these districts are, at least in part, as ‘natural’ as in the other districts. But, in general, this species is rather ephemeral in the Flora area.

- *Trapa natans* L.: the actual situation of this species in northeastern France is unclear. FLORAINE (2013) does not mention a single record while Vernier (2020) still refers to its presence in Champ. According to SI-Flore and the CBN Paris database, the species was recently seen east of Vouziers and around Épernay, in the Marne valley, whereas it apparently has disappeared from the Aisne valley in Champ. (from where it was recorded in NF6). In addition to these very rare occurrences in the wild, *T. natans* is also sometimes introduced as an aquatic ornamental, not only in the past (as stated in NF6) but also at present, for instance in Beloeil in 2019 (wn.be). It was also seen by De Langhe and Slembrouck in the early 1990s.

### 106. Onagraceae

- *Ludwigia palustris* (L.) S. Elliott: this species has completely disappeared from Lorr., both in Belgium, France and the Grand Duchy of Luxembourg, and the same applies to Pic. mér. and Tert. par. (FLORAINE 2013, wn.be, MNHN-Lux, SI-Flore, Digitale2).

- *L. grandiflora* (Michaux) Greuter et Burdet: this exotic aquatic ornamental is also known from Ard. (e.g. Marbehan; wn.be) and from several localities in Tert. par. (e.g. Oise; Digitale2).

- *L. peploides* (Kunth) P.H. Raven subsp. *montevidensis* (Spreng.) P.H. Raven: this aquatic weed is a relatively recent newcomer in the Flora area, probably first observed in 1995, but much expanding lately. In addition to the districts already mentioned in NF6, it now also occurs in Mar., Fl. and Camp. (wn.be) and in Brab. it is no longer confined to the canal Escaut-Deûle (SI-Flore, wn.be).

- *Oenothera laciniata* Hill: this species is more or less naturalized (“instable”, according to FG) in Tert. par. (Courcelles-Sapicourt and Muizon, i.e. west of Reims), close to the border with Champ. From the latter district itself there are apparently no records. At least in the first locality it has been present since the 1980s (Worms 1985)

and its persistence there was regularly confirmed up to the present (database CBN Paris). It is exceptionally seen as an alien elsewhere in the Flora area, e.g. in Drongen (Fl.) in 2020 (wn.be).

- *O. glazioviana* Micheli f. *rubricalyx* (R.R. Gates) Lambinon: this taxon was mentioned in NF6 from Mar. mér. (Étaples) where it is more or less naturalized in coastal dunes. It has recently also been observed in other areas (Rostański & Verloove 2015, Mahévas *et al.* 2015).

- *O. oehlkersii* Kappus ex Rostański: this species is more or less naturalized in parts of the Flora area, especially in Fl., Camp. and Brab. where it is R-RR (wn.be). It is occasionally observed elsewhere (e.g. SI-Flore, Mahévas *et al.* 2015). It was added to the key and a full account presented.

- *O. rubricaulis* Kleb.: this species is expanding recently and locally naturalized, especially in port areas of Antwerp and Ghent (Mar., Fl.) and in Camp. (wn.be). It is occasionally observed elsewhere. It was added to the key and a full account presented.

- *Epilobium montanum* L.: in Mar., Fl. and – particularly – Camp., this species is perhaps slightly less rare than indicated in NF6, AC-AR rather than AR (wn.be).

- *E. collinum* C.C. Gmel.: this species seems to be sharply declining in the Flora area. It is least rare in Ard. but even there R rather than AR (wn.be, AFW).

- *E. roseum* Schreb.: this species is not rarer in Fl. than in Camp. (wn.be), it was poorly known for quite a long time. Inversely, its assumed frequency in Lorr. (AC) is exaggerated, it is rather AR there (according to FLORAINE 2013 it is even R in Lorr.).

- *E. tetragonum* L. subsp. *lamyi* (F.W. Schultz) Nyman: in Fl. and Camp., this species is not rarer than in e.g. Brab., R rather than RR (wn.be).

- *E. angustifolium* L.: in NF6, this species was said to be AR-R in Fl. and Camp. This is no longer true, it is at most AC-AR in these two districts (wn.be). For comparison, in Zeeland (the Dutch part of Mar.) it is even considered to be CC (FZ).

- *E. dodonaei* Vill.: this recent newcomer in the Flora area is only known from Mosan and Lorr. It is expanding locally: a new locality was recently discovered in Marche-en-Famenne (Louviaux 2021). In Lorr., it was known from Belgium and the Grand Duchy of Luxembourg (Lorr. sept.); since 2011 it has also been present in the extreme southwestern corner of this district in France (Nully; database CBN Paris).

- *E. brachycarpum* C. Presl: this North American species was already briefly mentioned in NF6 from northwestern France (Brab. occ. and Mosan occ.). In the intervening years, it has much expanded and it is at present known from Mar. (ports of Antwerp and Dunkerque; wn.be and author’s observations), Fl., Brab., Mosan (wn.be), Ard. (both in Germany, Westeifel: Steffeln, Lavagrube; FT and in the Grand Duchy of Luxembourg; Wolff & Krippel

2022), Lorr. (Remacle 2014a, 2014b), Champ. (Troyes; database CBN Paris) and Tert. par. (Soissons; Digitale2). In 2020, this species was also recorded for the first time in the Netherlands, in Broekhuizenborst (Fluv.) (wn.nl).

- *Circaea lutetiana* L.: in NF6, this species was said to be R-RR in Fl. and Camp. which was highly exaggerated (wn.be).

- *C. ×intermedia* Ehrh.: the genuine presence of this hybrid in Tert. par. requires confirmation. SI-Flore nor Digitale2 indicate its presence there, not at present nor historically. The CBN Paris database only includes records from well beyond the southern border of the Flora area.

### 107. Staphyleaceae

- *Staphylea pinnata* L.: this ornamental tree has been recorded as an escape in several additional districts: Camp., Pic., Brab. and Tert. par. (wn.be, SI-Flore, H24). According to FG, it is native in eastern and northeastern France, but probably nowhere in the Flora area. In some regions, e.g. the Laonnois (Tert. par.) and to some extent also in Brab. occ., it is apparently not very rare (wn.be, SI-Flore, Digitale2).

### 109. Sapindaceae

- *Koelreuteria paniculata* Laxm.: this East Asian ornamental tree is not only cultivated in the Flora area. In fact, it rather easily reproduces from seed and is increasingly recorded in the wild. In riparian habitats (for instance on the banks of rivers Rupel and Scheldt) it could naturalize in a near future (wn.be).

- *Acer saccharinum* L.: this ornamental tree with leaves with a whitish-silvery lower side, is increasingly observed as an escape, even locally naturalized, in particular in riparian habitats (Verloove 2011). According to H24 it also occurs along river Maas, including in the territory covered by NF (see also wn.nl).

- *A. pseudoplatanus* L.: the genuine native distribution of this species is hard to assess. However, in areas where it is supposed to be not native (for instance in most of Flanders and further north) it is no longer AR-R (wn.be). The species is much expanding lately, probably exclusively as an escape from cultivation.

- *A. platanoides* L. and *A. campestre* L.: the genuine native distribution of these two species is hard to assess. However, in areas where they are supposedly not native (for instance in most of Flanders and further north) they are no longer R-RR (wn.be). These two species are much expanding lately, probably exclusively as escapes from cultivation.

- *A. rufinerve* Siebold et Zucc.: this species was introduced on an experimental basis in the forest of Bonsecours (Brab.) around 1950. It has shown an invasive potential there and is now the subject of an eradication project. It has occasionally been observed elsewhere (Forêt de Soignes) (wn.be).

- *Aesculus parviflora* Walter: this ornamental tree is not

only cultivated, it has also been observed as an escape recently (scattered records since 2013; wn.be).

- *A. hippocastanum* L.: this ornamental tree was already known to escape from cultivation. However, in recent years it has shown some tendencies towards a local naturalization, for instance in riparian habitats (wn.be).

### 110. Rutaceae

- *Skimmia japonica* Thunb.: this ornamental shrub is not only cultivated, it is occasionally also observed as an escape from or relic of cultivation (wn.be).

### 112. Malvaceae

- *Malva sylvestris* L.: this species is widespread throughout Fl. and Camp., it is C-AC rather than AC-AR. Also in Ard., it is slightly less rare than indicated, R-RR instead of RR (wn.be). In Eifel centr., on the contrary, it is not RR but completely missing (and considered non-indigenous elsewhere in the Eifel; FT).

- *M. neglecta* Wallr.: in Camp., this species is hardly any rarer than in e.g. Fl., thus C-AC rather than AR (wn.be).

### 113. Thymelaeaceae

- *Daphne laureola* L.: this species has exceptionally been recorded in Camp. (wn.be), doubtlessly as an escape from cultivation. In Champ., also not mentioned in NF6, it may well be indigenous; it is known in this district from a few localities (e.g. in Écurey-sur-Coole; database CBN Paris).

- *D. mezereum* L.: this native species is also grown as an ornamental and is increasingly observed in areas where it is not native, e.g. in Mar. (France), Fl. and Camp. (wn.be; comm. M. Leten 05.2021).

- *Thymelaea passerina* (L.) Coss. et Germ.: the distribution of this very rare species was updated. In Lorr., it is still present in Côtes de Meuse and Woëvre (Vernier 2020). In Tert. par., from where it was assumed to have possibly disappeared, it is still present (Messean 2010, SI-Flore, Digitale2). It was reported, for instance, from a military campsite in Sissonne (Messean *et al.* 2013). From Champ., however, it probably has indeed disappeared (database CBN Paris). In Belgium and the Grand Duchy of Luxembourg, on the contrary, it is extinct, the most recent records date back to 1951 (<http://observatoire.biodiversite.wallonie.be>) and 1899 (MNHN-Lux) respectively.

### 114. Cistaceae

- *Tuberaria guttata* (L.) Fourr.: it is questionable if this species, as a native, is still present in the Flora area. It was known from Montagne de Reims in Tert. par. but the most recent records there date back to 1925 according to SI-Flore. Recent records further southwest, near Creil (Digitale2), are located beyond the Flora limits. In 2017 a small population was discovered in Mar. sept. in the Netherlands (Brouwersdam: island Ossehoek) (H24, wn.nl). The species grows on an artificial island in the Grevelingen lake and its status is unclear (introduced?).

- *Helianthemum apenninum* (L.) Mill.: this species is only known from Mosan in the Flora area. However, it is occasionally observed elsewhere as an introduction. A population of a few hundred individuals was recently discovered in an old quarry in Lorry-Mardigny in the Moselle valley south of Metz. The plants have undoubtedly been introduced there and may belong to var. *virgatum* (Desf.) Font Quer. (Antoine & Aubry 2015).

- *H. nummularium* (L.) Mill.: the actual distribution of the two subspecies in parts of the Flora area is difficult to assess since they are not distinguished by all authors (e.g. FG). However, in Lorr. subsp. *obscurum* (Čelak.) Holub [as *H. grandiflorum* (L.) Mill.] is by far the least rare subspecies according to FLORAINE (2013), “peu commun” vs. “très rare” for subsp. *nummularia*. In NF6, the latter was said to be AC. The distribution and frequency of both subspecies in Eifel centr. is almost identical. Subsp. *obscurum* is therefore not RR at all, rather AC (“recht verbreitet in den Kalkgebieten von Gutland und Eifel”) (FT).

### 117. Resedaceae

- *Reseda luteola* L.: in Fl. and Camp., this species is not R-RR. In fact, its frequency is comparable with that in Brab., i.e. AR (wn.be). In many localities in the Flora area this species is introduced rather than native.

- *R. lutea* L.: this species is hardly rarer in Fl., Camp. and Brab. than in the districts where it is considered to be AC, thus AC-AR rather than AR-R (wn.be).

### 119. Brassicaceae

- *Sisymbrium volgense* Bieb. ex E. Fourn.: this alien species, with tough creeping rhizomes producing dense colonies, is naturalized since the 1990s on a railway embankment in Ghent (Fl.) (wn.be).

- *S. austriacum* Jacq.: there are a few recent records of this species in Champ. (database CBN Paris) but it is unknown which of the three subspecies is involved. Anyhow, the species is a mere accidental introduction in this part of the Flora area.

- *S. altissimum* L.: among the districts where this alien species is least rare, Brab. was added (wn.be).

- *S. orientale* L.: no distribution was given for this alien species in NF6. It seems to be most frequent in Mar., Fl., Camp. and Brab., especially in urban habitats (including foot of walls) (wn.be).

- *S. irio* L.: this species has been in the process of local naturalization in urban areas since the 2000s, first in Antwerp (Fl.), then also in Brussels (Brab.) (wn.be). It has also been observed repeatedly in Nancy in Lorr. mér. since 2006 (Bonassi *et al.* 2017). In Châlons-en-Champagne (Champ.), it was already known at the end of the 19<sup>th</sup> century; it was rediscovered there in 2016 and its persistence was subsequently confirmed (database CBN Paris).

- *Descurainia sophia* (L.) Webb ex Prantl: in NF6, this species was said to be least rare in the northern part of

Mar. (the Netherlands). It is, however, equally distributed throughout this district, in France, Belgium and the Netherlands (wn.be, SI-Flore). It was also explicitly mentioned from Fluv. (as AR). In reality, this species is much more rare there than in e.g. Fl. H24 does not mention this species from Fluv., only from Mar.

- *Alliaria petiolata* (Bieb.) Cavara et Grande: this species is not at all rarer in Camp. than in e.g. Fl., Brab., etc. (wn.be), i.e. C instead of AR.

- *Isatis tinctoria* L.: rather than as an adventive, this species is nowadays mostly seen as an escape. It is increasingly used for landscaping purposes, as a component of wild flower seed mixtures, and occasionally is running wild (wn.be).

- *Erysimum strictum* P. Gaertn., B. Mey. et Scherb.: this species is also known from at least one locality in Champ. (Cauroy) (database CBN Paris), a district not yet mentioned in NF6.

- *E. odoratum* Ehrh.: the actual presence of this species in Champ. and Tert. par. requires confirmation. According to SI-Flore and Digitale2, it has disappeared from all its localities, the northernmost extant populations being located south of river Seine, i.e. beyond the Flora limits. There is, however, a recent record east of Saint-Quentin (Pic.) (Digitale2), a district from where it had not been reported before. The species was found in Mont-d’Origny in 2018, on top of a chalky hillside (Falaise Bloucard), 20-25 individuals, apparently in a quite natural habitat (comm. J.-M. Lecron, 02.2022).

- *Conringia orientalis* (L.) Dum.: in NF6, this species was said to be R-RR in Lorr. In fact, it has disappeared there a long time ago already (see also FG), the most recent records dating back to before 1950 (SI-Flore). The species was no longer mentioned by FLORAINE (2013) and Vernier (2020). Elsewhere, this species is a very exceptional rather than an occasional alien in the Flora area.

- *Hesperis matronalis* L.: this species is expanding lately and is no longer RR in parts of Fl., Brab., Camp. and even Mar. (in Zeeland, for instance, AR; FZ). It is particularly well-represented in Fluv., especially between Maastricht and Roermond, where it is at most AR-R (wn.be, wn.nl).

- Some additional chorological information was added for the subspecies of *Barbarea vulgaris* R. Brown. Subsp. *rivularis* (Martrin-Donos) Sudre is probably R-RR throughout the Flora area, especially in Mosan, Ard. and Lorr. (wn.be, SI-Flore), whereas subsp. *arcuata* (Opiz ex J. et C. Presl) Hayek is probably also R-RR everywhere but seems to be expanding slightly (it is apparently also included in wild flower seed mixtures). Subsp. *vulgaris* is by far the most widespread subspecies (wn.be).

- *B. intermedia* Boreau: this species is clearly less rare in a triangle Ghent - Kortrijk - Brussels (Fl., Brab.) (wn.be), where it is R rather than R-RR.

- *B. stricta* Andrz.: the distribution of this species was updated. It is no longer RR in Mar. (see also: FZ), and in

Camp. and Brab., it is not more frequent in the northern parts than in the other parts of these districts (wn.be).

- *B. verna* (Mill.) Aschers.: this species was said to be possibly native in the northeastern part of Mosan. However, it is undoubtedly exclusively adventitious in the Flora area. Moreover, there are actually no records from that region (wn.be), the species must have been found there a number of times in the past, as an ephemeral alien. The species is increasingly observed throughout our territory and now is R-RR rather than RR (wn.be).

- *Rorippa* × *armoracioides* (Tausch) Fuss: this hybrid was mentioned in NF6 from the northern part of the Flora area, in the Netherlands. Since 2016, a stable population has also been known from Belgium, in Boom in Fl. (wn.be).

- *R. stylosa* (Pers.) Mansf. et Rothm.: the populations of this species in Oesling (Grand Duchy of Luxembourg) are quite isolated from other European populations. The species has become very rare there and is on the brink of extinction (Colling 2005).

- *R. palustris* (L.) Besser: this species is equally common in Mar., Fl., Brab. as in Camp. (i.e., AC-C, rather than AR-R) (wn.be; compare with Mar. in FZ: CC). In NF6, it was said to be absent or doubtfully recorded in Boul. and Eifel centr. However, in both districts the species is present, although probably RR (SI-Flore, FT).

- *R. austriaca* (Crantz) Besser: no distribution was given for this alien species in NF6. It seems to be most frequent in Fl., Camp. and Brab. and recently seems to be increasing slightly. Since 2010, it has also been known from the valley of river Marne, in Champ. (database CBN Paris).

- *Nasturtium officinale* R. Brown and *N. microphyllum* (Boenningh.) Reichenb.: the distribution of these two species in Eifel centr. was corrected, based on FT. The former is completely absent in Eifel centr. (instead of AR-R), while the latter is known from only one location, in Oberbettingen. In Lorr., this species is exclusively found in the Belgian part of this district (Lorr. sept.), it is completely absent from the French part (FLORAINE 2013).

- *Cardamine bulbifera* (L.) Crantz: outside the species' native distribution range in the Flora area, it is sometimes recorded as an escape from cultivation, occasionally even in naturalized populations, especially in Fl. and Camp. (wn.be). Populations in Zuid-Limburg in the Netherlands (H24) likely also refer to introductions.

- *C. amara* L.: this species was said to be absent in Mar. in NF6. There are several recent claims from this district (wn.be) but these are most likely erroneous (comm. M. Leten) and require confirmation. In Champ., it is not absent but RR (e.g. valley of river Marne near Châlons-en-Champagne; database CBN Paris).

- *C. dentata* Schult.: the distribution of this poorly known species remains uncertain but it appears to be the most widespread species of the *C. pratensis* group in coastal dunes, at least between De Panne and Oostduinkerke

(comm. M. Leten, 05.2020). A confirmation of this ID, using modern techniques, is however desirable. The species is also known from Champ., in the valley of river Marne (database CBN Paris).

- *C. impatiens* L.: this species is on the rise, especially in Camp. where it is not much rarer than in Mosan (AR). Also in Fl. and Brab., the species is increasing and now at most R-RR (wn.be). It is uncertain whether this recent expansion refers to a natural range extension or to multiple, independent introduction events. As a doubtlessly native species, it also occurs in various parts of Tert. par. (Laonnois, near Soissons, Montagne de Reims, etc.) (SI-Flore), from where it was not mentioned in NF6.

- *C. flexuosa* With.: this species is expanding lately. At present, it is clearly most common in Brab. (entire district) and Camp. (AC) and in fact hardly any rarer in Fl. (wn.be). It is very scattered and covers almost the whole area in the Eifel. centr.; it is at most AR-R there, not RR (FT).

- *C. hirsuta* L.: in Mar., Fl., Camp. and Brab., this species has become more common throughout the Flora area (C, rather than AC, in Mar., Fl., Camp. and Brab.), whereas in Mosan it is slightly but definitely less common than in these districts (AC) (wn.be). In Mar., in Zeeland, it is even considered to be CC (FZ). In Lorr., it is no longer R-RR but actually AC (FLORAINE 2013).

- *C. corymbosa* Hook. f.: the distribution of this recently introduced New Zealand species was specified. It is much rarer than initially thought (R rather than AR) and mostly found in Mar., Fl., Camp. and Brab. It is occasionally seen elsewhere, for instance in Lorr. (Remacle 2020).

- *C. occulta* Hornem.: this East Asian species is much increasing, especially in Mar., Fl., Camp., Brab., Mosan and Lorr. where it is AC-AR (wn.be). In the wild, *C. occulta* has been known in the Flora territory since 2007 but it was collected there as a pot weed already in 1968 (herb. BR). It has become the most widespread species of the genus worldwide in a few decades time (Šlenker *et al.* 2018).

- *Arabidopsis arenosa* (L.) Lawalrée subsp. *arenosa*: this subspecies is well-represented in Lorr. and parts of the Ard. (nord-or. and mér.) where it is R rather than RR. In Mosan, this subspecies is not more frequent in the northeastern part of the district (rather on the contrary). On the other hand, this subspecies is much rarer in Camp. and Brab. than indicated in NF6, RR rather than R (wn.be).

- *A. halleri* (L.) O'Kane et Al- Shehbaz: the exact origin of the populations found in the Flora area could be determined on the basis of genetic research: they originate in the Harz region in Germany (Pauwels *et al.* 2005).

- *Arabis sagittata* (Bertol.) DC.: this poorly known species is also known from scattered localities in Champ. (database CBN Paris), a district not mentioned in NF6.

- *A. planisiliqua* (Pers.) Reichenb.: this poorly known species from southwestern Europe reaches its northern

limit at the Seine valley, i.e. outside the territory covered by the Flora (SI-Flore). A former claim from Lorr., as referred to in NF6, is therefore probably erroneous.

- *Turritis glabra* L.: this species appears to be expanding. Its current abundance in Camp. or., often in linear populations (especially along roadsides and slopes), is remarkable (wn.be). It is not known whether these refer to introduced plants or to a natural range extension (comm. R. Barendse, 10.2020).

- *Fourraea alpina* (L.) Greuter et Burdet: in NF6, this species was said to have disappeared from Eifel centr. In reality, it has never occurred there. In neighboring areas, it is found in Rheinland-Pfalz in the Our region close to the known localities in the northern part of Grand Duchy of Luxembourg. There are also very rare occurrences at the northern edge of the Eifel in Nordrhein-Westfalen, e.g. at Achenlochhöhle in the Urft valley on Devonian limestone (comm. R. Hand, 10.2020). In Tert. par., it has indeed disappeared (SI-Flore, Digitale2).

- *Pseudoturritis turrita* (L.) Al-Shehbaz: there is a large, apparently well-established population in Mannebach-Kümmern (Lorr. nord-or.), near the border with the Grand Duchy of Luxembourg (FT). In addition to the naturalized populations, this species is exceptionally observed as a casual alien in the Flora area, e.g. in Edegem (Fl.) in 2009 (wn.be). SI-Flore reports a record from Gondrecourt-le-Château in Lorr. mér. (2002); it is unclear whether or not this species is naturalized there. It was not cited at all by Vernier (2020) and only from a locality outside the Flora area by FLORAINE (2013).

- *Lunaria rediviva* L.: outside its native distribution range in the Flora area, this species is occasionally observed as an escape from cultivation (wn.be).

- *L. annua* L.: no distribution was provided in NF6. In the past decades this species has much expanded. It is most frequently observed in Mar., Fl., Camp. and Brab. where it is AC-AR (R-RR elsewhere in the Flora area) (wn.be).

- *Alyssum alyssoides* (L.) L.: this species has disappeared from Mar., where it was last seen in Belgium in the 1970s, and in the 1990s in the Netherlands (AFV, FZ). It is occasionally observed as an introduction, recently for instance in the old port area of Ghent (wn.be). Repeated records since 2006 from a quarry in the Dutch part of Sint-Pietersberg (Brab. or.) (H24, wn.nl) likely also refer to adventive plants. In Lorr., it is very rare at present but evenly distributed throughout the district (FLORAINE 2013, wn.be); it is not predominantly found in the northern part of the district as erroneously stated in NF6. Surprisingly, this species was not mentioned from Tert. par. in NF6, although it is by far least rare in this district and adjacent Champ. (roughly between Compiègne-Laon-Reims-Épernay; SI-Flore, Digitale2).

- *A. murale* Waldst. et Kit.: this ornamental has extended in the Huy area where it is not only naturalized on rocks downstream but also upstream of river Meuse (wn.be).

- *Berteroa incana* (L.) DC.: in Mar., there are rather numerous observations, even in dense concentrations, on the Middle and East coast in Belgium (wn.be). On the other hand, the species is considered to be R in Zeeland (FZ). Its rarity in this district was left unchanged but it may be slightly less rare than indicated in NF6 (R-RR). In Eifel centr., this species is not R-RR but completely lacking (FT).

- *Draba muralis* L.: in the entire Mar. district (i.e. France, Belgium and the Netherlands), this species is only known from Koksijde (SI-Flore, FZ, wn.be, wn.nl). This information was deemed useful to add. It also occurs naturally (not adventitious) at some locations in the Eifel centr. (FT). In addition to the enumerated districts (where it is supposed to occur naturally), this species is increasingly observed as an introduction and seems to have locally naturalized, e.g. on canal or river banks in Brab. (Menen) or Camp. (Breda) (wn.be, wn.nl).

- *D. aizoides* L.: this rare species is historically known from Yvoir. Recently, it has also been found elsewhere, on old walls or rocks, in Mosan (Huy) as well as in Ard. (La Roche, Bouillon) (wn.be). The status of these populations is uncertain but they most likely represent escaped plants.

- *Cochlearia danica* L.: this coastal species has further expanded to more southern, inland districts (Mosan, Ard., Lorr., Tert. par.; for Lorr. see also Remacle 2015, Bonassi *et al.* 2017 and Krippel *et al.* 2018) (wn.be, SI-Flore). In Camp., it is equally distributed throughout the district, it is no longer more frequent in its northern part (wn.be).

- *C. officinalis* L.: some details were added about the distribution of this species. It is confined to Mar. where it occurs in France (contrary to NF6, at present it occurs exclusively north of Cap Blanc Nez, it has disappeared from Mar. mér.; SI-Flore) and Mar. sept. (the Netherlands) but also north of Antwerp in Belgium (wn.be).

- *C. anglica* L.: this species was recently discovered in several additional localities along the coast in northwestern France. It was already known, since 1995, from the estuaries of rivers Somme and Slack (NF6) and now also occurs at the mouth of rivers Authie and Canche and between Calais and Dunkerque (Digitale2, Legris & Villejoubert 2015, Dumont 2016). From Zeeland in the Netherlands, it has already disappeared a very long time ago, in 1857 (FZ).

- *Camelina sativa* (L.) Crantz: in NF6, this species was said to be formerly cultivated as an oil crop. In recent years, it is cultivated again on a small scale by bio-farmers, for instance in Malonne (Romain 2020), as an oilseed crop.

- *Neslia paniculata* (L.) Desv.: as a weed of arable land, this species may have almost disappeared in the entire Flora area. SI-Flore reports not a single recent record. Perhaps it is only extant in some parts of Lorr.: FLORAINE (2013) indicated a record from Nancy and Vernier (2020) mentioned the species from the northern Plateau Lorraine. In Champ. and Tert. par., it may be lost (SI-Flore).

- *Hornungia petraea* (L.) Reichenb.: this rare species was recently discovered in two places around Commercy in Lorr. mér. where it is believed to have been previously overlooked, due to its early flowering (Bonassi *et al.* 2017). It is exceptionally recorded as a casual alien, for instance in Boom in 2020 (wn.be).
- *Teesdalia nudicaulis* (L.) R. Brown: in Mar., this species is certainly not RR, rather R. It has scattered occurrences all along the Belgian coast (wn.be). For comparison: in Zeeland, in the Netherlands, it is considered to be AR (FZ).
- *Thlaspi arvense* L.: this species is less rare than indicated in Lorr., AC according to FLORAINE (2013).
- *T. alliaceum* L.: this species indeed probably occurs as a native species in Lorr. (comm. S. Antoine, 02.2021; Antoine 2020b), as already assumed in NF6, but also in the Champ./Tert. par. bordering area (database CBN Paris; SI-Flore). In Belgium, it has persisted since its discovery in 2007 in the south of Entre-Sambre-et-Meuse (Mosan occ.). Since 2020, the species has also been known from the edge of a tree nursery near Diest (at the limit of Camp. and Brab. districts).
- *Noccaea montana* (L.) F.K. Mey.: in Lorr., this species occurs – albeit RR – throughout the district, it is not confined to the southern parts of it, the northernmost populations being located immediately southwest of Thionville (FLORAINE 2013).
- *Iberis amara* L.: in Lorr., this species is actually limited to the French part of this district (it has completely disappeared in the Belgian part; AFW, wn.be). In Belgium, there are only extant native populations in Mosan; the species is sometimes found elsewhere in the Flora area as an alien or escape (wn.be).
- *I. umbellata* L.: this escaped ornamental is also known from Camp. and Brab. (wn.be), districts from where it was not yet mentioned in NF6.
- *Lepidium campestre* (L.) R. Brown: this species is indeed scattered in Mar. but at least as much in Belgium as in the Netherlands (it is not more frequent in the Dutch part). The species is also rather common in Camp. (especially or.: AR-R) and also less rare than indicated in NF6 in Fl. (R, rather than RR) (wn.be). The same applies to Lorr. where it is even said to be C (FLORAINE 2013). The species seems to be expanding lately.
- *L. heterophyllum* Benth.: in NF6, this species was said to be present in the Dutch part of Fluv. but this claim is not substantiated by recent observations (wn.nl), nor is the species mentioned from this district in H24. There are some observations (wn.be) in the Belgian part of Fluv. (river Maas) but these are likely erroneous.
- *L. graminifolium* L.: no distribution details were provided in NF6. It is naturalized in a few localities in Brab. occ. and Pic. sept. in France (SI-Flore) and in a single locality in Zeeland in the Netherlands (FZ, wn.nl). It was also recently seen in Charleville-Mézières, at the border of Ard. and Lorr., an area from where it was already recorded at the end of the 19<sup>th</sup> century (database CBN Paris).
- *L. latifolium* L.: the notion R in Mar. in NF6 in fact only applies to France where this species is indeed known from the Dunkerque area (it is much expanding there locally and now has become at most AR) (Digitale2). Elsewhere in Mar., this species is only exceptionally seen: in Zeeland (the Netherlands) it is RR (FZ) and in Belgium it hardly occurs in Mar. (wn.be). Elsewhere in the Flora area, this species obviously is on the rise, incl. in Fl. (wn.be) from where it was not yet mentioned in NF6. The species' recent spread is at least in part favored by the use of de-icing salt.
- *L. ruderale* L.: the distribution of this species was updated. It has expanded greatly in some districts but is missing in others. It is least rare in Mar., Fl., Brab. (mostly occ. and centr.) and Mosan (valleys) where it is AC-AR (wn.be). Everywhere else it is R-RR (not only in Ard., also in e.g. Lorr.) and it is even completely absent in Eifel centr. (FT).
- *L. virginicum* L.: in Fl., Camp. and Brab., the districts where it is least rare, this species has much expanded and is now AC-AR, rather than AR (wn.be).
- *L. densiflorum* Schrad.: this species is also expanding but yet much rarer than the previous species with which it is often confused. It is usually naturalized in urban agglomerations, for instance in Antwerp and Ghent (Fl.) (wn.be).
- *L. coronopus* (L.) Al-Shehbaz: the distribution and frequency of this species in Fl. is comparable with that in Brab., i.e. AR instead of RR (wn.be).
- *L. didymum* L.: in Camp. and Brab., this species is not more frequent in the northern parts of these districts (wn.be).
- *Subularia aquatica* L.: this very rare species is long-extinct in the entire Flora area. It was reported from Camp. (Genk) but historically also occurred in the French part of Ard., in the Monthermé area (1860-1900; database CBN Paris).
- *Diplotaxis tenuifolia* (L.) DC.: this species is much expanding recently and is by now also known from several locations in Ard. from where it was thought to be absent (wn.be; see also Bizot & Bouillard 2011 and Bizot *et al.* 2016 for records from the Charleville-Mézières area in France). In Camp. and Mosan (Meuse valley), it is at most AR and no longer R-RR. In Eifel centr., on the contrary, it has disappeared from its unique locality (FT). This species is now increasingly cultivated as a leaf vegetable, as a substitute for cultivated arugula.
- *D. muralis* (L.) DC.: this species was said to be more frequent in the western part of the Camp. district in NF6 but, in reality, it appears to be even more common in the eastern part (wn.be).
- *Brassica oleracea* L.: this species was discovered in Zeeland in Dutch Mar. in 2002. It has apparently persisted well since then but has hardly extended (FZ).

- *Sinapis arvensis* L.: this species was said in NF6 to be C throughout, except in Fl. and Camp. where it is AR. In reality, it is at least as frequent there as in the other parts of the Flora area (wn.be). On the other hand, in Eifel centr. it is much rarer than indicated, AR rather than C (FT).
- *Erucastrum gallicum* (Willd.) O.E. Schulz: in NF6, this species was indicated as least rare in Fluv. (AR-R). However, there are no records from this district in Belgium and only two in the Netherlands, both from 1992. It does occur further north in Fluv., but outside the Flora area. In our territory it apparently is a very rare and ephemeral alien in this district (H24, wn.be, wn.nl). It is completely missing and was never recorded in the past in Eifel centr. (FT).
- *E. supinum* (L.) Al-Shehbaz et Warwick: this rare species was not mentioned from Tert. par. in NF6. It is known from several localities in this district, especially east of Laon. It is also known from the area north of Laon, in Pic. or. (Digitale2).
- *E. nasturtiifolium* (Poiret) O.E. Schulz: indicated as a mere alien in NF6, this species has naturalized in several localities in northern France. It is known since at least the 1980s from a slag heap near Lens (Pic. sept.) and was also reported from a few localities in French Lorr., where it was qualified as a war alien (“plante obsidionale”) by Vernier (2014). FLORAINE (2013) indicated two records from the area between Metz and Verdun. SI-Flore also indicates scattered localities between Reims and Châlons-en-Champagne (Champ.).
- *Coincya monensis* (L.) Greuter et Burdet subsp. *cheiranthos* (Vill.) Aedo, Leadlay et Muñoz Garmendia: it is doubtful whether the distribution presented in NF6 is still correct. In Oesling, where it was considered to be least rare (AR), it is declared “vulnerable” (Colling 2005) and there are hardly any recent records from the other districts mentioned (Mosan and Lorr.). It is probably dramatically declining in its natural distribution range in the Flora area. In the Grand Duchy of Luxembourg, for instance, it was last seen in 2004-2005, the penultimate record being from 1988 (comm. Y. Krippel, 10.2020). The same applies to Eifel centr. from where the species has completely disappeared (FT). On the other hand, it is expanding elsewhere, as an alien, especially between Antwerp and Brussels, where it has become AC locally. The same applies to the northeastern part of Camp. and Fluv. in the Netherlands (H24, wn.nl).
- *Rapistrum rugosum* (L.) All.: this alien is expanding and at present most frequently observed in Fl. and Brab. occ. (wn.be).
- *Calepina irregularis* (Asso) Thell.: this species was rediscovered in agricultural fields in Belgium in 2018 (Jacobs 2019). It has also been known since the 1970s from Zuid-Limburg in the Netherlands (near Voerendaal; Brab. or.) (wn.nl, H24). Since 2010 it has been observed as a weed in tree nurseries north of Valenciennes (France; Brab. occ.) and near Diest (Camp. mér.) where it seems to be well naturalized (SI-Flore, wn.be).

- *Raphanus raphanistrum* L. subsp. *landra* (Moretti ex DC.) Bonnier et Layens: this subspecies has recently established itself in the Flora area, or perhaps it was overlooked for some time. It is R-RR in Mar. but also occurs in Fl., more precisely in the valley of river Scheldt downstream from Melle (wn.be; also comm. G. Rappé 10.2017 and M. Leten 01.2018).

- *R. raphanistrum* L. subsp. *raphanistrum*: this subspecies was said to be C-AR in the entire Flora area. In Eifel centr., however, it is completely lacking (FT).

## 120. Santalaceae

- *Viscum album* L.: this species is slightly expanding in the Flora area. It was mostly found south of a line Marquise-Saint-Pol-Amiens-Roye-Bohain-Le Quesnoy-Ath-Bruxelles-Louvain-Hasselt-Maaseik with only isolated localities further north. At present, however, it has become relatively widespread further north as well (wn.be).

- *Thesium pyrenaicum* Pourr.: according to NF6, this species occurs in Lorr. exclusively in the northern and eastern parts of the district. SI-Flore, on the contrary, only indicates localities in the southern part of it. In fact, the species is very rare but occurs throughout Lorr. (FLORAINE 2013, Vernier 2020).

- *T. linophyllum* L.: in the entire Flora area, this species was only known from Côte de Meuse in Lorr. mér., from where it was thought to have possibly disappeared (which seems to be confirmed by data from SI-Flore). However, according to Muller (2006) it is perhaps still present. Vernier (2020) also still mentioned it from Meuse (RRR). FLORAINE (2013), on the other hand, only presents records from beyond the Flora limits. Thus, it is quite unclear whether or not this species is still present in the Flora area.

- *T. humifusum* DC. subsp. *divaricatum* (Jan ex Mert. et Koch) Bonnier et Layens: in the entire Flora area, this taxon is only known from Tert. par., where it is considered to be RR. According to Digitale2 there are only some localities left in Laonnois but even there the most recent observations date back to 1996 (comm. B. Toussaint, 06.2021).

## 123. Plumbaginaceae

- *Cerastigma plumbaginoides* Bunge: in NF6, this ornamental was said to occur as an escape in the extreme southwestern part of the Flora area (in France). By now, it has also been observed as an escape further north, also in Belgium and the Netherlands (wn.be, wn.nl).

- *Limonium humile* Mill.: the situation with respect to this recent newcomer in the Flora area is very unclear: according to H24 it is known from a single locality in Zeeland, whereas according to FZ its ID remains questionable. There are many new recent claims from the Netherlands, both from Zeeland and Friesland (wn.nl, Atlas-NL). These may refer to a (recent) natural range extension, a previously overlooked species and/or escapes from cultivation. Anyway, contrary to NF6, the species is not restricted to Mar. sept. but also occurs south of the

Scheldt estuary. Plants recently observed in Belgian Mar. (Zwin nature reserve), with morphological characteristics that were in line with *L. humile*, turned out to have a genome size that rather corresponds with *L. vulgare* (comm. I. Jacobs & L. Delgat, 10.2021). The whole issue obviously requires further study.

- *L. binervosum* (G.E. Smith) C.E. Salmon: this species is known from two localities in French Mar., a historical one from chalk cliffs in Cran aux Œufs (Cap Gris-Nez) and one, discovered in 2007, from Platier d'Oye near Gravelines. In the latter locality, it is very well established, with very substantial numbers observed each year, mainly in former hunting ponds with little vegetation and flooded during high tides and at the contact of salt meadows / dunes (“haute schorre”). This ecology considerably differs from that of the “historic” population of Cran aux Œufs (Cap Gris-Nez) but both are (sub) halophilic systems that are relatively cut off from the direct impact of marine submersion (“sheltered areas”) by recent dune ridges which limit the marine influence to an area in the process of continentalization. However, the substrate in Platier d'Oye is sandy loam and not rocky or sandy (comm. B. Toussaint, 06.2021). Stace (2019) also indicated a double ecology for this species: “chalk cliffs / salt marshes”.

- *Armeria arenaria* (Pers.) Schult.: this species was recently observed, as an introduction, on a slag heap in Germignies-nord (Stien 2011).

#### 124. Polygonaceae

- *Rumex scutatus* L.: in NF6, this species was said to be AR-R in Champ. However, it has apparently much declined lately and seems to have completely disappeared from that district (database CBN Paris).

- *R. ×heterophyllus* C.F. Schultz: it is very doubtful whether this hybrid still exists in the Flora area. In Belgium there are no documented records from the past decades (wn.be, etc.). In France, it has disappeared ‘depuis longtemps’ (FG, which also makes the claim from the Seilles valley in Lorr., mentioned in NF6, questionable). It has long since disappeared in the Netherlands as well: it is no longer mentioned in H24, Atlas-NL, etc. Weeda *et al.* (1985) already indicated that this hybrid had disappeared from the Netherlands.

- *R. hydrolapathum* Huds.: in Fl., this species is clearly much more common along rivers and canals than in the rest of the district, AC vs. AR (wn.be).

- *R. triangulivalvis* (Danser) Rech. f.: this North American alien occurs more or less permanently along river Maas (Fluv.) (wn.nl, wn.be, H24), especially on the Dutch side, where it may be naturalized locally.

- *R. patientia* L.: this naturalized alien is by far least rare in Mar., Fl. and Brab. (especially Brab. occ.) (AR) (wn.be, SI-Flore); it is R-RR elsewhere in the Flora area.

- *R. sanguineus* L.: in NF6, this species was not mentioned from Mar. and Ard. although it is known in these districts from rather numerous localities. In Ard., it is par-

ticularly frequent in the French part of it (database CBN Paris), whereas in Mar., it is even considered to be AC in Zeeland, in the Netherlands (FZ).

- *R. conglomeratus* Murray: this species is not AR-R but completely absent from Eifel centr. (FT).

- *R. pulcher* L.: this species is native to neither Belgium nor the Grand Duchy of Luxembourg (Colling 2005).

- *R. obtusifolius* L. subsp. *transiens* (Simonk.) Rech. f.: in NF6, this subspecies was mentioned from, among other districts, Mosan where it occurs along river Meuse. There are several (permanent) populations along this river in Limburg (Fluv.) as well (wn.be).

- *R. maritimus* L.: the distribution of this expanding species was updated. It is certainly equally common in Fl. as in Mar. and Fluv. (AC-AR). Also in Camp. (especially around Hasselt and Genk, thus in Camp. or.) and Brab. (in the entire district, not just in occ.) it is less rare than indicated in NF6 (AR) (wn.be). It is also known from several localities in Champ., especially in the valley of river Marne (database CBN Paris). In Eifel centr., on the contrary, it is completely missing (FT).

- *R. palustris* Smith: in Fl. and Brab., this species is less rare than indicated in NF6, AR rather than RR (wn.be).

- *Polygonum arenarium* Waldst. et Kit. subsp. *pulchellum* (Loisel.) Thellung: this rare alien with petaloid tepals (markedly enlarged at the apex) has more or less established itself at the edge of a canal in Uikhoven (Fluv.), at least since 2009, where it was probably introduced with talc, most likely from Egypt or Pakistan (wn.be; comm. R. Barendse, 01.2021).

- *P. maritimum* L.: this species was found once in the Flora area, in 1962, in Zeeland. It is an ephemeral that has not been seen for more than half a century (FZ, H24) and probably will not reappear in the near future (it is even declining in France where it does not occur to the north of Bretagne) (FG, SI-Flore). It was therefore removed from the key and the account was deleted as well.

- An additional alien species of *Persicaria* Mill. was recently discovered, *P. filiformis* (Thunb.) Nakai (Genk, 2021; wn.be). A future naturalization of this Asian ornamental is not unlikely, especially in disturbed woodland (see also H24).

- *P. nepalensis* (Meissn.) H. Gross: this annual with ascending stems, subglobose heads that are subtended by one or two leafy bracts and auriculate leaves with winged petioles, seems in the process of naturalization since 2010, at least in Fl. and Camp. (respectively in Bruges and Averbode) (wn.be). The somewhat similar *P. capitata* (Buch.-Hamilt. ex D. Don) H. Gross, that according to NF6 was expected to be on the verge of naturalization in the Flora area, appears to remain rather ephemeral (wn.be).

- *P. mitis* (Schrank) Asenov: this species is not RR but completely lacking in Eifel centr. (FT).

- *P. minor* (Huds.) Opiz: in the entire Flora area this species is probably least rare in Camp. (AC, rather than AR-

R) (wn.be, wn.nl, SI-Flore). It is the only district where it is not rare.

- *Bistorta officinalis* Delarbre: in addition to the districts where this species naturally occurs, it is occasionally seen as an introduction (wn.be).
- *Rubrivena polystachya* (Wall. ex Meissner) M. Král: in the entire Flora area, this naturalized species is by far least rare in Camp. (wn.be). According to SI-Flore, it used to be relatively widespread in Pic. as well but it appears to have disappeared completely there (Digitale2). In northern France, at present, it appears to be least rare in Ard., in the valley of river Meuse (database CBN Paris).
- *Fallopia dumetorum* (L.) Holub: in Fl., this species is AR rather than RR (wn.be). In Eifel centr., on the contrary, it is not AR but completely missing (FT).
- *Reynoutria japonica* Houtt.: this Asian species has become one of the most invasive species in the Flora area, it is now C-AC almost everywhere (instead of AC-AR) (wn.be, SI-Flore). In Belgium, it is only lacking in some of the most pristine areas in Wallonia (AFW), perhaps also in parts of Pic. in France (SI-Flore).
- *R. ×bohemica* Chrtek et Chrtková: this hybrid is much more frequent than one of its parents, *R. sachalinensis* (F. Schmidt Petrop.) Nakai (see also Meerts & Tiébré 2007). It is AR rather than R and probably widely overlooked.
- *Fagopyrum esculentum* Moench: this is not an AR-R but rather AC-AR (albeit ephemeral) alien (wn.be).

## 125. Droseraceae

- *Drosera rotundifolia* L.: in Lorr., this species was indicated from the northern and eastern part of the district in NF6. It is, however, lacking in eastern Lorr. (FLORAINE 2013) (in the northern part it is confined to Belgium and absent from France; wn.be). In addition to the districts where this species is native, it is occasionally introduced, e.g. in Zeeland where it was originally introduced intentionally in the 1980s in the Braakman and now expanding greatly (thousands of individuals) (FZ).
- *D. intermedia* Hayne: this species naturally reappeared in 2011 in Mar. sept. (De Schotsman, Zeeland), after an absence of a century (FZ). It was recently also discovered in Kyllwald in Eifel centr. (FT). The species was not mentioned from these two districts in NF6.
- *D. anglica* Huds.: until the beginning of the 20<sup>th</sup> century, this species also occurred in a few places in Pic. (e.g. near Béthune, Péronne and Cambrai) (SI-Flore). In the entire Flora area, it seems to be known from a single extant locality, in Chenay (near Reims), in Tert. par., where it was still present in 2018 (database CBN Paris).

## 126. Caryophyllaceae

- *Moehringia trinervia* (L.) Clairv.: in the western part of Fl., this species is not C-AC, rather AR (wn.be).
- *Minuartia mediterranea* (Link) K. Malý: this species is very locally naturalized since 2004 in a single area in

Ghent (Fl.) (Verloove 2006b). It closely resembles *M. hybrida* (Vill.) Schischkin but differs from it by its more condensed inflorescence, with pedicels that are usually shorter than the calyces.

- *M. hybrida* (Vill.) Schischkin: in Eifel centr., this species is only known from a single area (Büdesheim; FT); it thus is RR there instead of AR. In NF6, this species was said to be R in Mar. It is absent from the Belgian and Dutch part of this district (wn.be, wn.nl) and only occurs near Dunkerque in France (SI-Flore). Even there, it is confined to railway infrastructure and thus likely introduced (author's observations).
- *Honckenya peploides* (L.) Ehrh.: this species is slightly less rare than indicated. It occurs throughout Mar., also to the north of Antwerp. It is AC-AR, rather than AR (wn.be, wn.nl). For comparison, it is said to be AC in Zeeland (FZ).
- *Stellaria palustris* Retz.: in much of Fl., this species is not rarer than in Camp. (AR, rather than R) (wn.be). In Lorr., it is slightly less rare in the larger valleys (R, elsewhere RR; Champluvier & Saintenoy-Simon 2014).
- *S. graminea* L.: in Mar., this species is certainly less common but not really rare (AR-R, rather than R; wn.be). For comparison, in Zeeland it is considered to be AC (FZ).
- *Myosoton aquaticum* (L.) Moench: in Fl. and Camp., this species is not rarer than in Pic., Brab., Mosan, Lorr. or Tert. par. (C-AC, rather than AR) (wn.be).
- *Holosteum umbellatum* L.: in NF6, this species was said to occur particularly in the western part of Fl. This is no longer true: according to wn.be (heat map) it is more or less equally distributed in this district with some concentrations near Ghent. It was also said to be absent or have disappeared from Pic. and Ard. However, it is still present in a few places in Pic. (valley of river Somme and west of Lens; SI-Flore) and its actual presence was recently confirmed in Ard. as well, at least in the Grand Duchy of Luxembourg (near Wiltz, 2020; MNHN-Lux). Finally, in Lorr. it is R in the entire district, not less so in its northern part (FLORAINE 2013).
- *Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter et Burdet var. *holosteoides* (Fries) J alas: this variety was only mentioned from the Netherlands in NF6 (Mar. sept. and Fluv. occ.). In fact, it is poorly known and probably overlooked. In Mar., it is certainly also present in coastal dunes in the Belgian and French part of this district (comm. M. Leten, 08.2020). In Fluv., it is apparently rarer than indicated, R rather than AR (H24).
- *C. brachypetalum* Desp. ex Pers.: this species naturally occurs in Eifel centr. (albeit RR) (FT).
- *C. semidecandrum* L.: this species is recently expanding and has become less rare in certain districts, especially in Fl., Camp., Pic. and Brab. where it actually is AC-AR instead of AR (wn.be, SI-Flore).
- *C. pumilum* Curt. var. *pumilum*: this variety was known from one location (Wöllersberg) in Eifel centr. but has long since disappeared (FT).

- *Moenchia erecta* (L.) P. Gaertn., B. Mey. et Scherb.: this species was recently discovered in Chamagne, Bainville-aux-Miroirs and Virecourt in Lorr. mér. (Voirin 2017, Voirin 2019), a district from where it was not mentioned in NF6. In Tert. par., on the contrary, it has completely disappeared (Digitale2, database CBN Paris).
- *Sagina alexandrae* Iamónico [syn.: *S. subulata* (Swartz) C. Presl]: in NF6, this species was said to rarely escape from cultivation (more precisely, a cultivar named ‘Hortensis’). In addition, wild forms of this species have recently also been observed, as an adventive, for instance on charcoal in the Ghent port area in 2014 (wn.be).
- *S. nodosa* (L.) Fenzl: this species has not disappeared from Pic. mér., it was recently confirmed from at least two locations, in Long and Forest-Montiers (Coulombel 2018).
- *S. apetala* Ard. subsp. *apetala*: this subspecies is locally much less rare than indicated in NF6, especially in urban areas (see also H24) and campsites (Verloove *et al.* 2020a). There are also, at least a few, records from Tert. par. and in Ard. it is not confined to the eastern part of this district (database CBN Paris).
- *S. apetala* Ard. subsp. *erecta* F. Hermann: in NF6, this subspecies was said to be AC-R throughout the Flora area. However, in Eifel centr. it is completely absent (FT).
- *Scleranthus annuus* L. subsp. *polycarpus* (L.) Bonnier et Layens: in addition to natural occurrences, this subspecies is occasionally found as an introduction, for instance in campsites (Verloove *et al.* 2020a).
- *S. perennis* L.: in NF6, this species was said to be least rare (R) in Fluv. in the Netherlands. In fact, it has completely disappeared from that district (Atlas-NL, H24). In Eifel centr., where it was said to be RR, it is absent (FT). This species seems to be declining in the entire Flora area and it may have disappeared from some of the districts mentioned, for instance in Brab. and Camp. (wn.be, wn.nl).
- *Herniaria hirsuta* L.: in NF6, this species was said to be RR throughout the Flora area. It is, in fact, slightly increasing and has become less rare in some districts, e.g. in Fl., Camp. and Brab. (R-RR) (wn.be, wn.nl, SI-Flore).
- *Illecebrum verticillatum* L.: in Lorr., this species is not predominant in the eastern part of this district (as stated in NF6). In fact, it only occurs in its northern (Belgian) part (wn.be, MNHN-Lux, SI-Flore). In France, it is restricted to the Vosges (Vernier 2020, FLORAINE 2013), thus far beyond the Flora limits. In Tert. par., it may never have occurred within the boundaries of the Flora area, the northernmost known locality being that from 1913 in Saint-Gratien in Val d’Oise (SI-Flore, CBN Paris database).
- *Polycarpon tetraphyllum* (L.) L.: this thermophilous species is much expanding in urban habitats. At present, it is locally naturalized in Mar., Fl., Camp. (district added, known from a few localities, mainly cemeteries and campsites; wn.be, Verloove *et al.* 2020a) and Brab., where it has become R rather than RR. It has been reported from other districts as well, e.g. Mosan (city of Liège; Paelinck *et al.* 2021) and Champ. (near Châlons-en-Champagne; SI-Flore) but it is unknown whether or not the species is genuinely naturalized in these districts.
- *Spergula arvensis* L.: in Mar., this species is certainly not R, rather AC, except perhaps in the polders (wn.be). For comparison, in Zeeland it is considered to be AC (FZ).
- *S. morisonii* Boreau: there are two recent (2013-2014), reliable records from the Lagland military camp in Saint-Léger in Lorr. sept. (wn.be), a district from where this species was not reported in NF6.
- *S. pentandra* L.: the actual presence of this very rare species in Lorr. was recently confirmed (Voirin 2017). Historically, in addition to the districts already mentioned in NF6, this species also occurred in Pic. and Tert. par. (SI-Flore).
- *Spergularia rubra* (L.) J. et C. Presl: this species was considered to be R-RR in Mar. in NF6. It is in fact at most AR there (wn.be). According to FZ, it is even AC in Zeeland.
- *S. media* (L.) C. Presl subsp. *angustata* (Clavaud) Keruguélen et Lambinon: this coastal plant is increasingly recorded in the interior part of the Flora area, especially in Fl., Camp., Brab. and Mosan (wn.be).
- *S. segetalis* (L.) G. Don f.: this species is indeed extinct in Belgium, the Netherlands (H24) and the Grand Duchy of Luxembourg (MNHN-Lux). In France, there is a relatively recent record, from 2001, northeast of Troyes (Champ.) (SI-Flore), at the extreme southern border of the Flora area.
- *Viscaria vulgaris* Bernh.: in Lorr., this species only occurs in the northern part of this district, other records from northeastern France being located (far) beyond the Flora limits (FLORAINE 2013, SI-Flore). This species was believed to have disappeared from Tert. par., however there is at least a recent record (from 2009) from near Soissons (SI-Flore; but reliable? not included in Digitale2).
- *Silene italica* (L.) Pers.: this southern species is known since 1995 from Metz in Lorr. It seems, however, that its presence there has not been confirmed lately: FLORAINE (2013) only reported a record from elsewhere in this district, near Thionville, whereas Vernier (2020) mentioned this species from the northern Lorraine plateau, without further details. Elsewhere in northeastern France it is occasionally observed, for instance in Val-de-Vesle (Champ.) in 2020 (database CBN Paris). It is worth noting that this species is still present, in quantity, in the Ghent port area, from where it was already reported in 2007 (Verloove 2008) (wn.be).
- *S. dioica* (L.) Clairv.: this species has expanded in Mar., Fl., Camp., Pic. (occ.) and Tert. par. and is no longer AR in these districts, rather AC-AR. For comparison, in Zeeland (Dutch Mar.) it is considered to be even CC (FZ).

In this district, it is however clearly less common in the polders (wn.be).

- *S. noctiflora* L.: in NF6, this species was said to be least rare in Tert. par. (Laonnois: R). However, it seems to have completely disappeared from that area (SI-Flore, Digitale2). At present, in Tert. par., it is nearly confined to Montagne de Reims (SI-Flore) and thus, as elsewhere in the Flora area, RR. There are also some records from Pic., for instance from southeast of Amiens (SI-Flore). It is not always easy to distinguish between native (or archaeophytic) and adventive occurrences (this species is a rather regular, usually ephemeral grain alien in the Flora area). As a consequence, in several (most?) of the districts mentioned in NF6 it now only occurs as an alien rather than as a native species (see also H24).

- *S. vulgaris* (Moench) Garcke subsp. *glareosa* (Jord.) Marsden-Jones et Turrill: this subspecies was mentioned in NF6 from Pic. sud-or. (valleys of rivers Oise and Noireux), rather disjunct from its distribution area in eastern France. FG did not report this taxon from that area and Duluc (2019) studied the problem in more detail. Such plants were known for instance from Tupigny. However, at present only subsp. *vulgaris* was found there and plants of alleged subsp. *glareosa*, transplanted to Bailleul in 1992, now also clearly belong to subsp. *vulgaris*. It therefore seems that plants of *S. vulgaris* from scree merely looked like subsp. *glareosa* but were not identical with it.

- *S. otitis* L.: although mentioned from Lorr. in NF6, this species does not appear to occur in that district, nor in its Belgian, Luxembourg, German and French parts (Vernier 2020, FLORAINE 2013, SI-Flore, wn.be, MNHN-Lux, FloraWeb).

- *S. baccifera* (L.) Durande: this species has apparently completely disappeared from Tert. par., at least from the part of this district that falls within the Flora limits. The northernmost extant localities are in the Paris area (SI-Flore, Digitale2), i.e. well beyond the Flora area.

- *S. coronaria* (L.) Clairv.: this escaped ornamental is increasingly found as a naturalizing alien, especially in Fl., Camp. and Brab. (wn.be, wn.nl, SI-Flore). It is mostly found near houses, on wasteland, in ruderalized woods and in roadsides.

- *Gypsophila muralis* L.: as a native species, this is very much declining everywhere and its actual presence in some districts requires confirmation.

- *Saponaria ocymoides* L.: this ornamental is not only known as an escape, it seems to be in the process of local naturalization, for instance on slag heaps (wn.be).

- *Petrorhagia prolifera* (L.) P.W. Ball et Heywood: nowadays, this species has its largest densities in Fl. and Camp. (especially in port and industrial areas and in the former coal mining area; wn.be), it is certainly not R-RR there, rather AR-R. In Mar., it is only less rare between Dunkerque and the Belgian border, i.e. in France; elsewhere in this district it is RR (see e.g. FZ). In Brab. occ.,

it is not at all rare in the coal mining basin, both in France and Belgium (wn.be, Digitale2).

- *P. saxifraga* (L.) Link: this is an escaped ornamental rather than a genuine adventive.

- *Dianthus caryophyllus* L.: this escaped ornamental was best known in the Flora area from the ramparts of Saint-Valéry-sur-Somme, where it was long-established and once quite common on old walls of castles and abbeys in the region. However, according to SI-Flore it was last observed there in 1978. In the past decades it has declined sharply, particularly as a result of restoration work on these old buildings. The few remaining localities (Les Andelys, Tosny, Conches-en-Ouche) are of historical heritage value (Digitale2) but all located well beyond the Flora area.

- *D. superbus* L.: in Lorr., this species occurs only in the extreme southeastern (not eastern) part of the district, from Lunéville southwards (FLORAINE 2013, SI-Flore). Its actual presence in Tert. par. requires confirmation, it may have disappeared from all its localities there (Digitale2). In the area east of Paris it only survives between Épernay and Troyes, in Champ. (and/or on the verge with Tert. par.) (SI-Flore).

- *D. carthusianorum* L.: in NF6, this species was said to be R but locally AC in Eifel centr. In fact, it has completely disappeared from that district (FT).

## 127. Amaranthaceae

- *Amaranthus retroflexus* L.: this species is not completely missing in Ard., there is e.g. a verifiable record from 2015 from La Roche-en-Ardenne (wn.be).

- *A. hybridus* subsp. *bouchonii* (Thell.) O. Bolós et Vigo: in Brab., this species is more or less as widespread in the eastern as in the western part of this district. It is much rarer in the central part (wn.be).

- *A. blitum* L.: the distribution of this species was updated as it has increased considerably, especially in Mar. (where it is not more frequent in its northern part), Fl., Camp., Brab. and Tert. par. The species is ubiquitous along the Maas river now; therefore it seemed appropriate to mention Fluv. separately (wn.be, wn.nl, SI-Flore). In these districts it has become AC-AR, rather than AR-R. Nowadays the species is often seen on exposed river and pond banks. This habitat was added (see also FG).

- *A. deflexus* L.: in Brab., this species is not only naturalized in the western part of this district (although it is much less rare there, for instance in the Lille agglomeration in France where it has become relatively common; pers. obs. author). It has been known from a locality in Brussels (Laken) since 2015 and in Mosan it is not only naturalized in the Charleroi area but also in Namur (wn.be). *A. deflexus* seems to be expanding lately and will doubtlessly naturalize in other districts as well. For instance, it has been known since 2016 from the city of Eindhoven (Camp., the Netherlands) (wn.nl).

- *Salicornia europaea* L. subsp. *disarticulata* (Moss) Lambinon et Vanderpoorten: although now present throughout Mar., this subspecies is much less rare in the southern part of this district, although it seems to have disappeared from many localities (SI-Flore, wn.be, wn.nl). In Belgium, it was thought to be extinct (since 1936), but it was rediscovered in the Zwin nature reserve in 2012, on both sides of the border, and it has persisted there ever since. It may have been overlooked there before (wn.be, also FZ, de Zwart 2013).
- *Polycnemum majus* A. Braun: apart from Rochefort (Mosan), this species was recently only recorded from the region south of Laon in Tert. par. (SI-Flore; but reliable? record not upheld in Digitale2). Elsewhere in the Flora area (Champ., Lorr.), it seems to have completely disappeared (e.g. FLORAINE 2013). A recent record in French Lorr., in Morsbach (Weicherding 2011), is located outside the Flora area. This species was considered extinct in Belgium for a long time. However, in 2018, a population was rediscovered near Rochefort (Jacobs 2019, Jacobs & Jacobs 2019) and its presence there was repeatedly confirmed ever since (wn.be).
- *Suaeda vera* Forssk. ex J.F. Gmel.: this species was formerly introduced in the Slack estuary in Mar. mér., from where it has disappeared. It was apparently last seen there in 1996 (SI-Flore, Digitale2).
- *Chenopodium vulvaria* L.: this species is much declining in the entire Flora area (Groom 2015). It was recently confirmed in Mar. sept. (a single historical locality in 's Gravenpolder; FZ), Brab., Lorr. (not only in its eastern part), Champ. and Tert. par. (wn.be, SI-Flore). From the latter district it was not mentioned in NF6; in fact, the species appears to be least rare in that area, e.g. in Montagne de Reims (SI-Flore).
- *C. ficifolium* Smith: this species is not rarer in Camp. than in e.g. Fl. or Brab. (wn.be). The species is AC-AR, rather than R-RR, in these districts, it has apparently increased over the last decades.
- *C. betaceum* Andr. (syn.: *C. strictum* Roth): the distribution of this poorly known species in the Flora area remains uncertain, although it is probably R-RR throughout. It is known e.g. in Lorr. or from several locations, at the extreme eastern border of the Flora area (FLORAINE 2013).
- *Dysphania ambrosioides* (L.) Mosyakin et Clemants: this alien is naturalized since at least 2006 and over a considerable distance along river Marne in Champ., between Épernay and Vitry-le-François (database CBN Paris).
- *D. botrys* (L.) Mosyakin et Clemants: in Brab., this species is practically limited to the coal mining region in northwestern France, where it is naturalized since several decades. Elsewhere in the same district (Anderlues, Clabecq, Meise; wn.be) it is probably merely ephemeral or only temporarily established.
- *D. pumilio* (R. Brown) Mosyakin et Clemants: in NF6, this species was said to be equally rare as the preceding (both RR). In fact, *D. pumilio* is less rare (rather R-RR) and locally naturalized in urban habitats (railway infrastructure, sidewalks, between cobble stones, etc.), sometimes also on exposed river banks, mostly in Fl., Camp., Brab., Fluv. and Mosan (wn.be).
- *Lipandra polysperma* (L.) S. Fuentes, Uotila & et Borsch: in Camp., this species is not rarer than in e.g. Fl., i.e. AC-AR, rather than AR-R (wn.be).
- *Chenopodium hybridum* (L.) S. Fuentes, Uotila et Borsch: there are quite a few records of this species in Mar., both on the Belgian coast and north of Antwerp. In this district it is R rather than RR. For comparison, it is considered to be R also in Zeeland (FZ).
- *Oxybasis glauca* (L.) S. Fuentes, Uotila et Borsch: this species has increased in recent decades. In Mar., Fl., Pic., Brab., Lorr. and Tert. par. it has become AC-AR, rather than AR. In Zeeland (Mar.), for example, it is even considered to be CC (FZ). It is also all but RR in Camp. and Mosan, at most AR-R (wn.be).
- *O. rubra* (L.) S. Fuentes, Uotila et Borsch: contrary to NF6, this species does occur in Ard. (there are reliable records from e.g. Bevercé, Bihain and Bastogne; wn.be). It has also strongly increased elsewhere. In Zeeland (Mar.), for instance, it is now considered to be even CC (FZ). On the other hand, the species has disappeared in Eifel centr. (FT).
- *O. chenopodioides* (L.) S. Fuentes, Uotila et Borsch: this species is historically known from Lorr. or. (Château-Salins). However, according to FLORAINE (2013), the populations are actually located further south, between Nancy and Lunéville.
- *Atriplex micrantha* Ledeb.: this Asian species has further expanded in the Flora area and now also occurs in Camp. and Ard. (wn.be). Most records are from the central reservation of motorways and other major roads but the species is also regularly recorded on rough ground.
- *A. longipes* Drejer: the genuine presence of this species in Zeeland is questionable. There is not a single unequivocal record from there (FZ). Also from Belgium there are some recent claims (e.g. from a coal terminal in the Port of Ghent) but none are genuine *A. longipes*. Although they often show some resemblance to this species, flower stalks always seem to be much too short, suggesting that they rather belong to its hybrid with *A. prostrata* Bouch. ex DC, *A. ×gustafssoniana* Tascher. In France, *A. longipes* was recently discovered in several localities in the estuary of rivers Authie and Somme (Digitale2; see also Meirland *et al.* 2010).

## 129. Phytolaccaceae

- *Phytolacca acinosa* Roxb.: this species is no longer in the process of naturalization but locally naturalized and increasing, especially in Fl., Camp. and Brab. (wn.be). It is usually found in urban habitats, incl. (as a weed in) cemeteries.

- *P. americana* L.: the same applies to this species, but in more natural habitats. It is now locally naturalized in Fl., Camp. and Brab. (wn.be) and also increasingly seen in the southwestern parts of the Flora area (Pic., Tert. par.; SI-Flore). In some areas incipient invasive behavior has been noticed, especially in thermophilic acidophilous clearings (Adriaens *et al.* 2019).

### 132. Montiaceae

- *Claytonia perfoliata* Donn ex Willd.: in Fl., Camp. and Brab., this species is in many areas hardly rarer (and locally much expanding) than in Mar. (AC-AR, rather than AR). Beyond these districts, it is much rarer (wn.be, SI-Flore).

- *C. sibirica* L.: the main distribution of this species in the Flora area is clearly in Camp. where it occurs scattered (wn.be). The same applies to Zeeland (incl. Mar. sept.) where it is apparently not rare (FZ). In these two districts it is AR, whereas in Fl. and Brab. it is R-RR. Outside these districts, it is only occasionally observed, e.g. in Mosan and Ard. (wn.be).

- *Montia arvensis* Wallr.: in Brab., this species is not rarer than in Fl. and Camp., especially east of Brussels (at the border with Camp.) it is very widespread (at most AR in these districts) (wn.be, SI-Flore). Also in Mar., it is certainly not RR, at most R (in Zeeland it is considered to be only AR; FZ). This species is clearly expanding lately and increasingly found in rather ordinary habitats, such as urban lawns. It is also known from scattered localities in Tert. par. (Digitale2, database CBN Paris), a district not mentioned in NF6.

- *M. fontana* L. (s.str.): in NF6, this very rare species was said to have possibly disappeared from Ard., the only district from where it is known in the Flora area. Its presence there has been confirmed recently, at least in France (e.g. Plateau de Rocroi and neighboring areas; FG, SI-Flore, database CBN Paris). There is also a record from 2008 in the Grand Duchy of Luxembourg (MNHN-Lux).

- *M. hallii* (A. Gray) Greene var. *hallii*: this variety is also found in Eifel centr., in Birresborn (FT), a district that was not mentioned in NF6.

### 133. Portulacaceae

- *Portulaca oleracea* L.: this thermophilous species is much expanding lately, especially in Mar., Fl., Camp., Pic. mér., Brab., Mosan, Lorr., Champ. and Tert. par.; it has become AC-AR in these districts (wn.be, FZ, SI-Flore, database CBN Paris).

### 134. Hydrangeaceae

- *Hydrangea macrophylla* (Thunb.) Seringe: this ornamental shrub is not only cultivated, it has also been recorded as an escape from (or perhaps rather relic of) cultivation (wn.be).

### 136. Cornaceae

- *Cornus mas* L.: this species is no longer RR in Eifel centr., it has completely disappeared there (FT).

### 137. Balsaminaceae

- *Impatiens glandulifera* Royle: this invasive species has much expanded and has become much more common than indicated in NF6 (wn.be, AFW, FloraWeb, SI-Flore, FT). It is now AC-AR in all districts, except in Champ. where it remains rare and almost exclusively confined to parts of the Marne valley (database CBN Paris).

- *I. balfourii* Hook. f.: in NF6, this species was said to be in the process of local naturalization in the southern part of the Flora area. This is no longer the case, it has locally also naturalized in e.g. Fl., especially in urban habitats (wn.be). It was recently also observed for the first time in the Grand Duchy of Luxembourg (Krippel & Proess 2017).

- *I. parviflora* DC.: this species is in expansion everywhere and currently more common than indicated in NF6 (wn.be, AFW, FloraWeb, SI-Flore), especially in Fl., Camp., Brab. and Lorr. where it has become AC-AR rather than AR-R.

- *I. noli-tangere* L.: this species occurs throughout Eifel centr. and is AC rather than AR-R (FT).

- *I. capensis* Meerb.: this relatively recent newcomer in the Flora area is much expanding lately. It is now least rare in Fl. (rivers Scheldt, Rupel and Schipdonk canal), Camp. (especially valley of river Nete), Brab. (rivers Lys, Dyle and Willebroeck canal), Fluv. (Netherlands), Pic. mér. (Somme valley between Péronne and Abbeville) and Lorr. (especially Moselle valley between Metz and Nancy) (wn.be, wn.nl, SI-Flore, FLORAINE 2013, Stien 2018). In Belgium, it was only observed for the first time in 2002 (valley of river Nete near Lier). It has spread considerably since then.

### 138. Polemoniaceae

- *Collomia grandiflora* Dougl. ex Lindl.: in NF6, this North American species was mentioned from Ard. or. and Eifel centr., both in Germany. However, it never occurred in Eifel centr., only in neighboring regions in Ard. and in Osteifel, and it is strongly declining everywhere (FT). In addition, it is locally naturalized in a quarry in Zuid-Limburg (Brab. or.) in the Netherlands (H24). It is occasionally observed elsewhere, for instance in Saint-Valery-sur-Somme in 2000 (SI-Flore, Digitale2).

- *Polemonium caeruleum* L.: in Lorr., this species does not mostly but exclusively occur in the northern part of this district (FLORAINE 2013). In addition to the areas where it is naturalized, it is regularly seen as an ephemeral escape (wn.be).

### 139. Primulaceae

- *Primula veris* L. var. *columnae* (Ten.) B. Bock: this poorly known variety also occurs in the southern, French part of Ard. (mér.), near Chooz and Fromelennes (database CBN Paris). Elsewhere in Ard. (in or.), plants intermediate between var. *veris* and var. *columnae* were already known. It is unknown if these plants from the

Chooz area belong to typical var. *columnae* or rather to such intermediates.

- *Androsace maxima* L.: this species, considered to be ‘only’ R in Champ. and RR in Lorr. mér., has completely disappeared from the entire Flora area (SI-Flore, Digitale2, database CBN Paris, FLORAINE 2013). For Lorr., this species is even no longer mentioned by Vernier (2020), not even as extinct.
- *Lysimachia thyrsoflora* L.: this is a very rare native species but it is sometimes introduced deliberately and then can persist for quite a long time. This applies, inter alia, to Zeeland (Mar.) (FZ) and doubtlessly to other areas as well. The species is known from a natural stand in Mauregny-en-Haye (Laonnois) (SI-Flore, Digitale2) in Tert. par., a district from where it was not mentioned in NF6.
- *L. punctata* L.: in Fl., Camp. and Brab., the frequency of this species is comparable with that in Ard., i.e. AC-AR rather than R-RR (wn.be).
- *L. minima* (L.) U. Manns et Anderb.: there are several recent records in Fl. (for instance from heaths in Houthulst, Waardamme, Zedelgem) and Camp. (Mol) (wn.be). These two districts were not mentioned yet in NF6. In Eifel centr., on the contrary, this species has never occurred (FT) and it has completely disappeared from Lorr., both in its Belgian, Luxembourg and French part (FLORAINE 2013, wn.be, MNHN-Lux, AFW, SI-Flore).
- *L. europaea* (L.) U. Manns et Anderb.: this species is known from at least a single, reliable record in Lorr. (Buzenol) (wn.be, AFW), a district from where it was not mentioned in NF6. The same applies to Brab. or. (Zuid-Limburg, the Netherlands) from where the species was historically known but supposed to have disappeared (Weeda *et al.* 1988). It is, however, still present (and known since many years) in Munningsbosch in Posterholt (wn.nl, H24).
- *L. tenella* L.: there are several recent records (at least since 2007, up to the present) from near Sint-Niklaas (Sinaai: Fondatie) (wn.be) in Fl. as well as from the Rocroi-Monthermé area in the French part of Ard. (SI-Flore), two districts from where the species was not mentioned in NF6.
- *Samolus valerandi* L.: this species is much less rare in Fl. than it is in Camp. (R vs. RR) (wn.be). It is also known from a single locality in Boul. (Desvres) (SI-Flore) and in Brab. it is not limited to the western part of this district (there are records from the central and eastern part as well; wn.be).

#### 140. Actinidiaceae

- *Actinidia deliciosa* (A. Chevalier) C.F. Liang et A.R. Ferguson: this species is increasingly often observed as an escape, it has become R rather than RR (wn.be).

#### 141. Clethraceae

- *Clethra alnifolia* L.: this ornamental shrub is not only known from Camp. It is also established in Merkenveld in Loppem (Fl.), at least since 2012 (wn.be).

#### 142. Ericaceae

- *Chimaphila umbellata* (L.) W.P. Barton: this species has been mentioned in NF from the very beginning. It is unknown on what this was based: the species was never documented from Belgium (e.g. Durand 1899, Verloove 2006a), nor from the Grand Duchy of Luxembourg, the Netherlands (part covered by our Flora), Germany (idem) or France (where it only occurs south of Paris) (SI-Flore, FloraWeb, Atlas-NL, etc.).
- *Erica tetralix* L.: this species is known from a single locality in Mar. mér. (Communal du Moulinel in Saint-Josse-sur-Mer; SI-Flore).
- *E. cinerea* L.: in Fl., this species is mostly but not exclusively confined to the Bruges area. In this district it is also found in Bovekerke (Koekelare) (wn.be). In Boul., it is no longer RR but long extinct, the records dating back to the end of the 19<sup>th</sup> century (SI-Flore, Digitale2). The same applies to Tert. par. (Digitale2, database CBN Paris).
- *Rhododendron luteum* Sweet: this ornamental shrub is locally naturalizing, especially in Camp. (wn.be).
- *Andromeda polifolia* L.: this species occurs in a single peat bog in the Laonnois (Tert. par.), in Cessières, where it was introduced in 1974 from a population in the Lower Normandy region (Baupte peat bog) as part of a safeguard operation to prevent its disappearance (Digitale2, SI-Flore).
- *Vaccinium oxycoccos* L.: in Tert. par., this species only survives in the Laonnois (Digitale2, database CBN Paris).
- *V. macrocarpon* Ait.: in Camp., this American species is still RR but definitely expanding. It has been discovered in two additional localities in Belgium (Groot Schietveld in Brasschaat and nature reserve De Maten in Genk; wn.be) and in several widely spread localities in the Netherlands as well (wn.nl).
- *Empetrum nigrum* L.: this species has disappeared from its unique locality in Mar. sept. (Zeeland). Moreover, it was in all likelihood merely planted there (FZ).
- *Orthilia secunda* (L.) House: this alien species is much declining in the Flora area. At present, it is probably only known from the Toul area in Lorr. (FLORAINE 2013) and from the southern part of Champ., northwest of Troyes (SI-Flore). From the latter district, this species was not mentioned in NF6.
- *Pyrola media* Swartz: this species is not RR in Eifel centr., it never occurred there. Its localities in the Eifel are in Osteifel, beyond the Flora limits (FT). It is still present in Tert. par. (Montagne de Reims, Mesnil-sur-Oger); however, according to the CBN Paris database it is merely naturalized there, not native. This district appears to be the only one where the species is still present these days: it seems to have disappeared from Ard. or. (AFW, FT, wn.be). The most recent record in the Luxembourg part of the Ardennes dates back to 1970 (MNHN-Lux).
- *P. rotundifolia* L.: this species is extinct now in Eifel centr. (FT).

• *P. chlorantha* Swartz: this very rare species is also known from at least a single locality in Tert. par. (Oger; database CBN Paris).

• *Monotropa hypopitys* L. subsp. *hypopitys*: this species occurs in at least one location, in Birresborn, in Eifel centr. (FT) and also in single localities in Champ. and Tert. par. (database CBN Paris), three districts from where it was not mentioned in NF6. Its presence in Brab. was recently confirmed in Forêt de Soignes (Delforge *et al.* 2016).

#### 143. Garryaceae

• *Aucuba japonica* Thunb.: this ornamental shrub is no longer rarely but increasingly recorded as an escape from cultivation (wn.be). A future local naturalization is even likely.

#### 144. Rubiaceae

• *Rubia tinctorum* L.: in Zeeland (Mar. sept.), this alien species was formerly not rare (Adema 1981) but it is now probably restricted to a single locality, in Kamperland, where the species appears to be well-established (FZ, wn.nl; contrary to H24). From Lorr., on the contrary, it has long disappeared or it was merely an ephemeral escape there. It was not mentioned by e.g. FLORAINE (2013) and only as a rare, presumably casual escape by Vernier (2020).

• *Sherardia arvensis* L.: this species is recently expanding (e.g. as a lawn weed, in urban habitats) and less rare than indicated in some districts. For instance in FL., it is no longer RR (wn.be).

• *Asperula arvensis* L.: in NF6, this species was said to be R in Champ. and R-RR in Lorr. In fact, at present, it has completely disappeared in that (and the remainder of the Flora) area, the most recent observations (as a native/archaeophytic species) dating back to well before 1950 (SI-Flore). From Lorr., the species was no longer mentioned by e.g. FLORAINE (2013) or Vernier (2020) and it was last seen in its Luxembourg part in 1949 (MNHN-Lux). It is exceptionally recorded as an ephemeral alien, most recently in 2014 near a grain mill in the Antwerp port area (wn.be).

• *Galium glaucum* L.: this species has completely disappeared from Champ. (database CBN Paris).

• *G. boreale* L.: this boreal species is known from at least two localities in Ard. occ., north of Charleville-Mézières (SI-Flore), a district from where it was not mentioned in NF6.

• *G. ×pomeranicum* Retz.: according to SI-Flore this hybrid has disappeared from Lorr. and it was not mentioned either by FLORAINE (2013), whereas according to Vernier (2020) it is very rare in this district. H24, on the other hand, reports that the hybrid seems to be rather common where both parent species occur together.

• *G. palustre* L.: the exact distribution of the two subspecies, treated as two distinct species in FG, *G. palustre* s.str. and *G. elongatum* C. Presl, still needs to be as-

sessed. According to SI-Flore, the latter is predominant in northwestern France (Mar., Boul., Pic., Brab. and the western part of Tert. par., with much more scattered occurrences further east), whereas *G. palustre* s.str. is more widespread in northeastern France (from Ard. occ. and the eastern part of Tert. par. further east and with much more scattered occurrences west of this area).

• *G. debile* Desv.: this very rare species was only known from a single extant locality in the entire Flora area (Plateau d'Helfaut, in Brab. occ.), from where it has been known since 1991. In the past years, however, it was discovered in several additional localities. In Mar. mér., it was found in 2004, then regularly confirmed, in the Laronville marshes in Rue (REFORME 2018). According to SI-Flore, it has recently also been known from at least one locality in Tert. par. (southwest of Épernay) and one in the southern part of Lorr. as well (west of Saint-Dizier).

• *G. mollugo* L.: the widespread subspecies in the Flora area is subsp. *erectum* Syme. The nominal subspecies is very rare and, according to NF6, only known from Lorr. mér. According to FT, however, it also occurs in the German (northeastern) part of Lorr. and in Eifel centr., respectively in Wasserliesch (Gutland) and Schönecken. The CBN Paris database also includes several records from the French part of Lorr. and from Tert. par. but these perhaps require confirmation. These two subspecies are genetically quite distinct and therefore perhaps better treated as two distinct species (*G. album* Mill. and *G. mollugo* s.str.), as was done in FG. However, on morphological grounds they can hardly be told apart (H24).

• *G. pumilum* Murray: this species is also known from scattered localities in Mar. mér., for instance on chalk near the estuaries of rivers Canche and Somme (SI-Flore, Digitale2).

• *G. fleurotii* Jord.: in NF6, this rare species was only mentioned from Lorr. [var. *bretonii* (Rouy) A. Donneaux] and Champ. (var. *fleurotii*). It is, however, also known from chalky outcrops (former quarries) in the Aa valley (three localities in Artois) in Brab. occ., at least since 1981 (SI-Flore, Digitale2). In general, this species is by far least rare in Champ. (SI-Flore) in the Flora area although it is unclear to which of the varieties these populations pertain (contemporary Floras such as FG no longer separate two varieties). Moreover, according to Vernier (2020) both varieties occur in Côte de Meuse in Lorr.

• *G. parisiense* L.: this thermophilous species is in expansion, especially in all southern parts of the Flora area where it has become R-RR, rather than RR (SI-Flore). Also further north, in Belgium and the Netherlands, it is increasing and no longer merely alien: it has naturalized locally in suitable suburban habitats, such as railway infrastructure, between cobble stones, etc., especially in FL. and Camp. (wn.be).

• *G. tricornutum* Dandy: as a native/archaeophytic weed of arable fields, this species is probably extinct in the entire Flora area. In Eifel centr., it has definitely disap-

peared (FT) and in northwestern France it was last seen in Esquerdes (valley of the Aa river; Brab. occ.) in 1991 (Digitale2). The species has also disappeared from the remainder of northern France (SI-Flore), except perhaps from Metz in Lorr. (FLORAINE 2013) where it may be merely adventive. It is exceptionally seen as an ephemeral alien, mostly associated with imported cereals (wn.be).

- *G. spurium* L.: this species is indeed RR throughout the Flora area. In Belgium it is nearly exclusively observed as a grain alien, mostly in port areas. In recent times (2011-2013), it was only recorded in Nismes (Mosan) in a habitat where it could be considered native or archaeophytic (wn.be). In the French part of the Flora area it was recently only observed in Pic. (between Amiens and St. Quentin) and from scattered localities in Champ. (SI-Flore). In Lorr., it probably only occurs outside the Flora area (Vernier 2020).

- *G. murale* (L.) All.: this southern species has recently naturalized in the Flora area. Established populations are known from Mar. (especially in campsites; Verloove *et al.* 2020a), Fl., Camp. (mostly in the Netherlands, e.g. Breda), Brab. and Mosan (Liège) (wn.be, wn.nl).

#### 145. Gentianaceae

- *Cicendia filiformis* (L.) Delarbre: this species has become very rare throughout the Flora area. A stable, long-known growth site is known from Zedelgem (Vloetenveld military base) in Fl., a district from where it was not mentioned in NF6. The species was formerly also found in Zeeland (Oostkapelle; Mar. sept.) but it has disappeared from that district (FZ).

- *Exaculum pusillum* (Lam.) Caruel: this very rare species was discovered in 2017 in the Netherlands between Neerpelt and Valkenswaard in the Hageven-De Plateaux nature reserve (Camp.) and its persistence there was regularly confirmed in the intervening years. The origin of this population is unknown (Lotterman *et al.* 2018, H24). In the 19<sup>th</sup> century, this species was not only known from Tert. par. (as stated in NF6) but also from other districts in France, e.g. Pic., Brab. and Ard. (SI-Flore).

- The hybrid *Centaureum erythraea* Rafn × *littorale* (D. Turn.) Gilm. [*C. ×intermedium* (Wheldon) Druce] is not only known from the Dutch part of Mar., also from the Belgian part (Brys *et al.* 2014). It is probably often overlooked, since it is frequently produced in areas where both parent species occur sympatrically (FG).

- *C. pulchellum* (Swartz) Druce: this species is not rarer in Fl. than in e.g. Brab., especially around Ghent and between Brussels and Antwerp (wn.be), thus R-RR rather than RR. Contrary to what was stated in NF6, the native distribution of this species does not include the Canary Islands (Acebes Ginovés *et al.* 2010).

- *Blackstonia perfoliata* (L.) Huds.: this species is slightly expanding. The claim that in Mar. this species mostly occurs west of Nieuwpoort has since been superseded: at present there are at least as much records east of this city.

In fact, most records in the Belgian part of this district are now concentrated on the West and East coast as well as in the Antwerp and Ghent port areas (wn.be). The species is also relatively widespread in Zeeuws-Vlaanderen in the Netherlands (FZ). Similarly, in Brab., it is no longer restricted to the western and eastern part of this district (wn.be) and the species has also been reliably recorded from Ard. (e.g. Vielsalm; wn.be, AFW), a district from where it was not yet mentioned in NF6.

- *B. acuminata* (Koch et Ziz) Domin: this species was first discovered in Belgium, around Antwerp, in 2008. This is not surprising as the species is recently expanding in Zeeland as well (FZ).

- *Gentiana lutea* L.: this species is known since a few years from two Belgian localities, in Ard. and Mosan occ. respectively: since 2008 in the Fagne de Malchamps (heath) near Spa and since 2010 near Franchimont (calcareous grassland) (wn.be). The origin of these populations is unknown. In Champ., it was reported in NF6 from the Ardennes department (Mont-Frémin, La Neuville-en-Tourne-à-Fuy). However, it is no longer mentioned from these localities in the CBN Paris database, only further south (northeast of Troyes). Elsewhere in the French part of the Flora area, the species has been qualified as an obsolescent plant (Vernier 2014); it is known as such from a single locality in Lorr. or. (Bacourt).

- *Gentianella campestris* (L.) Börner: this species is dramatically declining in the entire Flora area. It has completely disappeared from northern France, also from Tert. par. and Champ. where it was said to be RR in NF6. It was probably last seen in Laonnois in 1951 (SI-Flore, Digitale2). Its presence was recently confirmed from Brab. or. in Belgium (e.g. Thier à la Tombe nature reserve; wn.be) whereas in the Dutch part of this district its actual presence needs to be confirmed (wn.nl, despite H24). In the Netherlands, it is apparently also still present in Mar. sept. (e.g. Ouddorp; wn.nl), although the species was surprisingly left unmentioned in FZ.

- *Gentianopsis ciliata* (L.) Ma: in NF6, this species was mentioned from Boul. although the species is completely lacking there (Digitale2, SI-Flore). Its westernmost localities in northern France are from east of Amiens. Even there, its actual presence requires confirmation; it was last observed there in the 1990s (SI-Flore).

#### 146. Apocynaceae

- *Vinca major* L.: this species is known by now from all districts in the Flora area, except Eifel centr. (FT). It also occurs in Ard., from where it was not mentioned in NF6 (wn.be).

- *Vincetoxicum nigrum* (L.) Moench: this alien vine is naturalizing locally in Brab. (Heverlee and Lanaye, since 2011 and 2015 respectively; wn.be). It has young twining stems and purple corollas that are hairy inside.

- *Asclepias syriaca* L.: in addition to the districts already cited in NF6, this exotic species is also known from Fl.

(e.g. Nazareth, Mechelen; wn.be). It is rather doubtful, on the contrary, that it is present in Tert. par., at least in the part covered by the Flora (Digitale2, database CBN Paris).

#### 147. Boraginaceae

- *Trachystemon orientalis* (L.) G. Don f.: this species is naturalized in one place in Fl. (Roeselare) since the 1950s and is sometimes observed elsewhere. It resembles the genus *Borago* L. but differs from it by its early flowering (February-April) with inflorescences appearing a little before the leaves, the corollas with inrolled lobes and the basal leaves with a cordate blade.

- *Heliotropium europaeum* L.: the actual presence in Lorr. of this species, albeit RR, was recently confirmed by both FLORAINE (2013) and Vernier (2020). It is, however, not/no longer confined to the eastern and southern parts of this district (from where it may have disappeared). According to Vernier l.c. it only occurs in Pays-Haut. All occurrences in the Flora area are considered to be merely naturalized; in fact, those in the southernmost districts may well be 'natural' (species accepted as a native by CBN Paris).

- *Borago officinalis* L.: this species is slightly less rare than indicated, AR-R rather than R, especially in the northern part of the Flora area, e.g. in Flanders (wn.be).

- *Amsinckia micrantha* Suksd.: this North American weed is not merely adventitious but locally naturalized. In the Ghent port area (Rodenhuizedok), for instance, it has been present since 1986 (Robbrecht & Jongepier 1989).

- *Lithospermum officinale* L.: outside its native distribution range, this species is occasionally observed as an introduction, for instance at the ancient fortress belt in Wilrijk (Fl.) (wn.be).

- *Buglossoides purpureocaerulea* (L.) I.M. Johnst.: this species is much declining in the entire Flora area. According to FG it has become RR in the whole of France.

- *B. arvensis* (L.) I.M. Johnst.: in Mosan, this species turns out to occur in quite a few places after a targeted search, it is AR rather than R there (wn.be, AFW). In Eifel centr., on the contrary, it is completely absent (FT). In districts other than those enumerated, it is nearly always introduced (it is a rather regular grain alien in port areas).

- *Pulmonaria officinalis* L.: in Fl., this species is equally rare as in Brab., R-RR rather than RR and in Mar. it is not restricted to the northern part of this district (wn.be).

- *P. longifolia* (Bast.) Boreau: in NF6, the presence of this species in Tert. par. was said to be doubtful (confirmation required). It is indeed absent from this district (Digitale2, database CBN Paris).

- *P. mollis* Wulfen ex Hornem.: the presence of this species in Lorr. or. was considered possible in NF6 and it indeed appears to occur there (FLORAINE 2013). Vernier (2020) even mentioned it from yet other regions in Lorr. (Meuse and Plateau Lorrain Nord). However, according

to FG, in France (where only subsp. *alpigena* W. Sauer occurs), this species has only reliably been recorded from the southern Vosges area. In addition, *P. mollis* has also been discovered since 2014 in two areas in Belgium: in Modave (Mosan) and Ard. or. (Reuland), in the easternmost part of Belgium, against the German border (wn.be). There is no reason to believe why it should not be native in these localities, especially in the latter.

- *P. montana* Lej.: this species is also present in a few localities in Champ., e.g. southwest of Châlons-en-Champagne (SI-Flore).

- *Cynoglossum germanicum* Jacq.: this species is also present in Champ., southwest of Châlons-en-Champagne and immediately north of Troyes, at the extreme southern limit of the Flora area (SI-Flore). In French Lorr., it is still present near Neufchâteau (FLORAINE 2013), at or just beyond the Flora limits.

- *C. officinale* L.: this species has completely disappeared from Eifel centr. (FT).

- *Symphytum caucasicum* M. Bieb.: this ornamental species was already known as an escape from Brab. and Camp. In addition, it has also been observed lately in Mar., Fl., Mosan and Ard. (wn.be) and doubtlessly occurs in other districts as well (wn.be).

- *S. asperum* Lepechin: in NF6, this species was said to mostly occur south of rivers Sambre and Meuse but this is not apparent from verifiable records. It is probably often confused with its hybrid with *S. officinale* L., *S. ×uplandicum* Nyman, also in the French part of the Flora area (comm. J.-M. Tison 02.2020).

- *S. grandiflorum* DC.: this ornamental species was already known as an escape (RR) from Fl. and Brab. It has become less rare in these districts (R). In addition, it has also been observed lately in Mar., Camp., Mosan and Ard. (wn.be) and doubtlessly occurs in other districts as well (wn.be).

- *S. ×hidcotense* P.D. Sell: this hybrid ornamental is now known from Fl., Camp., Brab. and Mosan (R-RR) (wn.be).

- *Myosotis sylvatica* Ehrh. ex Hoffmann: this species is rather common throughout Lorr., it is even considered AC according to FLORAINE (2013). It was suggested in NF6 that outside of the northern half of this district, this species would only occur as an escape in the rest of Lorr., which was thus incorrect.

- *M. discolor* Pers. and *M. dubia* Arrondeau are now treated as two distinct species but their respective distributions remain largely unknown, as is the case in surrounding countries like France or the Netherlands (FG, H24). The former mostly occurs in open grasslands and arable fields on dry sandy soils, whereas the latter is found on more compact, clayey-loamy soils (Dirkse *et al.* 2022). Genuine *M. discolor* appears to be much less common than *M. dubia*.

- *M. stricta* Link ex Roem. et Schult.: this species has dramatically declined in the whole of northern France.

Apart from a few localities near Reims (Tert. par.) and one in Lorr. (near Nancy), it has completely disappeared (SI-Flore). This also applies to Mar. mér. where, despite a targeted search in 2010, not a single of the historical localities could be confirmed (confusion in the past with *M. ramosissima* Rochel cannot be ruled out either; Digitale2). The species is absent from Mar. in the Netherlands (FZ) and recent claims from the Belgian part of this district (wn.be) require confirmation.

- *M. arvensis* (L.) Hill subsp. *umbrata* (Rouy) O. Schwarz: this poorly known subspecies (ecologically rather distinct but a mere ecotype according to FG) was recently reported from Ard. or. in Germany (FT).
- *M. ramosissima* Rochel: in Fl. and Camp., this species is not rarer than in most other parts of the Flora area, i.e. AC-AR rather than AR-R (wn.be).
- *M. secunda* A. Murray: the genuine presence of this species in the Flora area appears to be very unlikely judging from the map presented by SI-Flore and FG. It has its northernmost populations south of Le Havre.
- *Anchusa italica* Retz.: as an ephemeral alien, this species is much rarer than indicated, RR rather than R-RR. The most recent record dates back to 2000 (wn.be) and it was only exceptionally observed in the preceding decades as well.
- *A. procera* Besser: some further details are provided on the areas where this species is naturalized in the Flora area. Up to the present, it was only known from Mar. where it occurs in abundance between Ghyvelde (France) and De Panne (Belgium) (wn.be). In addition, it was also reported to be naturalized in the Metz area in Lorr. (FLO-RAINE 2013).
- *Lycopsis arvensis* L.: in NF6, this species was erroneously given as both AC and R in Fl. Like in Camp., it is rather AC than R in this district (wn.be).
- *Pentaglottis sempervirens* (L.) Tausch ex L.H. Bailey: this species is increasing and no longer RR in the districts mentioned (Mar., Fl., Camp., Pic. sept., Brab., Mosan, Tert. par.), rather AR-RR. Its actual presence in the latter district, however, requires confirmation, the most recent records dating back to the 1990s (SI-Flore).

#### 148. Convolvulaceae

- *Convolvulus lineatus* L.: this alien species was formerly known from the Calandspolder in Zeeland (the Netherlands). It was last seen there in 1960 (FZ, H24), thus this information was no longer relevant and therefore removed.
- *Cuscuta gronovii* Willd. ex Schult.: in the entire Flora area, this species was only known from the German part of the Moselle valley. However, all growth sites are located some distance outside the Flora area, the closest near Kesten (FT). The species is also absent from the French and Luxembourg part of this valley (SI-Flore, MNHN-Lux) and thus actually does not occur in the Flora

area. The species has recently naturalized in Fluv. in the Netherlands (valley of river Waal; H24, wn.nl) but these populations are also located beyond the Flora limits.

- *C. campestris* Yunck.: this North American weed is best known from river banks (habitat added), especially those of river Maas/Meuse in Belgium and the Netherlands (Fluv.), where it is in the process of naturalization (wn.be, wn.nl).
- *C. epithymum* (L.) L.: although RR, this species is known from several localities in Champ. and Tert. par. (e.g. Laonnois, Montagne de Reims, surroundings of Châlons-en-Champagne, etc.; SI-Flore). It was not mentioned from these two districts in NF6.
- *C. lupuliformis* Krocke: this alien species was discovered in 2013 in the valley of river Scheldt and subsequently naturalized between Bornem and Temse (Fl.; wn.be). At least since 2011, this species is also naturalized in the Dutch part of the valley of river Maas, downstream from Roermond (wn.nl). Its actual presence along river Moselle in the Grand Duchy of Luxembourg requires confirmation: it was apparently last observed there in 1986 (MNHN-Lux).

#### 149. Solanaceae

- *Solanum villosum* Mill.: in NF6, it was stated that the usually encountered alien from this complex is subsp. *villosum*. It is just the opposite in fact, subsp. *miniatum* (Bernh. ex Willd.) Edmonds by far being the least rare of the two (wn.be).
- *S. physalifolium* Rusby var. *nitidibaccatum* (Bitter) Edmonds: this South American alien is recently expanding and has become slightly less rare, R-RR rather than RR, especially in Mar., Fl. and Fluv. From the latter district it was not yet mentioned in NF6. It has recently naturalized on both the Belgian and Dutch part of river Maas downstream of Maastricht (wn.be, wn.nl).
- *S. sarachoides* Sendtn.: this South American alien is, like the preceding, expanding. At least in the Ghent port area (Fl.), it has recently naturalized (wn.be).
- *Lycium barbarum* L.: in NF6, this species was said to be only AR in Lorr. In fact, it only occurs near Metz and Nancy and it is considered to be RR (FLO-RAINE 2013). Similarly, in Champ. and Tert. par., it was stated to be respectively AR and AC whereas it has almost completely disappeared from these two districts (SI-Flore).
- *Nicandra physalodes* (L.) Gaertn.: this (ephemeral) alien is much less rare than indicated in many parts of the Flora area, AR-RR rather than R-RR, for instance in Flanders (wn.be).
- *Physalis alkekengi* L. var. *alkekengi* L.: the actual presence of this variety in Lorr. was questioned in NF6. According to Vernier (2020) it is still present there, at least in the Meuse area. In Champ., on the other hand, this taxon may well have disappeared (SI-Flore). It is known from at least one recent locality in Tert. par. (Savigny-sur-Ardres),

a district not mentioned in NF6, where it is considered to be native (database CBN Paris).

### 150. Oleaceae

- *Fraxinus pennsylvanica* Marshall: this ornamental tree has also naturalized in Camp., especially along the Kempisch Kanaal (wn.be).
- *Ligustrum vulgare* L.: in Eifel centr., where this species was said to be AR-R in NF6, it is known from at most one locality (FT); it is thus RR in that district.
- *L. ovalifolium* Hassk.: this Asian ornamental shrub is not merely escaping; it is fact locally naturalizing and much expanding lately (wn.be).
- *Jasminum fruticans* L. was said to be naturalized in Lorr. in the Grand Duchy of Luxembourg. However, it was last seen there in 1963 (MNHN-Lux) and thus apparently has disappeared from its unique locality in the Flora area.

### 152. Plantaginaceae

- *Anarrhinum bellidifolium* (L.) Willd.: this ornamental species is allegedly native in the Moselle valley in Germany, just outside the territory of the Flora (FT). This nucleus is located quite disjunct from the species' main distribution area in southwestern Europe.
- *Littorella uniflora* (L.) Aschers.: this species is completely missing from the Belgian and French part of Lorr. and was last seen in its Luxembourg part in 1991 (FLO-RAINE 2013, wn.be, AFW, MNHN-Lux). It has thus apparently disappeared from this district.
- *Plantago coronopus* L.: this coastal species is very much expanding in the interior. In Fl., Camp., Pic. and Brab. (in the entire district, not more so in its central part) it now occurs almost area-wide and has become AC-AR rather than R (wn.be, SI-Flore). In Mosan it is naturalized at least in the valley of river Meuse (wn.be). Also in other districts that are not mentioned in NF6 it may be naturalized, at least locally, rather than merely adventive, e.g. in Champ. (SI-Flore).
- *P. maritima* L.: outside of the Mar. district, this species is occasionally observed as an introduction in the interior (Fl., Camp.; wn.be, Florabank), probably favored by the massive use of de-icing salt.
- *P. media* L.: in NF6, this species was not mentioned from Tert. par., suggesting that it is RR in that district. In reality, it is equally common there as in the other districts in northern France, i.e. C-AC. It was probably unintentionally left out in NF6.
- *P. major* L. subsp. *pleiosperma* Pilg.: this subspecies is fairly widespread in Brab., especially in its western (French) part and east of Brussels (SI-Flore, wn.be). In this district it is AR-R instead of R-RR.
- *P. arenaria* Waldst. et Kit.: this alien species is not merely adventive but locally naturalized, especially in Mar., Fl., Camp., Brab. and Fluv. (valley of river Maas) (wn.be, wn.nl, SI-Flore).

- *Hippuris vulgaris* L.: in areas where it is not native, this aquatic species is regularly introduced, as an ornamental (wn.be).

- *Callitriche cophocarpa* Sendtn.: this species was mentioned in NF6 although historical claims from the Flora area turned out to be erroneous. It was formerly found, in 1930 (H24), in the Netherlands but well beyond the Flora limits. Since it has no relevance at all for our area, the reference to this species was removed.

- *C. truncata* Guss. subsp. *truncata*: this subspecies, hitherto unknown in the Flora area, was discovered in 2011 in Marquise in the lower Slack valley (Boul.) (Delay & Petit 2011, Delay & Petit 2012; see also FG), subsequently also in Tardinghen in 2018 (Duluc 2019). Its persistence, at least in the first locality, was recently confirmed (Duluc l.c.). Given the geographical disjunction, these records may refer to an introduction.

- *C. truncata* Guss. subsp. *occidentalis* (Rouy) Braun-Blanq.: this subspecies is recently expanding in the Flora area. In Fl., where it was thought to be extinct, it was rediscovered in several localities (e.g. Destelbergen, Nazareth; wn.be). It was also discovered in districts from where it was not yet known: Camp. (scattered localities near Zonhoven; wn.be) and Ard. or. where it is known from one location in Eschfeld, Germany, where the species is considered to be non-native (FT).

- *C. stagnalis* Scop.: this species is less rare than indicated in NF6 in some districts, especially in Fl. and Camp. where it is AC-AR rather than AR-R (wn.be).

- *C. obtusangula* Le Gall: the Tert. par. district was left unmentioned in the distribution of this species in NF6. It is present there and its distribution and frequency are comparable with that in e.g. Pic., i.e. AR-R (SI-Flore).

- *C. platycarpa* Kütz. is less rare in Mar., Fl. and Camp. than indicated; AC-AR rather than AR-R (wn.be).

- *C. palustris* L.: this species is also present in Tert. par. (Montagne de Reims) (SI-Flore).

- *C. hamulata* Kütz. ex Koch: this species is also present in at least a few localities in the Épernay area, in both Champ. and Tert. par. (SI-Flore).

- *C. brutia* Petagna: the genuine distribution in the Flora area of this species remains largely unknown. Its presence in at least a locality in Brab. occ. (Plateau d'Helfaut: Bibrou) was confirmed by a chromosome count (Digitale2). There are also a few localities in Ard. occ., Lorr. occ. and Tert. par. (database CBN Paris).

- *Veronica hederifolia* L. and *V. sublobata* M. Fischer: the distribution of these two closely related species possibly needs to be reassessed. Both roughly have a similar distribution pattern and are likely C-AC in most parts of the Flora area, except in Ard. In Camp., where they were said to be AR in NF6, they are not markedly rarer than in e.g. Fl. (wn.be).

- *V. cymbalaria* Bodard: although a recent introduction in the Flora area (Hoste *et al.* 2016), this Mediterranean

weed managed to locally naturalize, especially in cemeteries. It is known at present from Mar., Fl., Camp. and Brab. (wn.be, wn.nl).

- *V. persica* Poiret: in NF6, this species was said to be AR in Fl. and Camp. Like in most of the Flora area, however, it is C-AC in these two districts (wn.be).
- *V. filiformis* Smith: this species was considered to be AR-RR throughout the Flora area. However, it is markedly less rare in Fl. and Camp. where it rather is AC-AR (wn.be).
- *V. agrestis* L.: in NF6, this species was not explicitly mentioned from Eifel centr., suggesting it was C-AC there. In reality, it is completely lacking in that district (FT).
- *V. polita* Fries: in Eifel centr., this species is not AR-R but absent (FT).
- *V. triphyllus* L.: in Lorr., this species was said to occur mostly in the northeastern and eastern part of this district. At present, in Lorr. it is confined to the Grand Duchy of Luxembourg (there, it is indeed not very rare: MNHN-Lux) and Belgium (wn.be), thus exclusively to the northern and northeastern part of the district. In French Lorr., there is a single extant locality, east of and beyond the limits of the Flora area (FLORAINE 2013).
- *V. verna* L.: in Lorr., this species only occurs in the Grand Duchy of Luxembourg and northwest of Toul (FLORAINE 2013); it is absent from the Belgian part of this district. The species' alleged presence in Champ. is probably erroneous: all records from that part of France are located in Tert. par., the easternmost in Laonnois (SI-Flore).
- *V. praecox* ALL.: the only current Belgian growth site is in Stockem near Arlon (Lorr.) where the species was discovered in 2009 (Remacle 2012, Remacle 2014a). The species was thought to have disappeared from most of the districts that were enumerated in NF6 (Mar., Pic., Brab., Mosan, Lorr., Champ., Tert. par.). However, it probably has only disappeared from Mosan (SI-Flore, wn.be) and Champ. (database CBN Paris).
- *V. acinifolia* L.: this species underwent a remarkable local expansion in tree nurseries around Diest and Lummen (Brab. or.) and Lesdain (Brab. occ.) (records respectively from 2012 and 2016 onwards; wn.be) where it is sometimes very abundant. In the same conditions it has been observed in Camp. sept. (Netherlands; H24). In addition, it is occasionally observed as an ephemeral (?) introduction, recently for instance in Antwerp and Boom (wn.be).
- *V. serpyllifolia* L.: in Mar. (incl. its northern part), this species occurs in almost every square (wn.be) and in Zeeland it is reported as "locally common" (FZ). It is thus AC-AR, not R, in this district.
- *V. beccabunga* L.: this species is indeed slightly less common in Mar. and Camp. but, like in Ard., AR not R (wn.be).
- *V. anagalloides* Guss.: the genuine presence of this species in the Flora area still needs to be confirmed. It was re-

ported by Litzler (1953) from the estuary of river Somme but this claim is highly questionable (comm. B. Toussaint 06.2020). The species was not withheld for the Hauts-de-France department by Toussaint & Hauguel (2019) and FG does not refer to its presence either in northern France. However, according to SI-Flore there are a few records that fall within the limits of the Flora area: in Champ. (near Rethel and Châlons-en-Champagne), Lorr. (near Saint-Dizier; the species was also mentioned from other parts of Lorr. that fall within the Flora limits by Vernier 2020: Meuse, Woëvre and the northern Plateau Lorrain) and Tert. par. (near Reims).

- *V. montana* L.: this species is in slight expansion, e.g. in Fl. (wn.be). These are mostly or even exclusively questionably native populations, rather escapes from cultivation.
- *V. teucrium* L.: naturally occurring populations of this species in the Flora area belong to two distinct taxa (see Verloove 2023). Dutch populations are ascribable to var. *teucrium* and confined to Fluv. This variety is also grown as an ornamental and increasingly seen as an escape. In Zeeland, it has locally naturalized on dikes (FZ).
- *V. spicata* L.: in addition to natural populations in Tert. par., this species is sometimes introduced elsewhere in the Flora area and is locally more or less naturalized, e.g. on slag heaps in Camp. (wn.be).
- *Cymbalaria muralis* P. Gaertn., B. Mey. et Scherb.: this species is not R but completely absent from Eifel centr. (FT). In Lorr. (entire district), it is AC rather than R (FLORAINE 2013).
- *Linaria purpurea* (L.) Mill.: this ornamental species was best known in the Flora area from the ramparts of Saint-Valéry-sur-Somme, where it is naturalized since many decades (although its actual presence may require confirmation; Digitale2). It recently naturalized in identical circumstances on the ramparts of Ypres (Brab.) as well (wn.be). In addition, it is increasingly cultivated and frequently escaping in recent years and perhaps very locally more or less naturalizing in urban habitats.
- *L. repens* (L.) MILL.: in areas where this species is introduced, it is not RR everywhere. In some parts of Fl. and Camp. it is rather R-RR (wn.be).
- *L. arvensis* (L.) Desf.: the distribution of this rare species needed to be corrected. It never occurred in Eifel centr., only in adjacent areas in Ard. or. and further east, in Ostefel (FT). In Fluv. (the Netherlands) it has disappeared a very long time ago already, around 1936 (H24). It has also completely disappeared in Tert. par., the most northern, more or less recent (2014) localities are in Gironville-sur-Essonnes, well outside the Flora area (database CBN Paris, Digitale2). On the other hand, it was observed recently in two districts that were not yet mentioned in NF: since 2019 a population with a few hundreds of individuals has been known from Tubize (Brab.) and in 2021 several dozens were observed in Boom (Fl.) (wn.be). These two populations are located on railway yards and perhaps to

be considered as introduced. Based on these new records the phenology of the species was also corrected: in the Flora area it is flowering from March to July, not from June to August (see also FG).

- *L. supina* (L.) Chazelles: in Mar., this species is only naturalized in France (mainly in the Dunkerque and Calais area; Digitale2). In addition to the districts where it was already known to be naturalized, it is also known from Fl.: at least at the Ghent railway station a stable population has been known since 2013 (wn.be), in circumstances similar to those in Camp. Its actual presence in Boul. requires confirmation (Digitale2).

- *L. simplex* (Willd.) DC.: this thermophilous species is a recent newcomer in the Flora area, that was already known from railway tracks in France (Mar., Brab. occ., Lorr.). Since 2013, it has been known also from Belgium, at first from tramway lines in Brussels (Brab.), subsequently (since 2021) from railway tracks in Meslin-l'Évêque and St.-Ghislain (both in Brab.), Flawinne (Mosan occ.) and Boom (Fl.) (wn.be). In French Lorr., it is known from the Metz and Nancy area (FLORAINE 2013) and its known presence elsewhere in northwestern France (e.g. Dunkerque area) was also confirmed lately (pers. obs. author). Since this species is apparently well-established and recently spreading, it was included in the key and a full account presented.

- *Antirrhinum majus* L.: in NF6, this naturalized ornamental was said to be least rare (R) in Pic., Mosan and Tert. par., and RR elsewhere. In reality, especially in urban habitats in Fl., Camp., Brab., etc., it has much increased lately. It is AR-RR throughout the Flora area (compare with H24: “vrij zeldzaam in Urb. (...), elders zeer zeldzaam”).

- *Gratiola officinalis* L.: in Camp., where it was thought to be extinct, this species germinated again – after sod cutting – from the long-lived seed bank, in Beerse and Mol (wn.be). In the Dutch part of this district, it is actually known from several recent localities (wn.nl, H24). From Ard., Champ. and Tert. par., it has apparently indeed disappeared, as stated in NF6 (database CBN Paris).

- *Digitalis lanata* Ehrh.: this species was said to be naturalized in Esch-sur-Alzette in the Grand Duchy of Luxembourg. Apparently, it was last seen there in 1954 (MNHN-Lux) and thus unlikely to be genuinely naturalized.

- *D. purpurea* L.: this species occurs almost area-wide in Eifel centr. where it is at most AC-AR instead of R (FT). The species' distribution in the remainder of the Flora area is rather muddled, owing to the fact that the natural distribution is hardly distinguishable from the 'secondary' one. The species is certainly not R or RR in Fl. and Camp. (wn.be) but most occurrences in these districts doubtlessly refer to naturalized, not natural populations.

- *D. lutea* L.: this species is not RR but missing in Eifel centr., it is only present in one locality further east, in Ost-eifel (FT). Outside the species' native distribution range, it is occasionally locally naturalized, for instance in some quarries in Zuid-Limburg in the Netherlands (H24, wn.nl).

- *D. grandiflora* Mill.: in addition to its natural occurrences, this species is sometimes observed as an escape from cultivation (wn.be).

### 153. Scrophulariaceae

- *Buddleja davidii* Franch.: the earliest subspontaneous occurrences in Belgium and northern France date back to 1930 (Huy), not to 1940 as stated in NF6 (APB).

- *Verbascum blattaria* L.: in NF6, this species was mentioned for Mar. mér. However, in this district it now also occurs further north, in Belgium as well as in the Netherlands (wn.be, FZ). It is definitely increasing in the Flora area and no longer RR, although its frequency varies from region to region (e.g. wn.be, SI-Flore).

- *V. thapsus* L.: in NF6, this species was said to be less common in Mar., Fl., Camp. and Ard. (AR, whereas AC elsewhere in the Flora area). It actually is hardly any rarer (if at all) in these districts, thus AC-AR (wn.be).

- *V. densiflorum* Bertol.: this species has much expanded recently, not only around Ghent (Fl.) and Antwerp (Mar.). In many districts it has become AR rather than RR, although many of these recent localities doubtlessly refer to naturalized rather than native populations (wn.be).

- *V. phlomoides* L.: more or less the same applies to this species, although it is much rarer. In Fl., it is slightly less rare than indicated in NF6, R-RR rather than RR (wn.be).

- *V. lychnitis* L.: outside the species' native area, it is occasionally observed as a naturalized alien, e.g. on rough ground at the Bruges railway station (Fl.) or in the Campine coal mining area. From these areas, it has been known for many decades (wn.be).

- *V. nigrum* L.: this species too is expanding recently. In some districts, e.g. in Fl. and Camp., it is no longer RR (wn.be).

- *Limosella aquatica* L.: this species is declining in almost the entire Flora area except in its northern part where, on the contrary, it is slightly increasing. In Mar., it is no longer predominantly occurring in the southern part and in the Antwerp area: it was discovered recently in at least six localities on the Oostkust in Belgium (wn.be) and in Zeeland, in the Netherlands, it is now even considered to be AC (FZ). In NF6, this species was said to be RR in all districts; in reality, however, it is obviously less rare in Mar., Fl., Camp. and Fluv. (R), whereas RR in Mosan, Ard., Lorr., Champ. and Tert. par. (SI-Flore, wn.be).

- *Scrophularia canina* L.: in addition to the few districts where this southern species is naturalized, it is sometimes observed as an ephemeral alien, recently for instance in the Ghent port area (wn.be).

### 154. Linderniaceae

- *Lindernia procumbens* (Krocker) Borbás: in NF6, this species was mentioned from Camp. or. (Zonhoven), suggesting that it is still present there. However, it was only

recorded once in this locality, in 1995, as an ephemeral accidental introduction (Berten 1997).

- *L. dubia* (L.) Pennell: this American invasive species was first discovered in the Flora area in 1993 (exposed fishponds in Zonhoven); it was probably introduced by transport of fish from France, where the species already naturalized a century and a half ago. It then started to spread, first in the surroundings of Zonhoven, then elsewhere in Camp., Pic. and the adjacent part of Tert. par. (valley of river Oise between Compiègne and Saint-Quentin, see: <https://www.cbnbl.org/lindernie-fausse-gratiolenouvelle- plante-exotique-envahissante-notre-territoire>) and in Fluv. It is likely to spread elsewhere and recently was observed for the first time in Fl. (Mechelen) as well (wn.be, wn.nl, Digitale2).

### 159. Lentibulariaceae

- *Utricularia vulgaris* L.: this species has not disappeared from Mar. where it is still known from scattered recent localities, both in Belgium (wn.be), the Netherlands (FZ) and France (Delplanque *et al.* 2012). It is also known from a few localities in Fl. (e.g. Eksaarde; wn.be), from where it was not mentioned in NF6.

- *U. australis* R. Brown: there are several localities for this species in Champ. (for instance in the surroundings of Châlons-en-Champagne) (database CBN Paris).

- *U. minor* L.: this species is completely missing in the French part of Lorr. (FLORAINE 2013). In this district, it is only known from a few localities near Vance, in Belgium, and thus in Lorr. sept. (wn.be). In the valley of river Aisne (Cormicy, in Champ.), this species is known for several years now (database CBN Paris). It was not yet mentioned from that district in NF6.

- *U. bremii* Heer ex K  lliker: the genuine presence of this poorly known species in the Flora area was questioned in NF6. According to SI-Flore, it is indeed absent from northern France, including from the valley of river Somme in Pic. m  r. However, this species was discovered in the coastal marsh of Villiers (Mar. m  r.) in 2005 (Duluc 2019). It is possibly less rare but overlooked for *U. minor* L.

- *U. intermedia* Hayne: this species is still present in Brab., in the Torbroek nature reserve (wn.be).

- *U. ochroleuca* R. Hartm.: this species is extinct now in the entire Flora area. It formerly occurred in Camp., Brab. occ. and Tert. par. (H24, wn.be, Digitale2, database CBN Paris).

- *Pinguicula vulgaris* L.: this very rare and much declining species is still present in a single locality in Pic. m  r., near Amiens in the valley of river Somme (Digitale2).

### 160. Verbenaceae

- *Verbena officinalis* L.: this species seems to increase and its degree of rarity may have been exaggerated in some areas, especially in Fl. where it is AR rather than R (wn.be).

- *V. bonariensis* L.: this ornamental is increasingly escaping and locally naturalizing. At present, it is merely AR in Mar., Fl., Camp. and Brab., RR elsewhere (wn.be).

### 161. Lamiaceae

- The casual alien species *Sideritis montana* L. has been found in Malz  ville near Nancy (Lorr. m  r.) since the 19<sup>th</sup> century, although it is sometimes not seen for decades. It was recently rediscovered there (Voirin & Antoine 2017).

- *Lycopus europaeus* L.: this species certainly also occurs in Haute Ard., both in Hautes Fagnes and around Baraque Fraiture (wn.be).

- *Mentha pulegium* L.: there are also records for this species from Camp. in Belgium, but all refer to non-natural occurrences (wn.be). Natural populations have become very rare everywhere, but the species is regularly sown in nature development areas and then often naturalizes. See also Ronse (2012).

- *M. longifolia* (L.) Huds.: the presence of ‘pure’ plants of this species in Belgium is questionable, although there are numerous claims (e.g. wn.be). The species never occurred in Eifel centr., from where it was said to be RR in NF6 (FT). In Lorr., this species is also present in the southeastern portion of this district (FLORAINE 2013). It may be present elsewhere in the Flora area but remains poorly known (e.g. plants that are much reminiscent of and probably belong to it are abundantly naturalized along the canal de Roubaix near Leers in Brab. occ.; pers. obs. author).

- *M. arvensis* L. subsp. *arvensis* is also known from at least one locality in Eifel centr., in Birresborn (FT).

- *M. arvensis* L. subsp. *parietariifolia* (J. Beck.) Briq.: this subspecies is also known from at least one locality in Eifel centr. (FT).

- *M.  $\times$ suavis* Guss.: this very rare hybrid was supposed to have disappeared from the Flora area. It was, however, recently observed on the extreme southern border of the Flora area, in the Champ./Lorr. bordering area (Lassicourt) and in Lorr. (Bailly-aux-Forges) (database CBN Paris).

- *M.  $\times$ carinthiaca* Host: the actual presence of this hybrid in Tert. par. was questioned in NF6. It has indeed completely disappeared from that district (Digitale2, database CBN Paris).

- *Salvia officinalis* L.: this ornamental is also found on old walls and coal mining spoil heaps (e.g. wn.be).

- *S. verticillata* L.: in NF6, this species was said to be much rarer in the western part of the Flora area. At present, however, it is more or less equally distributed throughout, with hotspots in the mining areas in Camp. and Brab. occ. (in Belgium as well as in France) (wn.be, Digitale2, database CBN Paris).

- *S. pratensis* L.: in the northern part of Lorr., this species is much rarer than indicated in NF6, R rather than C (Champluvier & Saintenoy-Simon 2014).

- *S. nemorosa* L.: this species is nowhere genuinely naturalized, not even in Lorr. (as claimed in FG); it is a rather regular (ephemeral) escape, especially in Fl., Camp. and Brab. (wn.be).
- *S. verbenaca* L.: this southern species does not occur more often in the western than in the eastern part of the Flora area. In the Viroin area (Mazée) it seems more or less naturalized, at least it has continuously been observed there since 2008 (wn.be). According to Messean (2016) this species is apparently well-established (or even indigenous) in a few places in Tert. par. (Époux-Bézu, Villiers-Saint-Denis).
- *Hyssopus officinalis* L.: this ornamental species is still present in Mosan: there are several recent localities in and near Dinant and it is also found in Durnal. It was also observed in Bure (Tellin), in Ard. (wn.be).
- *Thymus praecox* Opiz subsp. *praecox*: this species is not RR but has never been present in Eifel centr. (FT).
- *T. serpyllum* L.: claims of this species in Fl., Lorr., Champ. and Tert. par., already considered doubtful in NF6, are likely erroneous indeed (wn.be, Digitale2, database CBN Paris). Yet, its presence in Lorr. has been mentioned by both FLORAINE (2013) and Vernier (2020) but these claims require confirmation.
- *Clinopodium vulgare* L.: this species is in parts of Fl. and Camp. certainly not RR, e.g. around the larger cities (Ghent, Antwerp) or in the former coal mining region in Limburg where the species occurs on slag heaps. There is also a striking cluster of observations in the northern part of the province of East Flanders, for instance on chalky clay dikes (wn.be; comm. W. Van Landuyt 11.2022).
- *C. acinos* (L.) O. Kuntze: this species is not very rare in the eastern part of Camp., especially on slag heaps and on chalky slopes of the Albert Canal (wn.be).
- *C. nepeta* (L.) O. Kuntze subsp. *nepeta* var. *nepeta*: this taxon has also been recorded in Mar. (old wall in Veurne, 2006, F. Verloove 6445 in BR, LG).
- *C. nepeta* subsp. *nepeta* var. *glandulosum* (Req.) B. Bock: this taxon is no longer in the process of naturalization but genuinely naturalized in several locations, sometimes even in large numbers (e.g. abandoned railway yard in Wevelgem, etc.; wn.be). It was recently also reported for the first time from Mosan in Jambes (Wastiaux 2019).
- *Melittis melissophyllum* L.: in Lorr., this species is rarer than indicated in NF6 (AC-R). In reality, it is genuinely rare with most populations located in the northwestern and southern part of the district (FLORAINE 2013).
- *Lamium ×holsaticum* E.H.L. Krause: this hybrid has also been observed once in Fluv. in Belgium (Mazenhoven, 2017; wn.be).
- *L. galeobdolon* (L.) L. subsp. *galeobdolon* is also present in a few localities in Ard. or. and Eifel centr. (FT).
- *L. galeobdolon* (L.) L. subsp. *argentatum* (Smejkal) J. Duvigneaud: this invasive ornamental is rapidly spreading and has become widely naturalized throughout the Flora area (wn.be, etc.).
- *L. maculatum* L.: in areas where not native, this species is increasing, as an escape from cultivation, sometimes naturalizing locally (wn.be).
- *L. hybridum* L.: in Mar. (especially polders), Fl. and Brab. occ., this species is much less rare (AC rather than AR; wn.be), in Zeeland even very common (FZ).
- *L. confertum* Fries: this poorly known species was recorded in Belgium for the first time in 2018 in Aalter (Fl.) (Van Vooren & Hoste 2019) and it was subsequently observed in several other places as well. It is not known whether the species is expanding or has been under-observed before. Its genuine distribution remains poorly known. According to Atlas-NL the species is also found in Zeeland (and Zuid-Limburg) in the Netherlands, but it is not mentioned in FZ and there are no records substantiating these claims on wn.nl. In NF6, *L. confertum* was erroneously said to be present in the Iberian Peninsula; this refers to a different, similar species, *L. coutinhoi* García (Castroviejo *et al.* 2010).
- *Galeopsis speciosa* Mill.: this species almost disappeared in Fl. and needs to be considered RR, like in e.g. Mar. In Belgium, this species is least rare now east of Brussels (Brab. or.) (wn.be).
- *G. pubescens* L.: this species was recently discovered in Camp., in the Postel area, where it seems firmly established (wn.be). It may have been overlooked before and should be looked for elsewhere.
- *G. tetrahit* L.: this species is certainly rarer in Mar. but slightly less so than indicated in NF6 (see also FZ: AR). For example, it is hardly more common in the Borinage in Brab. (wn.be).
- *G. segetum* Neck.: this species appears to have almost completely disappeared in Fl. and Brab.: there is not a single reliable record (substantiated by photos) on wn.be. It has become RR in these districts.
- *G. ladanum* L.: this species seems to have declined dramatically in Belgium; in recent years, it was only seen as adventitious in the Ghent port area (2016-19: wn.be). According to AFW, it was seen in several places after 1980 and is least rare in the Viroin area (Mosan). It is probably RR everywhere now in Belgium, especially in Ard. and Lorr. In French Lorr., the species is now considered to be RR as well (FLORAINE 2013). It is perhaps least rare in the Grand Duchy of Luxembourg ('Least Concern' according to the Red List; Colling 2005). The species is also known from at least one locality in Champ. (Oyes) (database CBN Paris), a district not mentioned in NF6.
- *G. angustifolia* L.: outside the districts mentioned in NF6, this species is found here and there in important nuclei, e.g. in the coal mining region in Limburg (Camp.) and the Borinage (Brab. occ.), where it is undoubtedly introduced (railway lines, slag heaps) (wn.be). It appears to be increasing, contrary to the preceding species with

which it is sometimes confused. In Lorr., however, where it was said to be C in NF6, it is actually R (FLORAINE 2013).

- *Stachys recta* L.: since 2009, this species is known from several locations in Zuid Limburg in the Netherlands (wn.nl). H24 does not refer to these records even though their identity is correct.

- *S. annua* (L.) L.: this species was reported in NF6 from Brab. or. in the Netherlands but these are actually historical finds (from the 19<sup>th</sup> century; Duistermaat 1996). In 2014, however, the species was found again (once?) in Zuid Limburg, in Berg (wn.nl). In Eifel centr., this species is extinct (FT). Also in other parts of the Flora area, it is declining. For instance, in Pic., it has disappeared from many localities (Digitale2).

- *S. alpina* L.: this species is known since 2014 from one location on the Dutch part of Sint-Pietersberg (Brab. or.; wn.nl). In Eifel centr., it has much declined: at present it is known from a single extant locality and thus has become RR (FT). In Pic. mér., it is still present, near Amiens (Digitale2).

- *S. sylvatica* L.: AR in Mar. and Camp., as stated in NF6, is exaggerated and not apparent from the heatmap (wn.be); it is at most slightly less common than elsewhere in these districts (see also FZ: AC).

- *S. germanica* L.: in NF6, this species was said to have disappeared from Eifel centr. However, it has never occurred there (FT).

- *Marrubium vulgare* L.: on the one hand, natural populations of this species are disappearing in many districts (e.g., there are no recent records from Pic.; Digitale2); but on the other hand, it is increasingly found as an escape from cultivation (wn.be).

- *Ballota nigra* L. subsp. *meridionalis* (Béguinot) Béguinot: this taxon is much less rare in Fl. (especially in and near the larger cities) than in Camp., at most AR (wn.be).

- *Leonurus cardiaca* L.: this species is markedly rarer in Zeeland (FZ) than in Belgian Mar. In Fl., Camp. and Brab., it is significantly less rare than in Mosan, Ard., etc., AR-R rather than R-RR (wn.be). In general, it appears to be in expansion rather than in regression (as was stated in NF6).

- *Prunella grandiflora* (L.) Schöller: outside the districts mentioned in NF6, there are several recent records of this species, e.g. along river Maas (Fluv.) and in Kerkom (Brab.) (wn.be), where it seems to persist well. It is unclear what status should be assigned to these records. The species is also cultivated and sometimes escapes.

- *P. laciniata* (L.) L.: this species is sometimes found as an introduction, e.g. an established population is known since 2016 from a slag heap in Waterschei (Genk). In Ard., it also occurs outside of the Oesling area, especially south of Rochefort (wn.be).

- *Scutellaria galericulata* L.: in Fl. and Brab. or., this species is at most AR, not R (wn.be, wn.nl).

- *S. minor* Huds.: this species is clearly less rare in Brab. than in the other districts listed as RR: e.g., it is scattered in the region east of Brussels, immediately south of Camp. (from Leuven to Hoeselt). Also in Brab. occ., there is an important cluster of localities around Ypres, although the species was only confirmed in a single locality there recently (Zillebeke) (wn.be). Schneider & Wolff (2018) published an overview of the species' distribution in the Grand Duchy of Luxembourg.

- *S. columnae* All.: as an escape, this species is not only known from the Netherlands; it was also seen in at least one locality in Belgium, on city walls in Diest in 2017 (wn.be). The naturalized populations in Tert. par. are in fact located outside the territory covered by NF. Moreover, it has disappeared from most of its localities there and is now RR rather than R (database CBN Paris).

- *S. altissima* L.: this naturalized ornamental is no longer restricted to Mosan; it was found in many other places in the meantime (in Fl., Camp., Brab. and Champ.) (wn.be, database CBN Paris), where it is either merely ephemeral or locally naturalized.

- *Ajuga chamaepitys* (L.) Schreb.: this rare native is known since 1999 from a limestone slope near Harmignies in Brab. occ. (AFW, wn.be). Elsewhere in Belgium, it has become RR now, also in Mosan where it has nearly disappeared. The species is also extinct in Eifel centr. (FT). In Lorr., it is actually R, not AC-AR (FLORAINE 2013) and it has disappeared in the Belgian and Luxembourg parts of this district (wn.be, Colling 2005).

- *A. reptans* L.: in NF6, this species was said to be C throughout, except in Mar., Fl. and Camp. sept. However, it is hardly any rarer in Fl. and Camp. (sept.), at most AC-AR (wn.be), and also in Mar. it is at most R (see also FZ: AR).

- *A. pyramidalis* L.: Krippel & Thommes (2015) provided an update for the species' distribution in the Grand Duchy of Luxembourg: all known populations are located in the northern part of the country, with a clear predominance in the north-west. During the past 20 years, several large populations have been discovered in the Upper-Sûre region.

- *A. genevensis* L.: outside the species' native distribution range in the Flora area, it is occasionally observed as an introduction, for instance in an abandoned railway yard in Lille in France (Brab. occ.; Lemoine 2018).

- *Teucrium botrys* L.: this species is indeed sometimes found as an alien, e.g. in a few places in Zeeland (FZ, H24). In Belgium, it was recently also observed in Ghent (2020) and in 1992 in Staden (with imported bark) (wn.be).

- *T. scorodonia* L.: the degree of rarity in some districts of this species is probably slightly exaggerated and strongly depends on the region. E.g. in Fl., where it is said to be AR, it is common on the (slightly) poorer sandy soils between Bruges and Ghent, around Ypres and Houthulst, etc. and virtually absent elsewhere (wn.be).

- *T. chamaedrys* L.: this species is also grown as an ornamental and sometimes found outside its natural area (Mar., Camp., Brab.; wn.be), either as an escape, adventive or deliberately sown or planted.
- *T. scordium* L.: this rare native has completely disappeared from Mar. north of Calais (no post-1999 records; Digitale2), Belgium (last record in 1978; wn.be) and the Netherlands (only north of the Flora area, in Voorne; wn.nl). In 2016, a population was discovered along an old branch of the Scheldt river south of Ghent (wn.be). The population counts a few hundred individuals and actually represents the only one in Belgium.

## 162. Phrymaceae

- *Erythranthe moschata* (Douglas ex Lindl.) G.L. Nesom: in the Dutch part of the Flora area, this species is considered to be a mere escape rather than a naturalized alien (H24, Atlas-NL). Moreover, the only two records in the extreme southeastern part of the Netherlands are from the valley of river Maas (wn.nl), and thus from Fluv., not Brab. or. In Mosan (valley of river Vesdre), where it was also said to be naturalized, there is not a single recent record (AFW, wn.be); the species has probably disappeared from there (last seen in 1966; see APB). In NF6, this species was also said to be naturalized in Pic. or. and sept.; however, it is completely absent from the whole of north-western and north-central France (Digitale2, database CBN Paris).
- *E. guttata* (Fisch. ex DC.) G.L. Nesom: this species also occurs in at least one locality in Eifel centr. (Steffeln; FT), a district from where it was not mentioned in NF6.

## 163. Paulowniaceae

- *Paulownia tomentosa* (Thunb.) Steud.: this ornamental tree is increasingly escaping and locally naturalizing. At present, it is at most AR in urban areas (especially in Fl. and Brab.) and RR elsewhere (wn.be, Digitale2).

## 164. Orobanchaceae

- *Lathraea clandestina* L.: this species is slightly expanding lately. It has become less rare in some districts from where it was already known (especially Fl. and Brab. occ. where it is R now instead of RR) and was recently firstly reported from three districts: Mar., Camp. and Mosan. In Brab. centr. and or., it has also further expanded and it is no longer limited to Meise and the Geer valley respectively (wn.be). It is increasingly likely that the species' isolated occurrences in Belgium relate to an ancient introduction (see also FG).
- *Orobanche reticulata* Wallr.: this species was already mentioned in NF6 although its very few populations (all in the Netherlands) were located well outside the Flora area. However, the species has been observed since 2014 in a locality in Mar. sept (Roggenplaat in Zeeland) (FZ, H24, wn.nl).
- *O. gracilis* Smith: this species has completely disappeared from Tert. par. (database CBN Paris, Digitale2).

- *O. alba* Steph. ex Willd.: there are reliable records of this species from Tienne de Breumont (Viroin) in Mosan since 2008 (wn.be, AFW), a district not mentioned in NF6. An update of its occurrence in the Belgian part of Lorraine was given by Hennerese (2013): there are 13 extant localities and all plants grow exclusively on *Thymus pulegioides* L. There are also historical occurrences in Eifel centr., from where the species now has disappeared (FT). Its actual presence in Pic. or. is questionable and requires confirmation (Digitale2, database CBN Paris).

- *O. picridis* F.W. Schultz: this species may have been overlooked (it is much reminiscent of *O. minor* L.) in some parts of the Flora area or has been expanding slightly in recent years. It was recently discovered in Mar. (port of Dunkerque area; it perhaps should be looked for in the adjacent Belgian part of this district) and in the southern part of Pic. (valley of river Somme) (Digitale2; author observations).

- *O. hederiae* Vaucher ex Duby: this species is recently expanding. In Mar., it is no longer restricted to the southern part of this district: there are at least three localities in the Belgian part of it (wn.be) and, since 2008, also at several locations in Zeeland (FZ). It now also occurs in several places in Fl. and Camp. (wn.be), two districts not yet reported in NF6. In Mosan and Lorr., it is no longer restricted to the valley of river Meuse and the northeastern part of the district respectively (wn.be, FLORAINE 2013, Vernier 2020). In many newly recorded localities it is found in urban habitats and is probably (inadvertently) introduced. Its recent expansion almost exclusively relates to such populations (see also H24 for the Netherlands).

- *O. alsatica* Kirschl.: this very rare species is also present in the southeastern part of Champ., near its border with Lorr. (Couvrot; database CBN Paris).

- *O. lutea* Baumg.: this species never occurred in Eifel centr., only east of it, in Osteifel (FT), and thus beyond the Flora limits. Analogously, Dutch populations in Fluv. sept. are located along river Waal near Nijmegen and thus also outside of the territory covered by NF (wn.nl).

- *Phelipanche purpurea* (Jacq.) Soják: there is a well-known cluster of observations around Brussels (Brab. centr.) (wn.be; see also Ronse & Dierickx 2007). This species does also occur in Eifel centr., even in several localities (FT), and in Champ (e.g. Champfleury; database CBN Paris). All these districts were not yet mentioned in NF6.

- *Euphrasia frigida* Pugsley: this species was mentioned in NF6 although its unique locality was considered to be just outside the Flora area. This is not correct: this species was found in Stadtkyll, which is indeed located in Eifel centr. and thus within the limits of the territory covered by NF. It was discovered there by the German specialist Kalheber (1983). However, the population was destroyed shortly afterwards (comm. R. Hand 03.2021, FT).

- *E. confusa* Pugsley: the possible occurrence of this species in Mar. mér. was mentioned in NF6. It is, however,

lacking from all contemporary French Floras and local databases (FG, Digitale2, SI-Flore). In fact, this species is endemic to the British Isles (E+M Plantbase, Stace 2019) and thus not relevant to the Flora area.

- *Odontites luteus* (L.) Clairv.: in Camp. or., this species was at first known from slag heaps in Zolder and Genk, as stated in NF6, but by now also occurs elsewhere in the Campine mining area (wn.be).
- *O. jaubertianus* (Boreau) D. Dietrich ex Walp.: this species has completely disappeared from Tert. par. In north-central France, it is now confined to a small area northwest of Troyes, in Champ., at the extreme southern border of the Flora area (database CBN Paris, Digitale2).
- *Parentucellia viscosa* (L.) Caruel: this species is also known from rather numerous localities in Camp., both in Belgium and (particularly) in the Netherlands (wn.be, wn.nl). In Mar., this species is chiefly found in the Netherlands (as stated in NF6) but also in Mar. mér. where it is actually known from several localities south of river Canche (Digitale2) as well as in the Belgian part of this district (e.g. Antwerp and Zeebrugge port areas). There is also a single record from the area northeast of Troyes (Piney), in Champ., at the extreme southern border of the Flora area (database CBN Paris).
- *Rhinanthus alectorolophus* (Scop.) Pollich subsp. *buccalis* (Wallr.) Schinz et Thell.: in Lorr., this subspecies is much rarer in the Belgian (northern) part of this district: RR instead of AC (Champluvier & Saintenoy-Simon 2014).
- *Pedicularis palustris* L.: this species has completely disappeared from Eifel centr. (FT).
- *P. sylvatica* L.: this species occurs in the swamps of Balançon-Cucq et Villiers, in Mar. mér. (Delplanque *et al.* 2012).

### 165. Aquifoliaceae

- *Ilex aquifolium* L.: in addition to natural occurrences, this species is also very commonly grown as an ornamental and increasingly naturalizing, seriously obscuring its natural distribution in the territory of the Flora.
- *I. crenata* Thunb.: this Asian ornamental shrub is recently naturalizing and spreading in Camp. where it is actually at most AR-R (wn.be). It is confined to slightly acidic woodlands and thus much rarer in other districts.

### 166. Campanulaceae

- *Campanula cervicaria* L.: in NF6, this species was said to have formerly been present in Eifel centr. According to FT, however, it never occurred there. It has completely disappeared from Tert. par. (Digitale2, database CBN Paris; see also Filoche *et al.* 2010). There are, on the contrary, a few extant localities in Champ., a district not mentioned in NF6, northeast of Troyes (database CBN Paris), at the extreme southern limit of the Flora area.
- *C. glomerata* L.: this species is much rarer than indicated and declining in Lorr. sept., R rather than AC-AR,

especially in the Gaume (Champluvier & Saintenoy-Simon 2014). In addition to the districts where this species naturally occurs, it is occasionally observed as an escape from cultivation. In some localities it persists rather well, for instance on the verge of the Calmeynbos in De Panne (wn.be).

- *C. rapunculus* L.: this species is R rather than RR in Fl. (wn.be).
- *C. patula* L.: this species has disappeared from Eifel centr. (FT).
- *C. poscharskyana* Degen: this ornamental is increasing in urban habitats. It is now fully naturalized in several districts and R-RR (wn.be).
- *Legousia speculum-veneris* (L.) Chaix: this species has disappeared from Eifel centr. (FT). The same probably applies to some other districts: in the whole of northwestern France (particularly Pic. and Brab. occ., from where it was mentioned as RR in NF6) the most recent record as a weed of agricultural fields dates back to 1993 (Digitale2).
- *L. hybrida* (L.) Delarbre: in Eifel centr., this species has become RR instead of R. According to FT there is only a single extant locality, in Schönecken.
- *Phyteuma spicatum* L.: this native species is sometimes cultivated as an ornamental and locally naturalized. It is well-known for instance from the Steengelaag woodland in Stekene in Fl. (wn.be).
- *P. nigrum* F.W. Schmidt: this species occurs in several localities in Montagne de Reims in Tert. par. (database CBN Paris). Like the preceding species, it is sometimes grown as an ornamental and occasionally escapes (wn.be).
- *Lobelia urens* L.: this species has completely disappeared in the Flora area. It was probably last seen in 1993 in Oisy-le-Vergeur in Pic. (Hendoux 1997).

### 167. Menyanthaceae

- *Menyanthes trifoliata* L.: this species is also known from at least one locality in Champ. (Bétignicourt; database CBN Paris). Like *Nymphoides peltata* (S.G. Gmel.) O. Kuntze, it is much declining in its natural habitats but increasingly often introduced as an ornamental, also in semi-natural biotopes, unfortunately heavily blurring the data concerning its spontaneous distribution.

### 168. Asteraceae

- *Prenanthes purpurea* L.: this species was already briefly mentioned in NF6 because it was formerly found in the Grand Duchy of Luxembourg (most recent record in 1968; MNHN-Lux) and the adjacent part of Lorraine in France. In addition, it formerly also occurred in Eifel centr., on the border of West- and Osteifel (Prüm) (FT).
- *Limbarda crithmoides* (L.) Dum.: this southern species was discovered in 2006 in Goeree in the Netherlands. Contrary to what was stated in NF6, this locality is not located in Zeeland but in Zuid-Holland. Its presence there (in Kwade Hoek) was regularly confirmed ever since, at

least up to 2015 (wn.nl). Interestingly, despite its southern origin, it apparently recently also established itself further north in the Netherlands (Schiermonnikoog, Texel; wn.nl). In 2016 nine individuals were also discovered in Wimereux in Mar. mér. (Toussaint 2016a). By 2022, the population had expanded to about a hundred plants (comm. M. Leten, 07.2022).

- Two accidental aliens already mentioned in NF6 need some additional information. There are scattered recent claims of *Adenostyles alliariae* (Gouan) A. Kerner from French Lorr. (AFL, SI-Flore), including one near to the Franco-Belgian border (west of Longwy). These records require confirmation and are probably erroneous (comm. S. Antoine, 05.2021). In 2020, however, this species was also recorded in Montagne de Reims (Romery) (database CBN Paris), in Tert. par. (as an escape?). An old record of *Amphiachyris dracunculoides* (DC.) Nutt., also from French Lorr., was recently published (Pax 2019).

- *Galatella linosyris* (L.) Reichenb. f.: this species was said to be R-RR in Lorr. or. It is, however, completely missing in this district, in its French (FLORAINE 2013, Vernier 2020) as well as in its Belgian or Luxembourg part (wn.be, Colling 2005, MNHN-Lux).

- *Erigeron acris* L.: in Eifel centr., this species was said to be AR-R. In reality, however, it is completely lacking in that district (FT).

- *E. annuus* (L.) Desf.: this species was said to be R in Fl. and Camp. It is more likely AC-AR and much increasing in these two districts (wn.be).

- *E. karvinskianus* DC.: this ornamental is not rarely but frequently cultivated. In addition, it is a widely naturalized and much increasing escape in urban habitats. In Mar., Fl. and Brab. (not only in its western part) it has become AR-R rather than R-RR and it has also been known from Camp., Ard. and Lorr., where it is still RR (wn.be, AFL, Digitale2).

- *E. sumatrensis* Retz.: the species' distribution in Lorr. is unclear: it is completely missing according to most sources (FLORAINE 2013, SI-Flore, wn.be, Colling 2005) whereas Vernier (2020) reports it at least from the northern Plateau Lorrain. Although a relatively recent newcomer in the Flora area (Verloove & Boulet 2001), this species has much expanded lately, especially in Mar., Fl. and Camp. where it has become at most AC-AR (wn.be).

- *E. bonariensis* L.: although still very rare, this species has naturalized locally in urban habitats, especially in Antwerp (wn.be) and Zeeland (FZ).

- *E. bilbaoanus* (J. Rémy) Cabrera: in addition to the habitats already mentioned in NF6, this species also occurs on exposed gravelly river banks (it is locally frequent along river Maas in Fluv.; wn.be). Especially in the western part of the Flora area, it is expanding: it has become at most AR-R in Mar., Fl., Camp. and Brab. (wn.be). The species is also known from scattered localities in Pic. (Digitale2), a district not yet mentioned in NF6.

- *Baccharis halimifolia* L.: this American ornamental shrub has naturalized in coastal areas. In addition, it is occasionally also observed in inland localities (wn.be).

- *Bombycilaena erecta* (L.) Smolj.: the actual presence of this very rare species in the Flora area (Lorr., Champ. and Tert. par.) was questioned in NF6. At least from the latter district, it was recently confirmed: Mont-Saint-Martin, Aisne (Messean 2016); also in Grauves (database CBN Paris). According to this database, it has indeed disappeared from Champ.

- *Filago pyramidata* L.: this very rare native species is exceptionally observed as an introduction, e.g. in campsites in coastal areas (Verloove *et al.* 2020a).

- *F. germanica* L.: after having dramatically declined in the past decades, this species is recently increasing again in the Flora area (see also H24), although probably exclusively in anthropogenic habitats (railway infrastructure, quarries, by tracks, etc.). In Camp., a district that was not mentioned in NF6, it is at most R (wn.be).

- *F. lutescens* Jord.: this very rare species was thought to have probably completely disappeared from the Flora area. However, it is not extinct and still known from a single locality in Briquemont near Rochefort in Mosan (AFW, wn.be; see also Wastiaux 2019). Apparently, the species is also still present in the Moselle valley in Lorr. mér. (FLORAINE 2013, Voirin 2017), for instance in Tonnoy (<https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=FR4100227>) and in Rosières-aux-Salines (Bonassi *et al.* 2017). Finally, it is also known from scattered localities in Camp. in the Netherlands, e.g. in Overloon and Castelresche Heide (H24, wn.nl).

- *F. neglecta* (Soyer-Will.) DC.: this enigmatic species was believed to have possibly disappeared from Lorr. In fact, it is extinct everywhere in the small area where it once occurred (FG).

- *F. arvensis* L.: this species was not mentioned in NF6 from Eifel centr. It is in fact still fairly scattered, especially on lava (FT).

- *Logfia gallica* (L.) Coss. et Germ.: this species indeed seems to have completely disappeared from the Flora area. In northwestern France, the northernmost extant locality is in Martot (Eure department), well beyond the limits of the Flora. It is still present in the Paris area (FG) but only outside the Flora area (database CBN Paris). It is regionally extinct in northeastern France (Bonassi 2015).

- *Antennaria dioica* (L.) Gaertn.: a small population of this presumably extinct species in Flanders was found in 2019 in a moor in Brecht (Camp.; wn.be). As this is a site frequented by military engines, its nativity there is uncertain, although the species was formerly not quite rare in Camp. (AR-R, according to Durand 1899). It also still occurs in several places in Eifel centr. (FT) whereas in Lorr. it has completely disappeared from the French and Luxembourg part of this district (FLORAINE 2013, Colling 2005); it is still present in the Belgian part (wn.

be). The species has also disappeared from Pic., there are no post-1960 records (Digitale2).

- ***Gnaphalium uliginosum*** L.: this species was said to be R in Mar. in NF6. This is not correct, in Zeeland it is even considered to be common (FZ). It rather falls in rarity class AC-AR (see also wn.be).

- ***Laphangium luteoalbum*** (L.) Tzvelev: this species was formerly almost restricted to coastal areas but has much expanded lately. In Mar., Fl. and Camp. it has become AC-AR and in Brab. AR rather than R (wn.be). It is also present in Pic. (e.g. valley of river Somme), from where it was not yet mentioned in NF6 (Digitale2).

- ***Helichrysum arenarium*** (L.) Moench: in the entire Flora area this species is only known from Lorr., at least as a wild species. In NF6, it was said to be present in the northern and eastern part of this district. However, it seems to be restricted to the former and absent from the latter (FLORAINE 2013). In northeastern France, it also occurs in Alsace, beyond the Flora boundaries. In Camp., in the Netherlands (Oirschotse Heide), this species was discovered in 2021 (wn.nl) but it is rather doubtful that this refers to a natural occurrence.

- ***Inula racemosa*** Hook. f.: this recently naturalized ornamental is least rare in Brab. occ. (AR-R), RR elsewhere (Verloove 2008, Lemoine 2015, wn.be).

- ***Dittrichia graveolens*** (L.) Greuter: this southern species is slowly but definitely expanding in the Flora area. In recent years it has also been observed in Fl. and Camp. (wn.be), Ard or. (Germany: motorway near Winterspelt-Steinebrück; FT) and in Lorr. and Champ. The species is in fact in rapid expansion in Champagne-Ardenne in France, e.g. near Sainte-Menehould (Lorr.), in Cuperly and between Châlons-en-Champagne and Troyes (Champ.), etc. (Saint-Val 2018; previously also already reported in FLORAINE 2013).

- ***D. viscosa*** (L.) Greuter: this species seems to be in the process of local naturalization, especially in Mar. (port areas of Antwerp, Zeebrugge and Dunkerque; wn.be, Stien 2018, pers. obs. author).

- ***Pulicaria vulgaris*** Gaertn.: in Lorr., this species is not restricted to the northern part of this district: there are several records near Metz and south of Nancy (FLORAINE 2013). Similarly, in Camp. this species does not exclusively occur in the eastern portion of this district (wn.be). It is also relatively widespread (and perhaps least rare in Belgium) in the valley of river Maas (Fluv.), a district not mentioned in NF6 (wn.be, wn.nl).

- ***Buphthalmum salicifolium*** L.: in addition to the few indigenous and naturalized populations already mentioned in NF6, this species is sometimes observed as an adventive (e.g. slag heap in Genk, since 2016) or as escape from cultivation (e.g. cemetery wall in Bruges, since 2018) (wn.be).

- ***Telekia speciosa*** (Schreb.) Baumg.: this ornamental was initially discovered in Brab. centr. and for quite a long

time least rare there. However, at present, this species is known from most districts (except perhaps in northwestern France) but R-RR throughout the Flora area (wn.be, wn.nl, Digitale2).

- ***Ambrosia artemisiifolia*** L.: this North American weed has become relatively frequent in Flanders (AC-AR), R-RR elsewhere in the Flora area (wn.be). It is still predominantly ephemeral, only exceptionally naturalized.

- ***Guizotia abyssinica*** (L. f.) Cass.: this species has become a quite characteristic birdseed alien and is less rare than indicated in NF6, it is at most AR (wn.be).

- ***Coreopsis lanceolata*** L.: this North American ornamental has been recorded in two additional districts: Mar. (wn.be) and Lorr. mér. (Art-sur-Meurthe; Antoine & Aubry 2015).

- ***Cosmos bipinnatus*** Cav.: this ornamental is still frequently cultivated and less rare as an escape than indicated, R-RR rather than RR (wn.be).

- ***Bidens cernua*** L.: this species was not explicitly mentioned from Eifel centr., suggesting that it is AR in this district; it is, however, completely lacking there (FT). In Fl., it is AR rather than R (wn.be).

- ***B. connata*** Muhlenb. ex Willd.: in Lorr., this North American weed is only known from very few localities in Belgium and, at least recently, none from the Luxembourg (it was last seen there in 1959; MNHN-Lux) and French part of this district (FLORAINE 2013); it is RR rather than R. In the whole Flora area, it is obviously least rare in Camp. where it is actually AC-AR. Also in Fl., it is slightly less rare than indicated, R rather than RR (wn.be).

- ***B. frondosa*** L.: this alien species has slightly increased, especially in Fl. and Mar., where it has become AC and AR respectively, instead of AR and RR (wn.be).

- ***B. radiata*** Thuill.: this species is still RR throughout most of the Flora area but definitely increasing. In addition to the districts already mentioned in NF6, it was recently also observed in Fl. (most notable from the Bourgoyen-Ossemers nature reserve near Ghent, since 2019). It is by far least rare in Fluv. along river Maas, in Belgium as well as in the Netherlands (wn.be, wn.nl, H24).

- ***Gaillardia ×grandiflora*** Van Houtte: this ornamental is naturalized in coastal dunes and is expanding. It was initially confined to the Koksijde area but now has invaded other parts of the dunes as well: especially west of Ostend it has become AR-R rather than R-RR (wn.be).

- ***Anthemis arvensis*** L. and ***A. cotula*** L.: these two native species are much decreasing as weeds of agricultural fields but are regularly seen as adventives, mostly as grain aliens (wn.be).

- ***Chamaemelum nobile*** (L.) All.: in addition to natural populations in Mar. mér. (Ambleteuse) and Tert. par., this species has recently been observed as a more or less established lawn weed, in Antwerp (Fl.) and Meise (Brab.) (wn.be).

- *Achillea filipendulina* Lam.: this ornamental is increasingly escaping and locally tends to naturalize in urban habitats (wn.be). A short description was added.
- *A. maritima* (L.) Ehrend. et Y.-P. Guo: this southern species was recorded once in Mar. mér., in the 1980s, but has disappeared ever since (Digitale2).
- *A. nobilis* L.: this species does not only occur as an escape from cultivation but also as a genuine, unintentionally introduced alien, e.g. as grain alien in the Ghent port area (wn.be). Its persistence as a naturalized species in Camp. or. and Lorr. sept. was recently confirmed (wn.be, MNHN-Lux). Especially in the southern part of the Grand Duchy of Luxembourg it is apparently widely naturalized.
- *Leucanthemum vulgare* Lam. and *L. ircutianum* DC.: the frequency, distribution and ecology of these two species are poorly known but the widespread, ubiquitous species certainly is the latter. Genuine *L. vulgare* is probably confined to meso-xerophilous grasslands; its presence has been confirmed e.g. in Stevensweert (Fluv.; Zuid-Limburg) in the Netherlands (Haveman 2017) and in Weinsheim in Eifel centr. (FT).
- *Cotula coronopifolia* L.: though still rare, this South African species is further expanding in the Flora area. In addition to the districts from where it was already known, it has also been observed in Fl., and in Brab. it is no longer restricted to the western part of this district (wn.be). It is by far least rare in Mar. (polders, port area north of Antwerp): R, elsewhere RR (wn.be).
- *C. australis* (Spreng.) Hook. f.: this South African species has recently naturalized in the Flora area. It is at present known from Mar., Fl., Camp. and Brab. and chiefly occurs in urban habitats (foot of walls, cracks in concrete, between cobble stones), in Belgium for instance in the cities of Brussels (since 2015; Olivier 2015), Ghent (since 2017), Ieper (since 2020) and Antwerp (since 2021) (all wn.be). In addition, this species is naturalized in several campsites, mostly (but not exclusively) in coastal areas (Verloove *et al.* 2020a).
- *Soliva sessilis* Ruiz et Pav.: this recently naturalized weed is known at present from Mar., Fl. and Camp. where it exclusively occurs in disturbed lawns in campsites (Verloove *et al.* 2020a).
- *Artemisia princeps* Pamp.: this invasive alien species has been known since the 2000s in the Flora area, but has gone unnoticed for a long time (Verloove & Andeweg 2020, Verloove *et al.* 2020b). Many of the huge populations of alleged *A. verlotiorum* (especially those from the port of Antwerp) actually turned out to belong to *A. princeps*. The latter is at present known from Mar. and Fl. but likely to have been overlooked elsewhere.
- *A. absinthium* L.: in NF6, this species was not explicitly mentioned from Eifel centr., suggesting that it is R in that district. In fact, it is completely lacking there (FT).
- *A. verlotiorum* Lamotte: this invasive species is also known from Lorr., for instance in Virecourt along river Moselle (Bonassi *et al.* 2017). The species is poorly known there since it has long been confused with native *A. vulgaris* (FLORAINE 2013).
- *A. campestris* L. (subsp. *campestris*): this very rare native (sub-)species has been known as a naturalized introduction on a slag heap in Beringen, at least since 2007 (wn.be). In NF6, its subsp. *maritima* (DC.) Arcang., with main distribution in southwestern Europe, was said to have a small, disjunct area in the Netherlands, suggesting that it is native there. However, there is not the slightest doubt that this subspecies was formerly introduced on purpose there and thus merely naturalized (Weeda *et al.* 1991). In Belgium, it has been known since 2001 from De Panne and recently seems to expand to other coastal areas (wn.be). In the same district (Mar.), the subspecies is also known from Zeeland (FZ).
- *A. annua* L.: this alien species is indeed chiefly naturalized in Brab. For many decades it was restricted to its central part (Brussels) but in recent years (since 2012) it has established more or less permanent populations in the wide area around Kortrijk as well, much further west (wn.be). In Brab. occ., it is also known on the other side of the border in France, in the Lille metropolitan area (Digitale2). It is apparently not rare in Tert. par. (database CBN Paris) but probably only just outside the Flora area.
- *Petasites pyrenaicus* (L.) G. López: this ornamental is naturalized in several places in Zeeland, in Mar. sept. (H24, FZ, wn.nl).
- *P. albus* (L.) Gaertn.: this species is known from Ard. or. in Germany. Formerly, it also occurred in the adjacent part of Eifel centr., near Roth (FT). Since at least 2008, several naturalized populations have also been known from the Belgian part of Ard., more precisely from the area between Meyerode and Atzerath (Sankt Vith) and from Mont (Houffalize) (wn.be). It is occasionally observed elsewhere as an escape from cultivation.
- *P. japonicus* (Sieb. et Zucc.) Maxim.: this ornamental is naturalized locally in Mar., Fl., Camp. and Brab. where it is R-RR (wn.be, Lecron 2010).
- *Tephroseria palustris* (L.) Fourr.: in Pic., this species has been known historically from the Douai area (Pic. sept.). However, it also occurs elsewhere in this district, for instance in Villers-sur-Authie (Digitale2).
- *T. helenitis* (L.) Nordenstam: this rare species is much declining in the Flora area. In some districts mentioned in NF6, its actual presence needs to be confirmed. For instance, in Mar. mér. (Merlimont) it has not been observed after 1999 (Digitale2). In nearly all districts it is known from very few localities.
- *Senecio sarracenicus* L.: in Fluv., this species not predominantly but exclusively occurs in its Dutch, northern part. Also in the Netherlands, there are scattered localities in Zuid-Limburg (H24, wn.nl), in Brab. or. In Brab. occ., it was recently discovered in a second locality: in addition to the locality in Haaltert (Den Dotter), known since

2013, it is now also known from Wodecq (since 2019). In 2020, the species (1-2 individuals) was also discovered in a meadow in a nature reserve in Boortmeerbeek, on the verge of Fl. and Camp. (wn.be). The residence status of this species in Belgium remains uncertain. In Fluv., it is usually considered to be native (at the northwesternmost limit of its natural area; Weeda *et al.* 1991) but elsewhere in the Flora area it is probably at most naturalized.

- *S. hercynicus* Herborg: this species is also known from several localities in French Lorr. (AFL). According to Vernier (2020), in the Flora area, it occurs in Côte de Moselle and the southern Plateau lorrain. FG also confirms the species' presence in the Ardennes.

- *S. sylvaticus* L.: in NF6, this species was not mentioned from Mar., suggesting that it is RR in this district. Interestingly, in Zeeland (the Netherlands, especially north of the Scheldt estuary; Mar. sept.) it is not rare at all, according to FZ even AC.

- *S. vernalis* Waldst. et Kit.: this species was said to be R in Eifel centr. In fact, it only occurs immediately east of this region, in Osteifel (FT). In NF6, the flowering period of this species was said to be May(-July). However, nearly all flowering specimens on wn.be are from April and May (some even late March).

- *Jacobaea aquatica* (Hill) P. Gaertn., B. Mey. et Scherb. (subsp. *aquatica*): this species is not quite rare in Boul. (Digitale2), a district from where it was not mentioned in NF6, erroneously suggesting that it is absent or RR there. The distribution of its subsp. *erratica* (Bertol.) Verloove remains uncertain. Its presence in northeastern France was recently confirmed (Thévenin 2013). FLORAINE (2013) further reported it from the area northeast of Thionville and Vernier (2020) on the Plateau lorrain, all in Lorr. The database of the Paris CBN includes several records from Montagne de Reims in Tert. par. Its presence in northwestern France still requires confirmation (Digitale2) although it seems to have been confirmed at least from near Calais (Hames-Boucres; Duluc 2019). There are no confirmed records from Belgium (wn.be) but this taxon was mentioned in H24 (without details on its distribution) in the Netherlands. According to wn.nl and Atlas-NL there might indeed be records of it in the Dutch part of the Flora area, especially in Fluv., but these need to be confirmed. From Duluc's morphometric studies it appears that distinguishing features mentioned in contemporary Floras are not always reliable.

- *Doronicum plantagineum* L.: the genuine presence of this species in the Flora area (and its residence status) were questioned in NF6. According to the Paris CBN database it is indeed present in Tert. par. and, moreover, considered to be native there. In Pic., on the contrary, there are only recent records south of river Somme, i.e. beyond the Flora limits (Digitale2).

- *Arctium tomentosum* Mill.: this species formerly also occurred in several localities in Eifel centr. but it is extinct now (FT).

- *A. nemorosum* Lej.: this species was not mentioned from Eifel centr. in NF6, suggesting that it is RR or absent there. In fact, it is not rare at all in Eifel centr.: its distribution and frequency are similar to that of *A. minus* (Hill) Bernh., thus AR rather than RR (FT).

- *Carduus tenuiflorus* Curt.: this species was not mentioned from Lorr. in NF6, suggesting that it is merely adventive there. However, it naturally occurs in calcareous fields in the southern part of the Meuse department, e.g. in Abainville (Bonassi *et al.* 2017). In the entire Flora area, it is by far least rare in Mar., however, this only applies to the French and Belgian portion of this district; it is completely lacking in its Dutch part (H24, FZ).

- *C. nutans* L.: the species' abundance in Lorr. (C according to NF6) is strongly overestimated, certainly in Lorr. sept. (Champluvier & Saintenoy-Simon 2014). Overall, it is at most AC in Lorr. according to Vernier (2020).

- *C. acanthoides* L.: the distribution and frequency of this poorly known species were recently reassessed (Verloove 2014). It is overall RR but locally AC, notably in Mar. (port of Antwerp area). It is also increasingly recorded elsewhere in the Flora area and seems to be in expansion: in addition to the numerous records from the Antwerp area, there are confirmed records from Fl. (Ghent area), various parts of Brab., Fluv. (the Netherlands) and on the verge of Fl. and Camp. (Lier) (wn.be, wn.nl). In northern France, it is present in the bordering area of Champ. and Tert. par. (Reims, Cuis; database CBN Paris).

- *Cirsium eriophorum* (L.) Scop.: in addition to the districts where this species naturally occurs, it is occasionally observed as a casual or more or less established introduction. For example, it was present for some time in Eifel centr., as an introduction, but has disappeared again (FT). In Grootenhout (Lille: Giels Bos; Camp.) a small population persists since at least 2013 (wn.be).

- *C. acaulon* (L.) Scop.: in Lorr. sept., this species has become AR rather than C, due to the disappearance of its habitat (Champluvier & Saintenoy-Simon 2014).

- *C. heterophyllum* (L.) Hill: this naturalized species was thought to have probably disappeared from the Flora area. However, its persistence was recently confirmed in at least two localities, both in Ard.: Amel (2017) and Saint-Hubert (2010) (wn.be). In the latter area, it has been known since the 1960s (Delvosalle 1966). It was formerly also naturalized in an arboretum in Tervuren (Brab.) but its actual presence there was not confirmed lately (APB).

- *C. dissectum* (L.) Hill: this species is dramatically decreasing in the entire Flora area. It has certainly disappeared from some districts, for instance in Fl. and Brab. (wn.be). In the latter district it was formerly known from the valleys of rivers Scheldt and Scarpe but it is long extinct there (Digitale2). A small population was known since c. 2012 from Vorsdonkbos in Betekom but the species was introduced there (wn.be) and most likely has disappeared again lately (comm. A. Jacobs 10.2022).

- *C. tuberosum* (L.) All.: in NF6, this very rare species was still mentioned from Mosan (Marche-en-Famenne, Mariembourg). It is, however, long extinct in the whole of Belgium (Lawalrée & Delvosalle 1969) and the same applies to the Grand Duchy of Luxembourg (MNHN-Lux).
- *Silybum marianum* (L.) Gaertn.: it is very unlikely that this species is native anywhere in the territory covered by the NF (compare with FG, Verloove 2006a). It probably occurs in all districts, not markedly more frequently so in one than in the other.
- *Centaurea calcitrapa* L.: this species is dramatically decreasing throughout the Flora area and certainly has disappeared from some of the districts mentioned in NF6. For instance, in Mar. mér. it has not been recorded for several decades (Digitale2) and its actual presence in Mosan probably also requires confirmation (AFW, wn.be). In Belgium and the Netherlands, it is at present only known from Brab. or. (surroundings of the Sint-Pietersberg where it is still quite frequently observed; wn.be, wn.nl). It should be noted that in this area, part of the records are from the gravel banks of river Maas and thus in Fluv. In the part of northern France that belongs to the Flora area, it has also almost completely disappeared. Recently confirmed populations are known from Pont-sur-Seine in Tert. par. (database CBN Paris). It is absent from the French part of Lorr. (FLORAINE 2013, Vernier 2020) and was last seen in the Luxembourg part in 1949 (MNHN-Lux).
- *C. stoebe* L.: outside Lorr. or., this species does not only occur as a casual adventive or escape, it is locally naturalizing. This applies particularly to the Waasland port area (wn.be) where a weedy, tetraploid race was formerly introduced that is locally spreading, subsp. *australis* (A. Kerner) Greuter.
- *C. nigrescens* Willd.: this species is known from at least two localities in Fl. and Brab. (Aalter, Oudenaarde) where it is locally naturalized (Hoste *et al.* 2015). It may have been overlooked elsewhere. There are historical claims from northeastern France as well (for instance from Vouziers in Lorr. occ.; database CBN Paris), an area where the species ought to be sought.
- *Cyanus segetum* Hill: the distribution given in NF6 is no longer applicable. As an archaeophytic weed of crop fields it has become RR throughout most of the Flora area. However, at present, it is regularly cultivated for ornament in gardens, but also often introduced as a component of wild flower seed mixtures, especially at the edges of crop fields. As a result, despite being rare as a native/archaeophytic species, it has now become more widespread, as an ephemeral or naturalizing neophyte.
- *Carthamus lanatus* L.: this species was recently rediscovered in Thierville-sur-Meuse, near Verdun in Lorr., in a region where the species has been known for two centuries (Courte 2019). This district was not mentioned in NF6. In Tert. par., this species has dramatically decreased: it has almost disappeared from all its localities in the Flora area (database CBN Paris).
- *Lapsana communis* L. subsp. *intermedia* (Bieb.) Hayek: this non-native subspecies is apparently slightly increasing in the Flora area. As mentioned already in NF6, it is naturalized in Lorr. sept. in the Grand Duchy of Luxembourg where its actual presence in several localities has been confirmed lately (MNHN-Lux). In addition, it has been observed recently in at least three localities in northeastern France as well, in Sedan (Ard.) and in Florent-en-Argonne and Vienne-la-Ville (Lorr. occ.) (database CBN Paris).
- *Arnoseris minima* (L.) Schweigg. et Körte: this very rare species has almost completely disappeared from the Flora area. In NF6, it was still mentioned from Fl., Camp., Lorr. and Tert. par. It is likely extinct in Fl. where it was last seen in 2003 in Heikant (the Netherlands; FZ). The same applies to Tert. par. (database CBN Paris). In Camp., there are scattered extant populations, in Belgium as well as the Netherlands (wn.be, wn.nl). However, these refer for the most part to re-introductions (e.g. in Lichtaart and Zonhoven in Belgium; wn.be).
- *Hypochaeris glabra* L.: it was already known that this species was slightly less rare in the southern part of Mar.; the same applies to the northern part of this district, in Zeeland in the Netherlands. According to FZ it is only AR there. It has, on the contrary, completely disappeared from Lorr.: it is absent now from the Belgian and French part and since the 1960s also from the Luxembourg part of this district (FLORAINE 2013, Vernier 2020, wn.be, MNHN-Lux).
- *Leontodon saxatilis* Lam.: in NF6, Eifel centr. was not mentioned, suggesting that this species is only AR-R in this district. However, it is completely lacking there (FT).
- *Picris hieracioides* L.: this species has been expanding rapidly in recent times. In Fl., Camp. and (to a lesser extent) Ard., it is no longer AR-R, rather AC-AR (wn.be).
- *Helminthotheca echioides* (L.) Holub: the same applies to this species. In Fl., where it was considered to be RR in NF, it has become at most R now (wn.be).
- *Tragopogon porrifolius* L. × *pratensis* L. (*T. × mirabilis* Rouy): this hybrid is not only known from the western part of the Flora area. Although rare everywhere, it has been recorded throughout the entire territory (wn.be).
- *T. dubius* Scop.: in NF6, this species was said to be merely adventive or perhaps locally naturalized in Lorr. In fact, it is not quite rare and relatively widely naturalized in this district. According to FLORAINE (2013) it is R, whereas according to Vernier (2020) it is locally (Wœvre, Plateau lorrain) even AC. See also Remacle (2014a: railway yards Stockem, Athus).
- *Podospermum laciniatum* (L.) DC.: this species is probably extinct in the entire Flora area. It has certainly disappeared from Lorr. (FLORAINE 2013, Vernier 2020) and the same applies to Tert. par. and Mosan mér. (database CBN Paris). In the Grand Duchy of Luxembourg it was last seen in 1960 (MNHN-Lux), in Belgium apparently in Merlemont in the 1980s (Lambinon *et al.* 1994).

• *Chondrilla juncea* L.: this thermophilous species is recently expanding in the Flora area. In addition to the southern districts where it has been known since several decades [Mar. mér., Pic., Lorr. (surtout or.), Champ. and Tert. par.] it is in the process of naturalization further north, especially in the port areas of Dunkerque (France) and Antwerp (Belgium), as well as in the coal mining area in Camp. (wn.be, Stien 2018).

• *Taraxacum*<sup>3</sup> section *Erythrosperma* (Lindb. f.) Dahlst.: 1) *T. glauciniforme* Dahlst.: this species does probably not occur along the Dutch coast; claims from Zuid-Limburg, on the other hand, are correct. 2) *T. lacistophylloides* Dahlst.: Piet Oosterveld never observed this species in the Netherlands. At present, its presence in the Flora area is confirmed from the following districts: Mar., Pic., Brab., Mosan, Lorr., Ter. par. and Eifel centr., where it is AC-R (e.g. Matysiak 2012). 3) *T. taeniatum* Hagl. ex Holmgr.: this species is restricted to the coast of the North Sea. 4) *T. clemens* Matysiak: the distribution of this species in the Flora area was specified: it is known from Mar., Pic., Brab. and Ter. par. 5) *T. scanicum* Dahlst.: this species is found in ordinary, urban habitats (such as lawns, sidewalks) and thus probably is AC rather than AR. 6) *T. lacistophyllum* (Dahlst.) Raunk.: this species is much less rare in Mar. (AC) than elsewhere in the Flora area (AR). 7) *T. argutum* Dahlst.: this species has been known from Mar. mér. (Matysiak 2017).

• *T.* section *Palustris* (Lindb. f.) Dahlst.: in northwestern France, this section is mainly distributed in Mar., the most species rich locality being “les Mollières” in Berck-sur-Mer. The least rare taxa (each with around ten occurrences) are *T. palustre* (Lyons) Symons and *T. ciliare* v. Soest. They are often found together. *T. udum* Jord., well known from eastern France, was recently discovered near a slag heap in Wingles in northwestern France (Brab. occ.) (Matysiak 2018).

• *T.* section *Celtica* A.J. Richards: 1) *T. zevenbergenii* v. Soest: this species was found in France, in Avesnois (Mosan occ.; Matysiak 2018). 2) *T. nordstedtii* Dahlst. and *T. hygrophilum* v. Soest are both known from Zeeland in the Netherlands (FZ), the latter also from at least one locality in the Belgian part of Mar. (Peerdevisschersweide in Oostduinkerke; comm. M. Leten and I. Jacobs, 05.2022). 3) the recently described *T. frugale* Hofstra has been documented from Mar., Boul., Brab. and Pic. (it is R everywhere).

• *Sonchus tenerrimus* L.: this thermophilous weed has been known since several years from plant nurseries and garden centers, where it is one of the more characteristic weeds (Hoste *et al.* 2009). Up to the present, however, it was considered to be a mere casual. In 2021, a seemingly established population with a few hundred of individuals was detected on and near a railway yard in the port area of Dunkerque (Mar., France; obs. author). A future local

naturalization in climatologically suitable areas and habitats in the Flora area seems likely.

• *S. palustris* L.: this species is expanding lately. In Fl., along river Scheldt, it is no longer restricted to the area downstream of Dendermonde and it is now also present in the valley of river Leie (wn.be). In Lorr., it is no longer confined to the northwestern part of this district. FLO-RAINE (2013) also indicated its presence around Toul, in Lorr. mér. The species recently also appeared in several localities in the coastal part of Picardy (Mar. mér.) and in the valley of river Somme in Pic. mér. (Digitale2).

• *Lactuca saligna* L.: in NF6, extant populations of this very rare and much declining species were only mentioned from Lorr., especially from the valley of river Moselle. However, even there it has completely disappeared. FLORAINE (2013) still reported it from Neufchâteau (i.e. beyond the Flora limits) and Vernier (2020) only mentioned it from Hautes-Vosges. It is thus extinct in the entire Flora area.

• *L. serriola* L.: this species is much expanding lately and has become more common than indicated in NF6. In Fl., Camp. and Brab. it is actually C-AC rather than AC-R (wn.be).

• *L. virosa* L.: although evidently much rarer, this species also seems to be slightly expanding lately (wn.be).

• *L. muralis* (L.) Gaertn.: this species too is in expansion, especially in urban habitats (a habitat not yet mentioned, moreover, in NF6). In Fl. and Camp., it is AR rather than R-RR (wn.be).

• *Crepis sancta* (L.) Bornm.: the species' actual presence in Lorr. is uncertain: according to FLORAINE (2013) it has completely disappeared, whereas Vernier (2020) still reported it from Meuse.

• *C. foetida* L. subsp. *rhoeadifolia* (Bieb.) Čelak.: this alien subspecies is much expanding lately. It was already known from slag heaps in Camp. or. but at present also abundantly occurs in the Antwerp port area (roadsides, railway infrastructure) (wn.be).

• *C. setosa* Haller f.: in Lorr., this species is RR rather than R. It only occurs in the Belgian part of this district (Lorr. sept.) and is completely lacking in the French and Luxembourg part (FLORAINE 2013, MNHN-Lux).

• *C. praemorsa* (L.) F.W. Walther: this species, which is native to France, Germany and the Grand Duchy of Luxembourg, and already occurred near to the Belgian border, was discovered in a moor in Elsenborn (Ard.) in 2010, for the first time in Belgium (Frankard & Dahmen 2013).

• *C. paludosa* (L.) Moench: contrary to what was stated in NF6, this species is absent from Lorr. or. In this district it is restricted to the northern, Belgian part (wn.be, FLORAINE 2013).

• *Pilosella cymosa* (L.) F.W. Schultz et Schultz-Bip.: this species was mentioned in NF6, as an introduced species, in Eifel centr. In fact, its populations are located just beyond the Flora limits, in Ost-Eifel (FT).

<sup>3</sup> The account for the genus *Taraxacum* was updated by Jean-Patrice Matysiak.

- *P. flagellaris* (Willd.) P.D. Sell et C. West: this poorly known species is also known from Brab. (Saintenoy-Simon 2016), including several localities in the Brussels area (Ronse & Gottschlich 2017).
- *P. peleteriana* (Mérat) F.W. Schultz et Schultz-Bip.: this very rare species is historically known from a very small area in Belgium (Mosan: valleys of Hermeton and Lesse; Ard.: valley of Houille). In the same area, it was recently also discovered in France, in the valley of river Meuse (Chooz and Rancennes) (database CBN Paris).
- *P. piloselloides* (Vill.) Soják is expanding recently, especially in the southern (French) part of the Flora area. In addition to the districts already mentioned in NF6, it is also known from Mar. (Dunkerque area), Pic. (especially in the mining area), Ard. (not only in Oesling as stated in NF6 but also in the French, southern part of this district), Champ. and Tert. par. (Digitale2, database CBN Paris).
- *P. ziziana* (Tausch) F.W. Schultz et Schultz-Bip.: this species also occurs in Eifel centr., in Birresborn (FT). In Lorr. sept. (Grand Duchy of Luxembourg), on the contrary, where it is considered to be possibly native, its actual presence requires confirmation: it was last seen there in 1957 (MNHN-Lux).
- *P. caespitosa* (Dum.) P.D. Sell et C. West: this species was recently discovered in Zeeland (Mar. sept.) (FZ) and it is also known from several localities in Champ. (database CBN Paris). Its genuine presence in Pic. (and the French part of Brab.), on the contrary, requires confirmation: according to Digitale2 its presence in northwestern France is doubtful [confusion with *P. bauhini* (Schult.) Arv.-Touv.?].
- *Hieracium diaphanoides* Lindeb.: this species, more precisely its subsp. *deductiforme* Zahn, is also known from Eifel centr., in Steffeln (FT).
- *H. onosmoides* Fries: the possible presence of this species in Eifel centr. was already mentioned in NF6. FT indeed confirms its historical presence there (in Gerolstein) but it is extinct now. In Ard. or., also in Germany, it is still known from a single locality (FT).
- *H. wiesbaurianum* Uechtr.: in the German part of the Flora area, this (micro-) species only occurs in Ard. or., not in Eifel centr. (FT).
- *H. fuscocinereum* Norrlin and *H. caesium* (Fries) Fries: in NF6, these two (micro-) species were mentioned from Tert. par. It is doubtful that this refers to the Flora area: Digitale2 does not refer to these species and the CBN Paris database only indicates a few records from outside the Flora area, the most recent record for the former moreover dating back to 1969.
- *H. amplexicaule* L.: all known populations in the Flora area (Pic. sept. and Brab. occ. and or.) in fact belong to *H. pulmonarioides* Vill. (Verloove & Tison 2019). According to the CBN Paris database “*H. amplexicaule*” also occurs in a single locality in Lorr. occ. (Autry) but it is unknown whether or not this refers to *H. amplexicaule* s.str.

## 169. Adoxaceae

- *Adoxa moschatellina* L.: this species is hardly any rarer in (many parts of) Fl. than in for instance Brab., i.e. AR rather than R-RR (wn.be).
- *Sambucus ebulus* L.: this species is expanding slightly and is now found in areas where it was very rare or absent before (notably in Mar., Fl., Camp.; wn.be, FZ). At least in some of these localities, it is doubtfully native.
- *S. canadensis* L.: in the Flora area this North American ornamental is not merely known as an escape: at least in the Midden-Limburg Vijvergebied (Camp.) it is naturalized for several decades by now (wn.be). In this district, it is also known from several localities in the Netherlands (wn.nl).
- *S. racemosa* L.: this species too is locally expanding; it has become rather widespread in Camp. and also in the western part of the Flora area it is no longer ‘virtually absent’ as stated in NF6 (wn.be).
- *Viburnum rhytidophyllum* Hemsl.: this Asian ornamental is increasingly escaping and tends to naturalize locally, especially in Mar., Fl. and Camp. (wn.be).
- *V. opulus* L.: in NF6, this species was said to be C-AC throughout the Flora area, except in Mar. where it is R. This is no longer true: in Zeeland it is considered to be even CC (FZ) and it is hardly any rarer in the Belgian part of this district (wn.be). Many populations, however, refer to escaped garden plants.
- *V. lantana* L.: the same applies to this species: in addition to the districts where it occurs naturally, it is increasingly observed as an escape from cultivation, also in areas where it is not native (wn.be).

## 170. Caprifoliaceae

- *Cephalaria gigantea* (Ledeb.) Bobrov: in NF6, this ornamental species was said to have persisted for a few years near Luxembourg (city). This refers to 1952-1955 and thus is no longer relevant (MNHN-Lux).
- *Lonicera acuminata* Wall.: this ornamental liana is increasingly escaping and locally perhaps naturalizing (wn.be).
- *L. periclymenum* L.: according to NF6, this species is C-AC throughout the Flora area, except in Mar., where it is R-RR. However, this only applies to the polders; in coastal dunes this species is not rare at all (wn.be).
- *L. caprifolium* L.: although RR, this ornamental species is widely spread in Lorr. and not confined to the north-eastern part of this district as stated in NF6 (FLORAINE 2013). However, it should be noted that the ‘usual’ species of this complex in eastern France is *L. ×italica* Tausch (*L. caprifolium* × *etrusca* Santi) (comm. J.-M. Tison, 11.2021). The identity of plants that are naturalized in Lorr. thus possibly needs to be reassessed.
- *L. xylosteum* L.: this native species is also much grown for ornament and is readily escaping wherever planted. It easily naturalizes and has become R-RR rather than RR

in areas where it is not native, for instance in parts of Fl. (wn.be).

- *L. nitida* Wils.: this Asian ornamental is much escaping lately and has locally naturalized, especially in Mar., Fl., Camp. and Brab., where it is AC-AR (wn.be).
- the same applies to *L. pileata* Oliv., although this species is less common, rather AR-R (wn.be).
- *L. japonica* Thunb.: this ornamental Asian liana is increasingly escaping and locally naturalizing, especially in Fl., Camp. and Brab., where it is R-RR (wn.be).
- *Dipsacus fullonum* L.: in NF6, this species was said to be R-RR in Fl., Camp. and Ard. In the first two of these districts it is in fact at most AC-AR (wn.be). In Ard., on the contrary, it is indeed much rarer (wn.be, AFW).
- *D. laciniatus* L.: this species has naturalized locally in Fl. and Brab. (R-RR) (wn.be). It also occurs around Metz and Nancy in Lorr. (FLORAINE 2013) but it is unclear whether the species is also naturalized there. The species also occurs in at least two localities in Champ. (Bouy, Veuve) where it is even considered to be native (database CBN Paris).
- *D. pilosus* L.: this species is omnipresent in the valley of river Maas (Fluv.) where it is much less rare than elsewhere in Brab. or. (AR-R, rather than RR) (see also H24). In Eifel centr., it was said to be R-RR in NF6; in reality, it is absent there (FT). In general, this species seems to be slightly expanding lately and it certainly has become less rare in some of the districts, for instance in parts of Brab. (e.g. fairly common in Flemish Ardennes). Moreover, the species also occurs (RR) in districts that were not yet listed in NF6, e.g. in Mar. (FZ, wn.be).
- *D. strigosus* Willd. ex Roem. et Schult.: this species has only been known since 2012 in the Flora area where it was first observed in Brussels. It then underwent a remarkable expansion although it cannot be excluded that the species was previously confused with *D. pilosus* L. (Verloove 2012). At present it is known from Fl. (especially Ghent area), Brab. centr. (Brussels area) and or. (the Netherlands), Fluv. (the Netherlands) and Lorr. (Meurthe-n-Moselle). In these districts it is still RR but naturalized and expanding (wn.be, wn.nl, H24, Pax 2018b).
- *Knautia arvensis* (L.) Coulter s.l.: peculiar plants with pinkish-purplish corollas [tentatively ascribed to *K. purpurea* (Vill.) Borbás in NF6 but perhaps closer to *K. timeroyi* Jord.] were already known from Lorr. mér. (Metz and Nancy areas). Very similar and probably identical plants have recently become known from Latour near Arlon (Lorr. sept.) (wn.be, since 2018). Vernier (2014) considers this taxon to be a war-adventive (“plante obsidionale”) in northeastern France, known moreover from rather numerous localities, including near Verdun.
- *K. dipsacifolia* Kreutzer: this very rare native species is known from at least two localities in Lorr. (a district from where it was not mentioned in NF6), near Nancy and east of Thionville (FLORAINE 2013, Vernier 2020).

SI-Flore further indicates its presence south of Luneville, just south of the Flora area.

- *Scabiosa atropurpurea* L.: this species was already mentioned in NF6, as an escape from cultivation. It is more often observed in recent years (wn.be), probably mostly from wild flower seed mixtures (subsp. *atropurpurea*). In Mar. (port of Dunkerque) and Camp. (slag heap Heusden-Zolder), however, apparently naturalized populations have been known (in Dunkerque at least since 2010) of subsp. *maritima* (L.) Arcang., an adventive subspecies with pale corollas (Stien 2018). Its genuine naturalization in climatologically suitable parts of the Flora area is quite possible.
- *S. columbaria* L. subsp. *pratensis* (Jord.) Br.-Bl.: this subspecies, of debatable taxonomic value, is slightly less rare in Lorr. than indicated in NF6, AR-RR, rather than R-RR (FLORAINE 2013).
- *Centranthus ruber* (L.) DC.: this ornamental is naturalized since quite a long time in Mosan. In the entire Flora area, it is much expanding lately and locally naturalizing, especially in urban habitats (wn.be).
- *C. angustifolius* (Mill.) DC.: in addition to the few localities in Lorr. that were already cited in NF6, this species is also naturalized in Côtes de Moselle between Metz and Nancy (FLORAINE 2013, Vernier 2020).
- *C. calcitrapae* (L.) Dufur.: this thermophilous species has been known from the Lille metropolitan area in France (Brab. occ.) since 2016 and is now abundantly naturalized in some railway yards (pers. obs. author). It was subsequently also observed in the Ghent area in Fl. and is expected to further expand via railway infrastructure (Verloove *et al.* 2019).
- *Valeriana officinalis* L. subsp. *repens* (Host) O. Bolòs et Vigo: this taxon is C-AC throughout the Flora area, except in Mar. where it was said to be R-RR in NF6. In fact, this only applies to the coastal dunes area; in the polders it is a bit less rare (wn.be). It is also considered common in Zeeland, also outside the coastal dunes (FZ).
- *Valerianella carinata* Loisel.: this species seems to be expanding slightly (or has gone unnoticed before?), especially in some districts (Mar., Fl.; wn.be). Its current distribution remains to be determined.
- *V. locusta* (L.) Laterr.: this species was said to be R in Camp. in NF6. It is, however, hardly any rarer than in e.g. Fl. or Brab., at most AR (wn.be).
- *V. dentata* (L.) Pollich: as a weed of agricultural fields, this species is much declining in much of the Flora area. For instance, in Brab., where it was said to be merely AR, it has apparently not been recorded in the past decades, at least in Belgium and France (wn.be, Digitale2; it is still present in Zuid-Limburg in the Netherlands, see H24, wn.nl). Also in many of the other districts it may be (much) less common than indicated. In areas where it is not native (or archaeophytic), it is occasionally observed as a casual alien (mostly in port areas, as grain alien).

- *V. rimosa* Bast.: more or less the same applies to this species that is even less common. The genuine present-day distribution and frequency of these two species need to be reassessed.

- *V. eriocarpa* Desv.: this very rare species, and considered to be alien in the Flora area, is known from a few localities in the Tert. par. / Champ. bordering area (surroundings of Reims) where it is accepted as a native species (database CBN Paris).

### 171. Araliaceae

- *Hedera hibernica* (Kirchn.) Bean probably has been overlooked for quite some time in the Flora area and its actual distribution and frequency are still imperfectly understood. It is probably AC-AR in Fl., Camp. and Brab. (wn.be) and RR elsewhere (e.g. in Ard.; Bizot 2012a – also e.g. in Mar., Pic.; Digitale2). It may be much more widespread and common (Boeraeve *et al.* 2021). It is often more vigorous than *H. helix* and, for this reason, much more often cultivated than the latter these days. It is increasingly observed as an escape but its nativity in the territory of the Flora, especially in the extreme southwestern part, cannot be ruled out, although this is rather unlikely.

- *Hydrocotyle vulgaris* L.: in Lorr., this species does not predominantly but exclusively occur in the northern part of this district (wn.be, FLORAINE 2013).

- *H. ranunculoides* L. f.: this invasive aquatic weed has much expanded lately, especially in Fl., Camp. and Brab. where it is no longer R but AC-AR (although newly detected populations are usually readily eradicated nowadays). It is now also known from Ard. (wn.be, AFW).

### 172. Apiaceae

- *Trinia glauca* (L.) Dum.: in NF6, this species was mentioned from Champ. and Tert. par. However, none of these populations are located within the limits of the Flora area. The nearest locality apparently was in Saint-Fiacre (department Seine-et-Marne) but the species was last seen there in 1912 (database CBN Paris).

- *Eryngium giganteum* Bieb.: this species was already mentioned as an escaped ornamental in NF6. In addition, it is also present in some localities in French Lorr. (surroundings of Verdun and Nancy) where it is considered to be a war alien (“plante obsidionale”; Parent 2004, FLORAINE 2013, Vernier 2014).

- *Astrantia major* L.: this ornamental has been recorded in several additional districts: Mar., Fl. and Brab. (wn.be). In Ard., from where it was already known, it was recently reported from riparian woodland (Champluvier & Germeau 2013), while the species normally occurs in disturbed or other ordinary habitats.

- *Chaerophyllum byzantinum* Boiss.: this West Asian species was previously recorded from Mosan but probably as a mere ephemeral. Since 2016 a small, apparently naturalized population has been known from Genk in Camp. or. (wn.be).

- *C. temulum* L.: in Fl., this species is slightly less rare than indicated in NF6, AC rather than AR-R (wn.be). Only in Ard., it is indeed much less common than in the other districts.

- *C. bulbosum* L.: in NF6, this species was said to be AC in Lorr. which is a gross overestimation. It is AR or even R there (FLORAINE 2013). This species is occasionally observed as an (ephemeral) introduction, recently for instance in Fl. (Moerbeke, 1997) and Brab. (Moën, 2015) (wn.be).

- *C. aureum* L.: this species has recently naturalized in Montagne de Reims (Tert. par.) where it is known from three localities (Thévenin *et al.* 2014). It is occasionally observed as an (ephemeral?) introduction elsewhere in the Flora area, for instance in Camp. (Olmen, 2011-13; wn.be).

- *Anthriscus sylvestris* (L.) Hoffmann: this species was said to be AR in Fl. and Camp. (except in river valleys). This is no longer the case: it is by no means less common in Fl. and Camp., nor less frequently outside river valleys (wn.be).

- *A. caucalis* Bieb.: this species is in recent expansion, especially in Fl. and Brab. where it has become AR rather than R. In addition, it is slightly less rare in Camp. than in the rest of the Flora area (R instead of RR) (wn.be, Digitale2).

- *Torilis nodosa* (L.) Gaertn.: this species seems to be in recent expansion, especially in Fl. and Brab., two districts where it was thought to be RR, if not absent, until recently. It is predominantly seen in lawns and is presumably spread by lawn mowers. Even in Mar., where the species occurs naturally, it has become AC-AR, rather than AR-R (wn.be, FZ). Also elsewhere in the Flora area, it is on the rise but its status (ephemeral vs. naturalized) needs to be assessed (see also Bonassi *et al.* 2017 for a recent record in a lawn in Nancy in Lorr.). In Pic., it has not disappeared: the species is still present in the extreme south of this district, in the valley of river Somme in the surroundings of Amiens (Digitale2).

- *T. japonica* (Houtt.) DC.: in Camp., this species is AC rather than AR, especially when compared with Haute Ard., where it is indeed much rarer (wn.be).

- *T. arvensis* (Huds.) Link: there are dozens of reliable recent records from the Viroin (Mosan) (wn.be), where it is R rather than RR. The species may have been overlooked there before.

- *Orlaya grandiflora* (L.) Hoffmann: this species is dramatically declining in the Flora area. It probably has completely disappeared in Tert. par. and possibly also in Champ. (database CBN Paris). In Mosan, there is at least one extant population, in Comblain-au-Pont (wn.be).

- *Caucalis platycarpus* L.: the same applies to this species. It had already disappeared in Mosan (Othée) in 1980 (Fabri 1993) and also seems to be extinct now in Champ. and Tert. par. (database CBN Paris). There probably are a

few populations left in French Lorr. (FLORAINE 2013). In the Luxembourg part of this district it was last seen in the 1950s (MNHN-Lux).

- ***Turgenia latifolia*** (L.) Hoffmann: the same applies to this species. It is long-extinct in Belgium and the Grand Duchy of Luxembourg where it was last seen as a weed of agricultural fields in 1933 and 1959 respectively (MNHN-Lux; Colling 2005). It probably has also disappeared from most (if not all) of Champ. (database CBN Paris).

- ***Coriandrum sativum*** L.: this ephemeral alien is slightly less rare than was indicated in NF6, R-RR rather than RR (wn.be).

- ***Conium maculatum*** L.: this species is recently in strong expansion locally in the central reservation of motorways, especially in parts of Flanders. In Fl., it is therefore no longer R-RR, rather AR-R (wn.be).

- ***Bupleurum tenuissimum*** L.: this species, presumed extinct since 1928 in Belgium, was rediscovered on a dike near the Zwin nature reserve in Knokke in 2011. Its persistence there was regularly confirmed ever since (wn.be). It was also discovered, just outside the Flora area, on the south side of the Somme river, at Cap Hornu, in 2015 (Duhamel & Delaporte 2017).

- ***Helosciadium inundatum*** (L.) Koch: this species, thought to be extinct in Fl., has been known for 10-15 years from the Gulke Putten nature reserve in Wingene (numerous reliable records on wn.be). It is also known from very few localities in Lorr. occ. (Autry) and Tert. par. (Brie) (database CBN Paris), two districts not mentioned in NF6.

- ***H. nodiflorum*** (L.) Koch: in Lorr., this species is not C-AC but rather AR (FLORAINE 2013).

- ***Petroselinum crispum*** (Mill.) Fuss: in NF6, this species was said to be escaping or naturalizing in the Flora area. It is, however, strictly ephemeral but perhaps slightly less rare than indicated, R-RR rather than RR (e.g. wn.be).

- ***Sison amomum*** L.: outside its natural distribution area, this species is occasionally observed as an introduction, for instance in Kanne (Brab. or.) in 2016 (wn.be).

- ***Cicuta virosa*** L.: this species never occurred in Eifel centr., only further east, in Osteifel (FT). In the whole of northwestern France (at least the part covered by the NF), it has almost completely disappeared in the past decades: there is a single extant locality in Audomarais (Clairmarais) (Brab. occ.) but the species is probably extinct in Pic., even in the valley of river Somme where it was not rare until the 1990s (Digitale2). In recent years, this species is occasionally introduced: there are, for instance, a few localities in West-Flanders where the species is found in recently constructed retention basins (wn.be).

- ***Ammi majus*** L.: this xenophyte is much expanding recently and has definitively naturalized in parts of the Flora area (Ronse 2019). It is probably least rare now in Fl., Pic., Brab., Fluv., Champ. and Tert. par. (wn.be, Digitale2, database CBN Paris). In the latter two districts, it may be

considered a native species (natural range expansion). In Fluv., it has naturalized, sometimes in abundance, on the gravel banks of river Maas.

- ***Ptychotis saxifraga*** (L.) Loret et Barr.: in NF6, this species was only mentioned for the entire Flora area, as naturalized, in Euville in Lorr. mér., from where it may have recently disappeared according to Vernier (2020). There are a few other localities in the extreme southern part of the Flora area, not only in Lorr. mér. (Éclaron-Braucourt-Sainte-Livière) but also in the bordering area of Champ. and Tert. par. (Villers-Marmery, Soudé, Vindey, etc.) (database CBN Paris). These may result from a recent range expansion and could thus, at least in part, be considered as wild occurrences. A previous claim from Belgium, from a canal bank in Camp. (Heylen & Van Reet 2001), was erroneous and referable to *Carum carvi*. This atypical habitat was therefore deleted.

- ***Falcaria vulgaris*** Bernh.: in Eifel centr., there is only a single locality left for this species (FT), it is thus RR not R. In Mar., this species occurs in Zandvoorde since at least 1988 (wn.be) and it was also known in Zeeuws-Vlaanderen (the Netherlands) until a few years ago, from where it apparently disappeared recently (FZ). It was also found in Haulchin near Mons in Brab. occ. in 2015 (wn.be). In the latter district, it may be a mere temporarily persisting introduction but at least in Zandvoorde it seems to be naturalized.

- ***Trocodaris verticillatum*** (L.) Raf.: this very rare native species is much declining recently. In Belgium, it is only known from three extant localities in Camp. and two in Ard. occ. (AFW, wn.be). In the Flora area, it is by far least rare in Plateau de Rocroi (Ard. occ., France) (database CBN Paris).

- ***Bunium bulbocastanum*** L.: the distribution of this species was specified: in Mar., it is only present in France (Digitale2) and Zeeland (FZ). In Mosan, it is more or less equally dispersed throughout the district (not predominantly in its southern part) and in Brab. or. it is only known from the Netherlands (Zuid-Limburg) (wn.be, wn.nl, H24).

- ***Conopodium majus*** (Gouan) Loret: in Lorr., this species is not restricted to the Luxembourg part of this district: there are at least two localities further south, in France (FLORAINE 2013).

- ***Sium latifolium*** L.: in Brab., this species does not occur more often in the western part of this district, it is more or less equally dispersed throughout the district (wn.be). In NF6, for Lorr., it was said to be least rare in the valley of river Meuse. Even there, it has possibly mostly disappeared: FLORAINE does not indicate a single record in the whole of French Lorr. and SI-Flore only mentions one more or less recent record (2003) from Verdun. In the Belgian part of this district there are still some extant localities (wn.be).

- ***Foeniculum vulgare*** Mill.: this southern species is expanding and locally naturalizing. In Fl. and Brab., where

it was considered to be RR, it has become at most AR (wn.be). In Zeeland, it is considered to be even AC (FZ).

- *Crithmum maritimum* L.: this coastal species is clearly expanding lately and now occurs along the entire Belgian coast (numerous records; wn.be); it is no longer RR there, rather AR-R. Also in the southern and northern part of Mar. it has become less rare (AC-AR, rather than AR) (Digitale2, wn.nl). In Zeeland, it is now considered to be AC (FZ).

- *Seseli montanum* L.: in AFW and wn.be, there are a few claims for this species from the Belgian part of Mosan but these require confirmation (most likely erroneous identifications).

- *S. annuum* L.: in NF6, this species was said to be least rare in Tert. par. where it was considered to be merely R. However, it has probably completely disappeared from this district (at least from the part covered by NF), the nearest extant localities being in Val d'Oise and Haute Marne (database CBN Paris, Digitale2), i.e. beyond the Flora limits. A claim from the Belgian part of Mosan (AFW) requires confirmation but is most likely erroneous.

- *S. libanotis* (L.) Koch: there are several recent records at various places on the left bank of the Scheldt river north of Antwerp (since 2011) (Mar.) and one near Sint-Niklaas (2019) (Fl.) (wn.be) where it doubtlessly is adventive. A previous record in Fluv. mér. (river Maas, 2008) may also be classified as introduced rather than natural.

- *Aethusa cynapium* L.: in NF6, var. *cynapium* was said to be AR in Fl. and Camp. This, however, is not confirmed by data from wn.be, rather on the contrary. In Ard., it is indeed much less common than elsewhere in the Flora area. The distribution of var. *gigantea* Lej. is still imperfectly known. It is apparently least rare in Mosan and Lorr. and in Tert. par. it is known from e.g. Montagne de Reims (Thévenin *et al.* 2014). Claims from Fl. (wn.be) require confirmation.

- *Oenanthe aquatica* (L.) Poiret: in Mar., this species is not rarer than in Fl. and Camp., AC rather than AR (heat map wn.be; for comparison: in FZ it is also considered to be AC). In Brab. (entire district, not more so in its western part) it is rather AR than R (wn.be). Contrary to NF6, it is also known from Ard., both in the Belgian and French part of the district, e.g. from Sourbrodt and Renwez (wn.be, database CBN Paris).

- *O. fluviatilis* (Bab.) Colem.: this species is much declining recently. In the whole of northwestern France (Pic., Brab. occ.) it has almost completely disappeared in the past two decades (Digitale2). In northcentral and northeastern France, it was mentioned from Champ. (Marne) and Tert. par. in NF6. However, records from the latter district (all from near Meaux in Seine-et-Marne) are located well beyond the Flora limits. The species is still present in the valley of river Marne but only near Doulaincourt-Saucourt and thus in Lorr., not in Champ. (database CBN Paris). Moreover, these records are on (or rather beyond) the extreme southern border of the Flora area.

- *O. fistulosa* L.: in NF6, this species was said to be AC-AR in Fluv. This only applies to the Dutch part of this district, it is virtually absent from the Belgian part of it (wn.be, wn.nl).

- *O. silaifolia* Bieb.: this species was recently (re-?) discovered in the valleys of river Leie (Deurle; Fl.) and Scheldt (south of Oudenaarde; Brab.) (wn.be).

- *O. pimpinelloides* L.: this species has disappeared from Fluv. where it was last seen in Vianen about 20 years ago (H24, wn.nl, Westhoff & van der Meijden 2000). The same goes for Fl. (Gulke Putten nature reserve in Wingene, where it was last seen about 25 years ago). It was recently discovered in two new districts, both in France: in Mar. (Grande-Synthe) and two localities in Tert. par. (Brasles, Viffort) (Messean 2018, Digitale2). Its status in these newly detected localities remains unclear.

- *O. peucedanifolia* Pollich: this rare species was historically also known from Eifel centr. (FT). There is at least one extant population in the valley of river Marne, in Vésigneul-sur-Marne, in Champ., a district not mentioned in NF6. In this area, this species was historically known from several localities (database CBN Paris).

- *O. crocata* L.: this species is in slow but definite expansion. In Mar., it is no longer restricted to the southern and northern part of this district: it was found on the Belgian coast, in ruderalized dunes in Raversijde, in 2021 (comm. G. Rappé, 06.2021). It was recently also recorded for the first time in Camp., along Groot Schijn in Oelegem (wn.be). Finally, the first record in Schouwen-Duiveland dates back to 1986, not 1987 (FZ).

- *Angelica sylvestris* L.: in NF6, this species was said to be C-AC in most of the Flora area, except in Mar. where it was considered to be AR. However, also in Mar. it is AC rather than AR; there is hardly any difference in density between Mar. and e.g. Fl., Brab. or Camp. (wn.be; see also FZ).

- *A. archangelica* L.: this species is at least as common in Mar., Fl. and Brab. as in Mosan (AR) (wn.be; also FZ). In Mosan, it is more or less equally dispersed now upstream and downstream of Namur. In Fluv., it is indeed well-represented but only in the Dutch part of this district (wn.nl).

- *Selinum carvifolia* (L.) L.: this species has been found in rather numerous localities in Camp in recent years (wn.be); in this district it is R rather than RR.

- *Silaum silaus* (L.) Schinz et Thell.: there is an increasing number of reliable records in natural habitats of this species in Fl. (wn.be), probably due to a better prospection in recent years (comm. W. Van Landuyt, 12.2022); in this district it is R-RR rather than RR.

- *Thysselinum palustre* (L.) Hoffmann: only in Camp., this species is much less rare than in the other districts (AC-AR) (wn.be). In Fluv., even in its Dutch part, it is much rarer than indicated in NF6, R rather than AC-AR (wn.be, wn.nl; see also H24).

- *Dichoropetalum carvifolia* (Vill.) Pimenov et Kljuykov: this species is apparently not rare at all in Fluv., yet

a district from where it was not mentioned in NF6. Most records are from river Waal (beyond the Flora limits) but there are several occurrences along river Maas as well (e.g. in the surroundings of 's Hertogenbosch and near Demen; wn.nl). According to H24 it is even AC in this district. It is exceptionally observed further south in Fluv., including in Belgium (Hochter Bampd, since 2020; wn.be). Similarly, this species is known from several localities in Ard. (France) and Tert. par. (database CBN Paris), two districts not mentioned in NF6. In addition, it is sometimes recorded as an introduction, for instance in Zeeland in the Netherlands (FZ).

- ***Oreoselinum nigrum*** Delarbre: the species' presence in Tert. par. was questioned in NF6. Apparently, it is present in that district (database CBN Paris) but only beyond the Flora limits.

- ***Cervaria rivini*** Gaertn.: this southern species was observed in Givet in 2006 (Mosan) (database CBN Paris). Its status there is unknown.

- ***Pastinaca sativa*** L. subsp. *sativa*: this native subspecies is slightly expanding locally. In Fl., for instance, it is no longer AR-R, rather AC-AR (wn.be).

- ***P. sativa*** subsp. *urens* (Req. ex Godr.) Čelak.: this alien subspecies is much expanding lately, especially along motorways and around the major cities. In parts of Fl. and Camp. (especially its eastern part), and in the wide areas around Antwerp and Ghent, it has become at most AR instead of RR (wn.be).

- ***Heracleum mantegazzianum*** Somm. et Lev.: this invasive ornamental has further expanded lately. It has become AC-AR throughout most of the Flora area. Especially in urban areas it is no longer rare (although often eradicated). According to H24 it has become common in the 'urban district'.

- ***Tordylium maximum*** L.: contrary to NF6, this species has not disappeared from Pic. mér. It is still present in the valley of river Somme, at least near Abbeville and Amiens (Digitale2).

- ***Laserpitium latifolium*** L.: in Lorr., this species is no longer restricted to the Grand Duchy of Luxembourg and the area south of Verdun (SI-Flore, Saint-Val 2015, AFL, etc.). In 2018, a small population of what is supposed to be this species (only non-flowering individuals) was discovered in Rocherath in Haute Ard. (wn.be). Even if its identity were confirmed, it is rather unlikely that this species is indigenous in this locality, where it grows along with *Campanula glomerata* L. (comm. I. Jacobs, 11.2021).

- ***Laser trilobum*** (L.) Borkh.: this species is, in the entire Flora area, only known from Côtes de Moselle between Metz and Nancy. Vernier & Robaine (2021) provided an overview of the species' local distribution and ecology. It may be an archaeophyte rather than a genuinely native species.

- ***Smyrniium perfoliatum*** L. and *S. olusatrum* L.: these two alien species are increasingly observed and locally

tend to naturalize. The former is least rare and has been known from the Flora area since the 19<sup>th</sup> century. Its naturalization, however, only started around 2009. It is now more or less established, especially in Fl., Camp. and Brab. (wn.be). The latter species is a more recent introduction, first observed in Belgium in 2016, and likely to naturalize in, especially, Mar. where it recently was detected in a short period of time in the French, Belgian and Dutch part of this district (wn.be, Digitale2, Toussaint 2016b; see also FZ). It has also been recorded in inland districts (Fl., Brab.) but its degree of naturalization is unclear there.

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## The seventh edition of the *Nouvelle Flore de la Belgique*: nomenclatural and taxonomic remarks

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**Illustrations:** map (Fig. 1) by Wesley Tack and Sven Bellanger.

**ABSTRACT.** – Following the publication of the seventh edition of the *Nouvelle Flore*, in 2023, this contribution provides an overview of nomenclatural and taxonomic changes compared to the previous edition of the Flora, which was published in 2012.

**RÉSUMÉ.** – La septième édition de la *Nouvelle Flore de la Belgique* : mises au point nomenclaturales et taxonomiques. A l'occasion de la publication de la septième édition de la *Nouvelle Flore*, en 2023, cette contribution donne un aperçu des mises au point nomenclaturales et taxonomiques vis-à-vis de l'édition précédente de la Flore, qui était publiée en 2012.

**SAMENVATTING.** – De zevende editie van de *Nouvelle Flore de la Belgique*: nomenclatorische en taxonomische commentaren. Naar aanleiding van de publicatie van de zevende editie van de *Nouvelle Flore*, in 2023, biedt deze bijdrage een overzicht van nomenclatorische en taxonomische wijzingen ten opzichte van de vorige editie van de Flora, die dateert van 2012.

### Introduction

To continue a long tradition, nomenclatural and taxonomic modifications introduced in the latest edition of the *Nouvelle Flore* (Verloove & Van Rossum 2023a) are presented in this paper. Even more so than in previous editions, this paper should be regarded as an indispensable companion or supplement to the Flora. Due to a lack of space in the *Nouvelle Flore*, this paper contains a wealth of information that could not be included in the Flora itself.<sup>1</sup>

The seventh edition of the *Nouvelle Flore* is the most radically modified edition since the origin of this Flora. Not only the format, concept and lay-out have considerably changed. The classification of families now is in line with molecular phylogenetic studies (for an overview of changed familial circumscriptions, see Van Rossum 2019). Also at lower taxonomic levels (genera, species complexes, etc.), modern insights were usually followed and, as a result, many generic concepts have changed.

All author citations were checked and many of them were corrected (as a rule, however, no reference is made to these corrections in this paper).

Finally, the publication of the Shenzhen Code in 2018 (International Code of Nomenclature for algae, fungi, and plants; available online at: <http://www.iapt-taxon.org/icbn/main.htm>) resolved several nomenclatural matters.

<sup>1</sup> This also applies to an identical edition in Dutch of the Flora (Verloove & Van Rossum 2023b) published shortly before the French edition.

### Abbreviations

The following abbreviations referring to phytogeographical districts (Fig. 1) are frequently used throughout the paper:

- Ard. (district ardennais): Ardenne district.
- Boul. (district boulonnais): Boulogne district.
- Brab. (district brabançon): Brabant district.
- Camp. (district campinien): Campine district.
- Champ. (district champenois): Champagne district.
- Eifel centr. (district de l'Eifel central): central Eifel district.
- Fl. (district flandrien): Flemish district.
- Fluv. (sous-district fluviale): fluviale district.
- Lorr. (district lorrain): Lorraine district.
- Mar. (district maritime): maritime district.
- Mosan (district mosan): Maas/Meuse district.
- Pic. (district picard): Picard district.
- Tert. Par. (district du nord-est de l'Île-de-France): Paris Basin district.

Further frequently used abbreviations include:

- FG: *Flora Gallica* (Tison & de Foucault 2014).
- FT: *Flora der Region Trier* (Hand *et al.* 2016).
- FZ: *Flora Zeelandica* (Meininger 2018).
- H24: the 24<sup>th</sup> edition of *Heukels' Flora van Nederland* (Duistermaat 2020).
- AFL: *Atlas Flore Lorraine* (FLORAINE 2013; also checked online, but no longer available since mid-2021).
- NF6: the sixth edition of the *Nouvelle Flore* (Lambinon & Verloove 2012).



**Figure 1.** Delimitation of the territory covered by the Nouvelle Flore/Flora van België and the boundaries of the phytogeographical districts. Aa: Aachen; An: Antwerp; Br: Breda; Bo: Boulogne-sur-Mer; Bx: Brussels; Ca: Calais; Ch: Charleroi; Du: Dunkerque; Ei: Eindhoven; Ge: Ghent; Ha: Hasselt; Ko: Kortrijk; Li: Liège; Lu: Luxembourg; Ma: Maastricht; Me: Metz; Na: Nancy; Pé: Péronne; Re: Reims; So: Soissons; SQ: Saint-Quentin; Tr: Troyes; Vo: Vouziers.

- NF7: the seventh edition of the *Nouvelle Flore* (Verloove & Van Rossum 2023a).
- POWO: Plants of the World Online (<https://powo.science.kew.org/>).
- SI-Flore: database that merges data from the several different Conservatoire botanique national, thus presenting distribution maps for the entire French territory (temporarily unavailable online from mid-2021 onwards).
- wn.be: waarnemingen.be (<https://waarnemingen.be/>).

## Results

**General remark.** – The following taxa are newly introduced in the Flora; they are now keyed-out and a full account is

presented (in alphabetical order; taxa from the completely revised genera *Rosa*, *Rubus* and *Salix* excepted):

- Acer rufinerve* Siebold et Zucc.
- Alchemilla mollis* (Buser) Rothm.
- Anisantha madritensis* (L.) Nevski
- Artemisia princeps* Pamp.
- Avena barbata* Pott ex Link
- Bolboschoenus planiculmis* (F. Schmidt) T. Egorova
- Bolboschoenus yagara* (Ohwi) Yung C. Yang et M. Zhan
- Brachypodium phoenicoides* (L.) Roem. et Schult.
- Bromus commutatus* Schrad. subsp. *decipiens* (Bomble et H. Scholz) H. Scholz

*Callitriche truncata* Guss. subsp. *truncata*  
*Campanula poscharskyana* Degen  
*Cardamine occulta* Hornem.  
*Carex pendula* Huds. subsp. *agastachys* (L. f.) Ljungstrand  
*Centaurea nigrescens* Willd.  
*Centranthus calcitrapae* (L.) Dufur.  
*Cotoneaster dammeri* C.K. Schneider  
*Cotoneaster dielsianus* Pritzell  
*Cotoneaster divaricatus* Rehd. et E. Wilson  
*Cotoneaster fangianus* T.T. Yu  
*Cotoneaster franchetii* Bois  
*Cotoneaster hjelmqvistii* Flinck et B. Hylmö  
*Cotoneaster rehderi* Pojark.  
*Cotoneaster salicifolius* Franch.  
*Cotoneaster simonsii* Baker  
*Cotoneaster sternianus* (Turrill) Boom  
*Cotoneaster* × *suecicus* G. Klotz  
*Cotoneaster villosulus* (Rehd. et E. Wilson) Flinck et B. Hylmö  
*Cotoneaster* × *watereri* Exell  
*Cotula australis* (Spreng.) Hook. f.  
*Cytisus lotoides* Pourr.  
*Dipsacus laciniatus* L.  
*Dipsacus strigosus* Willd. ex Roem. et Schult.  
*Echinochloa muricata* (Beauv.) Fernald var. *wiegandii* (Fassett) Mohlenbr.  
*Elaeagnus angustifolia* L.  
*Elaeagnus umbellata* Thunb.  
*Eleocharis engelmannii* Steud.  
*Epilobium brachycarpum* C. Presl  
*Festuca trichophylla* (Ducros ex Gaudin) K. Richt.  
*Galeopsis pubescens* Besser  
*Galium murale* (L.) All.  
*Geum macrophyllum* Willd.  
*Himantoglossum robertianum* (Loisel.) P. Delforge  
*Hordeum murinum* L. subsp. *leporinum* (Link) Arcang.  
*Ilex crenata* Thunb.  
*Inula racemosa* Hook. f.  
*Juncus ensifolius* Wikstr.  
*Juncus tenuis* Willd. subsp. *dichotomus* (Elliott) Verloove et Lambinon  
*Linaria simplex* (Willd.) DC.  
*Lonicera japonica* Thunb.  
*Lonicera nitida* Wils.  
*Lonicera pileata* Oliv.  
*Oenothera oehlkersii* Kappus ex Rostański  
*Oenothera rubricaulis* Kleb.  
*Oxalis debilis* Kunth  
*Oxalis dillenii* Jacq.  
*Panicum barbipulvinatum* Nash  
*Paulownia tomentosa* (Thunb.) Steud.  
*Petasites japonicus* (Sieb. et Zucc.) Maxim.  
*Poa infirma* Kunth  
*Polypogon maritimus* Willd.

*Prunus laurocerasus* L.  
*Raphanus raphanistrum* L. subsp. *landra* (Moretti ex DC.) Bonnier et Layens  
*Rostraria cristata* (L.) Tzvelev  
*Scirpus cyperinus* (L.) Kunth  
*Sedum sarmentosum* Bunge  
*Silene coronaria* (L.) Clairv.  
*Sisymbrium irio* L.  
*Smyrniium perfoliatum* L.  
*Solanum sarachoides* Sendtn.  
*Soliva sessilis* Ruiz et Pav.  
*Sporobolus indicus* (L.) R. Brown  
*Taraxacum argutum* Dahlst.  
*Typha laxmannii* Lepechin  
*Ulex minor* Roth  
*Verbena bonariensis* L.  
*Veronica cymbalaria* Bodard  
*Viola tricolor* L. subsp. *saxatilis* (F.W. Schmidt) Arcang.  
*Wolffia columbiana* H. Karst.

Many additional species could have been added, especially ephemeral or only locally naturalized aliens. Detailed information about numerous species, including identification keys, is available on <https://alienplantsbelgium.myspecies.info/>.

Remark on the presentation of the comments below. – The species are discussed in the order as they are treated in the Flora; the numbering of the families follows the Flora. When several notes on a genus are given (usually including comments on more than one species) the first occurrence of the genus name in the text is in **bold**.

#### 1. Lycopodiaceae

- The genera ***Diphasiastrum*** Holub and *Lycopodium* L. were merged, since molecular data have demonstrated that the former is best accepted as a section of the latter (Wikström & Kenrick 2001; see also FG). Alternatively, *Lycopodium* could have been further segregated, also recognizing *Spinulum* A. Haines to accommodate *L. annotinum* L. (as was done in H24, based on Pteridophyte Phylogeny Group 2016).

#### 4. Equisetaceae

- An additional hybrid ***Equisetum*** L. has been reported from the Flora area, *E. ramosissimum* Desf. × *variegatum* Schleich. ex F. Weber et D. Mohr [*E. ×meridionale* (Milde) Chiov.]. It was discovered in 2019, along with both parents and *E. ×moorei* Newman (*E. hyemale* L. × *ramosissimum*), in the Braakman in Zeeland, the Netherlands (de Winter & De Somer 2021).

A very useful key for the identification of hybrids from subgenus *Hippochaete* (Milde) Baker was published by Jepson *et al.* (2013).

- *E. hyemale* L. subsp. *affine* (Engelm.) Calder et R.L. Taylor: non-native plants are ascribed to this taxon from North America (that probably also includes some plants from eastern Asia). According to some authors this is best

accepted as a distinct species, *E. praealtum* Raf. (Christenhusz *et al.* 2019). This name was added, as a synonym.

### 7. Hymenophyllaceae

- *Vandenboschia speciosa* (Willd.) Kunkel: this species was treated as *Hymenophyllum speciosum* Willd. in NF6. Molecular studies have demonstrated that it belongs in a separate genus, *Vandenboschia* Copel. (Ebihara *et al.* 2006).

### 10. Pteridaceae

- An additional alien species of *Pteris* L., *P. vittata* L., was recently observed as an escape from cultivation (Liège, 2015; wn.be).

- An additional alien species of *Adiantum* L., *A. aleuticum* (Rupr.) C.A. Paris, has been observed as an escape on a brick wall in Bruges (Assebroek) since 2016 (wn.be).

### 13. Aspleniaceae

- *Ceterach officinarum* Willd. was transferred again to *Asplenium* L., the genus in which it was originally described (as *A. ceterach* L.).

- *A. trichomanes* L.: a useful article about *A. trichomanes* hybrids and their recognition in the Flora area, particularly in the Ardennes, was published by Bizot (2011).

- *A. ×alternifolium* Wulfen (*A. septentrionale* × *trichomanes*): two nothosubspecies of this hybrid have been recorded in the Flora area. In addition to nsubsp. *alternifolium*, a hybrid with *A. trichomanes* subsp. *trichomanes*, nsubsp. *heufferi* (Reichardt) Aizpuru, Catalán & Salvo, a hybrid with *A. trichomanes* subsp. *pachyrachis* (Christ) Lovis et Reichst., was discovered near Aywaille in Mosan (Gyselinck *et al.* 2021).

### 16. Athyriaceae

- Sometimes cultivated as an ornamental and very rarely subsontaneous: *Anisocampium niponicum* (Mett.) Y.C. Liu, W.L. Chiou & M. Kato [syn.: *Athyrium niponicum* (Mett.) Hance]; it was recorded in As in 2017 (wn.be).

### 18. Dryopteridaceae

- *Polystichum* Roth: the two native species with 2 or 3-pinnate leaves, *P. aculeatum* (L.) Roth and *P. setiferum* (Forssk.) T. Moore ex Woynar, as well as their hybrid, *P. ×bicknellii* (Christ) Hahne, are not always easily identified. These three taxa are very variable, which sometimes leads to the impossibility, based on morphological criteria, of identifying the taxon to which certain individuals relate. The measurement of the average length of their stomata makes it possible to differentiate these taxa: they are ~ 42, ~ 54 and ~ 49 µm for *P. setiferum*, *P. aculeatum* and *P. ×bicknellii* respectively (Bizot *et al.* 2015).

- Three additional alien species of *Polystichum* have been recorded as casual escapes from cultivation: *P. acrostichoides* (Michx.) Schott (Heks, 2019), *P. munitum* (Kaulfuss) C. Presl (Kontich, since 2019) and *P. polyblepharum* (Roem. ex Kunze) C. Presl (scattered records since 2014) (wn.be).

- Hybrids between *Dryopteris affinis* (Lowe) Fraser-Jenkins and *D. filix-mas* (L.) Schott were already known in the Flora area. However, the exact identity of these hybrids remains to be determined, depending on the subspecies of the former involved. Next to *D. ×complexa* Fraser-Jenkins nsubsp. *complexa* (*D. affinis* subsp. *affinis* × *filix-mas*; tetraploid), already known, also *D. ×complexa* nsubsp. *critica* (Fraser-Jenkins) Fraser-Jenkins [*D. affinis* subsp. *borreri* (Newman) Fraser-Jenkins × *filix-mas*; pentaploid] has been recorded in Camp., Brab. or. (the Netherlands) and Ard. (France) (Bizot 2010, Hovenkamp *et al.* 2018). In Anchamps, in French Ard., both nothosubspecies occur as confirmed by flow cytometry (Bizot l.c.).

- An additional alien species of *Dryopteris* Adans., *D. erythrosora* (D.C. Eaton) Kuntze, has been recorded as an ephemeral or more or less persisting escape from cultivation. It has been known from several localities in Fl., Camp. and Brab., the first in Bruges in 2015 (wn.be).

- *D. affinis* (Lowe) Fraser-Jenkins: assessing the identity of the subspecies of this species in the Flora area requires further study. To further complicate the issue, a fifth taxon from this complex was recently described from Germany, *D. lacunosa* S. Jess. *et al.* (Jessen *et al.* 2011, FT) and it has been recorded near to the eastern border of the Flora region, in the Moselle valley in Tawern (Germany). According to Jessen *et al.* l.c. it is a genetically distinct triploid that mostly looks like subsp. *borreri*. In fact, it is merely a lobed-pinnuled and toothed form of the triploid subsp. *borreri*, whose type is a small specimen of the same entity, with brown scales, and brown colouring marks on the stipe and acute teeth; however, being a small specimen, the pinnules are unlobed. Jessen *et al.* (2011) justified their new species (anyway at a much too elevated taxonomic rank) based on biochemical features but these were subsequently invalidated (Fraser-Jenkins *et al.* 2020). Thus, *D. lacunosa* was merely added as a synonym of subsp. *borreri*.

### 19. Polypodiaceae

- *Polypodium cambricum* L.: this Mediterranean-Atlantic species has been known from old brick quay walls in Bruges since at least 2012 (wn.be; identity confirmed by flow cytometry). Its nearest native populations are in the British Isles. The leaves of this species are barely twice as long as they are wide, and at least some of the spores have paraphyses (branching, multicellular 'hairs'). Its status with us is unknown (subsontaneous or natural range extension?). Perhaps it is overlooked and should be looked for elsewhere.

### 22. Pinaceae

- An additional species of *Abies* Mill., *A. homolepis* Siebold et Zucc., has been recorded to self-sow (Ravels, 2019; wn.be).

### 24. Cupressaceae

- *Chamaecyparis nootkatensis* (D. Don) Spach is now ac-

cepted as *Cupressus nootkatensis* D. Don. This species has rarely been observed as an escape from cultivation. For the same reason, the (cultivated) intergeneric hybrid  $\times$ *Cupressocyparis leylandii* (A.B. Jackson et Dallim.) Dallim. (*Cupressus macrocarpa* Hartw. ex Gord.  $\times$  *nootkatensis*) is now called *C.  $\times$ leylandii* A.B. Jackson et Dallim.

## 25. Taxaceae

- The exact identity of *Taxus* plants observed these days as escapes from cultivation, or locally even as naturalized populations, is uncertain. Several species, as well as hybrids, are cultivated and probably dispersed by birds. However, their identification is not easy. In addition to *T. fastigiata* Lindl. (already mentioned in NF6), one should look for *T. recurvata* Lawson, *T. canadensis* Marshall, *T. cuspidata* Siebold et Zucc. (Spjut 2007a, 2007b, FG) and perhaps especially the hybrid between the latter and *T. baccata*, *T.  $\times$ media* Rehd. (Stöhr 2019). This issue requires further study.

## 27. Nymphaeaceae

- *Nymphaea alba* L.: the taxonomy of this species complex remains controversial. In NF6 *N. candida* C. Presl was reduced to subspecies rank under *N. alba*, following recent insights as explained in Verloove & Lambinon (2014). At present, most recent authors accept these two taxa again as distinct species (e.g. FG, H24). Apparently, *N. candida* is an allopolyploid hybrid of *N. alba*  $\times$  *tetragona* Georgi parentage (Volkova et al. 2010). According to Zonneveld (2019), based on genome size measurements, backcrosses with *N. alba* occur (*N.  $\times$ borealis*'), further complicating the distinction of taxa in this species group. Subsp. *occidentalis* (Ostenf.) Hyl. of NF6, with smaller, semi-closed petals, is merely ignored by recent authors (e.g. FG) and indeed probably of lesser taxonomic value (see, however, Stace 2019). In the absence of solid new evidence, the taxonomy followed in NF6 is maintained but new studies are obviously needed.

## 28. Saururaceae

- An additional alien species from this family, *Houttuynia cordata* Thunb., is sometimes recorded as an escape from cultivation (wn.be). This species is not only grown as an ornamental but also, by Asian immigrants, for its edible rhizomes (Saintenoy-Simon 2013).

## 34. Araceae

- Some additional alien species of Araceae have been recorded lately as, usually ephemeral, escapes from cultivation: *Zantedeschia aethiopica* (L.) Spreng. (rather regularly observed since 2013 and sometimes more or less persisting) and *Z. albomaculata* (Hook.) Baill. (Balen, 2011) (wn.be). *Typhonium venosum* (Ait.) Hett. et Boyce, already mentioned in NF6, is now treated as *Sauromatum venosum* (Ait.) Kunth, the name under which it is currently accepted.

- *Arum italicum* Mill.: the infraspecific variability of this species is differently treated in various recent Floras. Stace (2019), like NF6, accepted two subspecies whereas FG and H24 did not accept any infraspecific taxa. The two subspecies are indeed not always easily separated and their rank reduced to that of varieties, var. *italicum* and var. *neglectum* F. Townsend.

- An additional, alien species of *Wolffia* Hork. ex Schleid. has been recorded in the Flora area (in Camp. and Brab.), *W. columbiana* H. Karst. (Hendrickx & Verloove 2019, Lecron et al. 2021). It has pale green, somewhat translucent fronds with 1-15 stomata and the greatest width of the fronds is located well below the water surface. In *W. arrhiza* (L.) Hork. ex Wimm., in turn, the number of stomata is higher (usually 15-100), the fronds are dark green, not translucent and with their greatest width just below the water surface. This American species is in strong expansion (or has been overlooked for some time?) in the Netherlands and should be looked for elsewhere in the Flora area. It was added to the key and a full account was presented.

- *Lemna aequinoctialis* Welw. is very rarely encountered as a weed in garden centers and nurseries (Hoste 2011). It is characterized by its elliptical fronds with three distinct veins and its root with a winged triangular base.

- *Landoltia punctata* (G. Mey.) Les & D.J. Crawford [syn.: *Spirodela punctata* (G. Mey.) C.H. Thomps.] is very rarely observed as a weed in garden centers and nurseries (Hoste 2011). Like *S. polyrhiza* (L.) Schleid. it has several fasciculate roots but it is characterized by more elongated fronds (1,5-2 times longer than wide) with purple-red margins (top view).

## 35. Alismataceae

- *Baldellia ranunculoides* (L.) Parl.: two subspecies recognized in NF6 (subsp. *ranunculoides* and subsp. *cavanillesii* Molina Abril, Galán de Mera, Pizarro et Sardinero) are now accepted as two distinct species: *B. ranunculoides* s.str. and *B. repens* (Lam.) Ooststr. ex Lawalrée subsp. *cavanillesii* (Molina Abril, Galán de Mera, Pizarro et Sardinero) Talavera, following FG. Other recent flora accounts, e.g. H24, did not follow this taxonomic point of view because of the ease with which these two species hybridize.

## 37. Hydrocharitaceae

- An additional alien species from this family was recently recorded as a casual alien: *Limnobium laevigatum* (Humb. et Bonpl. ex Willd.) Heine (Ganshoren, 2013; wn.be).

- Some species of *Vallisneria* L. are sometimes cultivated in water bodies and especially in aquariums. A population of *V. australis* S.W.L. Jacobs & Les (syn.: *V. americana* auct. non Michaux) persists in a canal in Geel since 2016 (wn.be). These plants differ from *V. spiralis* in their leaves up to 35 mm in width (Mesterházy et al. 2021).

- *Najas marina* L.: Bräuchler (2015) typified names from the *N. marina* species complex. As a consequence, the correct name for the taxon previously known as *N. marina* s.str. (subsp. *marina*) is *N. major* All. The name *N. marina* L. should be reserved for the taxon previously known as *N. intermedia* Wolfg. ex Gorski [syn.: *N. marina* subsp. *intermedia* (Wolfg. ex Gorski) Casper].

#### 42. Potamogetonaceae

- Some additional hybrids in *Potamogeton* L. have been recorded recently. *P. crispus* L. × *lucens* L. (*P. ×cadburyae* Dandy et G. Taylor) was recorded once in Mar. (polders) in 2012, along with both parent species (wn.be) and *P. crispus* × *perfoliatus* L. [*P. ×cooperi* (Fryer) Fryer] was observed with both parents on the Belgian side of river Maas (Fluv.) in 2015 (ID confirmed by A. Mesterházy; wn.be). In Champ., at Lac du Temple near Troyes, at the southern limit of the Flora area, *P. crispus* × *trichoides* Cham. et Schlecht. (*P. ×bennettii* Fryer) was recorded in several localities (Le Gloanec *et al.* 2019). Finally, in the Dutch part of Fluv. two more hybrids have been recorded lately: *P. gramineus* L. × *natans* L. (*P. ×sparganiiifolius* Laest. ex Fries) (H24) and *P. gramineus* × *perfoliatus* (*P. ×nitens* Weber) (Pot & Bruinsma 2019).
- *Potamogeton pectinatus* L. was transferred to the segregate genus *Stuckenia* Börner, as *S. pectinata* (L.) Börner, based on molecular studies (e.g. Lindqvist *et al.* 2006).

#### 43. Ruppiaceae

- *Ruppia cirrhosa* (Petagna) Grande: this binomial was recently lectotypified and this name was shown to be a homotypic synonym of *R. maritima* L. Consequently, the name *R. spiralis* L. ex Dum. has nomenclatural priority over *R. cirrhosa* for the long- and coiled-pedunculate *Ruppia* (Ito *et al.* 2017).

#### 45. Dioscoreaceae

- The genus *Tamus* L. is now included in *Dioscorea* L., since it is nested in it in molecular phylogenetic analyses (Caddick *et al.* 2002). The native species *Tamus communis* L. is now called *Dioscorea communis* (L.) Caddick et Wilkin.

#### 47. Colchicaceae

- An alien species of *Colchicum* L., *C. byzantinum* Ker Gawl., is cultivated as an ornamental and has been recorded as an escape since 2013 (wn.be). In this species the flowers are more numerous (5-20) and the leaves are wider (5-13 cm).

#### 49. Liliaceae

- Several taxa of *Lilium* L. are grown as ornamentals and some are occasionally observed as escapes, incl. *L. ×hollandicum* Bergmans ex Woodcock et Stearn, a hybrid not yet mentioned in NF6 (wn.be).

#### 50. Orchidaceae

- General remark about the taxonomy of Orchidaceae.

As a result of molecular phylogenetic studies, the generic boundaries within this family have dramatically changed in the past 20 years. Some preliminary changes were already applied in NF6 and many more were made in this newest edition. These roughly agree with the taxonomy applied in FG. In recent years, yet other investigations have further explored the generic limits of certain genera. Tyteca *et al.* (2012), for instance, have advocated the segregation of the genus *Orchis* L., recognizing split-off genera such as *Herorchis* Tyteca et E. Klein, *Anteriorchis* E. Klein et Strack, *Paludorchis* P. Delforge and *Vermeulenia* Á. Löve (see also Tyteca & Klein 2008, 2009). These taxonomic changes, adopted by e.g. Kreutz (2019), were not yet taken into account.

The latter author has recently published a comprehensive, state-of-the-art publication on Orchidaceae in the Flora area (Kreutz 2019). He recognized rather numerous infraspecific taxa, many of them poorly known, and he reported some recently described taxa as well. However, the taxonomic value of many of these taxa requires further study, preferably applying molecular techniques. In most cases, no or little attention was paid to these taxa in NF7, although some may turn out to deserve taxonomic recognition. All cases relevant to the Flora area are referred to hereunder.

- The southern European species *Serapias vomeracea* (N.L. Burman) Briquet was mentioned by Kreutz (2019) from a locality in Belgian Mosan (Stockay). A single individual was found between 2012 and 2014 on the verge of a quarry. However, since there was some doubt about this identity and the fact that the species may have been deliberately introduced, this species was not included in NF.

- An additional intergeneric hybrid has been recorded: *Dactylorhiza maculata* (L.) Soó × *Gymnadenia conopsea* (L.) R. Brown [*Dactylodenia legrandiana* (E.G. Camus) Peitz]. This very rare hybrid is known from the Belgian part of the Sint-Pietersberg (Kreutz 2019).

- Two additional hybrids in *Epipactis* Zinn were discovered in the Flora area. *E. helleborine* (L.) Crantz × *leptochila* (Godf.) Godf., *E. ×stephensonii* Godf., is readily produced wherever both parent species grow in close proximity (Mariamé & Delforge 2013 and references therein; also Kreutz 2019). It has been demonstrated on several occasions that plants found in our area, for instance in Mosan, rarely refer to pure *E. leptochila* (neither subsp. *leptochila* nor *neglecta* Kümpel) but rather to this hybrid (Delforge & Breuer 2015, Delforge *et al.* 2015). Kreutz (2019) further mentioned a hybrid of *E. leptochila* subsp. *neglecta* [as *E. neglecta* (Kümpel) Kümpel] × *helleborine* from Belvaux (Bois de Resteigne). A second hybrid, *E. helleborine* × *muelleri* Godf. (*E. ×reinekei* P. Bayer), is known from Wijlre Akkers in Zuid-Limburg, the Netherlands (Brab. or.) (Kreutz 2019).

- *E. helleborine* (L.) Crantz var. *orbicularis* (K. Richt.) Aschers. et Graebn.: in NF6, this taxon was said to occur sporadically throughout most of the range of subsp.

*helleborine*. It was mentioned from e.g. Ciergnon by Delforge *et al.* (2015) and Kreutz (2019) reported it from Brab. or. (Belgian and Dutch part of Sint-Pietersberg) and Brab. occ. (Charleroi area) as well as from Mar. (north of Antwerp). The taxonomic value of this variety is probably weak; it likely is a mere thermophilous ecotype. In France, this taxon was considered to be possibly conspecific with *E. distans* Arv.-Touv. (FG). The latter does not, according to SI-Flore and FG, occur further north than the Jura (see also Mathé 2015). However, according to Kreutz (2019) it is present in a single locality (in Niederkorn) in the Grand-Duchy of Luxembourg, from where it was initially reported by Krippel & Colling (2008; sub *E. helleborine* var. *orbicularis*). Chas & Tyteca (1992) and Delforge (2004) thoroughly discussed the morphology and ecology of *E. distans*. According to these authors, it is a morphologically and ecologically well-differentiated species, confined to thermophilous, basiphilous pine-woods and limited to mountainous to subalpine regions, where *E. helleborine* s.str. is absent (see also Scappaticci & Démares 2003). These conditions do not at all correspond with those described from the Niederkorn population. Pending further studies, preferably corroborated by molecular data, the genuine presence of *E. distans* in the Flora area requires confirmation.

- *E. helleborine* subsp. *neerlandica* (Verm.) Buttler: recent molecular analyses showed that this subspecies is genetically distinct but able to cross easily and to produce a large number of viable seeds (Jacquemyn *et al.* 2018). Kreutz (2019) also referred to intermediate forms, especially in the border zone between dunes and polders.
- Additional infraspecific taxa of *E. helleborine* have been recorded from the Flora area. Kreutz (2019) reported var. *minor* R. Engel from some Walloon localities and var. cf. *moratoria* (Riech. & Zirnsack) P. Delforge from Limburg in the Netherlands. However, Delforge (2016) demonstrated that the taxonomic value of these varieties is nihil.
- The conservation and rejection proposals for *E. purpurata* Smith and *E. viridiflora* Krock. respectively were accepted by the latest Congress (Shenzhen Code Appendices).
- *E. muelleri* Godf.: Kreutz (2009) newly described a var. *saltuaria* Kreutz from the Venn-Eifel in Germany. He later reported this variety from a single locality in the Grand-Duchy of Luxembourg as well, near Helmsange (Lorr. sept.) (Kreutz 2019). This apparently is a mere ecotype, morphologically more or less intermediate between *E. muelleri* and *E. leptochila*, and probably of limited taxonomic value.
- *E. leptochila* (Godf.) Godf.: two infraspecific taxa mentioned in NF6 are reduced from subspecies to varieties, var. *leptochila* and var. *neglecta* (Kümpel) A. Gévaudan. According to FG the taxonomic value of the latter is limited, it is better included in *E. leptochila* s.str., and this was recently confirmed based on molecular studies (Sramkó

*et al.* 2019). Mariamé & Delforge (2013) also emphasized the difficulties experienced in attributing variety names to the Belgian populations. Plants more or less intermediate between *E. helleborine* and *E. leptochila* are often thought to refer to var. *neglecta*. However, it must be taken into account that these two species also hybridize quite easily wherever they occur sympatrically (*E. ×stephensonii* Godf.) These hybrids are recognizable by the pale pink tint of the base of the pedicels (Mariamé & Delforge l.c.). However, since in the Flora area these two taxa are only exceptionally growing together, this hybrid is doubtlessly very rare, if present (comm. W. Van den Bussche 10.2022).

- *E. phyllanthes* G.E. Smith: the populations of this rare species in the Flora area have been ascribed to var. *degenera* D.P. Young, a variety with imperfectly differentiated labellum and flowers that are usually not opening (Van de Vijver 2006, Delforge *et al.* 2016). However, this assumption requires confirmation (provided that the described varieties have any taxonomic value). According to Kreutz (2019) our populations may as well belong to var. *pendula* D.P. Young.
- *Spiranthes* L.C.M. Rich.: a population of a hybrid between two North American species, *S. cernua* (L.) L.C.M. Rich. (more precisely a cultivar named ‘Chadds Ford’) and *S. odorata* (Nutt.) Lindl., survives since 2014 in a hay meadow in Beernem (Fl.). These often more robust plants differ from *S. aestivalis* in flowers that are arranged in 3-4 spiral rows (vs. arranged in a single spiral row). A natural (not artificial) hybrid of these two species was recently formally described as *S. bightensis* M.C. Pace (Pace 2021). In the Netherlands, yet another exotic species, *S. romanzoffiana* Cham., native to North America and the British Isles, was seen near Breda (Camp.) in 2014-15 but may have disappeared again (wn.nl; comm. W. Van den Bussche 10.2022). All of these plants are grown as ornamentals and seem to escape quite easily. Their naturalization and possible extension are monitored (Dekker 2012, Kreutz 2014, Meijrink 2014, Gravendeel 2016, Kreutz *et al.* 2016, van Run 2016, Kreutz 2019, Gravendeel *et al.* 2020).
- *Liparis loeselii* (L.) L.C.M. Rich.: according to Kreutz (2019), all plants from coastal areas belong to var. *ovata* Riddelsdell ex Godf., those from inland localities to var. *loeselii*. However, these are probably mere ecotypes of a single species, as suggested by molecular and morphometric studies (e.g. Terrasse & Wojtkowiak 1999, Vanden Broeck *et al.* 2014a & b).
- *Platanthera* L.C.M. Rich.: in recent years numerous studies were dedicated to the *P. bifolia-chlorantha* complex. These more precisely dealt with plants with morphological features intermediate between these two species and previously thought to be their hybrid, *P. ×hybrida* Brügger. It was shown, based on molecular data, that genuine hybrids are in fact very rare (Esposito *et al.* 2017). For non-hybrid, intermediate plants the name *P. fornicata*

(Bab.) Buttler (Buttler 2011) was rehabilitated and a new species was described, *P. muelleri* Baum et Baum (Baum & Baum 2017). These two ‘species’ doubtlessly occur in the Flora area, but a lot of controversy persists as to the application of these names. Kreutz (2019), for instance, although applying a very narrow species concept and accepting numerous infraspecific taxa, questioned the relevance of *P. muelleri* and completely left unmentioned *P. fornicata*. The former was said to partly refer to *P. ×hybrida* whereas its holotype was said to be identical with *P. bifolia* (L.) L.C.M. Rich. var. *latiflora* (Drejer) Kreutz. According to Delforge (2020) Kreutz’ *P. bifolia* var. *latis-sima* (Tinant) Thielens corresponds with *P. fornicata*.

Molecular studies in this complex are not conclusive. On the one hand, there appear to be intermediate individuals between these two plants and also some populations made up exclusively of such intermediates. Based on morphological, molecular and chemical arguments, it was demonstrated that most so-called ‘intermediates’ are in fact *P. bifolia* (Esposito *et al.* 2017). On the other hand, morphological and ecological comparisons carried out in Belgium argue in favor of the recognition of two independent taxa within *P. bifolia*. The latter binomial should be reserved for allopatric populations growing on acidic to basic soil, in open, cool to humid habitats. Populations of *P. bifolia*, often growing in sympatry with *P. chlorantha*, on basic soil, in semi-open to shaded habitats, could then be referable to *P. fornicata* (Tyteca & Esposito 2018). Durka *et al.* (2017) also detected three distinct lineages within the *P. bifolia/chlorantha* group, the third referring to non-hybrid intermediates. To conclude, apparently, there are likely four taxa involved: *P. bifolia* s.str., *P. chlorantha*, the very rare hybrid *P. ×hybrida* that only occurs in mixed populations and a less rare, intermediate non-hybrid species (best called *P. fornicata*?) that also occurs in places where the other species are absent. However, additional and more convincing studies are required.

The varieties recognized by Kreutz (2019) are not easily interpreted. Var. *bifolia* refers to plants from damp heaths whereas var. *latiflora* is confined to slightly drier habitats on limestone. Var. *latis-sima* was reported from the Belgian part of the Sint-Pietersberg. As suggested before, these taxa at least in part probably coincide with non-hybrid intermediate plants; FG considered them to be mere ecomorphs, without taxonomic value. They were removed from NF7.

- ***Gymnadenia ×intermedia*** Peterm.: it is unclear whether this binomial refers to the hybrid between *G. odoratissima* (L.) L.C.M. Rich. and *G. conopsea* s.str. or *G. densiflora*. It was therefore removed.
- *G. conopsea* (L.) R. Brown was segregated in two different species, *G. conopsea* s.str. and *G. densiflora* (Wahlenb.) A. Dietr. The latter was previously considered to be a mere variety in NF6, var. *densiflora* (Wahlenb.) Lindl. Molecular studies, however, have shown these two taxa to represent genetically quite distinct entities (Stark *et al.* 2011). Some additional morphological features, useful

for their separation (mostly based on FG) were added to the key. However, in the Flora area this complex remains quite confusing. Up to 4 or 5 ecotypes are known one of which may be *G. densiflora*. Large, richly flowered individuals that are sometimes found in ‘normal’ populations could be polyploids. In the Calestienne and Gaume (but also elsewhere) there are two ‘types’ that are differing in phenology, flower scent and leaves, but neither of them fits the description of *G. densiflora* exactly, and in the Xerobromium there is yet another ecotype that begins to flower the earliest (comm. W. Van den Bussche 10.2022).

- Kreutz (2019) reported several additional varieties of *G. conopsea* from the Flora area but the taxonomic relevance of these taxa requires confirmation. Var. *graminea* (Dworschak) Kreutz, a slender plant with very narrow leaves and a laxly-flowered inflorescence, is known from a single extant population in the Benelux in the Torfbroek nature reserve in Kampenhout. Var. *odorata* (Dworschak) Kreutz is characterized by its strong odor and is known, in the Flora area, from the Calestienne area. Finally, var. *serotina* Schönheit was mentioned, a late-flowering variety, known from the Torfbroek nature reserve in Kampenhout (which means that this reserve harbors four taxa from the *Gymnadenia conopsea* complex!) and from scattered localities in the Grand-Duchy of Luxembourg. The identity of var. *serotina* apparently was confirmed by Wucherpfennig who is familiar with this taxon in Bavaria.

- Two additional hybrids in ***Ophrys*** L. are known in the Flora area. *O. aranifera* Huds. × *virescens* M. Philippe (*O. ×jeanpertii* E.G. Camus) has been recorded in the Laon area in France (SI-Flore) and *O. virescens* × *insectifera* L. is occasionally seen in Arnaville near Metz in Lorr. (Dirwimmer *et al.* 2016).

- In NF6, *O. sphegodes* Mill. contained two subspecies, subsp. *sphegodes* and subsp. *araneola* (Reichenb.) Lainz. These are now accepted as two distinct species, *O. aranifera* Huds. and *O. virescens* M. Philippe, respectively.

- *O. apifera* Hudson: Kreutz (2019) reported not less than nine varieties from the Flora area: var. *aurita* (Moggride) Gremlé (e.g. Mar., Brab. or., Lorr.), var. *badensis* L. Lewis et Kreutz (Mar., Mosan, Lorr.), var. *belgarum* Turner Ettliger (Brab. or., Mosan), var. *bicolor* (O. Nae-geli) E. Nelson (Mosan, Lorr.), var. *curviflora* A. Soulié (Mar., Brab., Mosan), var. *friburgensis* Freyhold (absent from Belgium but reported from neighboring territories in Mar., Brab. or., Lorr.), var. *fulvofusca* M.P. Grasso et Scrugli (Mar. sept.), var. *atrofusca* J. Dierckx, Kreutz, D. Riepe et L. Segers (described from the Belgian part of Sint-Pietersberg and also known from Mar.) and var. *trollii* (Hegetschweiler) Reich. f. (Zeeland, the Netherlands). The author admits that (translated FV) “over the years the plants may look completely different or the flowers may return to their typical shape”. Hence, the taxonomic value of all these varieties is likely nihil.

- The species named *O. holosericea* (Burm. f.) Greuter in NF6 is now called again *O. fuciflora* (F.W. Schmidt)

Moench., following other recent Floras, e.g. FG, Stace (2019), etc.

- An additional species of *Himantoglossum* Spreng. has reached the Flora area, *H. robertianum* (Loisel.) P. Delforge. This species was formerly included in a separate genus, *Barlia* Parl. [as *B. robertiana* (Loisel.) Greuter], but that genus is in fact nested in *Himantoglossum*, see e.g. Bateman *et al.* (2017). It is now included in the key and a full account is provided.

- *H. hircinum* (L.) Spreng.: in NF6, a very rare variety (in reality rather a monstrosity) was reported from Mosan, var. *obtusum* De Langhe, characterized by an unusually short labellum. This variety was not mentioned by Kreutz (2019) but this author cited a further variety from the Flora area, var. *aestivalis* Kreutz et P. Steinfeld, a later-flowering ‘race’ with a laxer, few-flowered inflorescence and narrower, longer leaves. It is known from the Grand-Duchy of Luxembourg (Kayl; Lorr. sept.) (Kreutz & Steinfeld 2013) but its taxonomic value requires confirmation. Such parapatric populations may have been the result of polyploidization (Bateman *et al.* 2017).

- The generic limits of *Orchis* L. have considerably changed. Four species included in this genus in NF6 have now been transferred to *Anacamptis* L.C.M. Rich.: *O. coriophora* L., *O. morio* L., *O. palustris* Jacq. and *O. laxiflora* Lam.

- *Anacamptis pyramidalis* (L.) L.C.M. Rich.: Londo *et al.* (2016) assigned some coastal populations from France (in the Flora area: Calais, Dunkerque) and the Netherlands to a newly described var. *dunensis* Londo, Kreutz et Slings. According to the authors this is not a mere ecotype although genetical evidence is still lacking (H24). In var. *dunensis* stems are slightly S-curved and corollas paler than in the nominal variety. However, judging from photographs in Kreutz (2019) plants of var. *pyramidalis* from the Grand-Duchy of Luxembourg have a similarly S-curved stem (Niederanven, p. 124) and plants from Differdange (p. 124) have paler corollas than some plants depicted of var. *dunensis*. In the absence of further evidence, in NF7 no mention is made yet of this variety.

- *Coeloglossum viride* (L.) Hartm. has now been transferred to *Dactylorhiza* Neck. ex Nevski [*D. viridis* (L.) R.M. Bateman, Pridgeon et M.W. Chase], following recent insights inferred from molecular studies (e.g. Bateman & Rudall 2018).

- *Dactylorhiza ×dinglensis* (Wilmott) Soó: in NF6, this binomial was applied to designate hybrids of *D. maculata* with *D. majalis*. However, *D. ×dinglensis* is the hybrid of *D. maculata* (probably subsp. *ericetorum*) with the Irish endemic *D. kerryensis* (Wilmott) P.F. Hunt et Summerh. (previously incorrectly placed in synonymy with *D. majalis*, a species that is absent in the British Isles) (Stace 2019). The correct name for our hybrid is probably *D. ×vermeuleniana* Soó.

- *D. incarnata* (L.) Soó: the infraspecific variability of this species in the Flora area is poorly understood. Rather

numerous infraspecific taxa have been reported lately, especially by Kreutz (2019), but the taxonomic value of most of these taxa needs to be confirmed by molecular studies. Two subspecies that were already recognized in NF6 are now reduced to varietal rank, var. *incarnata* and var. *serotina* Hausskn. [as subsp. *pulchella* (Druce) Soó in NF6], following FG. The application of the latter epithet [*D. incarnata* (L.) Soó subsp. *pulchella* (Druce) Soó; *D. pulchella* (Druce) Averyanov], moreover, is debatable since this taxon might rather be a British endemic, confined to neutral to acid wet peaty places (Stace 2019). It was therefore removed from the synonymy of var. *serotina*. A third variety, var. *lobelii* (Verm.) Soó, a compact ‘race’ from coastal dunes, very likely also occurs in the Flora area (wn.be, H24, Kreutz 2019) but its taxonomic status is questionable (plants with such characteristics usually occur as an ‘extreme form’ within populations of var. *incarnata* in coastal dunes; comm. M. Leten, 10.2022). It was mentioned by Delforge (2012) for some dune valleys in the Netherlands and further north to Norway and said to be sometimes erroneously referred, by Kreutz among others, to as *D. coccinea* (Pugsley) Averyanov, the latter being a British endemic. However, Delforge & Breuer (2015) also reported this variety from the Doolaege nature reserve in Oostduinkerke and Kreutz (2019) provides, as far as the Flora area is concerned, further records from Belgian and Dutch (Zeeland) coastal regions.

Kreutz (2019) reported several additional infraspecific taxa from the Flora area. var. *haematodes* (Reichenb. f.) Soó, distinguished from the other varieties by its clearly spotted leaves, is known from a single locality in Ekeren (Ekers Moeras) where it grows along with var. *incarnata*. It is unknown how this variety relates to other spotted variants of *D. incarnata*, e.g. subsp. *cruenta* (O.F. Muell.) P.D. Sell. The presence or absence of spots on the leaves probably is a poor taxonomic character in this species (Hedrén & Nordström 2009). Var. *latissima* (Zapalowicz) Hylander is a taller plant with wider leaves and longer floral bracts; it is reported from a canal embankment in Moen (Brab.) and is also known from the Netherlands but was not mentioned in H24. It is probably of little or no taxonomic value. Var. *dunensis* (Druce) Hylander has a distribution in the Flora area that roughly coincides with that of var. *lobelii*. It is a mere dwarf form and likely of no taxonomic value at all (despite being present in the Netherlands, it was ignored in H24). Subsp. *coccinea* (Pugsley) Soó was long considered to be a British endemic. According to Kreutz (2019) it also occurs in coastal areas in the Netherlands, including in Zeeland in the Flora area. Given the fact that this subspecies was absent before 1980, it likely reached the Netherlands in relatively recent times, probably as a result of a natural range extension (wind dispersal). However, this subspecies chiefly occurs on the western coast of the British Isles and is virtually absent on the eastern coast (Stace 2019; see also Online Atlas of the British and Irish Flora: <https://www.brc.ac.uk/plantatlas/>) which makes this assumption rather unlikely. It has ruby

to crimson red perianths and flowers two to three weeks later than var. *incarnata*. Plants of this subspecies originating in Wassenaar in the Netherlands, well beyond the limits of the Flora area, had a quite different cellular DNA content (genome size) as compared with typical plants of *D. incarnata*, suggesting that they indeed represent a distinct taxon (Zonneveld 2019). Similar-looking plants have also been observed in Belgian coastal areas but these proved to be genetically identical with *D. incarnata* var. *dunensis*, apparently indicating that flower color does not serve for the recognition of infraspecific taxa. Finally, subsp. *cungsi* Kreutz has been observed in a single locality in the Flora area, in an abandoned iron ore quarry near Differdange (Lorr. sept.) in the Grand Duchy of Luxembourg. In fact, this subspecies was newly described from that locality by Kreutz (2015; see also Krippel & Colling 2016). It is a coarse plant with wide leaves and probably of little, if any, taxonomic value. Pending further studies – preferably molecular-based – no further attention was paid to the infraspecific variability of *D. incarnata*, although it is possible or even plausible that some deserve formal taxonomic recognition.

- *D. traunsteineri* (Sauter) Soó: the genuine identity of plants found in the Flora area has been subjected to debate. The plants from northeastern France (Haute-Marne department) mentioned in NF6 were recently attributed to a separate species, *D. devillersiorum* P. Delforge (Delforge 2011; see also Kreutz 2019 who reported the same species from the Laon area). The same plants have also sometimes been assigned – incorrectly so – to *D. wirtgenii* (Höppner) Soó, the latter being a synonym of *D. ×carnea* (E.G. Camus) Soó [*D. incarnata* (L.) Soó × *maculata* (L.) Soó] (Delforge 2011, FG). The taxonomic interpretation of the *D. traunsteineri* group (composed of sexual, highly interfertile taxa!) has changed a lot over time. According to some authors it comprises three distinct, geographically isolated species: *D. traunsteineri* s.str. (Alps), *D. traunsteinerioides* (Pugsley) Landwehr (the British Isles) and *D. lapponica* (Reichenb. f.) Soó (Scandinavia) (Bateman & Denholm 2012). However, recent genetic research seems to indicate that the morphological variation is best understood as one variable species (Brandrud *et al.* 2020). Therefore, the name *D. traunsteineri* was upheld, incl. *D. devillersiorum*.

- *D. praetermissa* (Druce) Soó: the infraspecific variability of this species in the Flora area is poorly understood, although the taxonomic value of many infrataxa (see e.g. Kreutz 2019) probably is small. Two subspecies were recognized in NF6 [subsp. *praetermissa* and subsp. *integrata* (E.G. Camus ex Fourcy) Soó] but an in-depth study of northwestern European populations, based on morphology and genetics, is still lacking (H24) and yet highly desirable. However, coastal populations that have been assigned to ‘subsp. *integrata*’ are morphologically variable and in fact differ from one year to another (comm. M. Leten, 10.2022). FG already pointed out that plants with an isodiametric, undivided labellum (the sole character

that distinguishes subsp. *integrata*) actually belong to the variation of subsp. *praetermissa*. It was therefore reduced to the synonymy of subsp. *praetermissa*.

In addition to the taxa mentioned in NF6, Kreutz (2019) reported two further infraspecific taxa. Var. *bracteosa* Kreutz was recently described by Kreutz (2016) based on specimens found in the Doolaeghe nature reserve in Oostduinkerke (Mar.) in Belgium. Similar plants were subsequently observed in other localities in the same coastal area between Oostduinkerke and Nieuwpoort. These plants only differ by the presence of conspicuous floral bracts but are probably of no taxonomic value. In fact, they probably represent F2 hybrids between *D. incarnata* and *D. praetermissa* (most likely backcrosses with the former). A second infraspecific taxon, subsp. *schoenophila* R.M. Bateman et Denholm, recently described from the British Isles, is doubtlessly of more importance. This name encompasses populations located in southeast England, south of a line from the Severn to the Wash, that were formerly attributed to *D. traunsteinerioides* (at least in part erroneously so, see also NF6) on the basis of their gross morphology and habitat preference; however, they have genotypes characteristic of *D. praetermissa* (Bateman & Denholm 2012) and were thus subsumed under that species (although they are likely of hybrid origin as well, probably of *D. praetermissa* × *traunsteinerioides* parentage). Aberrant plants from the Torfbroek nature reserve in Kampenhout (Brab.) were ascribed to this taxon by Kreutz (2019) and a photo confirmed them to “look like a convincing population” of this subspecies by R.M. Bateman (in Kreutz l.c.). It has been present there since many decades (previous reports of *D. incarnata* and *D. praetermissa* from there need to be referred to it) and certainly does not represent a hybrid that arose *in situ* (except for the very different *D. fuchsii*, no further species of *Dactylorhiza* are present in the Torfbroek reserve) (comm. M. Leten, 10.2022; see also Meeuwis 2005). Its ecology is also in line with that of subsp. *schoenophila*, i.e. chalk marshes with *Schoenus nigricans*, a habitat in which subsp. *praetermissa* is completely absent. This subspecies was added and opposed to subsp. *praetermissa*.

- *D. sphagnicola* (Höppner) Averyanov: Kreutz (2019) reported two varieties from the Dutch province of Limburg, within the limits of the Flora area. Var. *deweveri* (Vermeulen) Kreutz is probably a stabilized hybrid, involving either *D. maculata* or *D. incarnata*. It is at present only known from Brunssum and Schinveld (claims from the Belgian Plateau de Tailles are erroneous according to Kreutz). A second variety, var. *hoepneri* (A. Fuchs) Kreutz, is known in the Flora area from the Roermond area. It probably refers to stabilized hybrids between *D. sphagnicola* and *D. praetermissa*. Although known from the Netherlands, these two varieties were completely ignored in H24, their taxonomic value probably being weak.

- *D. majalis* (Reichenb.) P.F. Hunt et Summerh.: Kreutz (2019) reported var. *brevifolia* (Bisse) Kreutz from the

Sampont marshes in Vance. It is a mere ecotype and thus of very limited taxonomic value.

- *D. maculata* (L.) Soó subsp. *arduennensis* (Zadoks) Tournay: in NF6, it was suggested that some plants of *D. maculata* subsp. *maculata* in fact may refer to this taxon. Kreutz (2019) confirmed this identity but reduced it to varietal rank, as var. *arduennensis* (Zadoks) Kreutz. However, since it is a mere robust ecotype it probably is of no taxonomic value at all.

- A new species of *Dactylorhiza* was recently described from hills in the valley of river Maas, *D. montis-mosae* Kreutz (2017, 2019). These plants in fact represent hybridogenous populations of *D. fuchsii* (Druce) Soó and *D. praetermissa* (more precisely with a variant that sometimes is referred to as ‘subsp. *integrata*’) and potentially can be found wherever these two species occur sympatrically. In addition to the Sint-Pietersberg area, from where it was initially described, it was subsequently also recorded at the Belgian coast (Doornpanne nature reserve), near Differdange in the Grand-Duchy of Luxembourg and in Kerkrade in the Netherlands. Despite being present in the Netherlands, this species was ignored in H24. Such plants can be subsumed under *D. ×grandis* (Druce) P.F. Hunt, the known hybrid between these two species.

- A proposal for the rejection of the binomial *Orchis latifolia* L., basionym of *Dactylorhiza latifolia* (L.) Soó, was accepted by the latest Congress (Shenzhen Code Appendices).

### 51. Iridaceae

- An additional *Crocus* L., *C. ×stellaris* Haw. (a hybrid of *C. angustifolius* Weston and *C. flavus* Weston), is much grown these days and regularly observed as an escape or throw-out (wn.be).

- An additional *Iris* L., *I. ×hollandica* H.R. Wehrh. (as for the valid name, see Shaw 2021), is rarely grown for ornament and exceptionally seen in the wild (Izegem, 2017; wn.be).

- Three additional species of *Sisyrinchium* L. have been recorded in the Flora area (wn.be): *S. angustifolium* Mill., *S. californicum* (Ker-Gawl.) Dryand. and *S. striatum* Sm. One of these species, *S. californicum* (with yellow corollas), may be in the process of local naturalization in Mar. sept. (Zeeland) (FZ).

- *Crocsmia* Planch.: the exact identity of plants found in cultivation and as escapes is not always clear. They are usually referred to *C. ×crocsmiiflora* (Lemoine) N.E. Brown but at least some may belong to other species or hybrids.

### 52. Asphodelaceae

- A weedy species has been recorded as a grain alien, *Asphodelus tenuifolius* Cav. (port of Antwerp, 2019-2022; wn.be).

- One of the species of *Kniphofia* Moench. that are frequently grown as ornamentals has been recorded as an

escape, *K. ×praecox* Baker. A more or less established population persists in a railway siding in Wervik since 2015 (wn.be).

### 53. Amaryllidaceae

- A cultivated ornamental, *Ipheion uniflorum* (Graham) Raf. [syn.: *Tristagma uniflorum* (Lindl.) Traub], has regularly been recorded as an escape from cultivation since 2012 (wn.be).

- Several additional species of *Allium* L. have recently been recorded as escapes from cultivation: *A. cristophii* Trautv., *A. hollandicum* R.M. Fritsch (syn.: *A. aflatunense* auct.), *A. karataviense* Regel, *A. lusitanicum* Lam., *A. macleanii* Baker, *A. moly* L., *A. nigrum* L., *A. pendulinum* Ten., *A. ramosum* L., *A. roseum* L., *A. triquetrum* L. and *A. zebdanense* Boiss. et Noë (wn.be). Some of these species are locally persisting or even more or less naturalizing.

- Several additional taxa of *Narcissus* L. have recently been recorded as escapes from cultivation: *N. obvallaris* Salisb., *N. tazetta* L., *N. ×cyclazetta* Chater et Stace (wn.be) and doubtlessly several others as well. They are often hard to identify and include complex hybrids, cultivars, etc.

- Several additional species of *Galanthus* L. have recently been recorded as escapes from cultivation: *G. elwesii* Hook. f., *G. plicatus* Bieb. and *G. woronowii* Losinsk. (syn.?: *G. ikariae* Baker) (wn.be).

### 54. Asparagaceae

- Several additional species from genera not treated in detail have recently been recorded as escapes from cultivation: *Agave americana* L., *Camassia leichtlinii* (Baker) S. Watson subsp. *suksdorfii* (Greenman) Gould, *Chlorophytum comosum* (Thunb.) Jacques, *Danae racemosa* (L.) Moench, *Liriope muscari* (Decaisne) L.H. Bailey, *Ophiopogon jaburan* (Siebold) Lodd., *Pseudomuscari azureum* (Fenzl) Garbari et Greuter (syn.: *Muscari azurea* Fenzl), *Puschkinia scilloides* Adams and *Triteleia laxa* Benth. (wn.be).

- The correct name for the variety of *Yucca gloriosa* L. called var. *recurvifolia* (Salisb.) Engelm. in NF6 is var. *tristis* Carr. (POWO).

- Several species that were formerly included in the genus *Scilla* L. are cultivated for ornament in gardens and parks. In addition to those already mentioned in NF6, *Chionodoxa forbesii* Baker [syn.: *Scilla forbesii* (Baker) Speta] has been recorded as an escape from cultivation (wn.be). In general, plants of *Scilla* s.l. shown on wn.be are often difficult to identify unambiguously; perhaps many of them refer to hybrids. From Eifel centr. an additional species has also been identified, *Ch. siehei* Stapf [syn.: *S. siehei* (Stapf) Speta] (FT), although the latter may not be specifically distinct from *Ch. forbesii*. This group requires further study in the Flora area.

- *Asparagus officinalis* L. subsp. *prostratus* (Dum.) Corb.: a character useful for the separation of this sub-

species was added: its cladodes are usually glaucous (FG, H24). However, even then, the populations observed in the territory of the Flora area are much less typical than those of, for instance, Bretagne in France, possibly resulting from introgression with subsp. *officinalis* (comm. M. Leten 06.2017).

- Two alien species of *Maianthemum* Wiggers, *M. dilatatum* (Alph. Wood) A. Nelson et J. F. Macbride (Peer, 2013) and *M. stellatum* (L.) Link [syn.: *Smilacina stellata* (L.) Desf.] (Brasschaat, since 2016; a rather large, apparently long-naturalized population in natural *Quercus* woodland) have been recorded as escapes from cultivation (wn.be).

- The genus *Ornithogalum* L. was dismantled and now only includes *O. umbellatum* L. s.l. in the Flora area. In NF6, the latter species was treated with two subspecies, subsp. *divergens* (Boreau) Bonnier et Layens and subsp. *umbellatum*, that are now treated as two distinct species, *O. divergens* Boreau and *O. umbellatum* s.str. respectively, following FG (contrary to H24 and Stace 2019). *Ornithogalum nutans* L. was transferred to *Honorius* S.F. Gray and was segregated in two species, *H. nutans* (Sm.) S.F. Gray s.str. and *H. boucheanus* (Kunth) Holub (previously as two subspecies of *O. nutans* in NF6). Finally, species related to *O. pyrenaicum* L. were transferred to *Loncomelos* Raf., as *L. pyrenaicum* (L.) Holub. In the Flora area, the latter genus is further represented by the following species: *L. brevistylus* (Wolfner) Dostál [syn.: *L. pyramidale* (L.) Raf., *O. pyramidale* L.] and *L. narbonense* (L.) Raf. (syn.: *O. narbonense* L.).

- Several additional species of *Muscari* Mill. are grown as ornamentals and at least one has recently been recorded as an escape from cultivation: *M. latifolium* J. Kirk, characterized by leaves up to 30 mm wide, has occasionally been recorded since 2014 (wn.be).

- *M. neglectum* Guss. ex Ten.: the correct name for the 'northern' taxon of this complex is *M. neglectum*. *M. atlanticum* Boiss. et Reut. is a Mediterranean species (FG; Garbari 2003). See also Hauteclair & Lambinon (2012).

- The separation of *M. neglectum* and *M. armeniacum* Leichtlin ex Baker is not always straightforward, especially in dried specimens. They are most easily distinguished in the field, based on flower scent and color (Hauteclair & Lambinon 2012; see also FG). Pruinosity of flowers, as mentioned in NF6, is not a reliable character and thus was removed (comm. I. Hoste, 05.2018).

## 55. Commelinaceae

- An additional ornamental species has been recorded as an escape from cultivation: *Tinantia erecta* (Jacq.) Schlecht. It was collected for the first time in 1956 already (as noticed in herbarium BR) and more recently also observed in Sint-Eloois-Vijve in 2017 (wn.be).

## 58. Typhaceae

- Plants intermediate between *Sparganium angustifolium* Michaux and *S. emersum* Rehm. have been reliably

recorded in several localities in Camp. (Fuhrmann 2013). These two species are closely related and indeed produce fertile hybrids.

- *S. erectum* L. includes four (not three) subspecies. In addition to those already listed in NF6 subsp. *oocarpum* (Čelak.) Domin should be sought. It is intermediate between subsp. *erectum* and *neglectum* (Beeby) K. Richt. and considered to be their hybrid (Pišová & Fér 2020). Its fruits are predominantly aborted whereas those that are developed are globular and up to 7 mm across.

- A second hybrid in *Typha* L., *T. ×provincialis* A. Camus [*T. domingensis* (Pers.) Steud. × *latifolia* L.], is known from one locality in Kortrijk (Brab.). It is characterized by its leaves and sheaths with numerous orange mucilaginous glands and by its pale brown female part of the spadix when ripe.

- A characteristic feature for the recognition of the alien *T. minima* Funck, i.e. the spherical or briefly obovoid female part of the spadix, was added.

- *T. laxmannii* Lepechin was already briefly mentioned in NF6; since it has naturalized in several localities throughout the territory, it is now keyed-out and treated in detail.

## 59. Juncaceae

- An alien species of *Luzula* DC. is sometimes recorded as an escape from cultivation, *L. nivea* (L.) DC. (wn.be). It is briefly described.

- The infrageneric taxa of *L. luzuloides* (Lam.) Dandy et Wilmott were reduced to varietal rank, var. *erythranthema* (Wallr.) I. Grint. [as subsp. *rubella* (Hoppe ex Mert. et Koch) Holub in NF6] and var. *luzuloides*.

- Two subspecies of *L. multiflora* (Ehrh.) Lej. were recognized in NF6; these are now treated as two distinct species, *L. congesta* (Thuill.) Lej. and *L. multiflora* s.str., following recent insights and Floras (FG, H24). Plants with more or less intermediate characters are sometimes encountered; it is unclear whether or not these are hybrids or rather indicate weak species boundaries.

- The correct name for *L. pallescens* Swartz is *L. pallidula* Kirschner according to some authors (Kirschner 1990; see also FG). Most recent authors, however, do not follow this viewpoint.

- Two additional alien species of *Juncus* L. have been recorded: *J. acuminatus* Michaux (Aptroot 2018) near Tilburg since 2017 and *J. xiphioides* E. Mey. in Blankenberge (Mar.) since 2016 (Verloove *et al.* 2017a). Both are treated under nrs. 23 (*J. canadensis*) and 25 (*J. ensifolius*) respectively, the species they most closely resemble. Many additional exotic species, mostly native to Australia and New Zealand, have been discovered in the hygrophilic meadows along the Meuse river (Dutch side) downstream from Maastricht since 2016. These species have germinated from the seed bank after extensive works in the alluvial plain; they undoubtedly are remnants of the former wool alien flora and were introduced a long time

ago upstream (especially in the Vesdre valley). Their fate is uncertain but at least a few species seem to have established themselves at least temporarily. Their exact identity should be checked carefully although at least 19 species seem to be involved (Verloove *et al.* in prep.).

- A small population of *J. striatus* Schousb. ex E. Mey., native to the western Mediterranean region, persists since 2015 in a humid dune depression in Koksijde (Mar.) (Leten & Verloove in prep.). Its origin is uncertain: recent arrival of diaspores or germination of seeds buried in the seedbank? This species closely resembles *J. acutiflorus* Ehrh. ex Hoffmann; characteristics useful for their separation are provided.

- *J. tenuis* Willd. now includes four subspecies in the Flora area: subsp. *dichotomus* (Elliott) Verloove et Lambinon was added (Hoste & Verloove 2016). It was already collected in the 19th century in Belgium but remained overlooked until recently. Besides, the rank given to these infraspecific taxa is debatable. Recent American Floras often treat them at specific rank. However, certain populations appear to be more or less intermediate. In addition, hybridization has been reported in the Netherlands, between subsp. *dudleyi* and *tenuis* (Corporaal & Schaminée 2015). Problem to be re-studied.

- *J. bufonius* L. subsp. *minutulus* Krecz. et Gontsch. ex Soó has no taxonomic value, according to Rooks *et al.* (2011) and is now included in subsp. *bufonius*. Var. *congestus* Wahlb. is an older name than var. *parvulus* Hartm. and thus has priority. The taxonomic value of this variety appears to be limited.

- *J. anceps* Laharpe: the infraspecific identity of the populations found in the Flora area should be carefully verified. Two morphological types seem to be present: the plants from Knokke and Zeebrugge rather belong to var. *atricapillus* (Drejer ex Lange) Buchenau (i.e., stocky plants with condensed inflorescences) while the plants from Oostduinkerke and Koksijde differ in being taller, with more open inflorescences and distinctly flattened, keeled leaves (Leten in prep.). This last type of plants would rather correspond to var. *anceps* s.str. This problem needs to be studied again.

- A full account is now provided for *J. ensifolius* Wikstr. and the species is included in the key.

## 60. Cyperaceae

- *Eleocharis engelmannii* Steud.: this North American species is increasingly recorded in the Flora area and is locally naturalized. A full account is thus provided and the species is included in the key (Verloove 2015, Simons *et al.* 2020).

- *E. palustris* (L.) Roem. et Schult.: the correct name for the subspecies called *vulgaris* in NF6 is subsp. *waltersii* Bures et Danihelka (Bures & Danihelka 2008).

- *E. austriaca* Hayek is better considered as a subspecies or even variety of *E. mamillata* Lindb. f., subsp. *austriaca* (Hayek) Strandh. (Gregor 2003; see also FG).

- The genus *Bolboschoenus* (Aschers.) Palla was completely revised. A key and full account is now provided for four species (a single species in NF6): *B. maritimus* (L.) Palla s.str., *B. laticarpus* Marhold, Hroudová, Zákavský et Ducháček, *B. yagara* (Ohwi) Yung C. Yang et M. Zhan and *B. planiculmis* (F. Schmidt) T. Egorova. A fifth species, *B. glaucus* (Lam.) S.G. Smith, was recorded once as a casual alien (Antwerp, 2015). Hybridization can complicate species identification in this complex (Píšová *et al.* 2017).

- The two subspecies of the North American *Scirpus atrovirens* Willd. are now accepted as distinct species, *S. georgianus* R.M. Harper and *S. hattorianus* Makino, following recent American flora accounts (see also FG).

- Another North American species, *S. cyperinus* (L.) Kunth, is naturalized in Camp., both in Belgium and the Netherlands. It is keyed-out and a full account is provided. This species occurs near Eindhoven since 2015 and is well-established there (Spronk 2016). Since 2018 it has also been known from a single Belgian locality (near Hoogstraten). As this is a potentially invasive species, an attempt was made to eradicate it in the latter locality in 2019 (at that time ca. 1000 individuals were present, including many seedlings in the riparian zone). The species was eradicated manually and is under control now but monitoring will be needed for several years to prevent the species from spreading again (comm. B. Hoeymans 02.2021).

- *Schoenoplectus supinus* (L.) Palla: this species has never been mentioned from the Flora area. It occurs spontaneously in the Moselle valley, near Trier (Germany), just outside the territory of the Flora (FT). However, it was also present in the past in Ard. (west of Charleville-Mézières, in France) and in Tert. par. (northeast of Paris) (last seen around 1938; SI-Flore). Around 2005, it was discovered in Champ. near Troyes (Didier *et al.* 2011-2012), at the southern limit of the Flora area, but it seems rather unstable at its stations. Like *S. mucronatus* (L.) Palla, it is an annual plant but its stems are subcylindrical, usually spreading or ascending and with a perigone with 0-3 bristles (perigone with 6 bristles in *S. mucronatus*).

- An alien species of *Schoenoplectus*, *S. bucharicus* (Roshch.) Grossh., was recorded as an ephemeral alien in Antwerp in 2014-2015 (wn.be).

- *Cyperus michelianus* (L.) Delile: this southern species was rediscovered in 2017 in the Brienne le Château area (Etang de la Motte, Aube department; Champ. mér.), at the extreme southern limit of the Flora area, more than 60 years after its last appearance there (Lanfant & Régnier 2018; database CBN Paris). Only one or two plants were observed and its survival needs to be confirmed. Therefore, this species was not (yet) added to the key but a future expansion towards the Flora area, further enhanced by a changing climate, cannot be ruled out.

- *C. longus* L. is usually represented by subsp. *longus* in the Flora area. However, a population known since 2009

in Koksijde (Fluithoekduinen nature reserve) seems to belong to subsp. *badius* (Desf.) Bonnier et Layens (Leten & Verloove in prep.). The same subspecies was also reported from a lake margin in the Grand-Duchy of Luxembourg (Lorr. district) (Krippel & Colling 2016) but this identity requires confirmation.

- *Carex liparocarpos* Gaudin: this species has been reported on several occasions from the French part of the Flora area, for instance from the Parc naturel régional de Lorraine between Metz and Nancy. However, according to Welk & Oesau (2019) these are erroneous claims.

- An important character to separate *C. flava* L. from *C. lepidocarpa* Tausch was added to the identification key, i.e. the shape of the ligule (see van der Meijden & Holverda 2006; comm. M. Leten, 05.2018). The degree to which the beak of the utricles is scabrid (as mentioned in NF6), on the contrary, was shown to be an unreliable feature, based on extended multivariate studies on plant material from northwestern France (Duluc 2019). The same study demonstrated that *C. lepidocarpa* has small utricles with short beaks and the percentage of retrorse utricles is greater than 50%, whereas *C. flava* has larger utricles with a longer beak and a ratio of retrorse utricles of less than 50% (see also FG, H24). But even then, only extremes can be reliably identified: plants with more or less intermediate utricule features (that thus could be considered to be their (sterile) hybrid) proved to be fertile which rejects this hypothesis.

- Several additional alien species of *Carex* L. were recorded recently (wn.be): *C. loliacea* L. (port of Ghent, 2015), *C. melanostachya* Bieb. ex Willd. (Koopman *et al.* 2014; also treated in some more detail under n° 50 *C. acutiformis* Ehrh.), *C. morrowii* Boott (several records as escape from cultivation), *C. muskingumensis* Schweinitz and *C. scoparia* Schkuhr ex Willd. (also treated in some more detail under n° 26 *C. crawfordii* Fernald) (see also Verloove 2016).

- An additional *Carex* hybrid was recorded in the Flora area: *C. divulsa* Stokes × *muricata* L. (Mol, 2011; identity confirmed by Ana Molina, Spain).

- Some nomenclatural issues were solved: *C. ×fulva* Good. is indeed the correct name for *C. demissa* Vahl ex Hartm. × *hostiana* DC. (Koopman 2011). The correct name for the hybrid *C. flava* × *lepidocarpa* is *C. ×ruedtii* Kneucker (1891), not *C. ×pieperiana* Junge (1904) (Koopman 2011) and *C. ×pseudomairei* E.G. Camus is indeed the correct name for *C. lepidocarpa* × *mairei* Coss. et Germ. (Koopman 2011).

- *C. ligerica* J. Gay en *C. colchica* J. Gay are conspecific and both names were first published by Gay in the same paper. Chronologically, *C. colchica* appeared first and thus has priority over *C. ligerica* (see also Koopman 2011).

- All recent authors accept the conspecificity of *C. reichenbachii* Bonnett and *C. pseudobrizoides* Clavaud (e.g. Koopman 2011, FG, H24), the latter binomial having nomenclatural priority.

- The correct name for *C. praecox* Schreb. subsp. *intermedia* (Čelak.) Schultze-Motel is *C. praecox* subsp. *curvata* (Knaf) Vollm. (Koopman 2011).

- The correct name for *C. cuprina* (Sándor ex Heuffel) Nendtvich ex A. Kerner is *C. otrubae* Podp. (Koopman 2011).

- The taxonomy of the *C. muricata* group has considerably changed. Four separate species are now accepted: *C. muricata* L. s.str. and *C. pairae* F.W. Schultz on the one hand and *C. divulsa* Stokes and *C. leersii* F.W. Schultz on the other (Molina *et al.* 2008, Koopman 2011). A fifth species, *C. nordica* Molina, Acedo et Llamas, has also been reported from the Flora area, including from Belgium, but the taxonomic value of this species is contested (comm. J. Koopman, 09.2020; see also Gregor 2014). According to Duluc (2019) it represents a mere juvenile morph of *C. leersii*.

- The conservation and rejection proposals for *C. leersii* F.W. Schultz and *C. chabertii* F.W. Schultz respectively were accepted by the latest Congress (Shenzhen Code Appendices).

- The correct name for *C. ovalis* Good. is *C. leporina* L. (Koopman 2011).

- An American species much reminiscent of *C. crawfordii* Fernald has been observed occasionally since 2013 on pond margins in Camp. and Brab., *C. scoparia* Willd. Its utricles are 1.2-2 mm wide and 4.2-6.8 mm long when mature and its achenes 0.7-0.9 mm wide (in *C. crawfordii* the utricule is 0.9-1.3 mm wide and 3.4-4.1 mm long and the achene 0.6-0.8 mm wide) (Koopman 2015, Verloove 2016).

- The species status of *C. lepidocarpa* Tausch was maintained, in accordance with recent authors (Jiménez-Mejías *et al.* 2014). It had been suggested that this species is better seen as a subspecies of *C. viridula* Michaux.

- *C. viridula* Michaux: the two varieties that were distinguished in NF6, var. *viridula* and var. *pulchella* (Lönnr.) B. Schmid, were tentatively maintained. However, they may turn out to be mere ecotypes and thus of limited or no taxonomic value at all (Więclaw 2018).

- An alien species similar to *C. acutiformis* Ehrh., *C. melanostachya* Bieb. ex Willd., originally from Central and eastern Europe and Asia, has been known since 2010 from a single locality in Antwerpen-Linkeroever where it was probably introduced a long time ago already (Koopman *et al.* 2014). It differs from *C. acutiformis* by its shorter female spike (10-20 × 5-7 mm), its utricule with distinctly depressed veins at maturity, its hairy leaf sheath (at least in this population) and its leaves 2-4 mm wide. Although clearly established in this locality, no full account for this species was provided because the growing place may disappear/has disappeared after infrastructural works (Oosterweel link).

- *C. nigra* (L.) Reichard: the presence or absence of stomata on upper and/or lower leaf surfaces enables to distin-

guish between this species, *C. acuta* L. and their hybrid, *C. ×elytroides* Fries, which is not quite rare and probably overlooked (Hoste & Verloove 2017). *C. nigra* has abundant stomata on the upper surface of the leaf (and usually no or few stomata on the lower surface of the leaf), *C. acuta* has abundant stomata on the lower surface of the leaf (and usually no stomata on the upper surface), their hybrid usually has abundant stomata on both leaf surfaces (comm. I. Hoste & M. Porter, 09.2021).

- *C. pendula* Huds.: two subspecies are now recognized in the Flora area, subsp. *pendula* and subsp. *agastachys* (L. f.) Ljungstrand. The latter is separated based on its rather obovate utricles, purple-reddish ligule edges and scabrous peduncles of the female spike. According to most authors, partly based on molecular data, these are in fact two distinct species (Jiménez-Mejías *et al.* 2017, Míguez *et al.* 2017), although fertile intermediates are regularly observed (see also H24). Their distribution and frequency in the Flora area should be investigated. Subsp. *agastachys* is considered to occupy the eastern portion of the species' distribution range whereas subsp. *pendula* is restricted to the western portion. At first sight, this is not corroborated by historical herbarium collections from the Flora area.

## 61. Poaceae

- Key: in the key to species in NF6 for *Tragus* the lemmas were said to be spiny on the back. In reality, the glumes have a row of spines on the back, not the lemmas.
- With respect to alien species not treated in detail:
  - *Cortaderia selloana* (Schult. et Schult. f.) Aschers. et Graebn.: although usually dioecious, there are also monoecious races and these result in the species increasingly reproducing from seed. Armitage (2012) listed all named cultivars with their gender; eight of them are hermaphrodite (male fertile). Self-sown plants are often found in rather remote localities (e.g. port areas) far away from gardens or ornamental plantations.
  - Name changes in Poaceae are listed in Table 1.
  - Bamboos: the nomenclature and taxonomy are very complex. *×Pseudosasa japonica* (Siebold et Zucc. ex

Steud.) Makino ex Nakai appears to be an intergeneric hybrid of *Arundinaria hindsii* Munro *× Sasa borealis* (Hack.) Makino et Shibata parentage (FG and references therein). One additional bamboo was found as an escape: *×Semiarundinaria fastuosa* (Mitford) Makino [*Arundinaria simonii* (Carrière) Riviere et C. Riviere *× Phyllostachys bambusoides* Siebold et Zucc.]. Two name changes were implemented; see Table 1 (*Thamnocalamus* and *×Sasinaria*). The exact identity and status of most species needs to be reconsidered and *Phyllostachys* Siebold et Zucc. has never been seriously studied. Most species do not really run wild but they can sometimes form large populations as relicts of cultivation or from discarded garden waste.

- Newly recorded aliens from genera not treated in detail: *Diplachne fusca* (L.) Beauv. ex Roem. et Schult. var. *fascicularis* (Lam.) P.M. Peterson et N. Snow (Antwerp, 2016), *Eriochloa villosa* (Thunb.) Kunth (Ghent, 2016), *Oryza sativa* L. (Antwerp, 2018), *Paspalum notatum* Flueggé (Antwerp, 2014), *Trisetaria panicea* (Lam.) Paunero (Antwerp, 2015) and *Urochloa ramosa* (L.) T.Q. Nguyen (Antwerp, 2018) (wn.be).
- A taxon, doubtfully recorded by Pelgrims in the past (Hoste & Verloove 2019), was removed: *Eustachys retusa* (Lag.) Kunth.
- *Panicum* L.: an additional species was found as a casual alien, *P. coloratum* L. (Meeswijk, 1986; comm. T. Denters).
- *P. miliaceum* L.: the biostatus depends from the subspecies, subsp. *miliaceum* always being ephemeral. Contrary to what was assumed before, subsp. *ruderales* (Kitagawa) Tzvelev and subsp. *agricola* H. Scholz et Mikoláš hardly differ in ecology and habitat preference. Both occur as weeds of agricultural fields and as ruderals.
- *P. barbipulvinatum* Nash was segregated from *P. capillare* L. and treated in detail, following FG, H24, etc. (see also Amarell 2013, Dirkse & Holverda 2016).
- *P. chloroticum* Nees ex Trin. was reduced to a variety of *P. dichotomiflorum* Michaux, var. *chloroticum* (Nees ex Trin.) B. Bock.

**Table 1.** Name changes in Poaceae in NF7 as compared with NF6.

Name in NF6	New name in NF7
<i>Beckeropsis petiolaris</i> (Hochst.) Figari et De Not.	<i>Cenchrus petiolaris</i> (Hochst.) Morrone
<i>Leptochloa uninervia</i> (J. Presl.) Hitchc. et Chase	<i>Diplachne fusca</i> (L.) Beauv. ex Roem. et Schult. var. <i>uninervia</i> (J. Presl) P.M. Peterson et N. Snow
<i>Pennisetum alopecuroides</i> (L.) Spreng.	<i>Cenchrus purpurascens</i> Thunb.
<i>Pennisetum flaccidum</i> Griseb.	<i>Cenchrus flaccidus</i> (Griseb.) Morrone
<i>Pennisetum villosum</i> Fresen.	<i>Cenchrus longisetus</i> M. C. Johnst.
<i>Stipa tenuissima</i> Trin.	<i>Nassella tenuissima</i> (Trin.) Barkworth
<i>Panicum clandestinum</i> L.	<i>Dichantherium clandestinum</i> (L.) Gould
<i>Piptatherum miliaceum</i> (L.) Coss.	<i>Oloptum miliaceum</i> (L.) Röser et Hamasha
<i>Trisetaria michelii</i> (Savi) D. Heller	<i>Avellinia festucoides</i> (Link) Valdés et H. Scholz
<i>Arundinaria spathacea</i> (Franch.) McClintock	<i>Thamnocalamus spathaceus</i> (Franch.) Soderstrom
<i>Sasaella ramosa</i> (Makino) Makino	<i>×Sasinaria ramosa</i> (Makino) Demoly

- An additional alien species of *Echinochloa* Beauv. has occasionally been recorded: *E. oryzicola* (Vasing.) Vasing (wn.be). *E. hispidula* (Retz.) Nees ex Royle was reduced to a variety of *E. crus-galli* (L.) Beauv., var. *hispidula* (Retz.) Honda (and it is likely even conspecific with var. *crus-galli*; Hoste & Verloove 2022). Distinguishing features for two frequently recorded but casual aliens, *E. esculenta* (A. Braun) H. Scholz and *E. frumentacea* Link, were added.
- A note in NF6, in which several varieties of *E. crus-galli* were described, was removed because these are of no taxonomic value. The variation of this species is endless and also partly depends on the habitat (ecotypes). Plants in wet locations tend to be stockier with overhanging, longer awned spikelets ('hispidula'). Also subsp. *spiralis* (Vasing.) Tzvelev may be nothing else than another ecotype, typical of dried out ponds and exposed river banks. There are also transitional forms to *E. colona* Link ('praticola') and even the separation from *E. esculenta* / *frumentacea* is not always straightforward. See also Hoste & Verloove (2022).
- *E. muricata* (Beauv.) Fernald: this species does not include two but three varieties: in addition to var. *muricata* (RR and ephemeral) and var. *microstachya* Wiegand (the most widespread variety) also var. *wiegandii* (Fassett) Mohlenbr. [syn.: *E. wiegandii* (Fassett) McNeill et Dore] (Hoste 2004, Bomble 2016b, Hoste & Verloove 2022). It is RR but possibly overlooked. All three varieties are keyed-out now.
- *Setaria verticillata* (L.) Beauv. var. *ambigua* (Guss.) Parl.: the taxonomic status remains debatable: in a recent monograph of the genus it is accepted as a distinct species (Morrone *et al.* 2014), whereas molecular data suggest that it does not differ from var. *verticillata* (Layton & Kellogg 2014).
- *S. viridis* (L.) Beauv.: this is the wild ancestor of *S. italica* (L.) Beauv. and both may be better combined in one species (as subspecies; cf. FG). Other recent Floras (Stace 2019, H24) do not do this, nor does the recent monograph of the genus (Morrone *et al.* 2014). The individual variation of *S. viridis* may be of little taxonomic importance. In addition to the varieties already mentioned in NF6, var. *weinmannii* (Roem. et Schult.) Heuffel. may be distinguished for plants with purple bristles.
- *S. italica*: according to some authors (FG) this species contains two taxa: plants with persistent caryopses, often drooping and lobed inflorescences and usually with bristles shorter than the spikelets belong to subsp. *italica*, while those with deciduous caryopses, often straight and barely lobed inflorescences and bristles usually longer than the spikelets could be referred to subsp. *moharia* (Alef.) R.A.W. Herrmann. Both are found in the Flora area.
- *S. faberi* R.A.W. Herrmann: the synonymy of this species with *S. macrocarpa* Lucznik was not questioned in a recent monograph of the genus (Morrone *et al.* 2014).
- An additional alien species of *Digitaria* Haller was recorded, *D. abyssinica* (A. Rich.) Stapf (Eksel, 2012; wn.be).
- *D. sanguinalis* (L.) Scop. var. *atricha* (Aschers. et Graebn.) Henrard: no recent Floras mention this taxon, since hair characteristics usually have little or no taxonomic value.
- *Eleusine indica* (L.) Gaertn. s.l.: it is still unclear which taxon / taxa exactly occur in the Flora area. According to our preliminary findings *E. africana* Kennedy-O'Byrne is the species usually recorded these days, whereas *E. indica* s.str. only occurred as an alien long ago. However, according to FG *E. indica* s.str. is the established species in France, while *E. africana* is an ephemeral alien. H24 only mentions *E. indica*, likely in a wide sense. In any case, these are better treated as separate species according to Peterson *et al.* (2015).
- *Spartina* Schreb.: according to some authors, this genus actually belongs in *Sporobolus* R. Brown now (Peterson *et al.* 2014) but there is a lot of opposition against these new insights (e.g. Bortolus *et al.* 2019). A conservative taxonomy is applied here but synonyms in *Sporobolus* were added (cf. H24).
- *S. anglica* C.E. Hubbard: this is better regarded as a separate species (neotaxon), originating from *S. ×townsendii* H. et J. Groves (FG, H24, Stace 2019). Both are now keyed out and treated as distinct entities.
- *Sporobolus indicus* (L.) R. Brown: this alien is recently naturalizing in the Flora area. The genus *Sporobolus* R. Brown and this species are keyed-out now and a full account is provided.
- Two additional alien species of *Eragrostis* Wolf were recorded (wn.be): *E. albensis* H. Scholz (Oostham, 2015) belongs to the *E. pilosa* group and is thus difficult to distinguish and possibly overlooked. It is increasing in the Netherlands and has also been recorded along river Moselle in the Trier area in Germany (FT), in both cases just outside the Flora area. The second new alien is *E. pectinacea* (Michaux) Nees (Antwerp port, 2012).
- *E. pilosa* (L.) Beauv. subsp. *damiensiana* (Bonnet) Thell. is now treated as a distinct species, *E. multicaulis* Steud.
- *Danthonia decumbens* (L.) DC. subsp. *decipiens* O. Schwarz et Bässler ex Bässler: this is a Central and eastern European taxon which presence in the Flora area was thought to be questionable (map Euro+Med Plantbase, FloraWeb; see also FG). However, it was recently found in two localities in the Trier area in Germany, in Eifel centr. and Lorr. nord-or. (FT, Schumacher 2013).
- An additional alien species of *Phalaris* L. was recorded, *P. angusta* Nees ex Trin. (Antwerp port, 2012; pers. obs.). A population of *P. aquatica* L., persisting in a ditch in Geel since 2008, consists of plants with hairy glumes. Such plants are sometimes classified as a separate species, *P. elongata* Br.-Bl. (e.g. Baldini 1995) although molecular

studies have shown that they are genetically not distinguished from *P. aquatica* (Voshell *et al.* 2015).

- ***Koeleria*** Pers.: this genus has hardly been sampled in molecular phylogenetic studies (Saarela *et al.* 2017). The three species found in the Flora area are morphologically similar and sometimes hard to tell apart. According to some authors they may be better understood as one variable species, *K. pyramidata* (Lam.) Beauv. (FG). However, according to Gregor *et al.* (2021) the relative DNA content of *K. macrantha* (Ledeb.) Schult. and *K. pyramidata* (Lam.) Beauv. is very clearly different. Pending further studies three distinct species are upheld.

- *K. glauca* (Spreng.) DC.: this species is sometimes grown as an ornamental and may be found as an escape. However, claims of it as a native species from the Flora area (see FLORAINE 2013) are doubtlessly erroneous (comm. S. Antoine 05.2021; compare also with FG).

- *K. albescens* DC. is a controversial name, as long as no (lecto-) type is chosen. The original material may partly belong to *K. macrantha* (Ledeb.) Schult. Therefore, the younger synonym *K. arenaria* (Dum.) B.D. Jacks. is now applied (FG).

- ***Rostraria cristata*** (L.) Tzvelev: this southern species is increasingly naturalizing in the Flora area, especially in urban habitats but also in coastal areas. The genus *Rostraria* Trin. and this species are keyed-out now and a full account is provided.

- ***Arrhenatherum elatius*** (L.) Beauv. ex J. et C. Presl subsp. *elatius* and subsp. *bulbosum* (Willd.) Schübl. et Martens: these subspecies are reportedly hybridizing. According to FG, such hybrids are much more common and increasing in some regions. Subsp. *bulbosum*, on the other hand, is indeed in regression, as indicated in NF6.

- ***Avenula*** (Dum.) Dum.: this genus now only includes *A. pubescens* (Huds.) Dum. in the Flora area, *A. pratensis* (L.) Dum. being transferred now to *Helictochloa* Romero Zarco, as *H. pratensis* (L.) Romero Zarco [the same applies to the introduced *H. bromoides* (Gouan) Romero Zarco].

- ***Deschampsia*** Beauv. now only includes *D. cespitosa* (L.) Beauv. in the Flora area, *D. flexuosa* (L.) Trin. and *D. setacea* now being transferred to *Avenella* (Bluff & Fingerh.) Drejer and *Aristavena* F. Albers et Butzin respectively [as *Avenella flexuosa* (L.) Drejer and *Aristavena setacea* (Huds.) F. Albers et Butzin].

- *D. cespitosa*: the infraspecific taxa already briefly mentioned in NF6 are now widely recognized, even as subspecies. The taxonomy and nomenclature were adjusted accordingly and now also correspond to e.g. FG and E+M Plantbase. Both subsp. *parviflora* (Thuill.) Dum. and subsp. *subtriflora* (Lag.) Ehr. Bayer et G. López [syn.: subsp. *convoluta* (Rouy) P. Fourn.] have been confirmed from northern France.

- ***Aira caryophyllea*** L. subsp. *multiculmis* (Dum.) Bonnier et Layens is now accepted as a distinct species, *A. multiculmis* Dum. (cf. FG).

- ***Elymus*** L. and ***Elytrigia*** Desv. are now treated as two distinct genera, following FG and particularly recent German authors (H. Scholz in E+M Plantbase), but this segregation remains controversial. In the Flora area *Elymus* only has one native representative, *E. caninus* (L.) L. The type of *Elytrigia* [*E. repens* (L.) Nevski], however, has the same genotype as *E. caninus*. A rare adventive species, *Elymus canadensis* L., also belongs in *Elymus* s.str.

- ***Elytrigia campestris*** (Godr. et Gren.) Kerguelen ex Carreras subsp. *maritima* (Tzvelev) H. Scholz: this taxon from coastal habitats was distinguished in NF6, differing from subsp. *campestris* by its inrolled leaves, even when fresh, with smooth or barely scabrous ribs (instead of more or less flat when fresh, with scabrous ribs), the spike 3-9 cm long (instead of 6-20 cm) and 2-6 flowered spikelets (instead of 3-10 flowered spikelets). However, it was demonstrated that such plants belong to either *E. acuta* (DC.) Tzvelev, *E. repens* (L.) Desv. ex Nevski or their hybrid (Wilcox 2012 and 2015a, Stace 2019, H24).

- An additional ***Secale*** was recorded as a casual grain alien, *S. ×derzhavinii* Tzvelev [*S. cereale* L. × *strictum* (C. Presl) C. Presl] (port of Antwerp, 2011-2013; wn.be).

- An additional alien ***Hordeum*** L. is sometimes observed, *H. murinum* L. subsp. *glaucum* (Steud.) Tzvelev (syn.: *H. glaucum* Steud.) (Verloove & Vercruyse 2020).

- Two subspecies are now distinguished and keyed out under *H. murinum*: native subsp. *murinum* and introduced, naturalized subsp. *leporinum* (Link) Arcang. (syn.: *H. leporinum* Link) (Verloove & Vercruyse 2020).

- ***Ammophila arenaria*** (L.) Link and ×***Calammophila baltica*** (Flügge ex Schrad.) Brand are now sometimes included in *Calamagrostis* Adans. (Saarela *et al.* 2017). Alternative names in this genus were added: *Calamagrostis arenaria* (L.) Roth and *C. ×calammophila* Saarela, respectively.

- A full account for a third species of ***Polygogon*** Desf., *P. maritimus* Willd., was added. It is increasingly found as an alien and has naturalized in a number of sand raised areas around Antwerp for over 20 years (Verloove *et al.* 2008).

- In the Mar. district, both in France (Gravelines) and in the Netherlands (Middelburg), plants intermediate between *P. monspeliensis* (L.) Desf. and *P. viridis* (Gouan) Breistr. have been recorded, occurring together or in the vicinity of these two species. They could be considered as belonging to the hybrid of these two species, *P. ×adscendens* Bertol. However, these plants are apparently very fertile and more likely belong to a morphologically ± intermediate species, *P. fugax* Nees ex Steud. In the Netherlands these plants were eventually considered to be indeed *P. fugax* (FZ, H24). The various genome weights of these three species (as provided by Zonneveld 2019) rather suggest that the intermediate plants are indeed a different species, *P. fugax*. The problem should be reconsidered.

- *Calamagrostis stricta* (Timm) Koeler: the use of this species name was controversial. Several databases and Floras (e.g. Digitale2, FG, E+M Plantbase) use the name *C. neglecta* for this species but this is a nom. illegit. according to Buttler (Florenliste). However, Sennikov (2022) reaffirmed the correct application of the name *C. neglecta* for this taxon.
- The binomial *Agrostis* × *sanionis* (Aschers. et Graebn.) Chase et Niles as indicated in NF6 for *A. capillaris* L. × *vinealis* Schreb., was removed since this name refers to the hybrid of *A. capillaris* × *canina* L. (Portal 2009).
- Several alien species of *Agrostis* L. are upheld in this genus, at least for the time being. *Agrostis*, *Lachnagrostis* Trin. and *Polypogon* form a clade and species of each are variously intermixed in plastid and nuclear ribosomal trees (Saarela *et al.* 2017). Their alternative names in *Lachnagrostis* were added: *Agrostis avenacea* J.F. Gmel. [syn.: *Lachnagrostis filiformis* (Forst.) Trin.], *A. eriantha* Hack. [syn.: *Lachnagrostis eriantha* (Hack.) A.J. Br.] and *A. lachnantha* Nees [syn.: *Lachnagrostis lachnantha* (Nees) Rúgolo et A.M. Molina].
- A species of *Agrostis* that is sometimes grown as an ornamental, *A. nebulosa* Boiss. et Reut., is now sometimes accommodated in a segregate genus; its alternative name in that genus was added, as a synonym [*Neoschischkinia nebulosa* (Boiss. et Reut.) Tzvelev].
- *A. stolonifera* L.: the correct name at varietal rank for a variety from salt meadows and brackish water edges is var. *arenaria* (Gouan) Dobignard et Portal. Var. *pseudopungens* (Lange) Kerguélen, also mentioned in NF6, is probably not distinguishable from it. Analogously, var. *palustris* (Huds.) Farw. likely is a mere hydromorphic form of var. *stolonifera* and of no taxonomic value (FG).
- An additional alien species of *Apera* Adans. was added, *A. intermedia* Hack. There are historical records (Verloove 2006) and it was also found in Ghent in 2013 (wn.be).
- An additional alien species of *Melica* L. was added, *M. altissima* L. It was seen as an escape in Sint-Stevens-Woluwe in 2020 (wn.be).
- *M. ciliata* L.: the wild populations that are found in the Flora area belong to subsp. *glauca* (F.W. Schultz) K. Richt., subsp. *ciliata* being mainly distributed in Central and Eastern Europe. The identity of plants found in the horticultural trade (and increasingly also as escapes) needs to be re-assessed; they may rather belong to subsp. *transilvanica* (Schur) Husn.
- *Brachypodium pinnatum* (L.) Beauv. and *B. rupestre* (Host) Roem. et Schult.: it remains completely unclear which species exactly occur in the Flora area. According to Digitale2 (see also Duluc 2019), in northwestern France only *B. rupestre* is found and AFL only mentions this species from French Lorraine. However, according to SI-Flore both occur in France in the Flora area. Moreover, in the Trier area in western Germany, adjacent to the Luxembourg part of Lorraine, *B. pinnatum* is considered to be

the only native species, whereas *B. rupestre* is at most an introduction there (FT). In the Netherlands, only *B. pinnatum* s.str. occurs (H24). The issue must be thoroughly reinvestigated; for now and pending further studies nothing was changed.

- *B. phoenicoides* (L.) Roem. et Schult.: this thermophilous grass species was recently discovered in a few localities (e.g. Verloove & Barendse 2019). At least in two, it is established and it may have been overlooked elsewhere. It is now keyed-out and a full account is presented.
- *Dactylis glomerata* L.: is now accepted as a single variable species that also includes *D. polygama* Horvátovszky, now treated as subsp. *lobata* (Drejer) Lindb. f., following e.g. FG, H24, etc.
- The status and distribution of *D. glomerata* subsp. *lobata* is unclear in the Flora area. It is considered to be R in Lorraine. However, according to AFL the widespread subspecies there is subsp. *slovenica* (Domin) Domin, a taxon not previously reported from the Flora area. A local Red List (Bonassi 2015) only includes the latter while subsp. *lobata* is left unmentioned. According to FG, subsp. *lobata* is present in Alsace (thus further south) and in the Paris region whereas subsp. *slovenica* occurs in the east of France (but also in the NE?). Subsp. *lobata* is certainly present in calcicolous beech-oak-woodland in the Lorraine plateau (Côtes de Meuse et Moselle), e.g. in the Haye massif. It is globally rare but can locally be abundant (frequency index: AR-R). The genuine presence of subsp. *slovenica* in the Lorraine floristic district requires confirmation although its presence is highly probable there (comm. S. Antoine and J.-M. Tison, 01.2021). A record of the potential presence of subsp. *slovenica* in Lorr. was added, as were some morphological features that enable its separation from subsp. *lobata* and subsp. *glomerata*.
- Two annual species of *Poa* L., *P. annua* L. and *P. infirma* Kunth, are sometimes accommodated in a segregate genus, *Ochlopoa* (Aschers. et Graebn.) H. Scholz (e.g. E+M Plantbase). Synonyms in this genus were added: *O. annua* (L.) H. Scholz and *O. infirma* (Kunth) H. Scholz, respectively.
- A recently naturalized (or previously overlooked?) species of *Poa*, *P. infirma*, was added to the identification key and a full account provided (Verloove *et al.* 2020a; see also H24). It is mostly found in Mar. and Fl. in Belgium and the Netherlands. It is also known around Paris (FG) but just south of the Flora area (valley of the Seine; Digitale2).
- At subspecies rank, the correct name for *Poa pratensis* L. subsp. *latifolia* (Weihe) Schübl. et Martens is subsp. *irrigata* (Lindm.) Lindb. f.
- *Bromus* L. is now segregated and includes four distinct genera: *Bromus* s.str., *Bromopsis* (Dum.) Fourr., *Anisantha* K. Koch and *Ceratochloa* DC. et Beauv., following recent insights (see also FG, H24, Stace 2019).

- Some additional casual alien taxa of *Bromus* have been recorded: *B. intermedius* Guss. (Berchem, 1952). *B. japonicus* Thunb. in fact includes three subspecies in the Flora area: subsp. *japonicus* (the least rare taxon, seen most years), subsp. *phrygius* (Boiss.) Pénzes (Antwerp port, 2013) and subsp. *subsquarrosus* (Borbás) Pénzes (scattered records in port areas from 2009 onwards; pers. obs.).
- *B. arvensis* L.: this is a variable species. Subsp. *parviflorus* (Desf.) H. Scholz, with much shorter anthers up to 2 mm long, was observed in northeastern Lorr. (Germany; FT) and could exist elsewhere.
- *B. racemosus* L. and *B. commutatus* Schrad.: these two species are sometimes difficult to separate. According to Stace (2019), both can better be regarded as synonyms. In Belgium (and doubtlessly elsewhere too), plants have been observed with intermediate character states, suggesting hybridization or introgression, even though hybrids were not confirmed by Stace (2010). According to U. Amarell (comm. 11.2018) crosses in *Bromus* are fertile which further complicates the issue. It has been suggested that allopolyploid speciation may be involved (comm. H. Baeté, 05.2017). Weak species boundaries are a known phenomenon in *Bromus*. See also the interesting discussion in FG (p. 217). From this point of view, only three genuine, ‘biological species’ are present in Belgium: *B. arvensis*, *B. hordeaceus* L. and *B. secalinus* L., all the others having evolved from them.
- *B. commutatus* includes two subspecies in the Flora area: subsp. *commutatus* and subsp. *decipiens* (Bomble et H. Scholz) H. Scholz. Both are now keyed-out. The latter was initially described as a subspecies of *B. secalinus* L. and treated as such in NF6. It is more or less intermediate between these two species, underscoring the taxonomic difficulties in this complex.
- *B. bromoides* (Lej.) Crépin: although morphologically quite distinct, this species is probably only a monogenetic mutant of *B. grossus* Desf. ex DC. Therefore, it was included in the synonymy of the latter in FG. However, taking into account the clear and constant morphological and genetic differences as compared to *B. grossus*, it was upheld (see also Koch *et al.* 2016, Godefroid *et al.* 2020).
- *B. hordeaceus* L.: this species includes two native subspecies in the Flora area: subsp. *hordeaceus* and subsp. *thominei* (Hardouin) Br.-Bl. A third subspecies, subsp. *pseudothominei* (P.M. Smith) H. Scholz is now accepted as a distinct, hybridogenous species, *B. pseudothominei* P.M. Smith (FG, Stace 2019). If this were upheld as a subspecies of *B. hordeaceus*, then the other parental species, *B. lepidus* Holmberg, should also be regarded as a subspecies of it. An additional subspecies has also been recorded, subsp. *longipedicellatus* L.M. Spalton. It is separated by some authors (FG, Stace 2019) but not by others (H24). These are very robust plants (stem up to 150 cm high) with a panicle over 12 cm long, with at least four panicle branches 15 mm or longer.
- The identity of a plant sown for the revegetation of a slag heap in Brab. occ. (France) should be reassessed. It was originally assigned to *Bromopsis pumpelliana* (Scribn.) Holub. (syn.: *Bromus pumpellianus* Scribn.) (Verloove 2008a), then to *B. riparia* (Rehm.) Holub (syn.: *Bromus riparius* Rehm.) (FG). These plants are more or less intermediate between *B. inermis* (Leyss.) Holub and *B. erecta* (Huds.) Fourr. and could also exist elsewhere in the Flora area.
- Two subspecies of *B. ramosa* (Huds.) Holub, subsp. *ramosa* and subsp. *benekenii* (Lange) Schinz et Thell., are now accepted as two distinct species, following recent insights (FG, Stace 2019; see, however, H24): *B. ramosa* s.str. and *B. benekenii* (Lange) Holub.
- *Anisantha diandra* (Roth) Tutin ex Tzvelev: this species included two subspecies in NF6. These are now accepted as two distinct species, *A. diandra* s.str. and *A. rigida* (Roth) Hyl., following recent insights (FG, Stace 2019; see, however, H24).
- *A. madritensis* (L.) Nevski is locally naturalized now in the Flora area. The species is keyed-out and a full account provided.
- *Ceratochloa carinata* complex: the established plants belong to *C. sitchensis* (Trin.) Cope et Ryves, not to *C. carinata* (Hook. et Arnott) Tutin s.str. (Verloove 2012a). See also FG, H24, etc. The latter is very close to and has often been confused with *C. sitchensis*. It is rarely seen as an ephemeral alien and differs by its smaller spikelets, grouped in a short, compact panicle.
- *Glyceria striata* (Lam.) A.S. Hitchc.: this American weed in fact includes two subspecies in the Flora area. The invasive plant belongs to subsp. *difformis* Portal: plants with spreading inflorescences with more or less inclined branches, with spikelets 2-2.5(-3) mm long, with 2-3 flowers, with lemmas 1.2-1.8 mm long and with upper glumes 0.7-0.8 mm long. In subsp. *striata*, which is hardly invasive, the inflorescence is distinctly one-sided with pendulous branches, the spikelets are (2.5-)3.5-5 mm long, 3-5-flowered, the lemmas are 2-2.4 mm long and the upper glumes 1-1.3 mm long. The distribution of these subspecies in the Flora area should be verified; however, most populations belong to subsp. *difformis*, including those found in Belgium (see also Vernier 2015 and Saint-Val 2018 with respect to populations found in French Lorraine). According to FLORAINE (2013) both subspecies are present in Lorr.
- *Puccinellia rupestris* (With.) Fernald et Weath. is now accommodated in a separate genus as *Pseudosclerochloa rupestris* (With.) Tzvelev, following e.g. Portal (2014) and FG.
- *Vulpia* C.C. Gmel. now also includes *Nardurus maritimus* (L.) Murb. [as *V. unilateralis* (L.) Stace].
- The generic circumscription of *Festuca* L. has dramatically changed. Three broad-leaved species with auriculate leaf blades are now accommodated in a segregate genus,

*Schedonorus* Beauv. As a result, intergeneric hybrids between these species and *Lolium* L. (formerly named  $\times$ *Festulolium* Aschers. et Graebn.) are now placed in  $\times$ *Schedolium* Holub. A fourth species of *Festuca*, *F. altissima* All., now belongs in another segregate, *Drymochloa* Holub. This renewed classification better reflects the natural relationships between the species of these genera and is in accordance with other recent western European Floras (FG, H24, Stace 2019). However, even then further studies are needed. Preliminary molecular studies have suggested to merge *Vulpia* and *Festuca* (Soreng *et al.* 2015). Also, *Schedonorus* has been included in *Lolium* by some authors (see Banfi *et al.* 2017 for an overview).

- The genus *Festuca* remains very poorly known, not only with respect to native species but also with regard to cultivated and escaped taxa. In addition to those briefly mentioned, several others are applied for various purposes (e.g. as ornamentals but also for revegetation and landscaping). Some recent publications may be of use to help solving this issue, e.g. Englmaier (2009) and Englmaier & Münch (2020). Interestingly, most plants labelled ‘*Festuca glauca*’ in the horticultural trade, including popular cultivars such as ‘Elijah Blue’, belong to *F. cinerea* Vill. instead (Englmaier & Münch l.c.). It is very unlikely that genuine *F. glauca* Vill., as mentioned in NF6, occurs in Belgium, either as an ornamental or as an escape.

- In NF6, reference was made to the existence of hybrids between species of *Festuca*. These, however, referred to species that are now placed in segregate genera like *Schedonorus* P. Beauv. Hybrids in *Festuca* s.str. are probably very exceptional (none were mentioned, for instance, by Stace *et al.* 2015) but not impossible (see e.g. Malik 2011).

- The taxonomy of the *F. rubra* group was completely revised and is now in agreement with that of FG. This means that subsp. *commutata* (Gaudin) Markgr.-Dann., subsp. *fallax* (Thuill.) Nyman and subsp. *arenaria* (Osbeck) Aresch. are now accepted as distinct species, respectively *F. nigrescens* Lam., *F. heteromalla* Pourr. and *F. arenaria* Osbeck. *F. rubra* L. s.str. is still represented by three subspecies in the Flora area: subsp. *rubra*, subsp. *litoralis* (G.F.W. Mey.) Auquier and subsp. *juncea* (Hack.) K. Richt. The latter also includes subsp. *pruinosa* (Hack.) Piper., previously distinguished in NF6 for pruinose plants from coastal habitats.

- A further species from the *F. rubra* group was recently discovered in the southeastern part of the Flora area, where it may have been overlooked in the past: *F. trichophylla* (Ducros ex Gaudin) K. Richt. [syn.: *F. rubra* L. subsp. *trichophylla* (Ducros ex Gaudin) Hegi]. Its leaves are very narrow (0.3-0.6 mm across) and scabrous, at least towards the apex. However, it is mainly characterized by the median sclerenchyma bundle which is clearly more developed than the (sub-)marginal ones (FG). It was added to the key and a full account is presented.

- The taxonomy of the *F. ovina* complex remains very controversial. For convenience and in the absence of a

better alternative, the taxonomic framework already applied in NF6 was maintained (it is also in agreement with that applied in FG). Dengler (2000) proposed a different scheme that was also followed in H24. *F. ovina* L. s.str. probably does not occur in the Flora area although morphologically similar plants have been reported, at least historically, from Belgium (Ronse & Arndt 2014) and the Netherlands (Haveman 2015). It is a predominantly Central-European species that has also been reported from northeastern France (FG). However, recent genetic analyses have demonstrated that Alsace populations of alleged *F. ovina* subsp. *ovina* (diploids as well as autotetraploids) are very distant from *F. ovina* subsp. *ovina* of Central-Europe (comm. R. Boeuf 02.2021).

Dengler (2000) attributed plants from zinciferous soils to *F. guestfalica* Boenningh. ex Reichenb. subsp. *guestfalica* [including subsp. *calaminaria* (Auquier) Dengler, the latter only being an ecotype without taxonomic value; in fact, *F. guestfalica* is found on a wide range of soil types]. In the Flora area, the latter [as *F. ovina* subsp. *guestfalica* (Boenningh. ex Reichenb.) K. Richt.] is considered to be a strictly zinciferous taxon, only found in a small area in Mosan or. (i.e., valleys of rivers Vesdre and Gueule in Belgium and the Netherlands, as well as in the Aachen region in adjacent parts of Germany). This, however, may be a serious underestimation of its genuine distribution in the Flora area, based solely on plants found on zinciferous soils (‘subsp. *calaminaria*’). In reality, subsp. *guestfalica* is possibly more widespread although assessing its distribution requires additional research. Whereas in Belgium it may indeed be (mostly) confined to zinciferous soils, in neighboring territories it also occurs on other substrates. It is widespread in Lorraine in northeastern France (SI-Flore) but, at present, probably only beyond the limits of the Flora area. However, further French records near Givet, Charleville-Mézières and Reims (respectively in Mosan, Ard. and Champ. districts) indicate that this taxon may be more widespread and should be looked for elsewhere. For instance, its presence is also likely in Boul. (see below). In the Trier area in Germany (FT) *F. guestfalica* is said to be the most common representative of the *F. ovina* complex but these authors include *F. lemanii* Bast. and *F. heteropachys* (St-Yves) Patzke ex Auquier in this species, the former indeed being relatively frequent in Eifel centr. (AC-AR). An additional difficulty is that not all plants ascribed to subsp. *guestfalica* in northeastern France indeed correspond to that taxon (comm. R. Boeuf 02.2021). In many instances the descriptions of the taxon in use in the main Floras are quite different from those used by Wilkinson & Stace (1987) who typified the species. These authors already said that “the plants from France thought of as possible *F. guestfalica* by Kerguelen are not good matches for the type material, and we have seen no material of *F. guestfalica* from France, Belgium or Holland”. It appears that the binomial *F. guestfalica* often has wrongly been applied.

A third subspecies of *F. ovina*, subsp. *hirtula* (Hack. ex Travis) M.J. Wilkinson, is also subsumed under this species by Dengler (2000), as *F. guestfalica* subsp. *hirtula* (Hack. ex Travis) Dengler. The taxonomic value of this taxon is not acknowledged by all authors (e.g. FG). It usually is, like subsp. *ovina*, confined to acid soils (Stace 2019). Hence, its alleged presence in Boul. (as per NF6) is questionable. These populations are actually referred to *F. ovina* subsp. *guestfalica* in Digitale2. Genuine subsp. *hirtula*, however, also occurs in the Flora area: it is found in quantity in decalcified dunes near Ostend in Belgium (although its status is unclear there: it may well be an old introduction since the population is found where once was a horse racing venue; comm. M. Leten, 2015).

- *F. heteropachys* (St-Yves) Patzke ex Auquier: this is a poorly known species that was recently additionally characterized by Boeuf (2018). The identity of populations found in the Flora area requires further study. According to Jauzein & Nawrot (2011), tetraploid *F. heteropachys* from Île de France refers to *F. ovina* subsp. *guestfalica*. *F. heteropachys* s.str., as originally defined by Saint-Yves, is a hexaploid (6x) and hairless taxon, as can be seen in the Alsace in the area of the *locus typicus* (comm. R. Boeuf 02 and 12.2021). Still according to R. Boeuf, *F. heteropachys* as accepted by Auquier (1974; and thus also referable to populations found in Belgium) partly refers to *F. guestfalica* (as per Jauzein & Nawrot l.c.) and partly to a hairy, tetraploid 'form' of *F. heteropachys*. In the Flora area, the latter is indeed said to have distinctly hairy leaf sheaths and leaf bases, suggesting that this hairy, tetraploid 'race' is the usual taxon encountered. In fact, all things considered, it represents a distinct species, with main distribution in the Ardennes, that will be described in due time as *F. arduennensis* R. Boeuf et Tison (comm. R. Boeuf 12.2021). All populations, however, should be critically revised and at least part of them thus refer to *F. ovina* subsp. *guestfalica*.

- In NF6, *F. lemanii* Bast. was said to sometimes occur in morphologically diverse populations, including pruinose and non-pruinose individuals. However, *F. lemanii* is a non-pruinose species and pruinose plants in such populations probably refer to other taxa (FG), incl. *F. ovina* subsp. *guestfalica*.

- An enigmatic species similar to *F. marginata* (Hack.) K. Richt. is worth mentioning: *F. costei* (St-Yves) Markgr.-Dann. Both are pruinose fescues with glaucous foliage and smooth, very narrow leaves. It was already discussed by Auquier (1969) and is known to be present at least in Lorr. in the Grand-Duchy of Luxembourg. In the past decades this taxon was widely neglected although according to new insights it may merit taxonomic recognition, even at species rank (comm. R. Boeuf 02.2021). In leaf section it clearly differs from *F. marginata* and *F. patzkei* Markgr.-Dann: leaves are V-shaped in section, (0.7-)0.9-1.3(-1.8) mm wide with the sclerenchyma generally in three decurrent islets, (1-)2-3(-4) ridges, 7-9(-13) bundles and (2-)3(-4) convex ribs.

- The species called *F. longifolia* Thuill. subsp. *pseudocostei* Auquier et Kerguelen in NF6 is now accepted as a distinct species, *F. patzkei* Markgr.-Dann.

- *Schedonorus arundinaceus* (Schreb.) Dum.: this is a very variable species that also includes cultivars. It is uncertain if the application of infraspecific taxa as proposed in NF6 is correct. For instance, do some of our plants genuinely belong to subsp. *asperus* (see also FG)? Similarly, the presence of subsp. *mediterraneus* (Hack.) H. Scholz et Valdés in northwestern France also appears to be highly unlikely. At least, this claim is not confirmed, neither by Digitale2 nor by SI-Flore, and may merely refer to xeromorphs of *S. arundinaceus* (FG). In reality, subsp. *mediterraneus* has a limited distribution area in the southwestern Mediterranean area (e.g. Devesa *et al.* 2019).

- A binomial was added for the intergeneric hybrid *Schedonorus arundinaceus* × *Lolium multiflorum*: ×*Schedonium krasanii* H. Scholz (Scholz 2007).

## 62. Ceratophyllaceae

- *Ceratophyllum platyacanthum* Cham. [syn.: *C. demersum* L. var. *platyacanthum* (Cham.) Wimmer]: this taxon was formerly recorded in the Nancy area in Lorr., as an ephemeral according to FG. Based on phylogenetic molecular studies this is probably a recently diverged polyploid lineage of *C. demersum* (Szalontai *et al.* 2018).

## 63. Papaveraceae

- Recent molecular studies (e.g. Xiao & Simpson 2017) have placed *Meconopsis cambrica* (L.) Vig. in *Papaver* L. again, the genus in which the species was originally described (as *Papaver cambricum* L.). This was not yet followed (contrary to FG, H24) but the synonym was added.

- An additional species of *Glaucium* Mill. was recorded as a casual alien, *G. grandiflorum* Boiss. et A. Huet (Ghent, 2016; wn.be).

- Two additional species of *Papaver* L. have been recorded: *P. commutatum* Fisch. et C.A. Mey. (a few records since 2015, as grain alien or garden escape; wn.be) and *P. nudicaule* L. (a garden escape in 2014 in Ghent; wn.be).

- The exact boundaries of the genus *Papaver* L. remain uncertain. According to recent molecular phylogenetic studies (e.g. Carolan *et al.* 2006) some species (notably *P. argemone* L. and *P. hybridum* L.) should be transferred to the genus *Roemeria* Moench or - alternatively - *Roemeria* included in *Papaver*. The same studies also include *Meconopsis cambrica* in the genus *Papaver*. Pending additional studies, a more conservative taxonomy was adopted but synonyms in *Roemeria* are added for the two *Papaver* species involved [respectively *Roemeria argemone* (L.) Morales *et al.* and *R. hispida* Stace].

- *P. dubium* L.: some authors, especially in Central-European countries, distinguish a third subspecies, subsp. *confine* (Jord.) Hörandl (syn.: *P. confine* Jord.). It is little known but probably mainly distributed in Central Europe (although originally described from France). Its latex is

white like that of subsp. *dubium*, but drying reddish like that of subsp. *lecoqii* (Lamotte) Syme. In addition, its basal leaves are quite roughly divided with rounded sections, usually green or only slightly glaucous. This subspecies has been recorded in Ard. and northeastern Lorr. (Belgium, Germany) (FT, Bomble & Jagel 2016, Remacle 2021) and should be sought elsewhere in the territory of the Flora, especially in its eastern part.

- Two species of *Corydalis* DC. have been recorded as aliens recently: *C. cheilanthifolia* Hemsl. (Genk, 2013-2014; wn.be) and *C. linstowiana* Fedde (Verloove & Devos 2021).

- *Fumaria muralis* Sond. ex Koch: this is a very variable species, especially with regard to the size of flowers and fruits. The plants usually observed in the territory of the Flora have been reported to subsp. *boraei* (Jord.) Pugsley with flowers 10-12 mm long and fruits 2.25-2.5 mm long and 2 mm wide. However, at least some plants have smaller flowers and fruits. The taxonomic value of the different subspecies is low (FG, Stace 2019) and they are linked by intermediates. In addition, according to some authors the amalgamation of *F. muralis* with *F. reuteri* Boiss. and *F. bastardii* Boreau would be desirable (Jauzein 1995). Plants probably belonging to the latter, with shorter lower raceme peduncles (15-22 mm), have been observed as a garden weed in Aublain (Mosan) (comm. S. Carbonnelle, 2017). A more profound study of the complex in the Flora area is needed.

- *F. officinalis* L.: the taxonomic value of the subspecies distinguished in NF6 is probably weak (FG; see also Remacle 2020).

#### 64. Lardizabalaceae

- This new family was added. In the Flora area, it is represented by two ornamentals that have been recorded as escapes from cultivation, *Akebia quinata* (Houtt.) Decne. (scattered records since 2009) and *Decaisnea insignis* (Griff.) Hook. f. et Thomson Thomson (a few records since 2015) (wn.be).

#### 65. Berberidaceae

- An additional species of *Epimedium* L. has been recorded as an escape from cultivation, *E. pinnatum* Fisch. ex DC. (Barvaux, 2012; wn.be).

- As currently understood, *Berberis* L. includes *Mahonia* Nutt. (Kim *et al.* 2004). The latter was merely distinguished by pinnate leaves and the absence of spines. Its separation was essentially artificial and chiefly maintained by horticulturists. The existence of artificial intergeneric hybrids also suggested their close relationship. However, merging both genera remains controversial. Yu & Chung (2017) – based on new molecular evidence – proposed a new classification of *Berberis* s.l. by applying a strict definition of *Berberis* (i.e., *Berberis* s.str.), reinstating *Mahonia* (i.e., core *Mahonia*) (see also Hsieh *et al.* 2022).

- Several additional species of *Berberis* have been observed recently as (usually) ephemeral escapes from cultivation: *B. darwinii* Hook., *B. ×hybrido-gagnepainii* J.V. Suringar, *B. ×interposita* Ahrendt and *B. wilsoniae* Hemsl. (wn.be). The same applies to *B. japonica* (Thunb.) R. Br. [syn.: *Mahonia japonica* (Thunb.) DC.] and/or hybrids of it with *B. bealei* Fortune (wn.be).

#### 66. Ranunculaceae

- Recent molecular studies have demonstrated that *Consolida* S.F. Gray is embedded in *Delphinium* L. (Jabbour & Renner 2010, 2011, 2012).

- Molecular studies have dramatically changed the generic boundaries of *Anemone* L. Several widely accepted genera like *Hepatica* Mill. and *Pulsatilla* Mill. were shown to be part of it (e.g. Hoot *et al.* 1994, Ehrendorfer & Samuel 2001, Schuettepelz *et al.* 2002, Hoot *et al.* 2012). Two species, *Hepatica nobilis* Schreb. and *Pulsatilla vulgaris* Mill., were transferred to *Anemone* again, the genus in which they were originally described, as *A. hepatica* L. and *A. pulsatilla* L. respectively.

- *A. blanda* Schott et Kotschy: this ornamental is increasingly observed as an escape and could be confused with the similar-looking *A. apennina* L. It differs from the latter by sepals that are glabrous on the lower side and pendent heads at maturity.

- An additional species of *Clematis* L. has been observed as an escape: *C. montana* Buch.-Ham. ex DC. This species persists with few individuals on a brick quay of river Leie in Kortrijk since 2014 (wn.be).

- As a result of recent molecular phylogenetic studies the boundaries of *Ranunculus* L. have slightly changed and these changes partly affect western European taxa. The native species *Ranunculus ficaria* L. now belongs in the segregate genus *Ficaria* Guett. (as *F. verna* Huds.) (Emadzade *et al.* 2010).

- *Ranunculus auricomus* L.: since Demarsin (1968), nothing substantial has been investigated in the Flora area in this species complex. The subspecies described from Belgium were all given species rank by Ericsson (1992): *R. sparsipubescens* (Demarsin) Ericsson, *R. monticola* (Demarsin) Ericsson, *R. scaldianus* (Demarsin) Ericsson, *R. hannonianus* (Demarsin) Ericsson, *R. mosanus* (Demarsin) Ericsson, *R. lawalreei* (Demarsin) Ericsson, *R. crassicaulis* (Demarsin) Ericsson, *R. delvosallei* (Demarsin) Ericsson, *R. brabantianus* (Demarsin) Ericsson, *R. baguetii* (Demarsin) Ericsson and *R. vanneronii* (Demarsin) Ericsson. *R. auricomus* subsp. *grandiflorus* Demarsin became *R. demarsinii* Ericsson and *R. auricomus* subsp. *incrassatus* Demarsin became *R. pachyphyton* Ericsson. From the western part of Germany and adjacent areas, Schmelzer (2016) newly described several species that also occur in the Flora area: *R. abyssus* Schmelzer (Grand Duchy of Luxembourg), *R. arundinoides* Schmelzer (Germany), *R. arundo* Schmelzer and *R. compositus* Schmelzer (Eifel centr.), *R. eifeliensis* Schmelzer (Eifel

centr.), *R. geraniifolius* Schmelzer (also Belgium: Voeren, Eupen), *R. lommersdorfensis* Schmelzer (Eifel centr.) and *R. meckelensis* Schmelzer (Eifel centr.). All these names, however, are provisional and need to be formally published.

In the absence of support from molecular studies, recent Floras from neighboring territories, such as H24, FG and Stace (2019), pay no attention to the (facultative) apomictic ‘species’ from the *R. auricomus* complex.

- *R. serpens* complex: two extreme forms of this species complex were treated as subspecies in NF6 (also in H24, as subspecies of *R. polyanthemus* L.) but other recent Floras tend to accept them as distinct species, e.g. FG, a point of view that was followed (*R. serpens* Schrank s.str. and *R. polyanthemoides* Boreau). The possible presence of a third species from this complex in the Flora area, *R. polyanthemophyllus* W. Koch et H. Hess, was recently confirmed. It occurs in several places in Eifel centr. (FT; determinations confirmed by M. Baltisberger, expert of the group). However, according to FG the taxonomic value of this species (and others from this complex, e.g. *R. tuberosus* Lapeyr.) is probably weak, with certain individuals or populations showing character states of two or even three ‘species’. Additional studies are needed.

- *R. baudotii* Godr.: this species was subsumed under *R. peltatus* Schrank in FG, as subsp. *baudotii* (Godr.) Meikle ex C. Cook. However, according to Zalewska-Gałosz *et al.* (2015) it is genetically closer to *R. fluitans* Lam. than to *R. peltatus* (see also Wiegleb *et al.* 2017, Wiegleb 2020). It was thus maintained as a distinct species, pending further studies.

- *R. penicillatus* (Dum.) Bab. subsp. *pseudofluitans* (Syme) R. Webster: morphological and preliminary genetic data, as well as its general distribution and ecology, suggest a hybridogenous origin (*R. fluitans* × *circinatus* Sibth.) (Wiegleb 2020). It is perhaps better treated as a distinct species (Wiegleb *et al.* 2017), as was done in H24.

- Moreover, a very similar species – native to the entire western Europe, though scattered in occurrence – probably has been overlooked: *R. vertumnus* (C.D.K. Cook) Lufertov [syn.: *R. penicillatus* var. *vertumnus* C.D.K. Cook; *R. penicillatus* subsp. *pseudofluitans* var. *vertumnus* (C.D.K. Cook) S.D. Webster] (Wiegleb *et al.* 2017). It differs from *R. pseudofluitans* by the short mostly flaccid leaves with a higher number of final segments. It is of hybridogenous origin and shows affinities to both *R. trichophyllus* Chaix and *R. aquatilis* L. It should be looked for in the Flora area, in alkaline rivers and streams.

- A species very similar to *Thalictrum flavum* L., *T. speciosissimum* L. [syn.: *T. flavum* subsp. *glaucum* (Desf.) Battand.], is cultivated for ornament and occasionally observed as an escape (wn.be). It differs from *T. flavum* by its glaucous leaves with very prominent veins on the lower side.

- *T. minus* L.: FLORAINE (2013) mentions three subspecies for Lorr.: subsp. *minus*, subsp. *majus* (Crantz) Hook.

f. and subsp. *saxatile* Ces. but this view is not shared by FG and Vernier (2020). Subsp. *majus* occupies a small area in south-eastern Central Europe, whereas the westernmost (and very disjunct) populations of subsp. *minus* are located near Mainz in Germany (Hand 2020).

## 69. Paeoniaceae

- In addition to *Paeonia officinalis* L., a second species is occasionally observed as an escape from cultivation, *P. lactiflora* Pallas (wn.be).

## 72. Grossulariaceae

- Two frequently cultivated ornamentals that have locally naturalized, *Ribes aureum* Pursh and *R. sanguineum* Pursh, are now added to the key and full accounts are presented.

- *R. aureum* Pursh: this species is quite variable. Cultivated and subsponaneous plants mainly correspond with var. *villosum* DC. (syn.: *R. odoratum* H.L. Wendl.) with a longer flower tube and young branches that are more or less pubescent (Morin 2009). However, the distinction from var. *aureum* seems to be weak. Therefore, the name *R. aureum* is applied, rather than *R. odoratum*, contrary to e.g. FG and H24.

- *R. rubrum* L.: cultivated and escaped plants of this species are often cultivars that are merely derived from *R. rubrum* (rather than representing the genuine species) and/or complex hybrids with related species such as *R. multiflorum* Roem. et Schult., *R. petraeum* Wulfen and *R. spicatum* E. Robson (see also FG, H24).

## 73. Saxifragaceae

- Many Saxifragaceae are cultivated for ornament in parks and gardens. In addition to those already mentioned in NF6, a few others have been recorded recently as escapes from cultivation: *Darmera peltata* (Torrey ex Benth.) Voss (observed in several localities, since 2011) and *Tiarella cordifolia* L. (exceptionally seen, since 2012) (wn.be).

- Another ornamental, *Tellima grandiflora* (Pursh) Dougl. ex Lindl., is now fully naturalized in several parts of the Flora area. It was included in the key and a full account presented.

## 74. Crassulaceae

- *Sempervivum funckii* F. Braun ex Koch var. *aqualiense* E. Morren: a recent karyological study showed that this taxon is of hybrid origin, but the putative parental species have yet to be identified to clarify its taxonomic status (*S. funckii* itself is a triple hybrid of *S. arachnoideum* L. × *montanum* L. × *tectorum* L. parentage). It is not known if the population is of horticultural origin or if it is a mid-European relic (Van Rossum *et al.* 2017).

- The generic circumscription of *Sedum* L. has considerably changed, as a result of molecular phylogenetic studies (numerous references, e.g. Mort *et al.* 2001, Gontcharova & Gontcharov 2009, Lim & Choi 2018). For species present in the Flora area, this means that species related to *S.*

*telephium* L. are now accommodated in the segregate genus *Hylotelephium* Ohba and flat-leaved species related to *S. spurium* M. Bieb. are now placed in *Phedimus* Raf.

- Two additional ornamental species of *Sedum* have been recorded as escapes from cultivation: *S. palmeri* S. Watson (known from a single locality, in Chokier, since 2018; wn.be) and *S. spathulifolium* Hook. (occasionally observed since 2019, often in cemeteries; wn.be).

- *S. album* L.: several very similar species are cultivated for ornament (especially green roofs, cemeteries), the identity of which remains to be confirmed. Probably at least *S. lydium* Boiss. and *S. pallidum* Bieb. are involved. These species are distinguished from *S. album* by the shorter petals (barely twice as long as the tepals) and more pauciflorous inflorescences. They easily escape and are sometimes seen near plantations.

- *S. rupestre* L.: a similar species, *S. sediforme* (Jacq.) Pau (syn.: *S. altissimum* Poir.), is sometimes cultivated for ornament and has been observed as an escape in an old quarry in Ampsin (Mosan), since at least 2013 (and occasionally elsewhere as well). This species is distinguished by its yellow-whitish petals and the absence of bracts in the inflorescence.

- *S. sarmentosum* Bunge: this Asian ornamental has now naturalized in the Flora area: it was added to the key and a full account was provided.

- *Hylotelephium telephium* (L.) Ohba: the taxonomic value of the two subspecies that are keyed out in NF6 [subsp. *telephium* and subsp. *fabaria* (Koch) Ohba] is probably weak (they are not accepted in most other contemporary Floras, e.g. FG, H24, Stace 2019). Their geographical distribution needs to be reviewed after finalization of this taxonomic problem. In addition, it is possible that plants exhibiting the characteristics of subsp. *fabaria* simply belong to the variation of *H. telephium* and do not correspond exactly to the plants described by Koch from the Sudetenland (FT). A third subspecies that was referred to in NF6 is probably better accepted as a distinct species, *H. maximum* (L.) Holub (FG, contrary to H24), but – at least to our current knowledge – it only occurs in the wild just outside the Flora area, in the Netherlands.

- Two species of *Phedimus* Raf., other than those treated in detail, have occasionally been recorded as ephemeral escapes from cultivation: *P. aizoon* (L.) 't Hart (syn.: *Sedum aizoon* L.) and *P. stolonifer* (J.F. Gmel.) 't Hart (syn.: *S. stoloniferum* J.F. Gmel.) (since 2012 and 2011 respectively; wn.be).

- *P. kamtschaticus* (Fisch. et C.A. Mey.) 't Hart: in NF6, the plants usually found in cultivation (and escapes) were referred to subsp. *ellacombeanum* (Praeger) R.T. Clausen. Other contemporary Floras, e.g. H24 and Stace (2019), attribute the escaped plants to other infraspecific taxa, especially to 'middendorffianus'. In reality, and doubtlessly as a result of long cultivation and selection, the plants from this complex are difficult to name and therefore only the species (without infraspecific taxa) was upheld.

## 75. Haloragaceae

- *Myriophyllum aquaticum* (Velloso) Verdc.: this species was placed on the EU list of prohibited invasive alien species in 2016. Subsequently, a similar but smaller aquatic plant was increasingly offered for sale in the horticultural trade, as an alternative, under the trade name *Myriophyllum* 'Brasiliensis' or *Myriophyllum* 'Red Stem'. Both morphologically and genetically, the latter and *M. aquaticum* can be easily distinguished: the emerged stems are red (vs. green for *M. aquaticum*), leaves are green (vs. glaucous) and flowers are pink (vs. white). The origin of this plant is unclear but it was recently described as a species new to science, *M. rubricaula* Valk. et Duist. (van Valkenburg *et al.* 2022). A critical reassessment of records of *M. aquaticum* demonstrated that this unknown species has already been present in the wild in the Flora area since at least 2012 (wn.be). Its presence was since then confirmed in Fl., Camp., Brab. and Ard. (wn.be).

- In NF6, *M. aquaticum* was said to be solely known in the vegetative state in the Flora area. This, however, no longer applies.

## 76. Vitaceae

- An additional species from a new genus is grown as an ornamental and has been recorded as an escape: *Ampelopsis glandulosa* (Wall.) Momiy (wn.be).

- *Vitis vinifera* L. subsp. *sylvestris* (Willd.) Hegi: the name *V. sylvestris* C.C. Gmel., applicable for the Asian-European wild grape, is a younger homonym of *V. sylvestris* Bartram and therefore illegitimate. A substitute name, *V. gmelinii* Buttler, was therefore needed (Buttler 2017). At the subspecies rank, as applied in NF, the name remains unchanged but the author citation needs to be corrected to '(Willd.) Hegi' (Ferrer-Gallego *et al.* 2019).

- *Parthenocissus quinquefolia* (L.) Planch.: this species is not only grown as an ornamental but has also been recorded as an escape (wn.be). A character useful for its separation from *P. inserta* (A. Kerner) Fritsch (the dull upper leaf surface) was added.

## 78. Fabaceae

- Two additional, casual alien taxa have been observed: *Arachis hypogaea* L. (scattered records since 1950) and *Scorpiurus vermiculatus* L. (recorded once, in 1957 in Brussels; herb. L. Delvosalle). Two ornamentals, *Styphnolobium japonicum* (L.) Schott and *Wisteria sinensis* (Sims) Sweet, have occasionally been recorded as escapes from or relics of cultivation (wn.be).

- Nomenclatural and taxonomic notes regarding casual alien taxa: the oldest valid name for the species named *Sesbania exaltata* (Rafin.) Rydberg ex A.W. Hill in NF6 is *S. herbacea* (Mill.) McVaugh. Three subspecies of *Scorpiurus muricatus* L. are now treated as distinct species, *S. muricatus* s.str., *S. subvillosus* L. and *S. sulcatus* L.

- The species named *Chamaecytisus hirsutus* (L.) Link in NF6 is now transferred again to *Cytisus* Desf., as *C.*

*hirsutus* L., the genus in which it was originally described (Cristofolini & Troia 2006). This species in fact encompasses two distinct but poorly known species in the Flora area, *C. hirsutus* s.str. and *C. lotoides* Pourr. (Coulot & Rabaute 2016, FG). Both are now included in the key and full accounts are presented. *C. hirsutus* has erect or ascending stems (at least the older ones, those of the current year are generally radiant), while in *C. lotoides* the older stems are lying down and those of the current year are generally ascending or even erect. The corollas of *C. hirsutus* are a pale sulfur yellow, turning rather late to dirty pink, while *C. lotoides* has bright yellow corollas that turn very quickly to dirty pink. Finally, leaflets of *C. hirsutus* are regularly over 15 mm long and larger and less densely hairy on the upper surface than those of *C. lotoides*, which are rarely 15 mm in length and are usually very hairy on the upper face (Coulot & Rabaute l.c.). The distinction between these two species, however, remains critical and some populations are difficult to assign unambiguously. A well-known historical population of *C. hirsutus* from Séchault (Ardennes department) was recently re-identified as *C. lotoides* (Bizot & Averlant 2013). Its habit indeed seems to suggest the latter species although corollas are not as bright as they should be. This species complex obviously requires further study.

- The parental species of the widely grown ornamental shrub *Cytisus* ×*praecox* Wheeler ex Bean are *C. multiflorus* (L'Hérit.) Sweet and *C. oromediterraneus* Rivas Mart. *et al.* The latter was referred to as *C. balansae* (Boiss.) Ball subsp. *europaeus* (G. López et Jarvis) Muñoz Garmendia in NF6 but the inclusion of this subspecies in *C. balansae* is incorrect (Cubas *et al.* 2006).
- The species named *Genistella sagittalis* (L.) Gams in NF6 is now transferred again to *Genista* L., as *G. sagittalis* L., the genus in which it was originally described (Pardo *et al.* 2004).
- *G. tinctoria* L.: the taxonomic value of the infraspecific taxa mentioned in NF6 is probably weak (FG).
- *Ulex minor* Roth: this species is naturalized in at least two localities in the Flora area. It is now included in the key and a full account was added.
- *Lupinus polyphyllus* Lindl.: this name undoubtedly covers several species, hybrids or cultivars. At least some (or most?) plants named as such actually belong to *L. ×regalis* Bergm. (*L. arboreus* Sims × *polyphyllus*), recognizable by its usually branched stem with several inflorescences and the upper calyx lip notched (*L. polyphyllus* s.str. is characterized by a single stem with one inflorescence and an entire upper lip of the calyx).
- From the genus *Robinia* L., an additional taxon is currently increasingly planted and sometimes escapes, *R. ×margaretta* Ashe (*R. pseudoacacia* L. × *hispida* L.) (FG, wn.be).
- The generic limits of *Vicia* L. have changed since NF6, as a result of recent molecular studies (Schäfer *et al.* 2012). *V. tetrasperma* (L.) Schreb. is transferred again to

*Ervum* L., the genus in which it was originally described (as *E. tetraspermum* L.). Similarly, three further species, the native *V. hirsuta* (L.) S.F. Gray and the introduced *V. ervilia* (L.) Willd. and *V. sylvatica* L., are now accommodated in the genus *Ervilia* Link, as *E. hirsuta* (L.) Opiz, *E. sativa* Link and *E. sylvatica* (L.) Schur, respectively.

- The casual alien *Vicia narbonensis* L. comprised two subspecies in NF6, subsp. *narbonensis* and subsp. *serratifolia* (Jacq.) Cesati. These are now treated as two distinct species, *V. narbonensis* s.str. and *V. serratifolia* Jacq., respectively.
- Similarly, the subspecies of *V. villosa* Roth, as recognized in NF6, are now treated as distinct species, *V. villosa* s.str. and *V. dasycarpa* Ten. [syn.: *V. villosa* subsp. *varia* (Host) Corb.], and the same applies to *V. sativa* L. that now comprises three separate species, *V. angustifolia* L. [syn.: *V. sativa* subsp. *nigra* (L.) Ehrh.], *V. segetalis* Thuill. [syn.: *V. sativa* subsp. *segetalis* (Thuill.) Čelak.] and *V. sativa* s.str. Still others have been reported or even newly described within the Flora area lately (i.e., *V. austroccidentalis* Bomble et Loos and *V. multicolorans* Bomble et Loos) (Bomble & Loos 2004) but they are probably of (very) limited taxonomic value (they are not referred to in other contemporary Floras where these species likely occur, e.g. in FG; see also Buttler 2009).
- Two subspecies of *Ervum tetraspermum* L. are now treated as two distinct species, *E. tetraspermum* s.str. and *E. gracile* DC. [previously *V. tetrasperma* (L.) Schreb. subsp. *gracilis* (DC.) Hook. f.].
- *Lathyrus linifolius* (Reichard) Bässler: the two varieties distinguished in NF6 are probably of limited taxonomic value and merely refer to individual variations (FG).
- Morphologically intermediate plants between *L. sylvestris* L. and *L. latifolius* L. exist here and there in the Flora area, sometimes in large populations and known for several decades. These plants could refer to *L. heterophyllus* L. Corollas of these plants have the size and color of that of *L. sylvestris* (fleshy pink, often washed with green at the base) but the wings of the petiole as well as the size of the leaves correspond rather to *L. latifolius* L. However, a broadleaved form of *L. sylvestris* [subsp. *platyphyllos* (Retz.) Hartm.] is hardly distinguishable from these plants. Genetic studies could eventually resolve the complex taxonomy of this group. In addition, *L. heterophyllus* itself is also variable. In its typical form (var. *heterophyllus*), the upper leaves have two or three pairs of leaflets while in western and northern Europe (including in the Flora area), all plants have only one pair of leaflets and belong to var. *unijugus* Koch. Additional studies are required to solve this problem (<http://alien-plantsbelgium.be/content/lathyrus-heterophyllus-potentially-overlooked-alien-belgium>).
- According to some recent studies *Pisum* L. belongs in *Lathyrus* L. (Schäfer *et al.* 2012). The corresponding name for *P. sativum* L. in the latter genus was added, *L. oleraceus* Lam.

- Two species of *Ononis* L., often hardly distinguishable, *O. repens* L. and *O. spinosa* L., are now treated as a single variable species (*O. spinosa*) with two subspecies, respectively subsp. *procurrens* (Wallr.) Bonnier et Layens and subsp. *spinosa*, following other recent Floras (FG, H24).
- The generic boundaries of *Trigonella* L. underwent dramatic changes in the past decades. Based on flower tripping mechanism numerous ‘medicagoid’ members were transferred to the genus *Medicago* L. (Small 1987, Small *et al.* 1987, Small & Jomphe 1989) and molecular data approved this transfer (Bena 2001). The remainder of the genus *Trigonella*, however, still is a polyphyletic assemblage with about 55 species. The same molecular studies have shown that all species releasing coumarin (including fenugreek) are in fact nearer to *Melilotus* Mill. than to the other species of *Trigonella*. For reasons of priority all species traditionally accommodated in *Melilotus* were thus transferred to *Trigonella*. The non-coumarin species of *Trigonella* should be divided over several smaller genera, incl. *Medicago* for the ‘medicagoid’ taxa, some not yet described. The current names for the species of *Melilotus* already cited in NF6 are: *T. alba* (Med.) Coulot et Rabaute (syn.: *Melilotus albus* Med.), *T. altissima* (Thuill.) Coulot et Rabaute (syn.: *M. altissimus* Thuill.), *T. officinalis* (L.) Coulot et Rabaute [syn.: *M. officinalis* (L.) Lam.], *T. smallii* Coulot et Rabaute [syn.: *M. indicus* (L.) All.] and the casual aliens *T. sulcata* (Desf.) Coulot et Rabaute (syn.: *M. sulcatus* Desf.) and *T. wolgica* (Poir.) Coulot et Rabaute (syn.: *M. wolgicus* Poir.).
- Two additional casual alien species of *Trigonella* have been recorded lately: *T. procumbens* (Besser) Reichenb. and *T. infesta* (Guss.) Coulot et Rabaute (syn.: *Melilotus infestus* Guss.) (wn.be).
- The correct name for the species named *T. corniculata* (L.) L. in NF6 is *T. esculenta* Willd. (Hedge & Sales 2000).
- An additional casual alien species of *Medicago* L. has been recorded lately, *M. monspeliaca* (L.) Trautv. (syn.: *Trigonella monspeliaca* L.) (Ghent, 2015-2016).
- *M. sativa* L. and *M. falcata* L. are two interfertile tetraploids and thus better treated as a single variable species, *M. sativa*, with two subspecies, respectively subsp. *sativa* and subsp. *falcata* (L.) Arcang. Their hybrid is then called *M. sativa* nsubsp. *media* (Pers.) Schübl. et Martens.
- Two additional casual alien species of *Trifolium* L. have been recorded lately: *T. sylvaticum* Lois. (Ghent, 2016) and *T. vesiculosum* Savi (Antwerp, 2014-2016) (wn.be).
- *T. suffocatum* L., already briefly mentioned in NF6, based on a record from northwestern France, is completely naturalized now and thus included in the key and a full account is presented.
- A table of comparison between *T. repens* L. and *T. fragiferum* L. in NF6 is of no use, not a single feature is really convincing. Stipules (shape and degree to which the edges are serrated) are very variable and the drawings

might refer to one as well as to the other species (comm. P. Van Vooren). Analogously, petiole hairiness is variable. For instance, according to Poland & Clement (2009) *T. fragiferum* can either have glabrous or hairy petioles.

- The infraspecific taxa of *T. hybridum* L. are of limited taxonomic value and thus reduced from subspecies to variety rank, var. *hybridum* and var. *elegans* (Savi) Boiss., following other recent flora accounts (e.g. FG).
- *T. pratense* L. var. *maritima* Zabel is reported in FG from Pas-de-Calais, based on Coulot & Rabaute (2013). However, this is an error (comm. B. Toussaint, 12.2020; Coulot & Rabaute 2014), this variety only occurs south of the Flora area.
- The generic limits of *Lotus* L. have considerably changed, as a result of recent molecular phylogenetic studies. The genera *Dorycnium* Mill. and *Tetragonolobus* Scop. are now included in it (Degtjareva *et al.* 2006). As a consequence, three name changes were implemented: *Dorycnium hirsutum* (L.) Seringe became *Lotus hirsutus* L., *Tetragonolobus maritimus* (L.) Roth L. *maritimus* L. and *T. purpureus* Moench L. *tetragonolobus* L.
- The taxon called *L. corniculatus* L. subsp. *tenuis* (Waldst. et Kit. ex Willd.) Berher in NF6 is now treated as a distinct species, following other recent Flora accounts (FG, H24). At the species rank, the correct name is *L. tenuis* Waldst. et Kit. ex Willd., the binomial *L. glaber* Mill. having been rejected lately (Shenzhen Code Appendices).
- *L. maritimus* L.: the plants found in western Europe are usually ascribed to var. *hirsutus* (Willk.) Kerguelen. However, the distribution of the varieties is unclear. According to Valdés (2000) var. *maritimus* is the widespread taxon in the entire area of the species whereas according to FG, it is limited to the Midi in France.
- *Securigera* DC. was transferred again to *Coronilla* L., following FG, although molecular phylogenies apparently have not yet tested their boundaries. As a result, *Securigera varia* (L.) Lassen is now named *C. varia* L. again.

## 79. Polygalaceae

- *Polygala vulgaris* L.: three subspecies, recognized in NF6, are perhaps rather ecological variants and thus of low taxonomic value (FG).

## 80. Rosaceae

- Several additional species that are cultivated as ornamentals have been recorded as (usually ephemeral) escapes in the past years: *Neillia tanakae* Franch. et Sav. [syn.: *Stephanandra tanakae* (Franch. et Sav.) Franch. et Sav.], several species of the genus *Photinia* Lidl., especially *P. davidiana* (Decaisne) Cardot (syn.: *Stranvaesia davidiana* Decaisne) and *P. villosa* (Thunb.) DC., *Sibbaldiopsis tridentata* (Aiton) Rydb. and several species of the genus *Acaena* L., especially *A. caesiiglauca* (Bitter) Bergmans (wn.be).
- *Sorbaria* (Seringe ex DC.) A. Braun : yet other species than those treated in NF6, such as *S. kirilowii* (Regel)

Maxim. (syn.: *S. arborea* C.K. Schneider), have been observed spontaneously (wn.be) but their identity should be critically re-assessed.

- ***Spiraea*** L.: in addition to the taxa already mentioned in NF6, an additional taxon has occasionally been observed as an escape from cultivation, *S. ×macrothyrsa* (Zabel) Dippel (*S. douglasii* Hook. × *latifolia* Borkh.) (wn.be).

- *S. alba* Du Roi: in NF6 this species was said to have short stamens, i.e. as long as the petals (vs. clearly longer than the petals in *S. ×rosalba* Dippel). In fact, also in *S. alba* they are definitely longer than the petals, up to twice as long. In fact, American authors divide this species into two 'varieties': var. *alba* with short stamens and var. *latifolia* (Aiton) Dippel with long stamens. However, only the latter seems to be recorded in western Europe, at least in England (Silverside 1990) and probably elsewhere. Some plants are aberrant which further complicates this issue: leaves sometimes have a higher L/W ratio, irregular pollen and fruits are not produced, suggesting a hybrid, perhaps var. *alba* × var. *latifolia* (comm. J.-M. Tison 08.2016).

- ***Rubus*** L.: see Devriese & van de Beek (2023) for a detailed overview of taxonomic, nomenclatural and chorological adjustments. In addition, two alien species have recently been recorded as escapes from cultivation: *R. niveus* Thunb. (*R. cockburnianus* auct. non Hemsl.) (mostly Camp.) and *R. nutkanus* Moc. ex Ser. (syn.: *R. parviflorus* Nutt.) (Camp., Brab. or.) (wn.be). The latter is reminiscent of *R. odoratus* L. Its flowers are, however, white and the stalked glands of the pedicels yellow or red (not dark purple).

- ***Geum*** L.: the alien *G. macrophyllum* Willd. is now completely naturalized in the Flora area and expanding. It is included in the key and a full account is presented. A hybrid with native *G. urbanum* L., *G. ×convallis* M.P. Wilcox (Wilcox 2015b), was recently described from the British Isles and is expected to occur in areas in the Flora area where both species grow in close proximity.

- In NF6 (key to the species), *G. urbanum* L. was said to have ca. 70 achenes per head. This is incorrect, they are normally 120-140 in number (Wilcox 2015b; comm. P. Van Vooren 05.2017).

- The generic limits of ***Potentilla*** L. have considerably changed recently, as a result of molecular phylogenetic studies. The genus now includes *Duchesnea* Smith, whereas other species were transferred to segregate genera: *P. rupestris* L. to ***Drymocallis*** Fourr., *P. fruticosa* L. and related species to ***Dasiphora*** Raf. and *P. anserina* L. to ***Argentina*** Hill (Potter *et al.* 2007). These changes were also implemented in FG but only partly in Stace (2019) and H24. There is still a lot of controversy: Dobeš & Paule (2010) alternatively proposed to accept *Potentilla* in a very wide sense, as to include, among others, *Alchemilla* L., *Aphanes* L., *Comarum* L., *Dasiphora*, *Fragaria* L., etc. According to Töpel *et al.* (2011) many questions about the phylogenetic relationships in the genus have not yet been answered.

- An additional alien species with reddish petals has been observed as an escape of cultivation: *P. nepalensis* Hook. (Rillaar, 2010; wn.be). It differs from *P. atrosanguinea* Lodd. ex D. Don by its leaves with five leaflets (vs. ternate leaves).

- *P. supina* L.: this is a variable species with regard to form, size and sculpturing of the achenes (Soják 1987). The European plant belongs to subsp. *supina*, but several others have been introduced to Europe. The identity of these adventitious plants should therefore be studied, the other subspecies (of Asian and American origin) being distinguished mainly on the basis of the morphology of the achenes.

- *P. recta* L.: for several years now, a morph with bright yellow corollas has been observed in the Flora area (RR in Mar., Fl., Camp. and Brab., often on slag heaps, railway infrastructure, etc.). These plants probably belong to var. *obscura* (Willd.) W.D.J. Koch [syn.: subsp. *obscura* (Willd.) Arcang.], although the taxonomic value of this variation is uncertain.

- *P. verna* L. (nom. conserv.): this is the accepted name for the species that was called *P. tabernaemontani* Aschers. in NF6 (Brummitt 2011). See also FG, H24, etc.

- ***Argentina anserina*** (L.) Rydb.: the variation of this species, mentioned in NF6, is doubtlessly of no taxonomic value at all; the corresponding information was removed.

- The generic limits of *Sanguisorba* L. have changed as a result of molecular phylogenetic studies (Potter *et al.* 2007). *S. minor* Scop. was transferred again to the genus ***Poterium*** L. (as *P. sanguisorba* L.), the genus in which it was originally described.

- ***Alchemilla*** L.: the genus remains poorly known in the Flora area. In particular, the identification of taxa with a hairy upper leaf surface can be problematic. The shape of the sinus at the base of the leaf blade appears to be variable, even in a single individual, and should be evaluated in the field. This is probably a weak feature in distinguishing certain species. The problem should be reconsidered.

- *A. micans* Buser: this species was reduced to varietal rank under *A. acutiloba* Opiz. Other contemporary Floras, e.g. FG, even consider both to be conspecific.

- *A. mollis* (Buser) Rothm.: this cultivated ornamental is now widely naturalized in the Flora area. It is included in the key and a full account is presented.

- The genus ***Rosa*** L. was thoroughly revised by A. Zwaenepoel. The new account and key greatly differ from that in previous editions of NF. For the dogroses (sect. Caninae DC.), the most speciose group in the Flora area, the account is now in line with the views developed and published by Bakker *et al.* (2019), based on a consensus among British and Dutch rhodologists. This means that the account is roughly in agreement with other recent West European flora accounts such as H24 and Stace (2019) but considerably deviates from that of e.g. FG. The identification key of Zwaenepoel (2019a) was used

as a basis and further expanded. Since hybrids are easily produced many of those known to occur in the Flora area were added to the key (in order of appearance): *R. ×inodora* Fr. (*R. agrestis* Savi × *elliptica* Tausch), *R. ×deseglisei* Boreau (*R. arvensis* Huds. × *corymbifera* Borkh.), *R. ×margerisonii* (Wolley-Dod) Wolley-Dod (*R. caesia* Sm. × *spinosissima* L.), *R. ×subcollina* (H. Christ) Vukot. (*R. caesia* × *corymbifera*), *R. ×dumetorum* Thuill. (*R. canina* L. × *tomentella* Léman), *R. ×grovesii* (Baker) Maskew (*R. canina* × *spinosissima*), *R. ×nitidula* Besser (*R. canina* × *rubiginosa* L.), *R. ×subcanina* (H. Christ) Vukot. (*R. canina* × *vosagiaca* N.H.F. Desp.), *R. ×insignis* Déségl. [*R. canina* × *squarrosa* (Rau) Boreau], *R. ×hibernica* Templeton (*R. corymbifera* × *spinosissima*), *R. corymbifera* × *tomentella*, *R. ×gremlii* (H. Christ) H. Christ (*R. micrantha* Borrer ex Smith × *rubiginosa*), *R. ×avrayensis* Rouy (*R. rubiginosa* × *tomentosa* Smith), *R. ×biturigensis* Boreau (*R. rubiginosa* × *spinosissima*), *R. ×timbalii* Crépin (*R. rubiginosa* × *tomentella*), *R. ×suberectiformis* Wolley-Dod (*R. sherardii* Davies × *tomentosa*), *R. ×andrzejowskii* Boreau (*R. spinosissima* × *tomentosa*), *R. spinosissima* × *vosagiaca*, *R. ×dumalis* Bechst. (*R. squarrosa* × *vosagiaca*), *R. squarrosa* × *stylosa* and *R. ×andegavensis* Bastard (*R. stylosa* Desv. × *canina*). Analogously, several additional species were added to the identification key: *R. sherardii*, *R. squarrosa* and *R. vosagiaca*, as well as the frequently cultivated and naturalizing *R. ferruginea* Vill.

- The application of the name *R. dumalis* Bechst. has long been controversial. This species is often considered to be a heterotypic younger synonym of *R. vosagiaca* or even as the correct name for the latter (Bakker *et al.* 2011). It is, however, a hybrid, of *R. squarrosa* × *vosagiaca* parentage, as demonstrated by Loos (1996) and Bakker *et al.* (2017). See also H24, Stace (2019).

- The correct name for *R. glauca* Pourr. (1788) is *R. ferruginea* Vill. (1779) (FG, Stace 2019).

- *R. ×dumetorum* Thuill.: this was long considered to be a synonym of *R. corymbifera* (e.g. Bakker *et al.* 2011, NF6). However, its type was examined in G by Graham & Primavesi (1990) and identified as *R. canina* × *tomentella* (Bakker *et al.* 2011). See also H24, Stace (2019).

- *R. spinosissima* L.: the Siberian var. *altaica* (Willd.) Rehd. (syn.: *R. altaica* Willd.), a slightly more upright growing plant, with glandular pedicels, is often planted as an ornamental and has been found as an escape here and there (for instance in the Antwerp port area). It should not be confused with the spontaneous cross between *R. spinosissima* and *R. rubiginosa*, which also has glandular pedicels.

- An additional ornamental species of *Rosa* L. has been recorded as an escape from cultivation, *R. nitida* Willd. (Oudenaarde, since 2015; wn.be).

- An additional ornamental species of *Prunus* L. has occasionally been recorded as an escape from cultivation, *P. tomentosa* Thunb. (Serskamp and Desselgem, since 2014; wn.be). It has leaves with a densely hairy lower surface.

- *P. ×fruticans* Weihe: the distinction of this hybrid from its parents, particularly *P. domestica* L. subsp. *insititia* (L.) Bonnier et Layens, is often delicate. In addition, genetic studies suggest that it is in fact a variety of *P. spinosa* L., rather than a hybrid (FG).

- *P. laurocerasus* L.: this ornamental shrub is no longer a casual escape from cultivation but is increasingly found in naturalizing populations in the Flora area, resulting from laurophyllisation processes (Walther 1999). It was added to the key and a full account was provided.

- The account for *Cotoneaster* Med. was updated, mostly based on Verloove (2013b). All more or less naturalized taxa were added to the key and full accounts were presented. This applies to the following taxa: *C. dammeri* C.K. Schneider, *C. dielsianus* Pritzl, *C. divaricatus* Rehd. et E. Wilson, *C. fangianus* T.T. Yu, *C. franchetii* Bois, *C. hjelmqvistii* Flinck et B. Hylmö, *C. rehderi* Pojark., *C. salicifolius* Franch., *C. simonsii* Baker, *C. sternianus* (Tur-rill) Boom, *C. villosulus* (Rehd. et E. Wilson) Flinck et B. Hylmö, *C. ×suecicus* G. Klotz and *C. ×watereri* Exell.

- In addition, several other taxa have been recorded in the wild in the past years, usually as ephemeral escapes from cultivation. Taxa with erect or sub-erect, pinkish tepals: *C. ambiguus* Rehd. et E. Wilson, *C. ascendens* Flinck et B. Hylmö, *C. boisianus* G. Klotz, *C. ganghobaensis* Fryer et B. Hylmö, *C. laetevirens* (Rehd. et E. Wilson) G. Klotz, *C. lucidus* Schldl., *C. mairei* H. Léveillé, *C. moupinensis* Franch., *C. nanshan* M. Vilm. ex Mottet and *C. qunghbixiensis* Fryer et B. Hylmö. Taxa with patent, usually white tepals: *C. conspicuus* Marquand and *C. hylmoei* Flinck et B. Hylmö (Verloove 2013b). The identification of *Cotoneaster* is not easy, in part because cultivated (and escaped) plants are often horticultural lines which no longer have much to do with their wild Chinese ancestors (as a result of cloning, multiple hybridizations, etc.). For an accurate identification, the availability of complete material (flowers, fruits and leaves) and observed at several stages of development are required.

- *Malus sylvestris* (L.) Mill. subsp. *mitis* (Wallr.) Mansf.: when accepted as a distinct species, the cultivated apple is called *M. pumila* L. in some contemporary Floras, e.g. in FG. It is an older but lesser known synonym of *M. domestica* Borkh. and thus has priority. However, the latter binomial was recently conserved (Applequist 2017) and thus should be applied. *M. pumila* was added as a synonym.

- *Pyrus communis* L.: the taxonomy of this complex group is very controversial. The two taxa distinguished in NF6 as subspecies [subsp. *communis* and subsp. *pyraster* (L.) Ehrh.] are considered to be good species by some authors, *P. communis* being genetically closer to *P. caucasica* Fedorov and *P. nivalis* Jacq. than to *P. pyraster* (L.) Du Roi (Zheng *et al.* 2014), or considered to be of little taxonomic value by others.

- A further species of *Pyrus* L. should be looked for in the extreme southern part of the Flora area, especially in Champ. mér., *P. cordata* Desv. It has smaller petals (usu-

ally less than 8 mm wide), small fruits (8-20 mm) with an early deciduous calyx and slender fruit stalks less than 1,5 mm across (FG, Stace 2019). It has recently been recorded near Reims (Montagne de Reims: Tert. par.; database CBN Paris) and may have been overlooked. See also Rameau *et al.* (1989).

- *Amelanchier ovalis* Med.: in the Flora area, all populations reportedly belong to subsp. *embergeri* Favarger et Stearn. However, the taxonomic importance of this taxon is appreciated very differently by various authors. FG does not list infraspecific taxa while FT accepts the taxon as a separate species, *A. embergeri* (Favarger et Stearn) Landolt (tetraploids vs. diploids). According to *Atlas Flora Europaeae* (Kurtto *et al.* 2013), there is little support for recognizing (cyto-) taxa.

- Molecular phylogenetic studies have shown *Mespilus* L. to be embedded in *Crataegus* L. (Lo *et al.* 2007). *M. germanica* L. was thus transferred to *Crataegus*, as *C. germanicus* (L.) Kuntze. It should be noted that this transfer is not uncontested and not followed by all recent workers, e.g. H24, Phipps (2016).

- *C. rhipidophylla* Gandoger: the application of this binomial is not uncontested. Some contemporary Floras, e.g. FG, use *C. rosiformis* Janka instead. This is a nom. inval. (1870) according to Buttler (<https://www.kp-buttler.de/florenliste/>) but that is not correct since the name was later validly published by Janka, in 1874. Moreover, the name *C. rhipidophylla* can no longer be used for our plant, since its type belongs to *C. ×subsphaerica* Gandoger (FG). Therefore, unless this name would be conserved with a new type, it is better to use *C. rosiformis*, although this name is not without controversy either because Janka's type specimen is not complete and its identity also uncertain. In the absence of agreement among authors, the oldest unequivocal name appears to be *C. praemonticola* Holub (Schmidt 2015).

- *C. rosiformis* Janka: in NF6, a variety with usually ellipsoidal-subcylindrical fruits that are crowned with erect or suberect sepals that are 1.5-3.1 times as long as wide and with lower leaf segments with (7-)12-18 teeth on either side is referred to *C. rhipidophylla* var. *lindmanii* (Hrabětová-Uhrová) K.I. Christens. The taxonomic value of this variety probably requires confirmation but a combination under *C. rosiformis* was apparently lacking and was validated: *C. rosiformis* var. *lindmanii* (Hrabětová-Uhrová) Verloove & Galasso (Verloove & Galasso 2023).

- *Sorbus* L.: according to recent molecular studies the genus *Sorbus* is not monophyletic and could be divided into several micro-genera. A novel taxonomic framework was developed by Sennikov & Kurtto (2017) and Kurtto *et al.* (2018) for *Atlas Flora Europaeae*. Pending further research, only names in new genera were listed, as synonyms (see also FG, Stace 2019, H24). Only *S. aucuparia* L. belongs in *Sorbus* s.str. The other taxa are transferred as follows: *S. ×thuringiaca* (Nyman) Fritsch is now *Hedlundia ×thuringiaca* (Nyman) Sennikov et Kurtto, *S. domes-*

*tica* L. is *Cormus domestica* (L.) Spach, *S. torminalis* (L.) Crantz is *Torminalis glaberrima* (Gandoger) Sennikov et Kurtto, *S. aria* (L.) Crantz is *Aria edulis* (Willd.) M.J. Roem.), *S. ×tomentella* Gandoger is *Karpatisorbus hybrida* (Borkh.) Sennikov et Kurtto, *S. latifolia* (Lam.) Pers. is *Karpatisorbus latifolia* (Lam.) Sennikov et Kurtto, *S. remensis* Cornier is *Karpatisorbus remensis* (Cornier) Sennikov et Kurtto and *S. intermedia* (Ehrh.) Pers. is *Borkhausenia intermedia* (Ehrh.) Sennikov et Kurtto.

- *S. graeca* (Lodd. ex Spach) S. Schauer [syn.: *Aria graeca* (Lodd. ex Spach) M.J. Roem.] has recently been reported from Lorr. nord-or. (Gutland, in Germany), at the limit of the territory of the Flora (FT). Considering the distribution of this species, in southeastern Europe, it is probably rather a micro-endemic, not yet described species, resembling *S. graeca* (comm. R. Hand, 03.2021).

## 81. Elaeagnaceae

- *Hippophae rhamnoides* L.: native populations of this species belong to subsp. *rhamnoides*, while shrubs that are cultivated as ornamentals (occasionally observed as escapes as well), with narrower leaves and with much more elongated and straight branches, usually belong to subsp. *fluviatilis* v. Soest. Still others, also cultivated and escaping, are often taller shrubs or small trees with yellowish fruits and winter buds with at least 6 scales (female flower) or 15-35 (male flower) (resp. 2-3 or less than 10 in subsp. *rhamnoides*). Sequencing analyses (two cpDNA loci and one nuclear gene) identified plants escaped in coastal dunes in Koksijde as a common haplotype of *H. rhamnoides* from the Caucasus, subsp. *caucasica* Rousi (comm. I. Bartish, 07.2016).

- Two ornamental species of *Elaeagnus* L. are now completely naturalized in the Flora area, *E. umbellata* Thunb. and *E. angustifolia* L. A key for their identification and full accounts are presented.

- Several additional species (incl. hybrids) of *Elaeagnus* are cultivated as ornamentals and increasingly observed as escapes. In addition to those already mentioned in NF6, *E. macrophylla* Thunb. has also been recorded (wn.be). *E. multiflora* Thunb., a native of East Asia, is very rarely found spontaneously. It is similar to *E. umbellata* but is distinguished by its pauciflorous inflorescence (1-2 flowers, despite its name) and its larger fruits (more than 10 mm) that are long-pedicellate and pendulous (pedicel up to 50 mm long).

## 82. Rhamnaceae

- An alien species of Rhamnaceae was observed in the Flora area: *Ziziphus lotus* (L.) Lam. A single young shrub was detected at the foot of a wall in the city of Ghent in 2006 and persisted for some years there (wn.be).

- *Rhamnus alaternus* L. is very rarely grown as an ornamental shrub. In a transport zone in Rekkem (Brab. occ.), a self-sown individual persists since 2014 at the foot of an unloading quay for containers.

### 83. Ulmaceae

- *Ulmus campestris* L.: a proposal for the rejection of this binomial was accepted by the Shenzhen Code (Appendix Code Botanical Nomenclature).
- *U. minor* Mill.: within this very variable species, the English botanist Melville formerly distinguished several ‘microspecies’ which hybridized easily with each other, so that, according to this author, *U. minor* in fact can be considered to represent binary or ternary hybrids. In NF6, it was said that this taxonomic system is hardly accepted today. However, it should be noted that recent British Floras (e.g. Sell & Murrell 2018, Stace 2019) still adopt this classification.

### 84. Cannabaceae

- *Humulus scandens* (Lour.) Merrill: there has been a lot of controversy about the application of this binomial and some contemporary Floras, e.g. FG, use the (younger) name *H. japonicus* Siebold et Zucc. instead. However, a proposal for the rejection of *Antidesma scandens* Lour. (Zeng & Ma 2009), its basionym, was rejected (Barrie 2011).

### 85. Moraceae

- *Broussonetia papyrifera* (L.) Vent.: this shrub, native to East Asia, is cultivated for ornament and is sometimes observed as an escape, at least since 2005 (old walls, etc.; wn.be). Its branches and leaves are bristly hairy and its false fruits globular and orange when ripe.
- *Morus alba* L.: the exact identity of mulberry plants with leaves with hairless upper sides is uncertain. Plants, also found as escapes, with large (more than 10 cm long), deeply palmatipartite leaves, may belong to another species, *M. kagayamae* Koidzumi.

### 86. Urticaceae

- *Urtica membranacea* Poir. ex Savigny: this alien species was already mentioned in NF6. It could naturalize in urban habitats in the near future, as it has done recently in the Netherlands (H24, Denters 2020). It differs from *U. urens* L. by its unisexual flower clusters that are at least 2 cm long, the male ones with a broadly winged axis.

### 90. Juglandaceae

- *Juglans* L.: in addition to *J. regia* L. and *J. nigra* L., other species have recently been recorded as escapes, but their identification requires further study. *J. cf. mandshurica* Maxim. was observed along river Rupel (2020) and plants similar to *J. cinerea* L. are rather regularly seen (wn.be).
- In addition to the locally invasive *Pterocarya fraxinifolia* (Poir.) Spach, its hybrid with *P. stenoptera* DC., *P. ×rhederiana* C.K. Schneider, is also cultivated. It is recognizable by its winged leaf. This hybrid has been observed very rarely as an escape from cultivation, e.g. along river Maas in Neerharen in 2011 (wn.be).

### 91. Betulaceae

- *Alnus* L.: several species and hybrids of this genus are cultivated for ornament in parks and along avenues. The hybrid *A. ×spaethii* Callier [*A. japonica* (Thunb.) Steud. × *subcordata* C.A. Mey.], with large elliptical leaves, has rarely been observed as an escape (wn.be).  
In Lorr., west of Metz, *A. alnobetula* (Ehrh.) K.Koch subsp. *suaveolens* (Req.) Lambinon & Kerguelen has been reported from several localities (FLORAINE 2013; also Vernier 2020 mentions this taxon). It is a Corsican endemic that was planted by the Office national des forêts in e.g. Rudemont (Arnaville (57) and in Rupt-de-Mad (comm. S. Antoine, 05.2021).

### 92. Cucurbitaceae

- Two additional alien species have recently been observed in the Flora area. *Ecballium elaterium* (L.) A. Rich. has been known as a weed in gardens in Rethel (Champ.) for a number of years (Bertaux 2011) and *Thladiantha dubia* Bunge was observed in Tienen in 2010 (wn.be).
- An additional alien *Cucurbita* L. has been observed as an ephemeral alien: *C. moschata* Duchesne (e.g. Roese-lare, 2014; wn.be).
- An additional alien *Cucumis* L. has been observed as an ephemeral alien: *C. dipsaceus* Ehrenb. ex Spach (Bossuit, 2018; wn.be).

### 94. Celastraceae

- An additional species of *Euonymus* L. has occasionally been recorded as an escape from cultivation, *E. alatus* (Thunb.) Siebold (wn.be, since 2011). It resembles *E. europaeus* L. but differs from it by its almost sessile leaves and its usually winged stems.
- In NF6, coastal populations of *Parnassia palustris* L. were ascribed to var. *condensata* Travis et Wheldon but this taxon is probably of limited taxonomic value (a mere ecotype). Although plants seem to differ in chromosome number (diploids vs. tetraploids) (Gornall & Wentworth 1993), there is no differentiation in allozymes, cpDNA and phenotype (Bonnin *et al.* 2002). It is ignored by most temporary Floras (FG, H24, etc.).

### 95. Oxalidaceae

- The account for *Oxalis* L. was improved based on Hoste (2012). Two increasingly naturalized species, *O. debilis* Kunth and *O. dillenii* Jacq., were added to the key and full accounts are now presented. Several additional species have been recorded lately, usually as casual escapes from cultivation (*O. articulata* Savigny, *O. triangularis* A. St.-Hil.) or as contaminants in plant containers (*O. conorrhiza* Jacq., *O. exilis* A. Cunn. and *O. pes-caprae* L.) (Hoste 2012, 2014).
- The name *O. stricta* L., not *O. fontana* Bunge, is upheld for the North American species that is long-naturalized and weedy in Europe, for the reasons explained by Ward (2004) and Nesom (2016), contrary to e.g. FG.

## 96. Hypericaceae

- An additional species of *Hypericum* L. is occasionally recorded as a casual escape from cultivation, *H. olympicum* L. (scattered records since 2014; wn.be).
- *H. majus* (A. Gray) Britton: this North American weedy species was discovered on the exposed banks of dried out fens in the northeastern part of Camp. in the Netherlands, for the first time in 2014. It seems to have established itself there in a short period of time and at present occurs with thousands of individuals in several localities near Nieuw-Bergen (wn.nl, H24).
- *H. perforatum* L. subsp. *veronense* (Schrank) Cesati: in NF6, narrow-leaved forms of *H. perforatum* were mentioned but these were considered to be a mere ecotype from arid substrates. However, the presence of genuine subsp. *veronense* was recently confirmed in the Flora area (France). It is in fact mostly characterized by capsule characters: capsule valves have large swollen (vesicular) vittae; in addition, leaves are all sessile and usually much narrower and with often inrolled margins. In subsp. *perforatum* capsules valves have narrow linear or punctiform vittae, leaves are (at least in part) petiolate and flat and wide (Robson 2002, Ciccarelli & Garbari 2005, Ciccarelli *et al.* 2003, FG).
- *H. maculatum* Crantz and *H. dubium* Leers: the latter species is now considered as a subspecies of the former, subsp. *obtusiusculum* (Tourlet) Hayek, following other contemporary flora accounts (FG, Stace 2019, H24).

## 98. Violaceae

- An additional alien species of *Viola* L. is sometimes recorded as a casual escape from cultivation, *V. sororia* Willd. (scattered records, mostly in urban habitats, since 2018; wn.be).
- *V. collina* Besser: the potential presence of this species in the Flora area was suggested in NF6, based on historical claims from Virelles and Saint-Mihiel. According to all contemporary sources, this species does not occur north of the Doubs area in France [SI-Flore, FG; it was not mentioned by AFL nor by Vernier (2020)].
- *V. riviniana* Reichenb.: a form with very dark leaves is cultivated as an ornamental. The exact identity of these plants is uncertain. They probably belong to the cultivar 'Purpurea', although some of the material has been ascribed to the North American *V. labradorica* Schrank. Such plants are increasingly observed as escapes from cultivation.
- *V. persicifolia* Schreb.: this is a nomenclaturally ambiguous name that was recently suppressed by the Code (Appendix Code Botanical Nomenclature), the correct name being *V. stagnina* Kit. The plants found in the Flora area belong to *V. stagnina* var. *stagnina*. Just north of our area var. *lacteoides* (W. Becker & Kloos) Van den Hof is also found (Van den Hof *et al.* 2013).
- *V. calaminaria* (Gingins) Lej.: in accordance with other contemporary flora accounts (e.g. FG, H24), this species

is now reduced to subspecies rank, as *V. lutea* Huds. subsp. *calaminaria* (Gingins) Nauenburg.

- *V. tricolor* L.: the taxonomy of this group has changed, following other modern flora accounts (FG, Stace 2019, H24). In the Flora area, *V. tricolor* now includes three subspecies: subsp. *tricolor*, subsp. *curtisii* (E. Forster) Syme (known as *V. curtisii* E. Forster in NF6) and subsp. *saxatilis* (F.W. Schmidt) Arcang. The latter subspecies was (re-)discovered in 2012 on the Rocroi and Hauts-Buttés plateaus in the French part of the Ardennes district (Coppa & Thévenin 2012, Thévenin & Coppa 2013; comm. M. Espeut 04.2021). In fact, it was already known there in the 19<sup>th</sup> century (Callay 1900). Specimens collected in 1904 in Hauts-Buttés (Monthermé) were distributed by the Société pour l'étude de la Flore Franco-Helvétique (sub n°1480 *Viola lepida* Jord.: <http://www.botanicalcollections.be/specimen/BR0000013206802>). Apparently, this taxon fell into oblivion in the 20<sup>th</sup> century. It is an often unusually tall plant (up to 80 cm in height), normally perennial with sterile suckers and large flowers up to 3 cm tall. It grows in acidiphilic, unamended meadows and should be sought elsewhere in the Ardennes. Stace (2019) evokes similar (identical?) plants from hilly areas in the northern British Isles. These have been ascribed to subsp. *saxatilis* but might as well (or rather) represent variants or hybrids of *V. tricolor*.

In NF7, the aforementioned French literature references (incl. FG) were followed as far as nomenclature and taxonomy are concerned. However, the correct name for the taxon called *saxatilis* requires further study. German contemporary Floras (e.g. Hassler & Muer 2022) accept two distinct subspecies, subsp. *alpestris* (DC. ex Ging.) Ces. (syn.: subsp. *saxatilis*) (an Alpine annual with predominantly yellow corollas) and subsp. *polychroma* (A. Kern.) Nyman (a perennial of lower mountain ranges with predominantly violet corollas). If these are indeed distinct entities, then the plants from the Flora area evidently belong to the latter taxon.

## 100. Salicaceae

- The account for *Salix* L. was completely reworked by A. Zwaenepoel, but much additional research is needed to elucidate the problems within this genus. Numerous more or less regularly encountered and/or easily recognized hybrids were added to the key, as were several frequently grown ornamentals. Some additional nomenclatural and taxonomic remarks are presented hereunder.
- The name of some hybrids is uncertain and requires further study. In NF6, the name *S. ×alopecuroides* Tausch was applied to designate the hybrid of *S. fragilis* (now *euxina*) × *triandra*. However, *S. alopecuroides* Tausch (1833) is a younger synonym of *S. speciosa* Host (1828) and the latter binomial thus has priority. It should be noted, however, that Stace (2019) retained the name *S. ×alopecuroides* for a triple hybrid (*S. euxina* × *alba* × *triandra*).
- The name of the hybrid *S. cinerea* × *purpurea* is also uncertain. In NF6, the binomial *S. ×sordida* A. Kerner

was applied for it but according to Stace (2019) its correct name is *S. ×pontederiana* Willd. However, POWO lists the latter as a synonym of *S. hastata* L. subsp. *hastata*.

In NF6, hybrids of *S. alba* × *triandra* were assigned to *S. ×erythroclados* Simonk. However, according to POWO its correct name is *S. ×eriocephala* Borbás (1880 vs. 1893). Other authors (e.g. Bartha 2021) consider the latter to be of *S. cinerea* × *triandra* parentage and thus *a priori* morphologically quite different.

- *S. fragilis* L., *S. euxina* I.V. Belyaeva, *S. ×fragilis* and *S. ×rubens* Schrank: the name *S. fragilis* has long been used for two different taxa, both for a West Asian species and for its hybrid with *S. alba*. Belyaeva (2009) proposed to reserve the name *S. ×fragilis* for the hybrid, while the previously unnamed parent species was newly described as *S. euxina*. This point of view was followed by most subsequent flora accounts in western Europe (e.g. H24, Stace 2019, Zwaenepoel 2019b, this account), but not by everyone (e.g. Hassler & Muer 2022). Indeed, some recent authors dispute this opinion (Marchenko & Kuzovkina 2022) and strongly recommend to continue using *S. fragilis* as the name for a glabrous crack willow and *S. ×rubens* for its hybrid with *S. alba* (as per NF6). The issue requires further study.

- Zwaenepoel (2019b) presented a key for the identification of infraspecific taxa and cultivars of *S. alba* and related taxa (these were not included in NF7). See also Belyaeva *et al.* (2018).

- The taxonomy and nomenclature of the weeping willows is complex. Two hybrids were accepted, *S. ×pendulina* Wender (*S. babylonica* × *euxina*) and *S. ×sepulcralis* Simonk. (*S. alba* × *babylonica*). Other contemporary authors (e.g. Belyaeva *et al.* 2018, Belyaeva *et al.* 2021, H24) have merged these two taxa. Most plants in the Flora area belong to *S. ×pendulina* nothof. *tristis* (Gaudin) I.V. Belyaeva (syn.: *S. babylonica* × *×fragilis* f. *vitellina* I.V. Belyaeva).

- The correct name for *S. caprea* × *viminalis* probably is *S. ×smithiana* Willd. (syn.: *S. ×sericans* Tausch ex A. Kerner) (Stace 2019, H24). According to some authors, however, *S. ×smithiana* is a synonym of *S. gmelinii* Pall. (POWO). Both are indeed similar and often confused. However, the leaves of *S. ×smithiana* are considerably shorter and wider and the veins are deeply impressed. Lenticels on branches and trunks are remarkably diamond-shaped (as in *S. caprea*) and the buds of the male plants are large and have a yellow-green top (as in *S. caprea*).

- A first step toward recognizing several hybrids of *S. udensis* Trautv. et C.A. Mey. in Belgium was recently published by Zwaenepoel *et al.* (2021), although this issue certainly requires further study.

- *S. atrocinerea* Brot. was considered to be a separate species in NF6. However, in the Flora area, transitional forms with *S. cinerea* are frequently observed. It is therefore better treated as a subspecies of the latter, subsp. *olei-*

*folia* Macreight. This point of view is followed by most contemporary authors in western Europe (e.g. Stace 2019, H24; see, however, FG).

- *S. eriocephala* Michaux: the application of this binomial in the Flora area remains uncertain and requires further investigation. According to some authors, these plants rather represent a hybrid of *S. eriocephala*, either with *S. purpurea* or with *S. petiolaris* Smith (Kuzovkina 2015).

- *S. gmelinii* Pall.: until recently, this species was called *S. ×dasyclados* Wimm., also in NF6, which is probably incorrect. The latter is probably of hybridogenous origin, probably derived from *S. viminalis* and an eastern European taxon (Belyaeva & Sennikov 2008).

- *S. purpurea* L.: the name var. *lambertiana* (Smith) Koch was upheld for the native taxon although this point of view is not uncontested. According to FG this only represents a juvenile phase of var. *purpurea* whereas POWO considers it to be a hybrid, *S. ×lambertiana* Smith, with hybrid formula *S. cinerea* subsp. *oleifolia* × *purpurea*. This issue requires further study.

- *S. repens* L.: the taxonomic framework of NF6 was kept for the time being, i.e. three subspecies are recognized, incl. subsp. *rosmarinifolia* (L.) Hartm., although claims of this latter subspecies require confirmation (all are probably erroneous). Moreover, subsp. *dunensis* Rouy probably is a mere ecotype from coastal dunes of subsp. *repens* (after transplantation, its characteristics hardly persist).

## 101. Euphorbiaceae

- An additional alien species of Euphorbiaceae has recently been recorded: *Manihot grahamii* Hook. (Leuven, 2017; wn.be).

- *Euphorbia lucida* Waldst. et Kit.: this adventive species was discovered on the banks of river Maas in Borgharen (Fluv., in the Netherlands) in 2012. It seems to have established itself there and at present occurs with several dozens of individuals (wn.nl). Although there initially was some doubt about this identity (H24), the species was positively identified recently (wn.nl).

- *E. characias* L.: in NF6, only subsp. *wulfenii* (Hoppe ex Koch) A.R. Smith was mentioned. By now subsp. *characias* has also been recorded but the separation of these two taxa is not always straightforward.

- *E. serpens* Kunth: in NF6, only subsp. *fissistipula* (Thell.) Verloove et Lambinon was mentioned. By now, subsp. *serpens* has also been recorded, for instance in a seemingly naturalized population in Ardoois in 2020 (wn.be).

- *E. esula* L. subsp. *tommasiniana* (Bertol.) Kuzmanov: according to Reichert *et al.* (2018) the correct name for this alien is subsp. *saratoi* (Ardoio) P. Fourn. A further synonym, frequently used by Russian authors for this taxon, was also added: *E. virgultosa* Klokov. The taxonomy of this group is very complicated and additional studies are needed. In the past, western European plants have been assigned – at least in part – to *E. ×pseudovirgata*

(Schur) Soó; this is a problematic name since its nomenclatural type in fact belongs to *E. virgata* Waldst. et Kit. (Reichert *et al.* l.c.).

Duluc (2019) demonstrated that the presence (subsp. *saratoi*) or absence (subsp. *esula*) of stomata on the upper leaf surface is the only reliable character to separate these two subspecies.

• In Champ. mér., a species very similar to *E. esula* has been recorded in basiphilous xerothermophilous wood margins and grasslands, *E. loreyi* Jord. It is a more slender plant, with sterile stems with shorter cauline leaves (usually not exceeding 30 mm in length), terminal umbels with often less than ten rays and with stomata located on the upper surface near the midrib and towards the apex. In the Flora area, this species has been recorded in Champfleury and Mailly-le-Camp, south of Épernay (database CBN Paris, FG).

• *E. dulcis* L. subsp. *purpurata* (Thuill.) Rothm.: the correct name at subspecies level for this taxon is subsp. *incompta* (Cesati) Nyman (Digitale2, FG).

• *E. brittingeri* Opiz ex Samp.: this species is best considered as a subspecies of *E. flavicoma* DC., subsp. *verrucosa* (Fiori) Pignatti (Digitale2, FG).

#### 104. Geraniaceae

• An additional alien species of *Pelargonium* L'Hérit. was recorded as an ephemeral alien, *P. candicans* Spreng. (Bilzen, 2017).

• Two additional ornamental species of *Geranium* L., *G. psilostemon* Ledeb. and *G. wallichianum* D. Don ex Sweet, have been recorded recently as ephemeral escapes from cultivation (wn.be).

• *G. robertianum* L. subsp. *maritimum* (Bab.) H.G. Baker: this subspecies was reported from coastal cliffs in the extreme southern part of the Flora area (or just beyond it) in France. FG merely included this taxon, without further comment, in the variation of *G. robertianum* and neither is it mentioned in Digitale2. Stace (2019) also indicated that it is difficult to distinguish. The taxonomic value of this subspecies is probably weak.

• *G. purpureum* Vill.: this species and *G. robertianum* rarely hybridize, forming sterile triploid hybrids. From the Aachen area (Germany) two more or less intermediate fertile diploid (micro-) species have been described lately and these undoubtedly also occur elsewhere in the territory of the Flora: *G. urbanum* Bomble and *G. alboroseum* Bomble (Bomble 2016a). However, assessing the taxonomic value of these species requires further study. In fact, his hypothesis was not supported by chromosome counts and these two taxa could as well refer to local 'micro-species' derived from *G. robertianum* in connection with the autogamy and disomic inheritance of the latter (Van Rossum *et al.* 2021), combined with habitat selection (the mutation of a single gene is often enough to change e.g. the color of the flowers). Especially the latter species, with pale pink or whitish corollas, appears to be not rare at all.

• An additional alien species of *Erodium* L'Hérit. has been recorded as an escape, *E. trifolium* (Cav.) Cav. (Ghent, since 2017; wn.be).

• *Erodium cicutarium* (L.) L'Hérit.: two subspecies were recognized in NF6, subsp. *cutarium* and subsp. *dunense* Andreas. However, the latter probably merely represents part of the endless variation of *E. cicutarium*: flower color, presence or absence of spots on the petals, leaf shape and hairiness, etc. are variable characters in this species. Most contemporary Floras (e.g. Stace 2019, FG) no longer distinguish subsp. *dunense*. This issue is also recognized by H24 but apparently both taxa differ in genome size (Zonneveld 2019). Therefore, both taxa were upheld but it was added that their separation may be problematic.

#### 105. Lythraceae

• An additional alien, ephemeral species was recorded: *Ammannia coccinea* Rottb. (Antwerp port area, 2016; introduced with rice, along with other rice weeds) (wn.be).

#### 106. Onagraceae

• Some additional ornamental species have been recorded recently as casual escapes: *Clarkia amoena* (Lehm.) A. Nelson et Macbr., *C. elegans* Dougl. and *Gaura lindheimeri* Engelm. et A. Gray [syn.: *Oenothera lindheimeri* (Engelm. et A. Gray) W.L. Wagner et Hoch] (wn.be).

• Recent molecular studies suggest that the genera *Gaura* L. and *Oenothera* L. should perhaps better be combined (e.g. Wagner *et al.* 2007), a point of view not yet followed.

• *Ludwigia grandiflora* (Michaux) Greuter et Burdet: this species contains two subspecies, one decaploid [subsp. *hexapetala* (Hook. et Arnott) Nesom et Kartesz], the other hexaploid (subsp. *grandiflora*) (Zardini *et al.* 1991, Nesom & Kartesz 2000). The two are morphologically very similar. However, the former is more vigorous with larger flowers and leaves. The Belgian (and European) invasive populations belong to subsp. *hexapetala* (Armitage *et al.* 2013).

• *Oenothera* L.: the account for this genus was updated, based on new insights. However, only the more or less frequent and/or naturalized species have been included in the key and were given a full account. For a more detailed overview, including a determination key covering all taxa, see Rostański & Verloove (2015). The following species were added: *O. oehlkersii* Kappus ex Rostański and *O. rubricaulis* Kleb.

• Additional, casual or very local taxa were merely listed: *O. casimiri* Rostański, *O. drawertii* Renner ex Rostański, *O. ersteinensis* R. Linder et R. Jean (syn.: *O. perangusta* auct. eur. non R.R. Gates), *O. moravica* V. Jehlík et Rostański, *O. speciosa* Nutt., *O. suaveolens* Pers. (Rostański & Verloove 2015, with posterior records by the author) and *O. villosa* Thunb. (the latter with certainty only in Mont-sur-Meurthe in Lorr. mér.; Mahévas *et al.* 2015).

• *O. fallax* Renner: in the hybridogenic complex of *O. glazioviana* Micheli and *O. biennis* L. two more or less

distinct ‘morphotypes’ can be observed, one with a flower bud that is progressively narrowed towards the base and the apex and with long sepal tips that are usually at least 4 mm long, the other with a subcylindrical flower bud that is abruptly narrowed at the apex and with shorter sepal tips. Both types are present in the Flora area, the latter can be assigned to *O. velutina* Renner.

- Two species of *Epilobium* L. that are present in the Flora area, *E. angustifolium* L. and *E. dodonaei* Vill., are sometimes included in a separate genus, *Chamaenerion* Ség. (syn.: *Chamerion* Holub). However, the taxonomic relevance of this genus remains to be confirmed, as recent molecular studies are unconvincing (FG).

- The binomial for the hybrid *E. montanum* L. × *roseum* Schreb. was corrected. The nomenclatural type of *E. ×mutabile* Boiss. et Reut., the name applied in NF6, belongs to *E. parviflorum* Schreb. (annotation on the type specimen by G. Nieto Feliner, 1994). The correct name for this hybrid appears to be *E. ×heteroeruleum* Borbás (Stace 2019).

- *E. ciliatum* Rafin.: according to some authors (e.g. Jonsell & Karlsson 2010) this species in fact includes three species in Europe (*E. ciliatum* s.str., *E. adenocaulon* Hausskn. and *E. glandulosum* Lehm.) which can be distinguished on the basis of the size of the bracts, the length of the pedicels, the petal color, the presence or absence of winter rosettes and the branching pattern of the inflorescence. The plants found in the territory of the Flora are indeed very variable but difficult to attribute to the aforementioned species. At least for now, they are best considered as a single variable species unless molecular studies show that they indeed represent several distinct species.

- *E. brachycarpum* C. Presl: this North American species, a recent newcomer in the Flora area, is now naturalized and much expanding lately. It was added to the key and a full account is provided.

### 109. Sapindaceae

- *Cardiospermum grandiflorum* Swartz: this casual alien that was formerly said to have been collected as wool alien near Verviers, likely refers to an unreliable collection (Hoste & Verloove 2019). The name was removed from the list with casual aliens.

- Several additional species of *Acer* L. have been recorded recently as escapes from cultivation: *A. cissifolium* (Siebold et Zucc.) K. Koch (Lokeren, since 2014), *A. japonicum* Thunb. (scattered localities, since 2012) and *A. pensylvanicum* L. (very few localities, since 2010) (wn.be). Several others have also been recorded recently but their identity requires confirmation, e.g. *A. buergerianum* Miq., *A. davidii* Franch. and *A. macrophyllum* Pursh (wn.be).

- *A. campestre* L. var. *hebecarpum* DC.: the taxonomic value of this variety is probably limited (FG).

- *A. rufinerve* Siebold et Zucc.: this Japanese tree recently started to escape from cultivation locally, to such an ex-

tent that in some areas it is considered to be an invasive species (Rafalowicz *et al.* 2009). It was therefore added to the key and a full account was provided.

### 110. Rutaceae

- *Citrus* L. seedlings are rarely observed (e.g. on exposed river banks, landfills; wn.be). Such plants can be recognized by the winged petioles and the presence of an articulation at the junction with the leaf blade.

### 112. Malvaceae

- Two alien ephemeral species were recently newly recorded: *Modiola caroliniana* (L.) G. Don f. (Ghent, 2015-2016 and Bilzen, 2017; wn.be) and *Sphaeralcea bonariensis* (Cav.) Griseb. (Antwerp, 2016; wn.be).

- *Althaea* L. now includes only a single native species in the Flora area, *A. officinalis* L. *A. hirsuta* L. was transferred to *Malva* L., as *M. setigera* Spenn. *Althaea* was traditionally distinguished from *Malva* and related genera by six (or more) epicalyx segments. However, recent studies have shown that epicalyx characters are not informative at the generic level (Ray 1995, Davis 2010). Escobar García *et al.* (2009) demonstrated that the annual species of *Althaea* doubtlessly belong in the *Malva*-complex.

- An additional alien species of *Althaea* L. has been recorded in two localities in Lorr., *A. cannabina* L. (FLO-RAINE 2013).

- The generic limits of *Malva* L. have considerably changed, as a result of molecular phylogenetic studies. The traditional generic distinction between *Lavatera* L. and *Malva* was based on fusion or non-fusion of the epicalyx but this character is very critical and turns out to be highly artificial and untenable (see for instance Ray 1995, Banfi *et al.* 2005). The relationships inferred from molecular data strongly contrast with this traditional classification (Escobar García *et al.* 2009). There are species in *Lavatera* (e.g. *L. mauritanica* Durieu and *L. triloba* L.) in which fusion of epicalyx segments differs between populations (Hinsley 2010). Some species traditionally included in *Lavatera* are more closely related to for instance *Malva sylvestris* L. than are some other species of *Malva*. Both genera are therefore better merged or *Lavatera* further divided into four or up to 12 independent genera (Banfi *et al.* 2005, Escobar García *et al.* 2009, Hinsley 2010). *Malva* having nomenclatural priority, all species formerly accommodated in *Lavatera* have been transferred to *Malva* (like was done in other contemporary regional Floras, e.g. FG, H24, Stace 2019).

- An additional ornamental species of *Malva* has recently been recorded as an escape of cultivation, *M. arborea* (L.) Webb et Berthel. (syn.: *Lavatera arborea* L.) (wn.be, Lemoine 2015b). In Mar., especially in Mar. mér., it could persist in coastal dunes near habitations. It is also known from coastal cliffs in Onival (Wattez 2018), south of the estuary of river Somme, i.e. beyond the Flora limits.

#### 114. Cistaceae

- An alien, probably ephemeral species has recently been recorded: *Cistus alyssoides* Lam. [syn.: *Halimium alyssoides* (Lam.) K. Koch] (Destelbergen, 2012-2022; wn.be).
- *Helianthemum nummularium* (L.) Mill.: the two subspecies that were distinguished in NF6, subsp. *obscurum* (Čelak.) Holub and subsp. *nummularium* are probably of limited taxonomic value (FG). In Lorr., however, the former is accepted as a distinct species, *H. grandiflorum* (L.) Mill. (FLORAINE 2013), a synonym that was added.

#### 119. Brassicaceae

- An additional casual alien species has been recorded recently, *Moricandia arvensis* (L.) DC. (Engis, 2017). A further alien species mentioned in NF6, *Malcolmia africana* (L.) R. Brown, is accommodated in a segregate genus by some authors (Al-Shehbaz *et al.* 2014). A synonym in that genus was added: *Strigosella africana* (L.) Botsch.
- *Malcolmia maritima* (L.) R. Brown: the exact identity of the plants found in the horticultural trade is uncertain. According to FG the widely cultivated species is *M. flexuosa* (Smith) Smith, or perhaps a hybrid of it. In the latter species fruiting pedicels are as thick as or broader than the fruit base, whereas in *M. maritima* fruiting pedicels are narrower than the fruit base. In plants that were recently observed in Belgium well-developed fruits are rather rarely seen, or not at all. In many cases, however, pedicels seem to be rather thick which indeed points at *M. flexuosa* – or even more likely (given poor fruit development) – hybrids of it with *M. maritima*.
- The generic limits of *Sisymbrium* L. have slightly changed. *S. supinum* L. was transferred to the genus *Erucastrum* C. Presl [now as *E. supinum* (L.) Al-Shehbaz et Warwick], following molecular phylogenetic studies and recent flora accounts (FG, H24).
- An additional alien species of *Sisymbrium* is now locally naturalized and increasingly observed, especially in urban habitats: *S. irio* L. It was added to the key and a full account is presented.
- An alien species of *Erysimum* L., *Erysimum crepidifolium* Reichenb., is known from Ralingen in the German Gutland (Lorr. nord-or.; FT). The species already appeared in the same region at the beginning of the 20<sup>th</sup> century, in the Sûre valley (Andres 1911).
- An additional casual alien species of *Conringia* Heist. ex Fabr. was recently recorded, *C. planisiliqua* Fisch. et C.A. Mey. (Antwerp port, 2013; wn.be).
- *Barbarea vulgaris* R. Brown: this species comprises three infraspecific taxa (either recognized as varieties or subspecies, depending on the authors) and all occur in the Flora area. According to recent molecular phylogenetic studies these may rather be three genetically distinct species (Toneatto *et al.* 2012): *B. vulgaris* s.str., *B. arcuata* Reichenb. and *B. rivularis* Martrin-Donos. Pending further studies, however, all three were maintained at subspecies rank.
- *Rorippa islandica* (Oeder) Borbás: this species was claimed from Lorr. by FLORAINE (2013), evidently in error for *R. palustris* (L.) Besser. In France, *R. islandica* only occurs in the Alps and Pyrenees and is lacking below 1600 m (FG).
- An additional alien species of *Cardamine* L. was recently observed, *C. graeca* L. (Verloove & Barendse 2020). Its persistence in a few localities has been confirmed subsequently (wn.be).
- The circumscription of *C. pratensis* L. has changed. The polyploid subspecies, subsp. *dentata* (Schult.) Čelak., is now accepted as a distinct species, *C. dentata* Schult. (see also FG and e.g. Melichárková *et al.* 2020, although this point of view was not followed in e.g. H24). These two taxa seem to represent, at least in parts of the Flora area and based on a limited sample, two clearly separated genotypes (with non-overlapping DNA contents) although their separation on morphological grounds is not always straightforward (preliminary results from a morpho-genetic study; comm. M. Leten, 07.2022): *C. dentata* has middle stem leaves with ovate to elliptic-elongated, clearly petiolate leaflets. The leaflets of the basal and lower cauline leaves have widely spaced, unequal teeth that are often separated by rather deep cuts; the terminal lobe is not significantly larger than the side lobes; the latter are numerous (10-24 in number). Petals are 9-16 mm long, often light pink or almost white. *C. pratensis*, in contrast, has middle stem leaves with narrow oblong-elliptic, sessile leaflets. The leaflets of the basal and lower cauline leaves usually have entire or weakly serrated leaflets; the terminal lobe is usually at least twice as large as the side lobes and the latter are less numerous (2-16 in number). Petals are 6-17 mm long, usually light to deep pink. *C. dentata* also tends to grow in wetter habitats.
- The East Asian weed *C. occulta* Hornem. (previously known as *C. hamiltonii* G. Don, *C. flexuosa* With. subsp. *debilis* O.E. Schulz or informally as ‘Asian Cardamine flexuosa’) is now widely naturalized in the Flora area. It was included in the key and a full account is presented. This octoploid species has long been confused with native *C. flexuosa* (tetraploid). It differs from it by the absence of a basal rosette, the leaves and stems that are (nearly) hairless and the usually lobed leaflets (Šlenker *et al.* 2018).
- *Cardaminopsis* (C.A. Mey.) Hayek was shown to be part of *Arabidopsis* Heynh. in recent molecular phylogenetic studies. As a consequence, both genera were merged, as was done before in other flora accounts (FG, Stace 2019, H24).
- The generic limits of *Arabis* L. have dramatically changed, as a result of molecular phylogenetic studies (e.g. Karl & Koch 2013). Three species included in this genus in NF6 have now been transferred to segregate genera: *Arabis glabra* (L.) Bernh. has become *Turritis glabra* L., *A. pauciflora* (Grimm) Garcke has become *Fourraea alpina* (L.) Greuter et Burdet and *A. turrata* L. has become *Pseudoturritis turrata* (L.) Al-Shehbaz.

- In NF6, *Arabis hirsuta* (L.) Scop. comprised three subspecies: subsp. *hirsuta*, subsp. *sagittata* (Bertol.) Nyman and subsp. *gerardii* (Besser) Hartm. f. These are now accepted as three distinct species, respectively *A. hirsuta* s.str., *A. sagittata* Bertol. and *A. planisiliqua* (Pers.) Reichenb., following FG. The latter is a critical species in the Flora area and its presence requires confirmation. Some populations from French Lorr. were formerly ascribed to *A. nemorensis* (Wolf ex Hoffman) Koch by G.H. Parent and this species was considered to be a synonym of *A. planisiliqua* in NF6. However, it is a quite different species, morphologically and ecologically, and with a different distribution as well. It was first incorrectly mentioned from France (FG) although recently it was found along the Doubs river near the Swiss border. The plants from French Lorr. possibly are just a form of *A. sagittata* (comm. J.-M. Tison, 10.2020). *A. planisiliqua* is distributed across southwestern Europe and reaches the valley of river Seine near Paris (SI-Flore), just beyond the boundaries of the Flora area.
- The naturalized ornamental *A. alpina* L. subsp. *caucasica* (Willd. ex Schlecht.) Briq. is now treated as a separate species, *A. caucasica* Willd. ex Schlecht., following e.g. FG and Stace (2019).
- *Alyssum saxatile* L. was transferred to the segregate genus *Aurinia* Desv., as *A. saxatilis* (L.) Desv., following other recent flora accounts (FG, H24, Stace 2019).
- *Draba* L. now also includes *Erophila* DC., following molecular phylogenetic studies (e.g. Jordon-Thaden *et al.* 2010).
- *D. verna* L.: this is a very variable species whose variation is poorly understood. As the species is autogamous, it shows locally discontinuous variations, sometimes interpreted as autonomous species. Three subspecies were recognized in the Flora area in NF6 but several additional taxa have been reported lately. Four species have recently been described from Mosan or. (Aachen; Germany): *D. acutidentata* Bomble, *D. aquisgranensis* Bomble, *D. kohlscheidensis* Bomble and *D. strigosula* Bomble (Bomble 2018). Two others, *D. glabrescens* Rouy et Foucaud (syn.: *Erophila glabrescens* Jord.) and *D. majuscula* Rouy et Foucaud (syn.: *Erophila majuscula* Jord.), sometimes mistakenly considered to be synonymous with *D. verna* subsp. *verna*, are known from the same region (Bomble 2011) and have been reported from the Netherlands as well (Mar., Camp. and Brab. or.; H24, wn.nl). DNA sequences and genome size measurements indeed seem to allow recognizing several species in western Europe (H24) but the identification of these species, based on morphological grounds, will require further study. Pending additional studies, the account was left unchanged (compare with FG).
- *Capsella rubella* Reut.: the taxonomic value of this species remains highly questionable, perhaps it is just a diploid line of *C. bursa-pastoris* (L.) Med. H24 therefore no longer recognized this species and provided a number of good arguments for this. In NF7, both species were upheld, following FG and Stace (2019), but this issue probably needs to be reconsidered.
- An alien species of *Hornungia* Reichenb., *H. alpina* (L.) O. Appel, was observed as a casual escape from cultivation (Antwerp, 2013; wn.be).
- The generic limits of *Thlaspi* L. have considerably changed as a result of recent molecular phylogenetic studies (e.g. Koch & Al-Shehbaz 2004). Meyer (1973), in fact, already proposed an alternative generic circumscription and recognized twelve distinct genera, mainly based on seed-coat sculpture and other anatomical characters. In a strict sense, in the Flora area, *Thlaspi* only includes *T. arvense* L. and perhaps *T. alliaceum* L. [the latter probably also belongs in a segregate genus, as *Mummenhoffia alliacea* (L.) Esmailbegi et Al-Shehbaz; Esmailbegi *et al.* 2018]. *T. perfoliatum* L. now belongs in *Microthlaspi* F.K. Mey. [as *M. perfoliatum* (L.) F.K. Mey.] and *T. caerulescens* J. et C. Presl and *T. montanum* L. were transferred to *Noccaea* Moench, as *N. caerulescens* (J. et C. Presl) F.K. Mey. [with two subspecies, subsp. *caerulescens* and subsp. *calaminaris* (Lej.) Holub] and *N. montana* (L.) F.K. Mey. respectively.
- *Microthlaspi perfoliatum* (L.) F.K. Mey.: according to some authors (Ali *et al.* 2016), a second species exists in the Flora area, *M. erraticum* (Jord.) T. Ali et Thines (syn.: *Thlaspi erraticum* Jord.) but their separation on morphological grounds is not easy. Its silicles are elongated with an acuminate base and a sharp notch (angle < 45°) while *M. perfoliatum* has ± rounded silicles with a wedge-subrounded base and an obtuse notch (angle > 45°); the first is diploid, the other polyploid. Based on these characters, plants found in the Flora area are hardly distinguishable. The problem needs to be studied again.
- *Iberis intermedia* Guersent subsp. *violletii* (Soyer-Will. ex Godr.) Rouy et Fouc.: in NF6, there was some doubt about the application of this name for plants found in Pagny-1a-Blanche-Côte and Saint-Mihiel in French Lorr. The same views, however, were recently expressed in FG.
- The genus *Lepidium* L. is now more broadly circumscribed, as a result of molecular phylogenetic studies (e.g. Al-Shehbaz *et al.* 2002). It now also includes *Cardaria* Desv. and *Coronopus* Zinn. Three species from these genera are now called *Lepidium draba* L. [syn.: *Cardaria draba* (L.) Dev.], *L. coronopus* (L.) Al-Shehbaz [syn.: *Coronopus squamatus* (Forssk.) Aschers.] and *L. didymum* L. [syn.: *Coronopus didymus* (L.) Smith].
- *L. virginicum* L.: in the Flora area, this species normally has petals that are longer than the sepals. However, in North America the species is much more variable than here and also includes small-flowered plants. Such forms recently have also been observed with us, including in Ghent in 2020 (wn.be).
- *L. neglectum* Thell.: species rank for this taxon is certainly exaggerated. Some authors tend to accept it as *L. densiflorum* Schrad. subsp. *neglectum* (Thell.) P. Fourn.

(synonym added) but probably no taxonomic rank whatsoever should be assigned to it. It is completely ignored by contemporary North American authors (Al-Shehbaz & Gaskin 2010).

- Two additional casual alien species of *Brassica* L. were recorded: *B. barrelieri* (L.) Janka (Roeselare, 2013) and *B. carinata* A. Braun (wn.be). The latter is sometimes grown as an oilseed plant now and is a hybridogenic taxon derived from *B. oleracea* L. × *nigra* (L.) Koch. It resembles *B. juncea* (L.) Czern. a lot but its leaves have 0-1 lateral lobes, the beak of the fruit is shorter (2.5-6 mm long) and the sepals are longer (7-10 mm long). It has been recorded several times as an alien recently.

- *Rapistrum rugosum* (L.) All.: the subsp. *linnaeanum* (Coss.) Rouy et Fouc. and *orientale* (L.) Arcang. are probably the most widespread in our territory, and they are quite easily distinguished from subsp. *rugosum* but are themselves hardly distinguishable (compare with FG).

- *Raphanus raphanistrum* L. subsp. *landra* (Moretti ex DC.) Bonnier et Layens [incl. subsp. *maritimus* (Smith) Thell.]: this subspecies recently has established itself in the Flora area (or was overlooked for a long time?). It is keyed-out now and a full account is presented. The plant characteristic of nitrophilous communities from sands of the Mediterranean, Black Sea and southwestern Europe coasts belongs to subsp. *maritimus*. The latter is probably conspecific with subsp. *landra*, reputed to be essentially Mediterranean but extending as far north as the southern British Isles. The latter name has nomenclatural priority and is thus applied now. Morphologically intermediate plants between subsp. *landra* and subsp. *raphanistrum* are quite frequent (especially with pods sometimes narrower than usual in subsp. *landra*). Therefore, the coastal populations of *R. raphanistrum* in the Flora area must be carefully checked.

## 120. Santalaceae

- *Thesium divaricatum* Jan ex Mert. et Koch: species rank for this taxon is probably exaggerated, it was thus reduced to subspecies rank under *T. humifusum* DC., as subsp. *divaricatum* (Jan ex Mert. et Koch) Bonnier et Layens, following e.g. FG. (see also Pedrol & Laínz 2000 who even considered both to be conspecific).

## 123. Plumbaginaceae

- An additional alien species of *Limonium* L. has rarely been recorded as a casual escape from cultivation: *L. platyphyllum* Lincz. [syn.: *L. latifolium* (Sm.) Kuntze] (wn.be).

- *Armeria maritima* Willd. subsp. *elongata* (Hoffmann) Bonnier: at species rank, the correct name for this taxon is *A. vulgaris* Willd. (synonym added). Since the name *elongata* at subspecies rank is illegitimate, the name *A. vulgaris* for this taxon was applied by FG.

## 124. Polygonaceae

- Several taxa from other genera than those analysed in the key are cultivated for ornament. The following have

recently been observed as escapes from cultivation: *Acronogonon campanulatum* (Hook. F.) H. Hara (a small population persists in Oubraker since 2013; wn.be), *A. ×fennicum* Reiersen [*A. alpinum* (All.) Schur × *weyrichii* (F. Schmidt) H. Hara] (an occasional escape here and there since 2012; wn.be), *Muehlenbeckia complexa* (A. Cunn.) Meissn. (idem, since 2016; wn.be) and *Oxyria digyna* (L.) Hill. (an escape from the Ghent Botanic Garden, known since 2020 as a pavement weed; wn.be).

- Two additional *Rumex* L. hybrids have been recorded recently: *R. obtusifolius* × *longifolius* (*R. ×hybridus* Kindb.) (Lommel, 2013, with the parents; wn.be) and *R. obtusifolius* × *palustris* (*R. ×steinii* Becker) (occasionally seen here and there with the parents since 2014; wn.be).

- Several additional alien (usually ephemeral) species of *Rumex* L. have recently been recorded: *R. confertus* Willd. (known from Mechelen and Sint-Niklaas since 2019; wn.be), *R. cristatus* DC. (occasionally observed but rarely typical; wn.be), *R. fueginus* Phil. [syn.: *R. maritimus* L. subsp. *fueginus* (Phil.) Hultén] (see also below) and *R. pseudonatronatus* (Borbás) Murb. (as grain alien in the Antwerp port and in Moen in 2011; wn.be).

*R. stenophyllus* Ledeb. has been known as an alien but it is seen quite regularly these days, especially in port areas (Verloove 2008b, Verloove 2013a). It went unnoticed for a long time due to confusion with *R. ×pratensis*. It is distinguished from the hybrid by its fruiting valves that all bear a callus (these equal to each other), its lower leaves with attenuate or truncate base and, of course, its fertility.

- *R. acetosella* L.: two subspecies that are distinguished in NF6 [subsp. *acetosella* and subsp. *pyrenaicus* (Pouret ex Lapeyr.) Akeroyd] are probably of limited taxonomic value (mere morphotypes?) (FG, H24).

- *R. salicifolius* Weinm. var. *triangulivalvis* (Danser) Hickman: this North American taxon is usually accepted as a distinct species by contemporary American taxonomists (e.g. Mosyakin 2005), *R. triangulivalvis* (Danser) Rech. f. In western Europe it is usually referred to as *R. salicifolius* but this species has a rather small native distribution range and does not occur as an alien outside this range.

- *R. pulcher* L.: the plants that are possibly native in the southernmost part of the Flora area belong to subsp. *pulcher* (FG).

- *R. obtusifolius* L. subsp. *sylvestris* (Wallr.) Čelak.: this rare alien is recognizable by its very small valves with almost entire margins, all with a callus.

- *R. maritimus* L.: a very similar American species, *R. fueginus* Phil. [syn.: *R. maritimus* subsp. *fueginus* (Phil.) Hultén], has been found in Mar. since 2011 (on exposed wet sands) but appears to be unstable. Due to its similarities with *R. maritimus* it might be overlooked. Its leaves (at least the basal ones) have distinctly wavy margins and the base is truncate-cordate. The plant is densely papillose (especially the underside of the leaves and the branches of the inflorescence) and turns dark brown when ripe. At least some valves have three teeth instead of two.

- *Polygonum oxyspermum* C.A. Mey. et Bunge ex Ledeb. subsp. *raii* (Bab.) D.A. Webb et Chater: this taxon is now treated as a distinct species, *P. raii* Bab., following e.g. FG.
- The generic limits of *Persicaria* Mill. have considerably changed as a result of recent molecular phylogenetic studies (Galasso *et al.* 2009). The following two genera were segregated: *Bistorta* Hill (with the native species *B. officinalis* Delarbre and some garden ornamentals) and *Rubrivena* M. Král [with the naturalized alien *R. polysachya* (Wall. ex Meissner) M. Král].
- In NF6, it was said that species of *Persicaria* Mill. hybridize rather easily. This is a gross overestimation: such hybrids must be exceedingly rare (see also FG, Stace *et al.* 2015, Stace 2019) and most claims are doubtlessly erroneous.
- The cultivated ornamental *Bistorta affinis* (D. Don) Greene [syn.: *Persicaria affinis* (D. Don) Ronse Decraene] has occasionally been observed as an escape (wn.be).
- The generic limits of *Fallopia* Adans. have changed as a result of molecular phylogenetic studies (Galasso *et al.* 2009). In a strict sense, this genus only includes species with twining stems, the others are now accommodated in *Reynoutria* Houtt. On the other hand, hybridization occasionally occurs between representatives of these genera [for instance between *Fallopia baldschuanica* (Regel) Holub and *Reynoutria japonica* Houtt.; see also below], which confirms their close affinity.
- *F. aubertii* (L. Henry) Holub and *F. baldschuanica* (Regel) Holub: these species are probably conspecific, the latter binomial having nomenclatural priority (see also FG, H24, Stace 2019).
- An intergeneric hybrid between *Fallopia baldschuanica* (Regel) Holub and *Reynoutria japonica* Houtt., ×*Reylopia conollyana* (J.P. Bailey) Galasso (syn.: *Fallopia conollyana* J.P. Bailey) has very rarely been observed (especially in Fl.). This plant resembles *R. japonica* in its habit, but its stems are a little thinner and incline more strongly and the apex of its leaves is acuminate. This hybrid was also cultivated from seeds collected from *R. japonica*, thus following pollination of the latter by *F. baldschuanica* (Hoste *et al.* 2017).

## 126. Caryophyllaceae

- Recent molecular phylogenetic studies have greatly modified generic limits in Caryophyllaceae (see below). The casual alien *Silene coeli-rosa* (L.) Godr. is now accommodated in a separate genus, as *Eudianthe coelirosa* (L.) Fenzl.
- An additional ephemeral (?) alien was recently observed, *Paronychia argentea* Lam. It was found, among others, in two campsites (Antwerpen-Linkeroever, De Panne), since 2017 (Verloove *et al.* 2020a).
- *Arenaria serpyllifolia* L.: the two subspecies that were distinguished in NF6, subsp. *serpyllifolia* and subsp. *leptoclados* (Reichenb.) Nyman, are now treated as two

distinct species, *A. serpyllifolia* s.str. and *A. leptoclados* (Reichenb.) Guss., following other contemporary flora accounts (e.g. FG, H24, Stace 2019).

*A. serpyllifolia* s.str. is a very variable species within which three varieties were distinguished in NF6 that are linked by intermediates (and therefore probably of limited taxonomic value; see also FG). The correct name for var. *lloydii* (Jord.) Lloyd is var. *macrocarpa* Lloyd.

- *Minuartia hybrida* (Vill.) Schischkin and *M. mediterranea* (Link) K. Malý: some recent studies, corroborated by molecular data (e.g. Dillenberger & Kadereit 2014), place these two species in a separate genus, *Sabulina* Reichenb., a point of view already followed by some contemporary western European Floras, e.g. H24 and Stace (2019). The corresponding names in that genus [respectively *S. tenuifolia* (L.) Reichenb. and *S. mediterranea* (Link) Reichenb.] were added, as synonyms.

- *Minuartia hybrida* (Vill.) Schischkin: this is a very variable species that seems to be represented in the Flora area by three subspecies. Most often the sepals and pedicels are glabrous [subsp. *tenuifolia* (L.) Kerguelén]. Much more rarely, sepals and pedicels are glandular; such plants probably correspond with subsp. *hybrida*. Plants with flowers with 3-5 stamens (vs. 6-10) and petals much shorter than sepals (vs. nearly equalling sepals) can be attributed to subsp. *laxa* (Jord.) Jauzein (syn.: *M. laxa* Jord.) (FG). The distribution and frequency of these three taxa remain to be assessed, although the last subspecies may be only adventitious in the Flora area (in France it predominantly occurs in the southeastern part; SI-Flore). It was also observed in Brussels (wn.be) and in the Dunkerque area (pers. obs. FV). Duluc (2019) also confirmed its presence in north-western France.

- An alien, ephemeral *Stellaria* L. was recently recorded: *S. media* (L.) Vill. subsp. *cupaniana* (Jord. et Fourr.) Nyman [syn.: *S. cupaniana* (Jord. et Fourr.) Bég.] (Antwerp port, 2013, as grain alien; wn.be). It was previously also noticed as a weed in plant containers (Hoste *et al.* 2009).

- *S. media* (L.) Vill.: two subspecies that were distinguished in NF6, subsp. *media* and subsp. *neglecta* (Weihe) Gremlí, are now treated as two distinct species, *S. media* s.str. and *S. neglecta* Weihe, in accordance with other contemporary western European flora accounts (FG, H24, Stace 2019).

- A cryptic species, very similar to *S. media* (L.) Vill., was recently described from the Czech Republic, *S. ruderalis* M. Lepší, P. Lepší, Z. Kaplan et P. Koutecký (Lepší *et al.* 2019). It is a tetraploid species, possibly resulting from hybridization between *S. pallida* (Dum.) Piré and *S. neglecta* Weihe. The plant is robust, up to 80 cm tall, ± yellowish green; early inflorescences are usually condensed, the first internodes of the dichasium branches are almost equal to each other; petals are shorter than or as long as sepals; stamens 3-5 (-10) in number; seeds light brown to dark brown, with long, conical tubercles which are longer than wide, with few or absent papillae. This

species is very widespread in Central and southern Europe and was found in Mosan or. in Aachen (Germany) (Bomble 2020) and near Genk in Camp. or. (wn.be). It should be sought elsewhere in the territory of the Flora, especially in its eastern part.

- *S. holostea* L.: molecular phylogenetic studies have shown that this species constitutes a monotypic entity that was resolved as sister to the clade containing *Stellaria* L. + *Cerastium* L. It was therefore transferred to a new genus, *Rabelera* (L.) M.T. Sharples et E. Tripp (Sharples & Tripp 2019). Its corresponding name in that genus, *R. holostea* (L.) M.T. Sharples et E. Tripp was added, as a synonym.

- *Cerastium fontanum* Baumg. subsp. *vulgare* (Hartm.) Greuter et Burdet var. *holosteoides* (Fries) Jalas: this variety is poorly known in the territory of the Flora. It was always believed to be absent in Belgium; in fact, it is probably the native taxon of depressions in coastal dunes. It is present in the permanent seed bank and is observed each time this bank is exposed. However, as soon as the ubiquitous var. *vulgare* appears – often anthropogenically introduced – seemingly intermediate plants are observed, rapidly replacing var. *holosteoides* (comm. M. Leten, 08.2020). It should be noted, however, that the taxonomic value of this variety is debatable: FG merely ignores it whereas H24 and Stace (2019) accept it at a more elevated rank (as subspecies).

- *C. brachypetalum* Desp. ex Pers.: the taxonomic value of the two subspecies distinguished in NF6, based on the presence or absence of glandular hairs, is probably limited (individual variation; FG).

- *C. pumilum* Curt.: two subspecies that were distinguished in NF6 were reduced to variety rank [var. *pumilum* and var. *glutinosum* (Fries) Beck], although there is some disagreement among recent authors. FG and H24, for instance, accepted both as distinct species. According to a detailed study by Letz *et al.* (2012) both differ in ploidy number and in a number of morphological features, at least some of them not mentioned in NF6. The key was improved accordingly. A traditionally used character (presence vs. absence of a scarious margin to the tip of the lowermost bracts) was shown to be not taxonomically informative by these authors.

- *Sagina subulata* (Swartz) C. Presl is an illegitimate name; the correct name for this species is *S. alexandrae* Iamónico (Iamónico 2016).

- A new alien species of *Sagina* L. was recently observed, *S. japonica* (Swartz) Ohwi (Antwerp port, 2018; introduced with rice).

- *Spergularia* (Pers.) J. et C. Presl: some recent molecular phylogenetic studies have advocated the inclusion of this genus in *Spergula* L. (e.g. Fior *et al.* 2006, López González 2010) and this point of view was followed by e.g. FG. Further studies, however, have shown that both genera are monophyletic entities (Kool & Thulin 2017). Both genera were thus maintained but synonyms in *Spergula* were added for all species of *Spergularia*.

- An additional alien species of *Spergularia* (Pers.) J. et C. Presl was recently observed: *S. bocconeii* (Scheele) Asch. et Graebn. [syn.: *Spergula bocconeii* (Scheele) Pedersen] (as campsite alien in Bredene in 2016-2017; Verloove *et al.* 2020a).

- *Delia segetalis* (L.) Dum.: all recent Floras (e.g. FG, H24) treat this as a species of *Spergularia* (Pers.) J. et C. Presl., *S. segetalis* (L.) G. Don f., which is corroborated by several molecular studies.

- A character useful for the separation of *S. media* (L.) C. Presl and *S. marina* (L.) Besser was added: stamens usually 8-10 and 1-6 respectively (FG, H24; comm. P. Van Vooren).

- The representatives of the former genus *Lychnis* L. were transferred to other genera. *L. viscaria* L. is now accommodated in *Viscaria* Bernh. (as *V. vulgaris* Bernh.), whereas *L. flos-cuculi* L. and two ornamentals [*L. coronaria* (L.) Desr. and *L. chalconica* L.] were transferred to *Silene* L. [*S. coronaria* (L.) Clairv. and *S. chalconica* (L.) E.H.L. Krause] (based on Jafari *et al.* 2020).

- The correct name for a species of *Agrostemma* L. that is regularly sown (and observed as an escape) in the Flora area is *A. brachyloba* (Fenzl) K. Hammer, not *A. gracile* Boiss. (e.g. H24). It is recognizable by its calyx teeth that not protrude from the petals.

- The generic limits of *Silene* L. have considerably changed, as a result of recent molecular phylogenetic studies (summarized by e.g. Jafari *et al.* 2020). In addition to some species of *Lychnis* L. that have been transferred to it (see before), the genus now also includes *S. baccifera* (L.) Durande (formerly in the segregate genus *Cucubalus* L.). *S. armeria* L., on the contrary, was removed from it and is now accommodated in *Atocion* Adans., as *A. armeria* (L.) Rafin.

- *Silene vulgaris* (Moench) Garcke subsp. *maritima* (With.) Á. et D. Löve: this subspecies is now treated as a distinct species, *S. uniflora* Roth, following FG. It is usually readily separated from *S. vulgaris*, much more so than the other infraspecific taxa that are usually accepted under the latter.

- *S. nutans* L.: this species is very variable and very probably consists of a complex of different species. The populations present in the territory of the Flora correspond to two different biological types that are forming non-viable or sterile hybrids. They differ in particular in the structure of the inflorescence, the number and color of the flowers and the size of the capsules (Somme *et al.* 2016, Van Rossum 2000); they correspond with calcicolous and silicicolous ecotypes that are cooccurring in the valley of river Meuse and its tributaries. A coherent taxonomic system remains to be developed.

- *S. coronaria* (L.) Clairv.: this ornamental species is very easily escaping, to such an extent that it has naturalized here and there in the Flora area. It was therefore added to the key and a full account was presented.

## 127. Amaranthaceae

- An additional ephemeral alien species was recently recorded: *Teloxys aristata* (L.) Moq. (syn.: *Chenopodium aristatum* L.) (Ghent port area, 2016, as grain alien; wn.be).
- The generic limits in Amaranthaceae (especially in ex-Chenopodiaceae) have considerably changed as a result of molecular phylogenetic studies (see also below). Two ephemeral aliens that were already mentioned in NF6 were transferred to other genera: *Bassia hirsuta* (L.) Aschers. is now *Spirobassia hirsuta* (L.) Freitag et G. Kadereit; *Monolepis nuttalliana* (Schult.) Greene is now *Blitum nuttallianum* Schult. (Kadereit & Freitag 2011, Fuentes-Bazan *et al.* 2012).
- *Amaranthus blitum* L.: in NF6, it was said that some of the plants belong to subsp. *emarginatus* (Moq. ex Uline et Bray) Carretero, Muñoz Garmendia et Pedrol. In fact, at least part of the naturalized populations, especially in Fluv. (river Maas), correspond to this subspecies. It appears to be a recently expanding taxon.
- *Salicornia europaea* L. subsp. *europaea* and subsp. *disarticulata* (Moss) Lambinon & Vanderpoorten: these two subspecies often hybridize and this hybrid was named *S. europaea* subsp. *europaea* n. subsp. *marshallii* Lambinon et Vanderpoorten. This concept is in line with molecular phylogenetic studies (Kadereit *et al.* 2012). In the British Isles, however, these two subspecies are still recognized as distinct species (Stace 2019) and their hybrid was recently formally named, *S. ×marshallii* (Lambinon et Vanderpoorten) Stace (Stace 2015).
- *S. procumbens* Smith: two varieties recognized in NF6, var. *procumbens* and var. *stricta* (G.F.W. Mey.) J. Duviigneaud et Lambinon, are well separated on morphological grounds and accepted as distinct species by some authors. However, genetically they are indistinguishable (Kadereit *et al.* 2012).
- *Polycnemum arvense* L.: this species is distinguished from *P. majus* A. Braun by tepals and fruits less than 1.6 mm long, bracteoles less than 2 mm long and median and upper floral leaves less than 5 mm long. It has recently been found in several localities in Lorr. (e.g. in a railway yard in Mont-sur-Meurthe, also in Piennes) and may naturalize locally (Weicherding 2011, FLORAINE 2013, Vernier 2020).
- The generic circumscription of *Salsola* L. has considerably changed, as a result of recent molecular phylogenetic studies (e.g. Akhani *et al.* 2007, Wen *et al.* 2010). Our native species *Salsola kali* L. was transferred to *Kali* Mill., as *K. soda* Moench. Its subsp. *tragus* (L.) Čelak. is now treated as a distinct species by most recent authors, *K. tragus* (L.) Scop. (e.g. FG, H24). In FG, this species was accepted under the binomial *K. australis* (R. Br.) Akhani et E.H. Roalson. The latter, however, is an Australian endemic species (also locally naturalized in southwestern North America and southern Africa) whereas the most widespread and often weedy species of ‘*Salsola*’ is now

properly known as *K. tragus* due to its lectotypification and epitypification (Rilke 1999, Mosyakin 2018).

- The generic limits of *Chenopodium* s.l. and related taxa have considerably changed as a result of recent molecular phylogenetic studies (see Fuentes-Bazan *et al.* 2012 for an overview). *Dysphania* R. Br. (for species with aromatic, glandular hairs) had already been segregated before on morphological grounds (Mosyakin & Clemants 2002) and this is confirmed by molecular data. *Chenopodium*, as traditionally understood, finally turns out to fall apart in seven distinct genera and the Belgian representatives, native as well as non-native, are now classified as follows (species preceded by an \* are non-native in Belgium):

- *Lipandra* Moq. with a single, native species: *L. polysperma* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium polyspermum* L.);

- *Oxybasis* Kar. et Kir., with 6 species (4 native, 2 non-native species): *O. chenopodioides* (L.) S. Fuentes, Uotila et Borsch [syn.: *Chenopodium chenopodioides* (L.) Aellen], *O. glauca* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium glaucum* L.), \**O. macrosperma* (Hook. f.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium macrospermum* Hook. f.), *O. rubra* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium rubrum* L.), \**O. salina* (Standley) Uotila (syn.: *Chenopodium salinum* Standley) and *O. urbica* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium urbicum* L.);

- *Blitum* L., with a single native and three non-native species: *B. bonus-henricus* (L.) Reichenb. (syn.: *Chenopodium bonus-henricus* L.), \**B. capitatum* L. [syn.: *Chenopodium capitatum* (L.) Ambrosi], \**B. nuttallianum* Schult. [syn.: *Monolepis nuttalliana* (Schult.) E. Greene] and \**B. virgatum* L. (syn.: *Chenopodium foliosum* Aschers.);

- *Dysphania* R. Brown, with nine non-native species: \**D. ambrosioides* (L.) Mosyakin et Clemants (syn.: *Chenopodium ambrosioides* L.), \**D. botrys* (L.) Mosyakin et Clemants (syn.: *Chenopodium botrys* L.), \**D. carinata* (R. Brown) Mosyakin et Clemants (syn.: *Chenopodium carinatum* R. Brown), \**D. cristata* (F. Muell.) Mosyakin et Clemants [syn.: *Chenopodium cristatum* (F. Muell.) F. Muell.], \**D. glomulifera* (Nees) P.G. Wilson [syn.: *Chenopodium myriocephalum* (Benth.) Aellen], \**D. multifida* (L.) Mosyakin et Clemants (syn.: *Chenopodium multifidum* L.), \**D. pseudomultiflora* (J. Murr) Verloove et Lambinon [syn.: *Chenopodium pseudomultiflorum* (J. Murr) Uotila], \**D. pumilio* (R. Brown) Mosyakin et Clemants (syn.: *Chenopodium pumilio* R. Brown) and \**D. schraderiana* (Schult.) Mosyakin et Clemants (syn.: *Chenopodium schraderianum* Schult.);

- *Teloxys* Moquin-Tandon, with a single non-native species: \**T. aristata* (L.) Moq. (syn.: *Chenopodium aristatum* L.);

- *Chenopodiastrum* S. Fuentes, Uotila & Borsch, with two native and one non-native species: *C. hybridum* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium hybridum* L.), *C. murale* (L.) S. Fuentes, Uotila et Borsch (syn.: *Chenopodium murale* L.) and \**C. simplex* (Torrey)

S. Fuentes, Uotila et Borsch [syn.: *Chenopodium simplex* (Torrey) Raf.].

The remaining species belong in *Chenopodium* s.str. In this new, narrower circumscription this genus is monophyletic.

- Some ephemeral alien species of *Chenopodium* L. s.str. were renamed. *C. bushianum* Aellen is treated as a variety of *C. berlandieri* Moq. [var. *bushianum* (Aellen) Cronquist] and the species called *C. desiccatum* A. Nelson in NF6 is now called *C. pratericola* Rydberg by contemporary North American authors (Clemants & Mosyakin 2003).

- A hybrid between *C. album* L. and *C. giganteum* D. Don (*C. ×reynieri* A. Ludw. et Aell.) is frequently cultivated nowadays (almost always under the wrong name of *C. giganteum*) and is sometimes found as an escape from cultivation (wn.be).

- The species of the *C. album* L. complex (*C. giganteum* D. Don, *C. missouriense* Aell., *C. opulifolium* Schrad. ex Koch et Ziz, *C. probstii* Aell., etc.) are all hexaploids, which would probably justify their amalgamation. The problem requires further study.

*C. album* subsp. *striatum* (Krašan) J. Murr, on the contrary, is a tetraploid that is better treated as a distinct species, *C. strictum* Roth. (see, however, below).

- *C. opulifolium* Schrad. ex Koch et Ziz is closely related to *C. album* L. (see above) and sometimes treated as a subspecies of it (e.g. in FG), subsp. *opulifolium* (Schrad. ex Koch et Ziz) Batt. This name was added, as a synonym.

- *C. berlandieri* Moq.: a variety with larger seeds (1.7–2 mm wide) and a slightly drooping inflorescence, var. *bushianum* (Aellen) Cronquist (syn.: *C. bushianum* Aellen), has been found in the past as an ephemeral alien.

- *C. strictum* Roth: this binomial has been misapplied. The name *C. betaceum* Andrz. should be applied to most of the European and western Asian plants currently called *C. strictum* sensu auct. The true *C. strictum* Roth belongs to a group of insufficiently known taxa from India and adjacent areas, and is not closely related to *C. betaceum* (Mosyakin 2017).

- *Lipandra polysperma* (L.) S. Fuentes, Uotila et Borsch: in NF6 (under *Chenopodium polyspermum* L.), two varieties were recognized [var. *polyspermum* and var. *acutifolium* (Smith) Gaudin] but these are probably only morphoses (resulting from autumn conditions?) without taxonomic value (see also FG). They were suppressed.

- *Oxybasis rubra* (L.) S. Fuentes, Uotila et Borsch: two varieties were distinguished in NF [under *Chenopodium rubrum* L.: var. *rubrum* and var. *humile* (Hook.) S. Watson]. These are sometimes well characterized, but probably of little taxonomic value. A third variety, var. *blitoides* (Lej.) Wallr., is not recombined yet under *Oxybasis* and there is little point in doing so as no one seems to recognize this taxon any longer.

- In Lorr. mér. and or. (e.g. in Dieulouard but also east of

Château-Salins, just beyond the Flora limits; formerly also in the southern part of the Grand-Duchy of Luxembourg) plants have been observed with characters intermediate between *O. rubra* and *O. urbica*. Such plants are usually ascribed to *O. rubra* var. *intermedia* (Mert. et W.D.J. Koch) B. Bock et Tison (e.g. FG) but it is possibly a distinct allotetraploid species, resulting from a hybridization between these species, for which the name *C. rhombifolium* Willd. is available (Wisskirchen & Weicherding 2020) (species not yet recombined under *Oxybasis*).

- The ephemeral alien species *Atriplex sibirica* L. is accommodated in *Obione* Gaertn. by some authors. Its name in that genus [*Obione sibirica* (L.) Fisch.] was added, as a synonym.

## 128. Aizoaceae

- Some species from this family are increasingly grown as ornamentals and some are rarely found as escapes from cultivation, e.g. several species of the genus *Delosperma* N.E. Brown (?*D. aberdeenense* (L. Bolus) L. Bolus, ?*D. cooperi* (Hook.f.) L. Bolus) and *Drosanthemum floribundum* (Haworth) Schwantes (Genk, 2018) (wn.be). Assessing their identity is rarely straightforward, most plants in horticulture possibly being cultivars or hybrids.

- The specific epithet of *Tetragonia tetragonoides* (Pallas) O. Kuntze was misspelt in NF6 (“tetragonioides”). See article 60.8, Ex. 23 of the Code.

## 129. Phytolaccaceae

- *Phytolacca acinosa* Roxb.: the taxonomic view of NF6 for this complex was maintained, contrary to FG. *P. acinosa* is treated as a collective species that includes, among others, *P. esculenta* Van Houtte. This is in accordance with e.g. H24, Stace 2019, Jäger *et al.* 2008).

## 132. Montiaceae

- The correct name for the species called *Montia minor* C.C. Gmel. in NF6 is *M. arvensis* Wallr. (FG, H24, Florenliste Buttler).

- The taxonomic framework of the *M. fontana* complex was changed. The subspecies *variabilis* Walters and *amporitama* Sennen of the latter, as recognized in NF6, are now considered to be a separate species, *M. hallii* (A. Gray) Greene, the latter itself with two varieties, var. *hallii* and var. *variabilis* (Walters) Holub (although the taxonomic value of these varieties may be limited; FG).

## 133. Portulacaceae

- *Portulaca oleracea* L.: this species has been subdivided into a series of subspecies, based essentially on seed size and ornamentation, and several infraspecific taxa have been identified in the Flora (Danin & Verloove 2015). However, genetic studies have shown that *P. oleracea* should be considered as a polymorphic species, indivisible into microspecies on the basis of seed ornamentation and size (El-Bakatoushi *et al.* 2013).

### 136. Cornaceae

- *Cornus sanguinea* L.: in addition to the two subspecies that are currently found in the Flora area, one native (subsp. *sanguinea*) and one introduced [subsp. *australis* (C.A. Mey.) Jáv. ex Soó], intermediate plants have also been encountered. These are believed to be their hybrid, nsubsp. *hungarica* (Kárpáti) Soó.

### 138. Polemoniaceae

- Two further ornamental species are occasionally recorded as casual escapes from cultivation: *Gilia capitata* Sims and *Phlox paniculata* L. (wn.be).

### 139. Primulaceae

- Two additional species of *Primula* L. have recently been observed as ephemeral escapes: *P. denticulata* Sm. (Sourbrodt, 2016-2018; wn.be) and *P. florindae* Kingdon-Ward (Koerselse Heide, 2010; wn.be).

- *P. veris* L.: the taxonomic value of subsp. *columnae* (Ten.) Maire et Petitmengin is probably limited, it was reduced to variety rank, var. *columnae* (Ten.) B. Bock (see also FG).

- The generic limits of *Lysimachia* L. and related genera have dramatically changed in recent times, as a result of molecular phylogenetic studies. Hao *et al.* (2004) already showed that *Glaux* L. is deeply nested in *Lysimachia*. More numerous data sets used by Anderberg *et al.* (2007) confirmed this and demonstrated that, among others, *Anagallis* L. (incl. *Centunculus* L.) and *Trientalis* L. are also completely nested in *Lysimachia*. Manns & Anderberg (2009) made the corresponding nomenclatural transfers. Despite being morphologically fairly aberrant, this new generic concept has since then been applied by many authors (e.g. Banfi & Galasso 2005, FG; see however H24). Stace (2010), who initially classified the amalgamation of *Anagallis* and *Lysimachia* as an “unwelcome newcomer”, eventually also treated *Lysimachia* in a broad sense (Stace 2019).

- *L. europaea* (L.) U. Manns et Anderb.: in NF6 (key), this species was said to usually have fruits with 7 valves. In reality, this number is rather variable and ranges between 5 and 9 (FG, H24, Stace 2019).

- Several species of the genus *Lysimachia* L. are cultivated for ornamental purposes. At least *L. clethroides* Duby (observed in very few localities since 2016) and *L. fortunei* Maxim. (Ploegsteert, 2015), both with white flowers in dense spikes, have recently been recorded as escapes from cultivation (wn.be).

- *L. punctata* L.: the plants that are found naturalized in the territory of the Flora are rather variable. Two morphotypes are observed: on the one hand, plants with a loose inflorescence with flowers with pedicels up to 25 mm long and with clearly petiolated leaves (petiole up to 20 mm long); on the other hand, plants with a dense inflorescence with (sub-) sessile flowers and with almost sessile leaves. These plants would correspond respectively to *L.*

*verticillaris* Spreng. and *L. punctata* s.str., the first morphotype being more frequent. However, plants with more or less intermediate morphology are also observed. It is very likely that our populations of *L. punctata* represent in fact hybrids which lean sometimes towards the one, the other time towards the other species.

- Two subspecies of *Anagallis arvensis* L. that were recognized in NF6, subsp. *arvensis* and subsp. *foemina* (Mill.) Schinz et Thell., are now treated as two distinct species of *Lysimachia*, *L. arvensis* (L.) U. Manns et Anderb. and *L. foemina* (Mill.) U. Manns et Anderb. respectively, which is in accordance with most other contemporary Floras (e.g. FG, Stace 2019; see however H24).

- The forms of *Anagallis arvensis* (as mentioned in NF6) have not yet been combined under *Lysimachia*, no doubt mostly because their taxonomic value is nihil. They were not recombined by us either.

- A further species of *Cyclamen* L., *C. coum* Mill., with spring flowering and more or less reniform leaves, is increasingly observed as an escape from cultivation, either as an ephemeral or locally naturalizing (wn.be).

### 142. Ericaceae

- Two further shrubby species of Ericaceae are grown as ornamentals and have been observed as escapes from cultivation: *Daboecia cantabrica* (Huds.) K. Koch (a small, more or less established population known from an anthropogenically disturbed heath in Keerbergen since 2012) and *Leucothoe fontanesiana* (Steud.) Sleumer (occasionally observed since 2011) (both wn.be).

- *Calluna vulgaris* (L.) Hull var. *hirsuta* (Waltz) S.F. Gray: this taxon is not listed in FG, Stace (2019), etc. and is also missing from databases such as Tropicos, Plantlist, IPNI. It is probably of limited taxonomic value. H24 treats this as a cultivar, rather than a variety.

- The hybrid *Erica* × *darleyensis* (*E. erigena* R. Ross × *carnea* L.) is often grown as an ornamental and has been recorded as an escape as well (wn.be).

- *Rhododendron ponticum* L.: some naturalized populations may be artificial hybrids involving *R. baeticum* Boiss. et Reut. [syn.: *R. ponticum* subsp. *baeticum* (Boiss. et Reut.) Hand.-Mazz.], native to the Iberian Peninsula, and North American species such as *R. catawbiense* Michaux, *R. maximum* L., and possibly also *R. macrophyllum* D. Don ex G. Don. The true *R. ponticum* is neither vigorous nor invasive. The invasive plant in the British Isles is thought to belong to a complex and variable hybrid, *R. ×superponticum* Cullen, a name that perhaps is applicable as well to the naturalized populations in the Flora area (see e.g. Chamberlain 1982, Milne & Abbott 2000, Cullen 2011, H24).

- *Vaccinium corymbosum* L.: the exact identity of the cultivated and escaped plants is not clear. Some plants rather correspond to *V. corymbosum*, others to *V. angustifolium* Ait. However, at least part of the plants are intermediate in morphology and probably belong to their

hybrid (Kowarik & Schepker 1995, Schepker *et al.* 1997, Schepker & Kowarik 1998, H24, Adriaens *et al.* 2019).

#### 144. Rubiaceae

- A second species of the genus *Rubia* L., *R. peregrina* L., is native just to the south of the territory covered by the Flora and is very rarely observed within its limits, in Champ. mér. (for instance near Châlons-en-Champagne; database CBN Paris). It differs from *R. tinctoria* by its leathery leaves that lack prominent lateral veins.
- *Galium rotundifolium* L. was found in the extreme southern part of the Flora territory, near Troyes (Champ.) (SI-Flore) and it may also occur in Lorr. (Vernier 2020 reports it from the northern Plateau Lorrain). It resembles *G. boreale* L. but its leaves are broadly oval to elliptical and the fruit hairs are usually at least 0.4 mm long at maturity. This species is probably naturalized rather than native to this region (FG).
- *G. murale* (L.) All.: although a very recent newcomer in the Flora area, this thermophilous species has established itself in few years' time. It is locally naturalized now, especially in urban habitats and in campsites (Verloove *et al.* 2020a). It was added to the key and a full account is presented.

#### 145. Gentianaceae

- *Gentiana asclepiadea* L. was recorded once, in 1961, as an exceptional and ephemeral alien, probably an escape from or relic of cultivation, in Waimies in the Hautes Fagnes (Mont Rigi) (herbarium Meise Botanic Garden).
- In NF6, *G. cruciata* L. was said to be a herbaceous chamaephyte, which is not correct. It is a hemicryptophyte (based on comm. B. Toussaint and E. Bertiaux, 12.2021; compare also with FG).
- In the key to *Gentianella* Moench, flowers are said to be usually 5-merous in *G. amarella* (L.) Börner, less often 4- or 6-merous. In Flemish populations of this species, however, a majority of the individuals have 4-merous flowers (comm. M. Leten, August 2022).
- *G. amarella* (L.) Börner: there is no longer any doubt that this species in fact includes two distinct species, even if the differences are morphologically minor (Greimler *et al.* 2004). It is, however, still unclear to which species the plants from the Flora area belong. FG only accepts *G. amarella* s.str. from France, whereas in the Netherlands *G. uliginosa* (Willd.) Börner appears to be the least rare of both species (H24). This issue requires further study.
- *G. ciliata* (L.) Borkh.: this species is now accommodated in a segregated genus, *Gentianopsis* Ma, as *G. ciliata* (L.) Ma. Its placement in that genus was corroborated by molecular phylogenetic studies (Yuan & Kupfer 1995) and is accepted by contemporary Floras in western Europe (e.g. FG, H24, Stace 2019).

#### 146. Apocynaceae

- An additional ephemeral alien was recently observed:

*Gomphocarpus fruticosus* (L.) W.T. Aiton (syn.: *Asclepias fruticosa* L.) (Roeselare, 2017; wn.be).

- The alleged presence in the Flora area of hybrids between *Vinca major* L. and *V. minor* L. (as per NF6) appears to be very unlikely. Although both species are often found growing together, such hybrids do not seem to exist (compare with Stace *et al.* 2015).

#### 147. Boraginaceae

- Some representatives of the genus *Nemophila* Nutt. are grown as ornamentals and are sometimes observed as escapes: *N. maculata* Benth. ex Lindl. and *N. menziesii* Hook. et Arnott (wn.be).
- *Brunnera macrophylla* (Adams) I.M. Johnston is cultivated for ornament and often confused with *Omphalodes verna* Moench. It is observed as an escape in similar habitats and tends to naturalize locally (wn.be). It differs from this last species by its smaller corollas (only 3-4 mm across) and by the absence of stolons.
- Contrary to NF6, *Amsinckia micrantha* Suksd. is not the sole species of this genus that is recorded these days in the Flora area. A small population of *A. lycopsoides* Lehm. ex Fisch. et C.A. Mey. has been known from a railway siding in Wasmes-Audeméz-Briffoeil since 2018 (wn.be) and a further species of the genus, *A. intermedia* Fisch. et C.A. Mey., has been recorded as grain alien in the Ghent port area since 2019 (wn.be).
- *A. micrantha* Suksd.: the exact identity of the species that is locally naturalized in the Flora area remains uncertain. Some authors (e.g. FG, Juan 2012) ascribe these plants to a similar-looking South American species, *A. calycina* (Moris) Chater. However, this last species has smaller achenes (2 mm only) and very narrow leaves (Brand 1931). At least for the time being, the name *A. micrantha* is maintained but future monographic studies in the New World may shed new light on this issue.
- The generic circumscription of *Lithospermum* L. has changed, resulting from molecular phylogenetic studies. In the Flora area, it now only includes *L. officinale* L. Two others, *L. arvense* L. and *L. purpureocaeruleum* L., have been transferred to *Buglossoides* Moench (compare with FG). Alternatively, *Lithospermum* could have been further segregated to accommodate the latter in *Aegonychon* Gray, like was done by Stace (2019) or, pending further studies, retained in a broad sense (as per H24).
- An additional alien species of *Pulmonaria* L. is sometimes grown as an ornamental and has been recorded as an escape, *P. rubra* Schott (Erpe, 2015-2016; wn.be).
- *P. mollis* Wulfen ex Hornem.: this species is easy to recognize due to its indument (presence of long and dense glands). However, it is probably not well known because of its resemblance with *P. montana* Lej. According to a recent study the whole *P. mollis* + *alpigena* + *collina* assemblage is entirely derived from a single, relatively recent hybridization of *P. montana* (female) and *P. obscura* (male), followed by allopolyploidy (Meeus *et al.* 2016).

- *Cynoglossum amabile* Stapf & J.R. Drumm is cultivated for ornamental purposes in parks and gardens (sown especially in ‘wild flower seeds’). This species with sky-blue flowers (except cultivars) is sometimes observed as a casual escape from cultivation (wn.be).

- *C. germanicum* Jacq.: the taxonomic value of two subspecies distinguished in NF6 is probably weak (FG).

- A further species of *Symphytum* L. is occasionally observed as an escape from cultivation, *S. orientale* L. (Mol, 2020; wn.be). It is characterized by its calyx that is incised for less than half of its length, its leaves that are all non-decurrent and its white corollas.

- *S. officinale* L.: it was believed that besides subsp. *officinale* a second subspecies would exist in the Flora area, subsp. *uliginosum* (A. Kerner) Nyman. The latter is confined to riparian habitats in central and eastern Europe and allegedly would be present in Fluv. in the Netherlands. However, in reality these plants refer to hybrid populations in which it is impossible to distinguish two taxa (H24).

From the same complex, FT further distinguishes *S. bohemicum* F.W. Schmidt [syn.: *S. officinale* subsp. *bohemicum* (F.W. Schmidt) Celak.], which is also said to occur in the Flora area (Ard. or. and Lorr. nord-or., both in Germany). Other Floras usually consider this to be a mere synonym of *S. officinale* (e.g. FG, E+M Plantbase, etc.). Phylogenetic studies have shown that they are indeed synonyms (Hacıoğlu & Erik 2011). The name, as a synonym, was added.

- *Myosotis discolor* Pers.: the two subspecies that were recognized in NF6 [subsp. *discolor* and subsp. *dubia* (Arrondeau) Blaise] are now treated as two distinct species, *M. discolor* s.str. and *M. dubia* Arrondeau, following FG. Dirkse *et al.* (2022) thoroughly emphasized the differences between Dutch and German accessions of diploid *M. dubia* and hexaploid *M. discolor*.

- *Anchusa officinalis* L.: the two subspecies that were recognized in NF6 [subsp. *officinalis* and subsp. *procera* (Besser) Lambinon] are now treated as distinct species, *A. officinalis* s.str. and *A. procera* Besser, following FG.

- *A. arvensis* (L.) Bieb.: this species was transferred again to *Lycopsis* L., the genus in which it was initially described, as *L. arvensis* L., following FG.

- An alien, ephemeral species of *Lycopsis* L. was recently observed, *L. orientalis* L. [syn.: *Anchusa arvensis* subsp. *orientalis* (L.) Nordh.; *A. ovata* Lehm.] (Ghent port area, 2019; wn.be).

- Several species of *Phacelia* Juss. are grown as ornamentals. One of them, *P. campanularia* A. Gray, is sometimes observed as an escape from cultivation (e.g. Egem, 2016; wn.be).

#### 148. Convolvulaceae

- Some further ephemeral, alien species of Convolvulaceae have been recorded recently. *Dichondra argentea* Humb. & Bonpl. ex Willd. is an escape from cultivation in

urban areas (scattered records since 2015; wn.be). It has small silvery-gray, kidney-shaped leaves, creeping stems and tiny, deeply divided flowers.

In addition, a second species of *Dichondra* J.R. et G. Forst. was observed as an adventive, *D. micrantha* Urb. (Bilzen, on dredging sludge from river Scheldt, 2017; wn.be). The same species was recently also repeatedly recorded in the Dutch part of the Flora area: on the banks of river Maas in Grevenbicht (Fluv., 2020-2021) and in a lawn/roadside in Ospel (Camp., 2020) (wn.nl).

- The rare, ephemeral alien *Ipomoea coccinea* L. is now accommodated in a segregate genus, as *Quamoclit coccinea* (L.) Moench.

- *Calystegia* R. Brown is morphologically well separated from *Convolvulus* L. and forms a monophyletic group. However, molecular data have shown that it is in fact nested in the latter genus (Stefanović *et al.* 2003). It should therefore be included in it or *Convolvulus* further divided in several additional genera. Most recent western European Floras (e.g. FG, H24) have merged both genera, as was done in NF7. In a recent monograph of the genus *Convolvulus* (Wood *et al.* 2015), for pragmatic reasons, *Calystegia* was excluded from it.

- *Convolvulus sepium* L.: specimens of this species with a pink corolla, with whitish radial stripes belong, at least in part, to f. *colorata* (Lange) Dörfler (Verloove 2012b).

- *Cuscuta epilinium* Weihe was recently recorded as an ephemeral alien: in 2011 along river Maas in Maaswinkel and in 2013 in Grobbendonk, twice as a parasite on *Linum usitatissimum* L. (Barendse 2012, wn.be). The most recent records from Belgium dated back to 1938.

#### 149. Solanaceae

- *Lycopersicon* Mill. was long warranted generic status (mainly based on anther morphology) but is in fact nested in *Solanum* L. according to several molecular phylogenetic studies (see Peralta *et al.* 2008 and references therein). *L. esculentum* Mill. was thus transferred (again) to *Solanum*, as *S. lycopersicum* L.

- An additional species of *Solanum* L., *S. pseudocapsicum* L., is rarely observed as an ephemeral escape from cultivation (since 2015; wn.be).

- The American weed *S. chenopodioides* Lam. seems to be naturalizing locally in urban habitats and port areas of Ghent and Antwerp (wn.be). It is very similar to *S. nigrum* L. but it is perennial (collar becoming woody and emitting sterile shoots), the inflorescence is umbellate (not cymose) and the ripe berries are dark purple to black-purple.

- *S. nigrum* L. subsp. *schultesii* (Opiz) Wessely: this subspecies is sometimes treated as a distinct species, for instance by Central European authors. Its name at species rank, *S. decipiens* Opiz, was added, as a synonym.

- *S. sarachoides* Sendtn.: this South American weed has locally naturalized in the Flora area. It was added to the key and a full account was presented.

- Two further alien species of *Nicotiana* L. have recently been observed: *N. langsdorffii* J.A. Weinm. as an ephemeral escape from cultivation (in scattered localities since 2015; wn.be) and *N. glauca* Graham (as a wool alien in Boorseem in 2011; wn.be).

### 150. Oleaceae

- *Fraxinus pennsylvanica* Marshall: two other similar-looking American ashes are also grown for ornamental purposes and have also been observed as escapes from cultivation. *F. americana* L. differs from *F. pennsylvanica* in having leaves with a whitish glaucous underside, *F. latifolia* Benth. in having lateral leaflets that are acute at apex (or abruptly acuminate) with petioles less than 2 mm long.

- *Syringa* L.: some further species are sometimes grown for ornament in parks and gardens, for instance *S. josikaea* J. Jacq. ex Reichenb. f. This species has been observed as an escape from or relic of cultivation, for instance in the Wolvenberg nature reserve in Berchem (wn.be).

- *Ligustrum* L.: in addition to *L. vulgare* L. and *L. ovalifolium* Hassk., several other species are grown for ornamental purposes, including their hybrid, *L. ×vicaryi* Rehd. The latter has also been observed as an escape from cultivation (wn.be). The identity of some of the other subsynchronous species, e.g. *L. sinense* Lour., should be verified.

### 152. Plantaginaceae

- Some additional, ephemeral aliens have recently been recorded, all as escapes from cultivation: *Chelone obliqua* L. (scattered records since 2011), *Ellisiophyllum pinnatum* (Wall. ex Benth.) Makino (Douvrain, 2016; comm. P. Dupriez), *Penstemon digitalis* Nutt. ex Sims (Lacuisine, 2019) and *Veronicastrum virginicum* (L.) Farw. (scattered records since 2015) (wn.be).

- An additional alien species of *Plantago* L. was recently observed, *P. sempervirens* Crantz. A small population persists since 2016 on a slag heap in Genk (wn.be).

- *P. cynops* L.: the proposal to reject this binomial was accepted by the latest Congress (Shenzhen Code Appendices).

- *P. major* L. subsp. *intermedia* (Gilib.) Lange: the correct name for this taxon at subspecies rank is subsp. *pleiosperma* Pilg. (see also FG).

- *Callitriche truncata* Guss.: it was thought that in the Flora area only subsp. *occidentalis* (Rouy) Braun-Blanq. was present. However, in 2011 subsp. *truncata* was discovered near Marquise (Delay & Petit 2011, Delay & Petit 2012) and its presence in that locality was recently confirmed (comm. B. Toussaint 06.2020; see also FG). A second locality, in Tardinghen, about eight kilometers from the first, was discovered recently (Duluc 2019). This subspecies is distinguished by its narrowly winged mericarps.

- *Veronica agrestis* group: the identification key was slightly improved. In *V. agrestis* L. hairs on capsules are predominantly but not exclusively glandular (comm.

I. Hoste). *V. opaca* L. and *V. polita* Fr. are perhaps best separated on sepal shape: sepals are widest at or above the middle and below the middle, respectively (FG, comm. I. Hoste). Contrary to what was stated in NF6, petals in *V. polita* and *V. opaca* can also be veined (comm. P. Van Vooren; see also FG).

- Some additional species of *Veronica* L. have recently been observed in the Flora area. *V. austriaca* L. and *V. repens* Clarion ex DC. (Oostakker, 2020) are escaped ornamentals (wn.be).

- *V. paniculata* L. and *V. urticifolia* Jacq.: these two species have been claimed from Belgium a very long time ago. Herbarium material is lacking, so these species were not upheld by Verloove (2006). This reference has become irrelevant and thus was removed.

- *V. hederifolia* L.: in accordance with most other contemporary western European Floras (e.g. FG, H24), the subspecies that were previously accepted in NF6 were raised to species rank, *V. hederifolia* s.str. and *V. sublobata* M. Fischer [syn.: *V. hederifolia* subsp. *lucorum* (Klett et Richt.) Hartl].

- *V. cymbalaria* Bodard: this Mediterranean weed has been observed quite regularly since 2015 (Hoste *et al.* 2016) and has locally naturalized (gardens, cemeteries). It was added to the key and a full account was presented. It looks like *V. hederifolia* L. s.l. but differs from it by its white corollas, hairy capsules and non-cordate sepals.

- *V. anagallis-aquatica* L.: in accordance with most other contemporary western European Floras (e.g. FG, H24, Stace 2019), the three subspecies that were previously accepted in NF6 were raised to species rank, *V. anagallis-aquatica* L. s.str., *V. catenata* Pennell and *V. anagaloides* Guss.

- The taxonomic and nomenclatural concept of the *V. austriaca* L./*V. teucrium* L. group remains insufficiently understood in the Flora area and very confusing. The complex consists of a series of recently diverged diploid-polyploid taxa in which delimiting species is quite challenging (Padilla-García *et al.* 2018). According to FG, the species that was called *V. prostrata* L. subsp. *scheereri* J.P. Brandt in NF6 should now be treated as a distinct species, *V. scheereri* (J.P. Brandt) Holub and the same applies to *V. teucrium* subsp. *vahlilii* Gaudin that should now be called *V. orsiniana* Ten. However, this concept is not entirely in correspondence with the most comprehensive taxonomic revision of the group (*Veronica* subsection *Pentasepalae*; Rojas-Andrés & Martínez-Ortega 2016), resulting from recent phylogenetic analyses based on DNA sequence data and ploidy level information. *V. scheereri* is indeed best treated as a separate species and corresponds with what was called *V. prostrata* subsp. *scheereri* in NF6; its correct name, however, appears to be *V. satureiifolia* Poiteau & Turpin (Rojas-Andrés *et al.* 2016, as already pointed out much earlier by Hand 2003). Yet, the genuine identity of plants found in Fluv. in the Netherlands remains uncertain. Judging from the ecology and description (wn.

nl, verspreidingsatlas.nl, H24, Weeda *et al.* 1988), at least part of these plants may belong to *V. prostrata* s.str., a species from Central and eastern Europe (Rojas-Andrés & Martínez-Ortega l.c.). However, photos on wn.nl show a wide variety of forms, especially in terms of leaf characteristics. The problem thus requires further study in the Flora area.

The name *V. orsiniana*, on the contrary, was misapplied in FG and is reserved for the plants distributed along a continuous area from northeastern Spain and southern France to Italy. Similar-looking (native) plants that occur much further north in France (including in parts of the Flora area) belong to *V. teucrium*, more precisely to a western race that was treated as var. *angustifolia* Vahl by Rojas-Andrés & Martínez-Ortega l.c., var. *teucrium* having a more eastern distribution (mostly in Germany, Austria and Bulgaria). These are two mostly allopatric octoploid entities that are morphologically distinct and therefore best treated as two distinct species, *V. angustifolia* (Vahl) Bernh. and *V. teucrium* s.str. respectively (Padilla-García *et al.* l.c.). Plants that naturally occur in the southern part of the Flora area belong to the former. Natural populations from Fluv. in the Netherlands apparently belong to *V. teucrium* s.str. To further add to the confusion, more or less intermediate plants between the latter and *V. prostrata* (s.str.?) have been recorded in the Netherlands (H24).

In addition, the identity of adventive or escaped plants from this complex also requires a critical reassessment.

- *V. spicata* L.: this species was introduced on some slag heaps in Camp., as part of wild flower seed mixtures, and subsequently managed more or less to naturalize. These plants differ from the native populations in the Flora territory, notably by their generally paler corollas with linear and twisted lower lobes. They appear to belong, at least in part, to subsp. *orchidea* (Crantz) Hayek.
- *Linaria simplex* (Willd.) DC.: this southern species was already known from some areas in northern France. Its naturalization there was recently confirmed and the species further spread to Belgium where it also seems to naturalize locally. It was therefore added to the key and a full account was presented.
- The binomial *Digitalis* × *media* Roth for the hybrid *D. grandiflora* Mill. × *lutea* L. was removed. According to The Plantlist, this is a synonym of *D. lutea*. Perhaps there is no valid name for this hybrid (see also FG). TAXREF attributes this name to P. Fournier (1930). Possibly Fournier described this hybrid in 1930 but Roth already used the same name in 1800 for a species now considered as a synonym of *D. lutea*.

### 153. Scrophulariaceae

- An additional alien species has been recorded as an ephemeral escape from cultivation: *Alonsoa intermedia* Lodd. (Heverlee, 2017; wn.be). Another, more frequent escape, *Sutera cordata* (Thunb.) O. Kuntze, is now accommodated in the segregate genus *Chaenostoma* Benth.,

as *C. cordatum* (Thunb.) Benth., based on recent molecular studies (Kornhall & Bremer 2004, 2005).

- *Buddleja davidii* Franch.: a hybrid with *B. globosa* Hope, *B. ×weyeriana* Weyer, is sometimes cultivated as an ornamental in gardens and has recently been found in the wild (dunes, slag heaps). However, it is not clear whether such plants are genuine escapes or mere relics of former cultivation. This hybrid has globular inflorescences with yellowish corollas.

- An additional hybrid *Verbascum* L. has been recorded since 2014, *V. ×angulosum* Teyber (*V. nigrum* L. × *speciosum* Schrad.) (e.g. in Lommel in Camp., with both parent species; wn.be).

- An additional (ephemeral) alien species of *Scrophularia* L. was recorded since 2020, *S. peregrina* L. (Turnhout, Oostende; wn.be). In 2016-2017 it was also observed in Vlissingen in Zeeland (wn.nl, H24).

- *S. umbrosa* Dum.: some recent Floras (e.g. FG) used the name *S. oblongifolia* Loisel. for this species. Both names were officially published in 1827 but Dumortier's *Florula Belgica* was probably only effectively published later (cf.: <https://www.biodiversitylibrary.org/page/33120830#page/747/mode/1up>). Loiseleur's name may thus indeed be older but there is no hard evidence. For sake of completeness, *S. oblongifolia* was added as a synonym (see also E+M Plantbase). This name is also poorly known, for example it does not appear in Tropicos.org, nor was it accepted in Buttler's *Florenliste*.

Two subspecies [subsp. *umbrosa* and subsp. *neesii* (Wirtg.) E. Mayer] are distinguished in the Flora area, the taxonomic value of which is not uncontested. According to some authors, these are two very different species with sympatric distributions, so the rank of subspecies has not been considered appropriate (Hand 2019, Gregor *et al.* 2020). Morphologically, the distinction between these two taxa apparently is not more complicated than that between *S. auriculata* L. and *S. umbrosa* s.l. The problem as well as the distribution of these two entities in the territory of the Flora must be studied again.

- *S. canina* L.: this is a fairly variable species. Naturalized populations from the Flora area probably all belong to subsp. *canina*. Plants recently found as a waif in the port of Ghent (Fl.), with corollas with a wide white border, belong to subsp. *bicolor* (Sm.) Greuter (syn.: *S. bicolor* Sm.).

### 154. Linderniaceae

- *Lindernia palustris* Hartmann: a rejection proposal for this long-neglected binomial (Rico *et al.* 2006) was accepted by the latest Congress (Shenzhen Code Appendices). Its correct name now becomes *L. procumbens* (Krocker) Borbás.

- In addition to the characters already used in the key to distinguish between *L. procumbens* and *L. dubia* (L.) Pennell, a few others that are deemed useful were added: corolla length (respect. 2.5-4 and 7-9 mm) and color (respect. pale pink and pink-lilac).

### 156. Pedaliaceae

- The correct name for the casual alien *Sesamum orientale* L. is *S. indicum* L.

### 157. Acanthaceae

- Various species of the genus *Acanthus* L. are cultivated for ornamental purposes in parks and gardens. The most common is probably *A. mollis* L.; it is regularly seen as an escape as already stated in NF6. Another species, *A. spinosus* L. with spiny leaf lobes, has very rarely been observed spontaneously (wn.be).
- *Thunbergia alata* Bojer ex Sims (Suzanne-aux-yeux-noirs. Suzanne-met-de-mooie-ogen) is also cultivated as an ornamental. It is a climbing plant with yellow or orange flowers with a black throat. This species has also been observed very rarely as an escape (wn.be).

### 158. Bignoniaceae

- In addition to the species of *Catalpa* Scop. already mentioned in NF6, a further species has been observed as an escape, *C. ovata* G. Don (wn.be), with leaves usually 3-5 lobed and a yellowish corolla about 25 mm in diameter.

### 159. Lentibulariaceae

- All species of *Utricularia* L. have become very rare in the territory of the Flora and most of them are even threatened with extinction. On the other hand, species of this genus are sometimes intentionally introduced into waterbodies, thus disrupting the natural distribution of certain species. The introduction of similar non-native species cannot be ruled out either. It has been demonstrated that *U. brennensis* Gatignol et Zunino, recently described from France (Gatignol & Zunino 2019), in fact represents an exotic (Asian) species, *U. tenuicaulis* Miki (Bobrov et al. 2022).

### 160. Verbenaceae

- Two additional species from Verbenaceae, others than *Verbena* L., have been recorded as escapes from cultivation: *Lantana camara* L. and *Phyla nodiflora* (L.) Greene. The latter species has been known since at least 2011 from a locality in Essen where it looks more or less established (wn.be).
- *Verbena bonariensis* L., a widely grown ornamental, is increasingly found as an escape and locally tends to naturalize, especially in urban habitats. It is now treated in detail in NF7.
- Two additional species of *Verbena* have been recorded as alien/escape: *V. bracteata* Lag. et Rodr. and *V. incompta* Michael (wn.be).

### 161. Lamiaceae

- General: *Clinopodium* L. now includes *Acinos* Mill. and *Calamintha* Mill. whereas *Betonica* L. was segregated from *Stachys* L., following recent insights based on molecular phylogenetic studies.

- Several additional species of Lamiaceae, pertaining to genera not treated in detail, have been recorded as aliens (marked with \*) or escapes from cultivation: *Callicarpa bodinieri* H. Lév., *Caryopteris ×clandonensis* N.W. Simmonds ex Rehder, *C. incana* (Thunberg ex Houltuyn) Miquel, *Clerodendrum bungei* Steud., *C. trichotomum* Thunb., *\*Dracocephalum thymiflorum* L., *Lavandula stoechas* L., *Monarda didyma* L. and *Pycnanthemum pilosum* Nutt. (wn.be). Out of the casual escapes, a single species, *Lavandula angustifolia* Mill., locally tends to naturalize, e.g. in coastal dunes and urban habitats.

- *Mentha* L. The latest thorough revision for our territory dates back to Lebeau (1974, 1982) and the genus remains insufficiently known. Some modern treatments (e.g. FG) tend to accept species complexes rather than numerous (notho-) taxa. For instance, *M. spicata* L. is allegedly derived from *M. longifolia* (L.) Huds. and *M. suaveolens* Ehrh. (see, however, below). If so, it also includes all other hybrids derived from the same crossing, i.e. *M. ×villosa* Huds., *M. ×villosa-nervata* Opiz (not yet reported in previous editions of the NF but certainly present in our territory) and *M. ×rotundifolia* (L.) Huds. Recent molecular phylogenetic studies have shed new light on *Mentha* section *Mentha*. Heylen et al. (2021) demonstrated that, as a result of complex genomes, polyploidization and an extensive historical nomenclature, potentially cryptic taxa have gone unnoticed. A straightforward interpretation of phylogenetic relationships within the section *Mentha* is further hindered by dominant but outdated concepts on historically identified hybrid taxa. For instance, there is no evidence whatsoever that *M. spicata* is indeed of hybrid origin and *M. longifolia* was shown itself to be polyphyletic. In-depth additional studies are needed in order to better understand this section.

- *M. ×rotundifolia* (L.) Huds. certainly also occurs in the Flora area and appears to be not rare at all. It resembles *M. ×villosa* Huds. a lot but is (at least partly) fertile.
- Two additional species of *Mentha* are cultivated for ornament and were found as escapes or locally naturalized (wn.be): *M. cervina* L. (with a calyx with 4 teeth only and linear upper leaves) and *M. requienii* Benth. (with creeping threadlike stems and tiny leaves and flowers).
- *M. arvensis* L.: the three subspecies that were recognized in NF6 are doubtlessly of limited taxonomic value (see also FG).
- Several additional alien species of *Salvia* L. have been recorded: *S. hispanica* L. (Chia), *S. glutinosa* L. and *S. viridis* L. (wn.be).

- An additional species of *Origanum* L. has been recorded as an escape, *O. onites* L. (wall of river Dyle in Mechelen in 2020; wn.be).

- *Thymus praecox* Opiz: it is unclear which taxa/taxon from this complex occurs in the Flora area. Two were recognized up to the present: subsp. *praecox* and subsp. *ligusticus* (Briq.) Paiva et Salgueiro. According to FG, *T. praecox* s.str. is absent from France and only one species is found in the northernmost part of the country, *T. dru-*

*cei* Ronninger [syn.: *T. praecox* subsp. *ligusticus* (Briq.) Paiva & Salgueiro]. True *T. praecox* probably is a Central European species. The two subspecies currently accepted in NF are solely told apart based on stem indumentum: hairy throughout (subsp. *praecox*) or hairy on two opposite sides of the stem (subsp. *ligusticus*). However, holotrichous vs. allelotrichous stem hairiness is a virtually worthless character state and both types can be seen in *T. drucei*, sometimes within a same population (FG; comm. J.-M. Tison 01.2021).

- ***Clinopodium nepeta*** (L.) O. Kuntze now includes three subspecies: subsp. *nepeta* [with two varieties, var. *nepeta* and var. *glandulosum* (Req.) B. Bock], subsp. *sylvaticum* (Bromf.) Peruzzi et F. Conti and subsp. *ascendens* (Jord.) B. Bock. The two latter subspecies were treated as distinct species in NF6, resp. *Calamintha menthifolia* Host and *C. ascendens* Jord.

- Two taxa of ***Nepeta*** L., *N. racemosa* Lam. and *N. ×faassenii* Bergm. ex Stearn, are commonly grown as ornamentals these days and often escape (wn.be). Characters for their separation were added.

- ***Lamium galeobdolon*** (L.) L. was maintained as a member of *Lamium* L., not of a separate genus *Galeobdolon* Graec. ex Adanson or *Lamiastrum* Fabr. (contrary to e.g. H24). Molecular analyses demonstrated that it is not genetically distant enough from *Lamium* to be considered as a separate genus, and integration of *Galeobdolon* and *Lamium* is legitimate (Krawczyk *et al.* 2013).

- *L. ×holsaticum* E.H.L. Krause is indeed morphologically intermediate between *L. album* L. and *L. maculatum* L. However, molecular studies have shown that it is not a hybrid; it may either be a simple variation of *L. maculatum*, or a separate taxon (Bendiksby *et al.* 2011).

- An additional species of *Lamium* is grown for ornament and has been found as an escape: *L. orvala* L. (wn.be).

- *L. confertum* Fries: the hybrid nature of this species (*L. amplexicaule* L. × *purpureum* L.) was confirmed lately (Bendiksby *et al.* 2011).

- An additional species of ***Galeopsis*** L., *G. pubescens* Besser, is treated in detail. There were historical records for it from Belgium (Verloove 2006) and it was rediscovered in 2014 in two localities in Camp. (Postel and Ravels) where it was probably introduced and now naturalized. Subsequently it was also observed in a few other places in Camp. and is perhaps overlooked elsewhere (wn.be).

- ***Stachys recta*** L. var. *luxemburgensis* Lefort, mentioned from French Lorr. in NF6, is left unmentioned in FG and doubtlessly of minor taxonomic importance.

- ***Leonurus cardiaca*** L.: according to molecular studies (Marciniuk *et al.* 2014), subsp. *villosus* (Dum.-D'Urv.) Hyl. is a distinct, variable species (*L. quinquelobatus* Gilib.) that also includes forms that are more or less intermediate between *L. cardiaca* and *L. quinquelobatus*. The latter not only occurs as an adventive, it is also planted (as a bee plant?) and often escapes from cultivation (wn.be).

- An additional alien species of *Leonurus*, *L. marrubias-trum* L., has been recorded twice since 2017 along river Maas in the Netherlands in Fluv. (Maastricht, Meers) (wn.nl). In 2011, it was already recorded, probably as a mere casual, in Anderlecht (Brab.) by L. Delvosalle (Saintenoy-Simon 2012).

- ***Prunella grandiflora*** (L.) Schöller subsp. *pyrenaica* (Gren. et Godr.) A. et O. Bolòs, known from Sangatte in northwestern France, is now treated as a distinct species, *P. hastifolia* Brot. (see also FG).

- ***Ajuga ×hampeana*** A. Braun et Vatke: a proposal to conserve this name was rejected (Barrie 2011).

- *A. reptans* L.: a cultivar name for a widely planted and escaped form ('Atropurpurea') was added.

- Two ornamental species of ***Teucrium*** L. have been recorded as escapes: *T. hircanicum* L. and *T. ×lucidris* Boom (*T. chamaedrys* L. × *lucidum* L.) (wn.be).

- *T. chamaedrys* L.: based on photos from wn.be, the extent to which the blades are hairy and incised seems to vary greatly. It is therefore doubtful that two subspecies can be distinguished in our territory (see also FG). Similarly, FT ascribes records from the Trier area to subsp. *chamaedrys*, whereas according to NF6 these plants belong to subsp. *germanicum* (F. Hermann) Rech. f. However, the latter is merely considered to be conspecific with subsp. *chamaedrys* in that area, like in France (comm. R. Hand, 03.2021).

- *T. scordium* L.: the taxonomic value of the two subspecies currently mentioned needs to be confirmed (see also FG). Plants found in the sole extant Belgian population seem to correspond to subsp. *scordium*.

## 162. Phrymaceae

- A species of the genus ***Mimulus*** L. (s.str.), *M. ringens* L., native to North America, is cultivated for ornamental purposes. This entirely hairless species with a bluish to purple corolla has been very rarely observed as an escape from cultivation (Fl., Fluv., Mosan; wn.be, wn.nl, H24, Dhaussy 2013).

- The generic circumscription of *Mimulus* L. has changed as a result of molecular phylogenetic studies (Beardsley & Olmstead 2002, Barker *et al.* 2012). With the exception of the single species mentioned above, all representatives previously recorded in the Flora area are now accommodated in the segregate genus ***Erythranthe*** Spach: the naturalized species *E. guttata* (Fisch. ex DC.) G.L. Nesom and *E. moschata* (Douglas ex Lindl.) G.L. Nesom and the casual escapes *E. lutea* (L.) G.L. Nesom var. *rivularis* (Lindl.) Silverside, *E. ×robertsii* (Silverside) G.L. Nesom and *E. cuprea* (Dombrain) G.L. Nesom. The latter is possibly more or less established in a single locality in Haute Ard. (surroundings of Waimes; wn.be).

## 163. Paulowniaceae

- The genus ***Paulownia*** Siebold et Zucc. and its species *P. tomentosa* (Thunb.) Steud. were already briefly men-

tioned, under Scrophulariaceae, in NF6. This species is increasingly escaping and in the process of local naturalization (wn.be). It was thus added to the keys, nowadays as a member of a family of its own, Paulowniaceae (Olmstead *et al.* 2001, Oxelman *et al.* 2005), and a species account was added.

#### 164. Orobanchaceae

- The casual alien *Bellardia trixago* (L.) All. is now treated as *Bartsia trixago* L., following Molau's monographic study (Molau 1990). Recent molecular phylogenetic studies are inconclusive and pending additional studies a conservative approach was adopted.

- The generic limits of *Orobanche* L. have changed as a result of recent molecular phylogenetic studies. Species with three bracts (one median and two lateral) subtending each flower (vs. a single bract) and a tubular calyx with 4-5 lobes (vs. calyx divided into two lobes) are now accommodated in the segregate genus *Phelipanche* Pomel (Park *et al.* 2007). In the Flora area, this applies to *P. ramosa* (L.) Pomel, *P. purpurea* (Jacq.) Soják and *P. arenaria* (Borkh.) Pomel. All these species have entirely bluish corollas.

- *Orobanche reticulata* Wallr.: plants found in the Flora area have been ascribed to subsp. *pallidiflora* (Wimm. et Grab.) Hayek (Londo & Mourik 2001). Contemporary western European Floras do not seem to accept infraspecific taxa (e.g. FG, H24), although some authors (e.g. Kreutz 1995) treated it as a species of its own.

- *O. alsatica* Kirschl.: data on the host plants of this species in Lorr. are uncertain and in part contradictory. It has been observed on *Cervaria rivini* Gaertn., which indeed is typical of subsp. *alsatica*. The subsp. *libanotidis* (Rupr.) Tzvelev (a distinct species according to some authors, including FG: *O. bartlingii* Griseb.), on the other hand, parasites on *Libanotis pyrenaica* (L.) Bourgeau ex Nyman and *Seseli montanum* L. It differs from subsp. *alsatica* in particular by smaller flowers [corolla 12-17 mm long, against (15-)20-25 mm], filaments inserted 1.5-3.5 mm above the base of the corolla [in subsp. *alsatica*, filaments are inserted at (2-)4-7 mm above the corolla base] and a more slender habit. Although these two subspecies have been reported from Lorraine, the presence of subsp. *libanotidis* remains to be confirmed (Brulé 2009; comm. H. Brulé 05.2020). According to some authors (e.g. Kreutz 1995, Brulé l.c.), the latter is a taxon from Central Europe that is absent in France. The problem needs to be re-studied.

- An additional species of *Melampyrum* L. was recently recorded as an ephemera alien, introduced with timber, *M. nemorosum* L. (Ghent port area, 2015; wn.be).

- *M. sylvaticum* L. was reported on several occasions from Lorr. in France (FLORAINE 2013, Vernier 2020, SI-Flore), for instance from Plateau de Haye near Nancy (comm. S. Antoine 05.2021) and thus from the area covered by NF. However, *M. sylvaticum* typically grows in

fir and spruce forests on acidic substrates and normally does not occur below 1000 m. Claims of it from north-eastern France doubtlessly refer to a form of *M. pratense* L. with golden yellow corollas (corresponding to subsp. *pratense* of German authors) which is frequent in that part of France and which one often takes for *M. sylvaticum* (comm. J.-M. Tison, 08.2021).

- *M. pratense* L.: two subspecies are distinguished in NF [subsp. *pratense* and subsp. *commutatum* (Tausch ex A. Kern.) C.E. Britton] but these are not always easily told apart. According to FG, they are solely separated on flower color (respectively yellow and discolourous), a character that was added to the identification key.

- *Euphrasia* L.: FLORAINE (2013) lists *E. picta* Wimm. for the Flora area, just south of Toul. According to Vernier (2020) and FG, this species occurs in Lorr. only in Hautes-Vosges, thus outside the Flora area (also comm. S. Antoine, 05.2021).

As was already stated in NF6, this genus remains very complex in terms of taxonomy and requires additional studies, in particular as regards the taxa present in the southern part of the territory. It should be noted that the treatment in NF roughly agrees with that of FG and thus still is in line with current-day concepts.

- *E. officinalis* L.: three subspecies are distinguished in the territory of the Flora, the taxonomic value of which is disputed by some authors [not only that of subsp. *camp-estris* (Jord.) Kerguelen et Lambinon as stated in NF6]. Only the nominal subspecies is quite distinct but of arctic origin (FG) and thus absent from the Flora area.

- *Odontites jaubertianus* (Boreau) D. Dietrich ex Walp.: this is in fact a stabilized hybridogenic tetraploid species of *O. luteus* (L.) Clairv. × *vernus* (Bellardi) Dum. subsp. *serotinus* Corb. parentage. However, occasional hybrids can also result from a recent hybridization between these taxa; such plants are named *O. ×senneni* Rouy.

- An additional alien species of *Parentucellia* Viv. has recently been detected in some campsites: *P. latifolia* (L.) Caruel (Verloove *et al.* 2020a). It was already known from the southern border of the Somme estuary, just outside the Flora area (Digitale2).

#### 165. Aquifoliaceae

- *Ilex* L.: two hybrids of horticultural origin (sometimes hardly distinguished from *I. aquifolium* L.) are frequently grown as ornamentals and both are increasingly escaping from cultivation (wn.be). *I. ×altaclerensis* (Loudon) Dallim. (*I. aquifolium* × *perado* Ait.) was already mentioned in NF6 but it should be noted that its leaf margins can also be entire (e.g. in 'Cameliifolia' or 'Belgica'). *I. ×meserveae* S.Y. Hu (*I. aquifolium* × *rugosa* F. Schmidt) is similar-looking but it is smaller in stature (1-2 m) and leaves are only 2-6 cm long.

- An additional species of *Ilex* L. is treated in detail, *I. crenata* Thunb. In few years' time it has become more or less widely naturalized in Camp. and has also been re-

corded elsewhere (wn.be, H24). With its small, evergreen leaves, rapid growth and disease resistance, *I. crenata* is increasingly replacing boxwood balls in gardens.

### 166. Campanulaceae

- Several additional alien taxa were recorded recently, all as (casual) escapes from cultivation: *Isotoma axillaris* Lindl., *Platycodon grandiflorus* (Jacq.) DC. (both recorded in urban habitats, respectively since 2018 and 2013) and *Triodanis perfoliata* (L.) Nieuwl. (Boom, 2018) (wn.be).
- *Wahlenbergia hederacea* (L.) Reichenb.: genetically, this species is distant from the rest of the members of *Wahlenbergia* Schrad. ex Roth. It has been suggested to place it in a monospecific genus, as *Hesperocodon hederaceus* (L.) Eddie et Cupido (Eddie & Cupido 2014).
- *Campanula poscharskyana* Degen: this ornamental is now fully naturalized and thus keyed-out and a full account provided.
- *Pratia pedunculata* (R. Brown) Benth. is now treated as *Lobelia pedunculata* R. Brown (see e.g. Lammers 2011).

### 168. Asteraceae

- Rather numerous ephemeral aliens from the Asteraceae family have been recorded lately. The following, all from genera not treated in detail, were observed as escapes from cultivation (data, unless otherwise stated, from wn.be): *Acmella oleracea* (L.) R.K. Jansen, *Amberboa moschata* (L.) DC. (syn.: *Centaurea moschata* L.), *Argyranthemum frutescens* (L.) Schultz-Bip., *Cynara cardunculus* L., *C. scolymus* L., *Dimorphotheca pluvialis* (L.) Moench, *Heteranthemis viscidhirta* Schott [syn.: *Chrysanthemum viscidhirtum* (Schott) Thell.; herbarium L. Delvosalle, BR], *Leptinella dispersa* (D.G. Lloyd) D.G. Lloyd et C.J. Webb (syn.: *Cotula dispersa* D.G. Lloyd), *Liatrix spicata* (L.) Willd., *Ligularis przewalskii* (Maxim.) Diels, *Psephellus dealbatus* (Willd.) K. Koch (syn.: *Centaurea dealbata* Willd.), *Tithonia rotundifolia* (Mill.) S.F. Blake and *Vernonia fasciculata* Michx.

Some escapes that were already mentioned in NF6 are now accommodated in other genera, as a result of recent molecular phylogenetic studies: *Ageratina altissima* (L.) King et Robinson (syn.: *Eupatorium rugosum* Houtt.), *Dendranthema ×grandiflorum* (Ramat.) Tzvelev (syn.: *Chrysanthemum ×grandiflorum* Ramat.), *Eurybia divaricata* (L.) Nesom (syn.: *Aster divaricatus* L.) (perhaps locally naturalizing), *Euthamia graminifolia* (L.) Nutt. [syn.: *Solidago graminifolia* (L.) Salisb.] [probably very locally naturalizing in Lorr. mér., in Rosières-aux-Salines (Pax 2019) and near Breda (Camp.) and Meerssen (Brab. or.) in the Netherlands (H24, wn.nl). It should be noted, however, that the identity of these plants possibly needs to be reassessed: plants found naturalized in Europe at least partly belong to *E. lanceolata* (L.) Nesom; obs. author, Nesom 2021a and b], *Eutrochium maculatum* (L.) E.E. Lamont (syn.: *E. maculatum* L.) (known by now from several localities and locally perhaps naturalizing) and *E. purpureum* (L.) E.E. Lamont (syn.: *E. purpureum* L.) and

*Mauranthemum paludosum* (Poiret) Vogt et Oberprieler [syn.: *Leucanthemum paludosum* (Poiret) Bonnet et Baratte].

- Analogously, several ephemeral, genuine aliens (unintentionally introduced) from the Asteraceae family have been recorded lately, all from genera not treated in detail (data, unless otherwise stated, from wn.be): *Arctotheca calendula* (L.) Levyns (formerly a wool alien; since 2012 regularly recorded in port areas of Antwerp and Ghent), *Andryala integrifolia* L. (Herseaux, since 2019), *Gutenbergia rueppellii* Schultz-Bip. (port of Roeselare, 2013), *Notobasis syriaca* (L.) Cass. (port of Antwerp, 2014) and *Oncosiphon piluliferum* (L.f.) Källersjö (ports of Antwerp and Ghent, since 2017). One of these species, *Andryala integrifolia*, is a rather frequent native species just outside the Flora area (departments Aube, Seine-et-Marne; database CBN Paris). It is definitely spreading further north recently (Digitale2) and a natural range expansion towards and into the Flora area is quite likely.

Some aliens that were already mentioned in NF6 are now accommodated in other genera, as a result of recent molecular phylogenetic studies: *Cladanthus mixtus* (L.) Chevall. (syn.: *Anthemis mixta* L.), *Gamochaeta pensylvanica* (Willd.) Cabrera (syn.: *Gnaphalium pensylvanicum* Willd.) (locally perhaps naturalizing in urban habitats) and *Rhaponticum repens* (L.) Hidalgo [syn.: *Acropilton repens* (L.) DC.].

- *Inula crithmoides* L. is now accommodated in a separate genus, as *Limbarda crithmoides* (L.) Dum. (Gutiérrez-Larruscain *et al.* 2018).

- *Solidago altissima* L.: this species closely resembles *S. canadensis* L. and has been regularly reported in the Flora area, although until recently, always in error. It is a more robust hexaploid species (stem up to 200 cm high), stem hairy to the base, later flowering (late October-early November), with thick, more or less leathery leaves with almost entire or irregularly serrate margins and a 3-4 mm long involucre. It was recently found in the port of Antwerp (Verloove *et al.* 2017b) and could be overlooked elsewhere.

- The generic limits of *Aster* L. have dramatically changed in recent times, resulting from molecular phylogenetic studies (see Nesom 1994 for an overview). All but two of the Belgian representatives of the genus *Aster* s.l., native as well as non-native, are now accommodated in several other genera. An alphabetical overview is given in table 2 with respectively names applied in NF6 and currently accepted names

- *Tripolium pannonicum* (Jacq.) Dobroc.: occasionally, plants are observed with discoid flowers. These were referred to *Aster tripolium* var. *flosculosus* (S.F. Gray) P.D. Sell in NF6. A combination at varietal rank under *T. pannonicum* seems to be non-existing; however, if taxonomic recognition is appropriate, then at most at forma level, for which rank a name is available, f. *discoideum* (Reichenb. f.) B. Bock.

**Table 2.** Accommodation of the species of genus 'Aster' in NF7 as compared with NF6. Asterisk (\*) indicates taxa not mentioned in NF6.

Name in NF6	Name in NF7
* <i>Aster ageratoides</i> Turcz.	<i>Aster ageratoides</i> Turcz.
<i>Aster amellus</i> L.	<i>Aster amellus</i> L.
<i>Aster brachyactis</i> S.T. Blake	<i>Symphotrichum ciliatum</i> (Ledeb.) Nesom
<i>Aster divaricatus</i> L.	<i>Eurybia divaricata</i> (L.) Nesom
<i>Aster dumosus</i> L.	<i>Symphotrichum dumosum</i> (L.) Nesom
<i>Aster ericoides</i> L.	<i>Symphotrichum ericoides</i> (L.) Nesom
<i>Aster lanceolatus</i> Willd.	<i>Symphotrichum lanceolatum</i> (Willd.) Nesom
<i>Aster lateriflorus</i> (L.) Britton	<i>Symphotrichum lateriflorum</i> (L.) Á. et D. Löve
<i>Aster linosyris</i> (L.) Bernh.	<i>Galatella linosyris</i> (L.) Reichenb. f.
<i>Aster novae-angliae</i> L.	<i>Symphotrichum novae-angliae</i> (L.) Nesom
<i>Aster novi-belgii</i> L.	<i>Symphotrichum novi-belgii</i> (L.) Nesom
<i>Aster pilosus</i> Willd.	<i>Symphotrichum pilosum</i> (Willd.) Nesom
* <i>Aster racemosus</i> S. Elliott	<i>Symphotrichum racemosum</i> (S. Elliott) Nesom
* <i>Aster subulatus</i> Michaux s.l.	<i>Symphotrichum subulatum</i> (Michaux) Nesom s.l.
<i>Aster</i> × <i>salignus</i> Willd.	<i>Symphotrichum</i> × <i>salignum</i> (Willd.) Nesom
<i>Aster tradescantii</i> L.	<i>Symphotrichum tradescantii</i> (L.) Nesom
<i>Aster tripolium</i> L.	<i>Tripolium pannonicum</i> (Jacq.) Dobrocz.
<i>Aster</i> × <i>versicolor</i> Willd. (incl. <i>A. laevis</i> L.)	<i>Symphotrichum</i> × <i>versicolor</i> (Willd.) Nesom [incl. <i>S. laeve</i> (L.) Á. et D. Löve]

• An additional species of *Aster* L. (s.str.) is much applied in public green these days: *A. ageratoides* Turcz. It is occasionally observed as an escape from cultivation since 2014 (wn.be).

• An additional species of *Symphotrichum* Nees, *S. subulatum* (Michx.) Nesom var. *squamatum* (Spreng.) S.D. Sundb. [syn.: *Aster squamatus* (Spreng.) Hieron.], was found as a casual alien in Kortrijk (Heule) in 2017 (wn.be). This is also a rather characteristic weed in plant containers in garden centers and plant nurseries.

• *S. lanceolatum* (Willd.) Nesom: this species is very variable as to the size of the flower heads, the color of the ligulate flowers, etc. In the past, some authors, notably in the Netherlands, considered that it is possible to distinguish two species, one of which corresponds to the North American species *S. tradescantii* (L.) Nesom. However, more recent cytometric studies have shown that in fact another North American species, *S. ontarionis* (Wiegand) Nesom (syn.: *Aster ontarionis* Wiegand), is involved (Dirkse *et al.* 2014). This species has not been found recently in the territory of the Flora but it could be present in Fluv.

• *Conyza* Less. was long included in *Erigeron* L. but Cronquist (1947) defended its separation from the latter genus, a point of view that since then was followed, almost without exception. However, recent molecular phylogenetic research showed that *Conyza* is in fact polyphyletic and nested within *Erigeron* (Noyes 2000; see also Greuter 2003a).

• In NF6, *E. canadensis* L. and *E. bilbaoanus* (J. Rémy) Cabrera were primarily separated based on the number of florets per head, respectively 10-15 vs. 4-6. This, however, is not a reliable feature [also compare with Strother (2006) in *Flora of North America*, sub *Conyza canadensis* (L.) Cronq. and *C. floribunda* Kunth].

• *E. acris* L.: this is a very variable species that perhaps includes two subspecies in the territory of the Flora: the nominal subspecies has stem leaves that are twisted or not, with green basal leaves present at anthesis and is mainly flowering in summer; some plants have very twisted stem leaves, with basal ones withered at anthesis and is flowering in fall. Such plants have been assigned to subsp. *serotinus* (Weihe) Greuter (syn.: *E. serotinus* Weihe; *E. muralis* Lapeyr.) (Pliszko 2015 and references therein). The taxonomic value, distribution and status of the latter are to be specified in the Flora area. It is predominantly found in highly anthropized environments (slag heaps, railroads; e.g. Remacle 2014). However, plants with ± intermediate characters are observed in natural habitats as well, including coastal dunes where subsp. *acris* also occurs. The problem requires further study.

• A proposal to conserve the name *Filago vulgaris* Lam. against *Gnaphalium germanicum* L. [syn.: *Filago germanica* (L.) Huds.] (Andrés Sánchez *et al.* 2011) was not approved (Applequist 2012). Thus, the latter binomial is applied now for the species called *F. vulgaris* in NF6.

• Two species that were included in *Filago* L. in NF6 [*F. gallica* L. and *F. minima* (Smith) Pers.] are now accommodated in the segregate genus *Logfia* Cass., resulting from molecular phylogenetic studies (Galbany-Casals *et al.* 2010), which is in accordance with other contemporary western European Floras (FG, H24, Stace 2019).

• The generic limits of *Gnaphalium* L. have changed but are still unclear. The taxonomy of FG was followed (except for *Gamochoaeta* Wedd.) which implies that *G. luteoalbum* L. was transferred to the segregate genus *Laphangium* (Hilliard et B.L. Burt) Tzvelev. Other recent flora accounts either applied a conservative approach (H24) or further dismantled *Gnaphalium* (Stace 2019).

- The generic limits of *Inula* L. are very unclear. Recent molecular phylogenetic studies (e.g. Gutiérrez-Larruscain *et al.* 2018) found that generic delimitations within the *Inula* complex need to be revised. *Inula* could either be accepted in a broader sense (incl. *Telekia* Baumg. and other segregates) or most species (incl. the type!) be segregated as *Pentanema* Cass. Pending additional studies, a more conservative approach was followed (see also H24, Stace 2019).
- *I. racemosa* Hook. f.: this Asian ornamental has been known since 2001 in Belgium. Currently, it is much more frequently cultivated as an ornamental than *I. helenium* L. and is increasingly observed as an escape as well, also in northwestern France (Verloove 2008a, Lemoine 2015a). It is now naturalized locally and thus was added to the key and a full account is presented. Although the distinction between these two species is usually straightforward, plants with more or less intermediate characters are sometimes observed.
- The casual alien *Pulicaria paludosa* Link is now called *P. arabica* (L.) Cass. subsp. *hispanica* (Boiss.) Murb.
- *Xanthium orientale* L.: in NF6, this species was accepted in a broad sense. It is a very complex group, made up of taxa probably of American origin but which gave rise, after their introduction in Europe, to populations which were partly different from the original strains. The plants that are naturalized in Fluv. roughly correspond with the microspecies *X. saccharatum* Wallr. However, recent molecular studies have shown that this and all other microspecies should be included in a single, highly variable species, *X. orientale* (Tomasello 2018).
- The exact taxonomic placement of *Iva xanthiifolia* Nutt. remains unresolved. Some recent authors (incl. Stace 2019) accommodated it in *Euphrosyne* DC. Pending further studies, a conservative approach was adopted but its name in the latter genus [*Euphrosyne xanthiifolia* (Nutt.) A. Gray] was added, as a synonym.
- An additional (ephemeral) species of the genus *Guizotia* Cass. has been recorded lately, *G. scabra* (Vis.) Chiov. subsp. *schimperi* (Schultz-Bip.) J. Baagøe (syn.: *G. schimperi* Schultz-Bip.) (Lokeren, 2015; wn.be).
- *Coreopsis* L. is, according to some molecular phylogenetic studies, better included in *Bidens* L. The corresponding name for *C. lanceolata* L. in the latter genus, *B. lanceolata* (L.) Banfi, Galasso et Bartolucci, was added as a synonym (Banfi *et al.* 2018).
- An additional species of *Helianthus* L., *H. maximiliani* Schrad., is grown as an ornamental and has been recorded as an escape from cultivation (Roeselare, since 2019; wn.be). *H. decapetalus* L., already mentioned in NF6 as an ornamental species, also occurs as a very rare escape (since 2011; wn.be).
- There is general agreement now that *H. laetiflorus* Pers., considered as a species in NF6, is in fact a hybrid of *H. rigidus* (Cass.) Desf. × *tuberosus* L. parentage.
- *Cosmos* Cav. is, according to some molecular phylogenetic studies, better included in *Bidens* L. The corresponding name for *C. bipinnatus* Cav. in the latter genus, *Bidens formosa* Schultz-Bip., was added as a synonym.
- *Bidens connata* Muhlenb. ex Willd.: this species is frequently confused with individuals with entire (undivided) leaves of *B. tripartita* L. Based on achene characteristics both species can usually be distinguished, although they are obviously very close, perhaps even conspecific (Strother & Weedon 2006).
- The generic limits of *Anthemis* L. have dramatically changed as a result of recent molecular phylogenetic studies (e.g. Oberprieler 2001, Lo Presti *et al.* 2010). As currently understood, in the Flora area, the genus includes only two native species, *A. arvensis* L. and *A. cotula* L., and the casual alien *A. ruthenica* Bieb. The others were transferred to segregate genera like *Chamaemelum* Mill. (*A. nobilis* L.), *Cladanthus* Cass. (*A. mixta* L.) and *Cota* J. Gay. (*A. altissima* L., *A. austriaca* Jacq. and *A. tinctoria* L.).
- Similarly, the generic limits of *Matricaria* L. have also changed. *M. maritima* L. now belongs in *Tripleurospermum* Schultz-Bip. (Oberprieler 2001).
- The correct name for the species called *Matricaria recutita* L. in NF6 is *M. chamomilla* L. (Applequist 2002, Hansen & Christensen 2009).
- Two subspecies of *Tripleurospermum maritimum* (L.) Koch are now accepted as two distinct species, *T. maritimum* s.str. and *T. inodorum* (L.) Schultz-Bip., which is in accordance with most contemporary western European Floras (FG, Stace 2019). Both, however, are interfertile and according to some authors merely expressions of a single variable species (see discussion in H24). Both form a moderately supported clade in molecular phylogenies but differ in genome size (Inceer *et al.* 2018). The issue requires further study.
- An alien species of *Tripleurospermum*, *T. decipiens* (Fisch. et C.A. Mey.) Bornm., has rarely been observed as a casual grain alien in the Antwerp port area since 2011 (wn.be).
- *Leucanthemum vulgare* Lam. of NF6 in fact includes two distinct species in the Flora area, *L. vulgare* s.str. (diploid) and *L. irtutianum* DC. [tetraploid, derived from *L. vulgare* and *L. virgatum* (Desr.) Clos] (e.g. Konowalik *et al.* 2015).
- *Cotula australis* (Spreng.) Hook. f.: this South African weed, formerly known as an ephemeral wool alien in the Flora area, has recently naturalized, on the one hand in urban areas, on the other hand in campsites (Verloove *et al.* 2020a). It was added to the key and a full account is presented.
- *Soliva sessilis* Ruiz et Pav.: like the preceding species, this South American species has been known for a long time as a casual wool alien in the Flora area. It has recently naturalized in campsites (Verloove *et al.* 2020a)

and was therefore added to the key and a full account presented. Its fruit has a persistent and spiny style when ripe and attaches very easily to clothing which enhances its dispersal.

- An additional alien species of *Artemisia* L. has been recorded as an escape from cultivation, *A. ludoviciana* Nutt. (scattered observations since 2015; wn.be).

- The Far Eastern weed *A. princeps* Pamp. probably has been overlooked for some time in the Flora area, as a result of confusion with *A. verlotiorum* Lamotte (Verloove & Andeweg 2020, Verloove *et al.* 2020b). It is more or less intermediate between *A. vulgaris* L. and *A. verlotiorum*, is locally naturalized or even quite invasive and thus added to the key and a full account presented.

- *A. maritima* L.: two varieties that were distinguished in NF6 [var. *maritima* and var. *pseudogallica* (Rouy) J. Duvigneaud et Lambinon] are doubtlessly of little taxonomic value (compare with FG) and thus removed.

- *Petasites japonicus* (Sieb. et Zucc.) Maxim.: this East Asian ornamental is now fully naturalized in the Flora area. It was added to the identification key and a full account was presented.

- The generic limits of the polyphyletic genus *Senecio* L. have considerably changed as a result of recent molecular phylogenetic studies (Pelser *et al.* 2002). *Jacobaea* Mill. is now segregated and its generic status is furthermore supported by hybridization behavior: there are several hybrids within *Jacobaea* while there are none between *Jacobaea* and *Senecio*. However, morphologically both genera are poorly separated. In *Jacobaea* the number of inner involucre bracts usually equals the number of ligules, whereas in *Senecio* s.str. the number of inner involucre bracts is ca. 1,5-2 times the number of ligules. Moreover, in *Jacobaea* the surface of the achenes is finely papillose while achenes are usually smooth in *Senecio* s.str. Representatives of the genus *Jacobaea* are mostly biennial or perennial. In the Flora area the following species were transferred to *Jacobaea*: *S. paludosus* L., *S. cineraria* DC., *S. erucifolius* L., *S. jacobaea* L. and *S. aquaticus* Hill (incl. *S. erraticus* Bertol.).

- *S. ovatus* (P. Gaertn., B. Mey. et Scherb.) Willd.: in NF6, two subspecies were said to be present in the territory of the Flora, subsp. *ovatus* and subsp. *alpestris* (Gaudin) Herborg, the latter being restricted to the western and southwestern part of the species' distribution range. Moreover, plants with intermediate characters were also said to be present. According to FG, however, the northernmost populations of subsp. *alpestris* are located in the Jura and in the Paris CBN database the most northerly records are in Yonne, i.e. well beyond the Flora limits. Therefore, it appeared very unlikely that true subsp. *alpestris* is present in the Flora area. Yet, the presence of the latter was recently confirmed in northwestern France (e.g. in Forêt d'Hardelot in Boul.) where subsp. *alpestris* indeed seems to be the 'usual' taxon (comm. B. Toussaint, 10.2021).

- Hybridization between species of the genus *Jacobaea* is regularly observed. The following hybrids have been observed in the Flora area: *J. ×albescens* (Burb. et Colgan) Verloove et Lambinon ex Verloove et Galasso [*J. maritima* (L.) Pelser et Meijden × *vulgaris* P. Gaertn.] and *J. ×ostenfeldii* (Druce) B. Bock [*J. aquatica* (Hill) P. Gaertn., B. Mey. et Scherb. × *vulgaris*]. The former is usually produced wherever both parents occur in close proximity (for instance in cemeteries; see also Verloove & Lambinon 2011), whereas the latter was recorded in the Bourgoyen-Ossemeersen nature reserve in Ghent in 2017, together with the parent species (wn.be).

- *J. aquatica* (Hill) P. Gaertn., B. Mey. et Scherb.: in NF6, two subspecies were distinguished, the nominal subspecies and a subspecies that was called *S. aquaticus* Hill subsp. *erraticus* (Bertol.) Tourlet. A combination for the latter under *J. aquatica* was not yet available and was validated by Verloove & Galasso (2023), subsp. *erratica* (Bertol.) Verloove & Galasso. The taxonomic status of the latter remains uncertain. FG accepted it as a distinct species, *J. erratica* (Bertol.) Fourr., emphasizing however that according to Pelser *et al.* (2002) it probably merely is a variety of *J. aquatica*, a point of view followed by H24.

- *Doronicum orientale* Hoffm.: this ornamental was reported from three localities in Lorr. (FLORAINE 2013; see also Vernier 2020). However, according to FG statements of this kind are incorrect or require confirmation.

- *Carlina vulgaris* L. subsp. *longifolia* Nyman (syn.: *C. biebersteinii* Bernh. ex Hornem.): at one time, some populations of *C. vulgaris* from the eastern part of the Flora area were thought to be possibly referable to this taxon. In the latest edition of the NF, this assumption was considered to be rather unlikely. Indeed, no data indicate its presence in the Flora area, neither in France (Digitale2, database CBN Paris, AFL), nor in Germany (FT, FloraWeb). According to FG its northernmost occurrences are in the Vosges and the species is absent below 1200 m of altitude.

On slag heaps in Camp. or. (Belgium) some naturalized populations also show some resemblance to subsp. *longifolia* but within these populations plants with characters typical of subsp. *vulgaris* also occur (wn.be). Their exact identity remains uncertain.

- The couplet in the identification key that allows to distinguish *Carduus acanthoides* L. and *C. crispus* L. was thoroughly modified, based on Verloove (2014).

- The alien *C. vivariensis* Jord. is better treated as *C. nigrescens* Vill. subsp. *vivariensis* (Jord.) Bonnier et Layens (FG).

- *C. nutans* L.: several subspecies have been reported in the past in the territory of the Flora. At present, only subsp. *nutans* seems to be present (at least as a native or naturalized entity). It is characterized by flower heads 2-4 cm in diameter and involucre bracts 1.5-3 mm wide. The subsp. *leiophyllus* (Petrovič) Arènes (syn.: *C. thomeri* Weinm.) has 4-8 cm wide flower heads and 3-8 mm

wide involucre bracts and is rarely seen as an (usually) ephemeral adventive (except perhaps in parts of Mar., for instance in the Dunkerque area, where it may persist for some time; comm. B. Toussaint, October 2021). According to FG, the latter is possibly not distinct from subsp. *platylepis* (Reichenb. et Sault.) Nyman. The *C. carduus* complex anyhow requires further study.

- An ephemeral alien species of *Onopordum* L. was recently observed, *O. tauricum* Willd. (Linkhout, 2014; wn.be).

- *O. acanthium* L.: the native (or long-naturalized?) plants are markedly different from plants grown for ornament. The latter are characterized by densely woolly-araneous leaves and involucre and probably belong to *O. ×beckianum* (John) Sutory, the hybrid between *O. acanthium* and *O. illyricum* L. This hybrid is observed here and there as an escape (wn.be).

- The generic limits of *Centaurea* L. have long been controversial. As traditionally circumscribed it is a polyphyletic assemblage. Molecular phylogenetic studies have considerably redefined its limits and several segregate genera have now become widely accepted. A modern treatment is now followed in NF7 as well. Two genera were segregated: *Amberboa* (Pers.) Less. (Susanna *et al.* 1995) and *Cyanus* Mill. (Greuter 2003b, although some authors are reluctant to accept generic status for the latter, e.g. Boršić *et al.* 2011, Hilpold *et al.* 2014). *Cnicus* L., on the contrary, traditionally accepted as a genus of its own was shown to be nested in fact in *Centaurea* (Garcia-Jacas *et al.* 2000).

- Three alien species of *Centaurea* were recently newly recorded. The adventive *C. diffusa* L. has been observed since 2018 as grain alien in the Ghent port area. The same species was also recorded from a slag heap in Hénin-Beaumont in northwestern France (Lemoine 2018). In addition, two ornamentals have been observed as escapes from cultivation recently: *C. calocephala* Willd. (Laakdal, 2014; wn.be) and *C. macrocephala* Willd. (scattered occurrences since 2012; wn.be).

- The correct name for the hybrid *C. diffusa* L. × *stoebe* L. that was called *C. ×psammogena* Gayer (1909) in NF6 is, for reasons of priority, *C. ×varnensis* Velen. (1891).

- *C. stoebe* L.: the infraspecific variability of this species in Belgium requires further study. In wild flower seed mixtures, subsp. *micranthos* (Gugler) Hayek [syn.: subsp. *australis* (A. Kerner) Greuter] seems to be the usual taxon (Frank & John 2007). It is a potentially invasive (allo-)tetraploid eastern taxon, that was also introduced to North America. According to some authors this taxon and *C. stoebe* s.str. are two distinct species (Mráz *et al.* 2011), although the morphological distinction between the two seems rather weak. Flow cytometric analyses on five samples from the Waasland port area (where the species is fully naturalized and spreading) demonstrated that all are indeed tetraploids (pers. comm. P. Mráz & A. Pieters, 01.2022).

- *C. jacea* L. complex: this remains a difficult group, comprising populations differing in morphology, phenology, ecology and chromosome number, in which hybridization appears to be frequent; moreover, there is a lot of phenotypic plasticity in this complex. Some authors only admit a single species, completely ignoring certain infraspecific taxa, or even more or less well characterized species; others distinguish up to ten or more species that are linked by intermediates. In accordance with recent treatments in neighboring regions (notably in France, Germany and Great Britain; e.g. FG, Stace 2019), the group has been reworked, accepting in addition to *C. jacea* s.str. [with two subspecies, subsp. *jacea* and subsp. *timbalii* (Martini-Donos) Br.-Bl.] three more or less distinct species: *C. decipiens* Thuill. (accommodating the infraspecific taxa intermediate between *C. jacea* and *C. nigra* L.), *C. nigra* and *C. nigrescens* Willd. (the latter not being indigenous in the territory of the Flora). This system is still provisional; further (molecular) research on this complex remains essential. Vanderhoeven *et al.* (2002) already demonstrated that there is a lot of phenotypic plasticity and that, when cultivated *ex situ*, many character states change (e.g. heads radiate or not). In our area there may rather be only two native, genuine species: the relatively rare *C. nigra* (diploid and in Belgium mostly confined to the Ardennes massif) and the remaining, widespread tetraploid populations.

- *C. jacea* L.: wild flower seed mixtures often include plants of *C. jacea* with deeply divided leaves with narrow segments and widely diverging inflorescence branches. Their identity is unclear and requires further study. They may belong to subsp. *angustifolia* (DC.) Gremler [syn.: *C. pannonica* (Heuff.) Simonk.], a taxon from Central and Eastern Europe.

Such seed mixtures also include plants with characters intermediate between those of *C. jacea* and *C. nigra* (or even *C. decipiens*). The appendages of the phyllaries are tawny as in *C. jacea* but the margins are irregularly toothed or deeply jagged. These are hybrids spanning the morphological spectrum of the putative parents. The name *C. ×gerslaueri* Erdner (syn.: *C. ×moncktonii* Britton, *C. ×drucei* Britton) can be applied for such plants. It is unknown whether or not such hybrids naturally occur in the Flora area.

- *C. nigrescens* Willd.: this alien species is locally naturalized (or was previously overlooked?) in the Flora area. It was added to the key and a full account is presented. It presents a combination of characters that allows it to be identified fairly easily: leaves with a broad blade and narrowed at the base, the upper more or less amplexicaul; flower heads small (involucre up to 12 mm in diameter); appendages of the middle phyllaries consisting of a triangular central part and fringes equal to or slightly exceeding their width, leaving the underlying bracts more or less exposed; heads usually radiate; pappus nil or weakly developed (Hoste *et al.* 2015).

- *C. decipiens* Thuill.: as currently understood, this is a

very polymorphic and apparently hybridogenous species (*C. jacea* × *nigra*), which now accommodates several infraspecific taxa which were distinguished in NF6. The following names are now reduced to synonyms: *C. serotina* Boreau, *C. jacea* subsp. *debeauxii* (Godr. et Gren.) Douin, *C. debeauxii* Godr. et Gren., *C. nigra* subsp. *debeauxii* (Godr. et Gren.) Gugler, *C. jacea* subsp. *grandiflora* (Gaudin) Schübl. et Martens, *C. jacea* subsp. *pratensis* (Koch) Čelak., *C. debeauxii* Godr. et Gren. subsp. *thuillieri* Dostál, *C. thuillieri* (Dostál) J. Duvigneaud et Lambinon and *C. jacea* subsp. *microptilon* (Godr.) Douin. They were previously separated on the basis of particularly variable criteria: heads radiant or not, achenes with or without a more or less developed pappus (often variable in the same flower head), length and position (patent to reflected) of the appendages of the phyllaries,...

- An additional adventive species of *Cichorium* L. has been observed lately: *C. calvum* Schultz-Bip. (wn.be). It is occasionally included, as an impurity, in commercial birdseed mixtures.

- As a result of molecular phylogenetic studies the generic limits of *Leontodon* L. have changed. *L. autumnalis* L. was transferred to *Scorzoneroideus* Moench (Samuel *et al.* 2006, Greuter *et al.* 2006).

- The infraspecific taxa recognized under *L. hispidus* L. are of uncertain taxonomic value. In addition to the nominal subspecies, subsp. *hyoseroides* (Welw. ex Reichenb.) Greml. is doubtlessly worth recognizing (see also FG) but the varieties recognized of these two subspecies (solely based on indumentum characters) are of debatable value. The Euro+Med plantbase, however, accepts *L. hyoseroides* Welw. ex Reichenb. as a distinct species and the varieties mentioned in NF6 as subspecies. Thus, for the time being, the infraspecific taxa of *L. hispidus* were upheld but their taxonomic value needs to be reassessed, preferably using modern techniques.

- The generic limits of *Picris* L. have changed as a result of molecular phylogenetic studies. *P. echioides* L. is now accommodated in the segregate genus *Helminthotheca* Zinn, characterized by conspicuously enlarged and cordate outer phyllaries of the capitula (Samuel *et al.* 2006).

- *Tragopogon* L.: in the Flora area plants are sometimes observed that are more or less intermediate between *T. pratensis* L. and *T. dubius* Scop. and these could correspond to their first generation hybrid (*T. ×crantzii* Dichtl). An allotetraploid resulting from repeated crosses between these two species is known as *T. miscellus* Ownbey in North America (Ownbey 1950, Novak *et al.* 1991, Soltis 2006). It is very similar to *T. pratensis* but larger and more robust and probably difficult to distinguish from the latter. Soltis *et al.* (2022), using ITS sequence data, recently showed that the morphologically diverse, broadly defined *T. dubius* in fact comprises a complex of at least ten different ITS types in its native range that ultimately merit recognition as separate species. This issue requires further study.

- *T. pratensis* L. subsp. *orientalis* (L.) Čelak.: according to recent molecular studies (Mavrodiev *et al.* 2012), this subspecies deserves a higher taxonomic rank. At least some of the plants observed in the territory of the Flora are obviously introduced, especially as a component of wild flower seed mixtures. It naturally predominantly occurs in eastern and northeastern Europe. Its correct name at species rank, *T. orientalis* L., was added.

- *Chondrilla juncea* L.: in two localities in the Flora area (Pic. mér. in France and Lorr. sept. in the Grand-Duchy of Luxembourg) plants are found with numerous stem leaves, the upper with lanceolate leaf blades. The leaf blades are hirsute-spinulose on the margins and on the back of the midrib and the basal leaf blade is pinnately lobed. These plants correspond to *C. latifolia* Bieb. [syn.: *C. juncea* L. var. *latifolia* (Bieb.) Boiss.] and have always been treated as such in NF although its taxonomic relevance was questioned. However, recent genetic studies now have shown that the latter is just part of the morphological variable apomictic *C. juncea* (Kashin *et al.* 2019).

- *Taraxacum* Wiggers: the account for *Taraxacum* was updated by Jean-Patrice Matysiak, based on data extracted from van Soest (1957, 1969), Øllgaard (1986), Oosterveld (1993), Kirschner *et al.* (1994), Hagendijk *et al.* (1998), Kirschner & Štěpánek (1998), Uhlemann (2003), Uhlemann *et al.* (2005), Ferrez in Tison & de Foucault (2014), Kirschner *et al.* (2019), online resources such as *Taraxacum Nederland* (<https://www.taraxacumnederland.nl/>) and TARDET (Hagendijk *et al.* 2007), the Øllgaard herbarium, as well as field and herbarium observations by the author (JPM).

- The correct name for sect. *Ruderalia* is sect. *Taraxacum* (Kirschner & Štěpánek 2011).

- *T.* section *Erythrosperma* (Lindb. f.) Dahlst.: based on data provided by the late Piet Oosterveld, who methodically traveled the Netherlands and neighboring regions, the account (incl. the identification key) for this section was completely reworked.

- *T. silesiacum* Dahlst. ex Hagl.: the vast majority of specialists now consider this species to be conspecific with *T. parnassicum* Dahlst.

- *T. wallonicum* v. Soest: the separation of this species from *T. lacistophylloides* Dahlst. is problematic: in some plants achenes have intermediate dimensions and the leaves of the two species are identical; we considered them to be conspecific, the latter name having nomenclatural priority. Van Soest described other Mediterranean taxa which also appear to be synonyms of *T. lacistophylloides*.

- *T. clemens* Matysiak: in NF6, this species was keyed out amidst species with light brown to cinnamon achenes; however, its achenes are rather reddish than brown.

- *T. proximum* (Dahlst.) Raunk., *T. proximiforme* v. Soest and *T. pseudoproximum* v. Soest: this is a very fuzzy species complex. Based on cultivation experiments by Piet Oosterveld, it turned out that *T. proxi-*

*mum* is exceedingly variable with respect to the presence or absence of pollen, leaf shape and achene color. It should either be further segregated into several additional taxa or accepted as a single, highly variable species. The latter concept was applied (note that Piet Oosterveld has not found *T. pseudoproximum* in the type locality or elsewhere; similar-looking taxa were found, but with red achenes).

- *T. polyschistum* Dahlst.: this species was included in NF6 as a result of a confusion with what now is called *T. clemens*. In fact, *T. polyschistum* is a Scandinavian species which does not reach the Flora area.
- *T. perincisum* (J. Murr) J. Murr: according to Štěpánek & Kirschner (2017) the lectotype of *T. perincisum* belongs to the taxon usually referred to as *T. oxoniense* Dahlst. The former, older name should therefore replace *T. oxoniense*.
- *T. argutum* Dahlst.: this species was recently recorded for the first time in the Flora area, in Mar. mér. (France; Matysiak 2017).
- *T. section Palustria* (Lindb. f.) Dahlst.: the identification key was completely reworked. Achene characters provide good support for identifications and relevant data for these were mostly extracted from Kirschner & Štěpánek (1998) and Uhlemann *et al.* (2005). Stigma color, on the contrary, was avoided as much as possible because the hues are often very close. Analogously, robustness turned out to be a variable and thus unreliable feature (e.g. the usually robust *T. udum* Jord. also occurs with small individuals in Wingles in northwestern France). All species are divided in two major groups: those with undivided leaves (merely dentate or very shallowly lobed) and those with divided leaves.

Taxa with undivided leaves:

- *T. pauckertianum* Hudziok: Kirschner & Štěpánek (1998) indicated the extensive variation in pollen presence / absence as being typical of this species (often variable in a single individual).
- *T. multilepis* Kirschner & Štěpánek: this species was originally (invalidly) described as a form of *T. balticiforme* Dahlst., f. *multilepis* v. Soest (nom. inval.) (Kirschner & Štěpánek 2014), based on specimens with undivided, dentate leaves. Kirschner & Štěpánek l.c. emphasized that leaves can be either undivided or, less often, lobed.
- *T. palustre* (Lyons) Symons: this species is often found with merely toothed leaves. Even then, it remains identifiable based on its bracts with a wide whitish margin.

These three previous taxa were grouped together in a first dichotomy (species with undivided leaves, i.e. dentate or very shallowly lobed).

Taxa with divided leaves:

- *T. delanghei* v. Soest and *T. aginnense* Hofstra were grouped in an entry that includes species with leaves like in sect. *Erythrosperma* or sect. *Taraxacum*, following Kirschner & Štěpánek (1998).

- *T. udum*: according to Kirschner & Štěpánek (1998) leaves in this species are very variable due to the extreme plasticity of the taxon, which led to the description of new species which ended up as synonyms. The author documented a population with a few hundred individuals in Wingles in northwestern France. These plants at first had quite undivided leaves and outer phyllaries of a beautiful bright red color, reminiscent of *T. duvigneaudii* v. Soest. The next year, however, the outer phyllaries were green, like in *T. delanghei*. Cultivation *ex situ* finally proved these plants to belong to a robust form of *T. udum* (Matysiak 2018). With its rather oval-lanceolate, erect or even spreading phyllaries, this species at first sight shows some resemblance with sect. *Celtica*.
- *T. section Celtica* A.J. Richards: the delimitation of this section is quite controversial. Piet Oosterveld applied a fairly strict concept, corresponding to that of Uhlemann *et al.* (2005). Meijer, in *Taraxacum Nederland*, created a new section (sect. *Frugalia*, nom. prov.) for *T. nordstedtii* Dahlst. and some others, and kept less characteristic taxa in the *Celtica* section. Uhlemann (2003) did exactly the opposite and accommodated *T. nordstedtii* and similar taxa in the *Celtica* section and the least characteristic taxa in a “*T. adamii*-Gruppe”. Kirschner *et al.* (2019) redefined the section. The relatively strict concept of NF6 was maintained.
  - *T. duvigneaudii* v. Soest: apparently no one has ever found this species after van Soest and its taxonomic identity remains unclear. From the description, with its red phyllaries, it may perhaps be conspecific with *T. udum* or *T. delanghei* (Matysiak 2010, FG).
  - *T. zevenbergenii* v. Soest: from cultivation experiments, it turned out that the description of the taxon was made late in the season, at the end of spring (Hagendijk *et al.* 1998). Only then the typical, rather broadly lobed leaves with the clear red petioles and midrib are formed. Therefore, the illustration was replaced with another, more typical leaf.
  - *T. johannis-jansenii* v. Soest is definitely synonymous with *T. hygrophilum* v. Soest.
  - The name *T. frugale* Hofstra was effectively published by Hofstra (2020) although this taxon had been recognized as early as 1997. It appears to consist of several clonal lineages. Populations from northern France (growing intermingled with *T. hygrophilum*) very subtly differ from Dutch populations and were tentatively named ‘*T. francofrugale*’ by Piet Oosterveld. Curiously, in the Netherlands, *T. frugale* exclusively occurs in the northern part of the country and then, further south, reappears in Mar., Brab. and Pic. in northwestern France (the species is apparently absent in the large area in between). Besides, *T. frugale* and *T. hygrophilum* are not exclusively acidiphilic taxa; they are also found on basic substrates, sometimes with species from sect. *Palustria*, but in slightly less humid conditions. They are often found together. *T. frugale* is

more resistant to shrubification (after abandonment of grazing) by producing very large leaves. In contrast, *T. hygrophilum* seems to survive the longest under eutrophication.

- *T. reichlingii* v. Soest: Piet Oosterveld has visited the type locality which is destroyed now (it has become a children's playground). Uhlemann reports it from eastern Germany, based on a herbarium specimen.
- *T. beefinkii* Hagend., v. Soest et Zevenb.: this species is known from Voorland Nummer Een in Zeeuws-Vlaanderen (FZ). However, its taxonomic position is uncertain. We did not integrate it in sect. *Celtica* because it is not part of the 'hard' group, that is to say with the outer row of phyllaries erect and with sigmoidal lateral leaf lobes. It was also initially described and placed in the ex-section *Vulgaria* (Hagendijk *et al.* 1982). If it were integrated into the *Celtica* section, several others, currently classified in the *Taraxacum* section, should also be included. Meijer (Taraxacum Nederland) created a new section, *Frugalia* ined., which corresponds to the core *Celtica*. Uhlemann also splitted the group, placing the core species in the *Celtica* section, and the 'soft' (including *T. beefinkii*, *T. gelertii* Raunk., *T. bracteatum* Dahlst., etc.) in an informal group., the *T. gelertii*-group. As long as the boundaries of section *Celtica* are not established, the ambiguity will continue.
- In section *Celtica*, Hagendijk *et al.* (1998) referred to the presence of mutants that are more successful under changing conditions. However, we believe there is also, at least to some degree, genetic exchange. For instance, in the Avesnois in northern France (Mosan occ.), there is some intergradation between *T. frugale* and *T. nordstedtii*.
- *T.* section *Taraxacum*: two additional species with reddish to purplish petioles and not producing pollen are known to occur in the Flora area: *T. exertiforme* Hagend. *et al.* and *T. morulum* Hagl. & v. Soest. Both were found in Carvin, in Brab. occ. (France), where they are very common in urban environments (and thus probably also occur elsewhere) (Matysiak 2012, Matysiak & Tison 2016). Finally, some species classically arranged in the section *Taraxacum* are sometimes separated from it and accommodated in section *Hamata* H. Øllgaard instead, some representatives at least of which are similar to the *Celtica* section. From this "Hamata section" two additional species have been recorded recently: *T. marklundii* Palmgr. and *T. pseudohamatum* Dahlst. (Matysiak 2012). Bonassi *et al.* (2017) reported *T. adamii* Claire from the Nancy area in Lorr. mér. (« à la base d'escarpements rocheux en forêt thermophile »). This is a critical, not yet typified species and claims of it are in need of critical revision (see also FG).
- *Sonchus asper* (L.) Hill: native plants belong to subsp. *asper*. The very robust subspecies *glaucescens* (Jord.) Ball with large flower heads and bright yellow ligules has recently been observed as a casual grain alien (Ghent port area, 2018; wn.be).

- The generic limits of *Lactuca* L. have considerably changed recently, as a result of molecular phylogenetic studies, although there is still some disagreement. *Mycelis* Cass. is certainly nested in *Cicerbita* Wallr. but the placement of the latter remains controversial: some authors accept it as a separate lineage (e.g. Cichorieae portal at <https://cichorieae.e-taxonomy.net/portal/>) whereas others also include it in a broadly circumscribed genus *Lactuca* (e.g. Wang *et al.* 2013). The latter concept was applied, following e.g. FG (contrary to H24).

- Two alien, probably ephemeral species of *Crepis* L. were recently recorded in the Flora area: *C. bursifolia* L. and *C. nicaeensis* Balb. The former was found in 2016 in Menen as a pavement weed. In 2020 a small population was discovered in Koksijde (Mar.) and its presence there was confirmed in 2021 (wn.be). This species was also observed in a campsite in Zeeland (Mar.) in 2019 (Verloove *et al.* 2020a). Just beyond but near to the Flora limits, it is also known in Tert. par. (it recently established itself in the Paris area) and Champ. (Troyes) (database CBN Paris). *C. nicaeensis* is apparently known from some areas in Lorr. in France (FLORAINE 2013, Vernier 2020: Meuse and Wœvre). Both species might locally naturalize in climatologically suitable areas and habitats in the Flora area.

- *C. sancta* (L.) Bornm.: in NF6, the taxon that occurs in the Flora area was ascribed to subsp. *nemausensis* (Vill.) Babç. It is, however, probably of no taxonomic value (FG).

- The correct name for the species called *C. polymorpha* Pourr. in NF6 is *C. vesicaria* L. subsp. *taraxacifolia* (Thuill.) Thell. ex Schinz et R. Keller (multiple sources).

- Following recent insights, inferred from molecular phylogenetic studies, *Pilosella* Hill was segregated from *Hieracium* L. (see also FG, H24, Stace 2019).

- *Pilosella* requires further investigation in the Flora area. In addition to the widely accepted (macro-) species, rather numerous infraspecific taxa and microspecies have recently been reported. In some parts of the Flora area, the genus has been studied more thoroughly which resulted in the recognition of additional taxa. This applies particularly to the German part of the area (Eifel centr.; see FT) and to northern France (see FG). From Belgium, Ronse & Gottschlich (2017) also reported three new taxa: *P. caespitosa* (Dum.) P.D. Sell et C. West subsp. *colliniforme* (Peter) P.D. Sell & C. West (Brab.), *P. ×fuscoatra* (Nägeli et Peter) Soják [*P. aurantiaca* (L.) F.W. Schultz et Schultz-Bip. × *caespitosa*] (Camp.) and *P. ×stoloniflorum* (Waldst. et Kit.) F.W. Schultz et Schultz-Bip. (*P. aurantiaca* × *officinarum* F.W. Schultz et Schultz-Bip.) (Fl.).

- In NF6, species of *Pilosella* were assigned to two different life forms: herbaceous chamaephytes (for *P. officinarum* F.W. Schultz et Schultz-Bip. and related species) and rosette-bearing hemicyptophytes (for the remaining species). However, there seems to be no difference, as far as life form is concerned, between these species. In accordance with other recent Floras, such as H24, Jäger &

Werner (2005), etc., all are now considered as hemicyptophytes (based on comm. B. Toussaint, 03.2021).

- Binomials (if available) for the numerous hybrids between species of *Pilosella* were removed, since many of these names are of dubious application.

- *Hieracium* L. also requires further investigation in the Flora area. In some parts of it, the genus has been studied more thoroughly which resulted in the recognition of additional taxa. This applies particularly to the German part of the area (Eifel centr.; see FT and below), to northern France (see FG) and to the Dutch part, although H24, like in NF, only marginally treated these ‘microspecies’ (about 100 in number). H24 only recognized sections (roughly corresponding with ‘macrospecies’) since morphological characteristics of these sections are corroborated by molecular data and gene flow appears to be rare among sections. In NF, a more or less hybrid taxonomical scheme has always been applied in which, in addition to macrospecies, a few microspecies are recognized. This taxonomy was maintained, pending further study, but certainly is in need of a thorough revision.

- *H. glaucinum* Jord.: within this species many infraspecific taxa have been described and several of them have been reported from the Flora territory, especially in the eastern part. FT mentions (post 1980): subsp. *cinerascens* (Jord.) Breistr. et Litard. (Eifel centr.), subsp. *conjugatum* (Boreau) O. Bolòs et Vigo (Eifel centr.), subsp. *pallidifrons* (Sudre) O. Bolòs et Vigo (Ard. or.), subsp. *praecox* (Sch. Bip.) O. Bolòs et Vigo (Ard. or.) and subsp. *recensitum* (Boreau) Gottschlich (Eifel. centr.). At least part of the Flemish populations belong to the latter subspecies (Verloove 2001).

- *H. murorum* L.: within this species many infraspecific taxa have been described and several of them have been reported in the Flora territory, especially in the eastern part. FT mentions, after 1980: subsp. *exotericoides* Zahn (Eifel centr.), subsp. *gentile* (Boreau) Sudre (Ard. or.), subsp. *nemorensis* (Jord.) Zahn (Eifel centr.), subsp. *pseudosilvularum* Zahn (Eifel centr.) and subsp. *subnemorensis* (Zahn) Zahn (Eifel centr.).

- *H. lachenalii* C.C. Gmel.: *H. vulgatum* Fries var. *limburgense* Zahn is endemic to Zuid-Limburg (the Netherlands) and was recently raised to (micro-) species rank, *H. limburgense* (Zahn) Haveman (Haveman 2013). Like in similar cases, no further attention was paid to this taxon in NF7.

- *H. amplexicaule* L.: in the populations that are naturalized in the territory of the Flora, the edge of the leaf blade is mainly provided with fine and flexible hairs; such plants belong to *H. pulmonarioides* Vill. [syn.: *H. amplexicaule* L. subsp. *pulmonarioides* (Vill.) Ces.]. In *H. amplexicaule* s.str. the edge of the leaf blade is almost completely covered with glandular hairs (Verloove & Tison 2019).

## 169. Adoxaceae

- *Viburnum* L.: several additional ornamental species from this genus have recently been recorded as escapes from cultivation: *V. ×rhytidophylloides* Suringar (*V. lan-*

*tana* L. × *rhytidophyllum* Hemsl.), *V. davidii* Franch. and *V. plicatum* Thunb. (wn.be).

## 170. Caprifoliaceae

- An additional, ephemeral escape from cultivation has recently been recorded: *Lomelosia stellata* (L.) Raf. (syn.: *Scabiosa stellata* L.) (Heverlee, 2017; wn.be).

- Several additional ornamental species of the genus *Lonicera* L. have recently been recorded as escapes from cultivation: *L. chrysantha* Turcz. ex Ledeb. (a few localities, since 2012), *L. involucrata* (Richardson) Banks ex Spreng. (Assenede, 2014), *L. maackii* (Rupr.) Maxim. (a few localities, since 2015), *L. morrowii* Gray (Bruges, 2010) and *L. ×purpusii* Rehd. (*L. fragrantissima* Lindl. et Paxt. × *standishii* Jacq.) (Meise, since 2006) (wn.be).

- *L. nitida* Wils. and *L. pileata* Oliv.: these Far Eastern ornamental shrubs have naturalized recently and thus were added to the key and a full account is presented. These are very similar species that are sometimes difficult to tell apart. There is a cv ‘Elegant’ (syn.: *L. yunnanensis* Hort. non Franch.) which is intermediate between *L. nitida* and *L. pileata*. According to some authors, *L. nitida* as well as *L. pileata* are very close to *L. ligustrina* Wall. and perhaps best considered as varieties of the latter species (Schulz 2011). *L. nitida* and *L. pileata* seem to hybridize very easily which also suggests a very close relationship (Wilcox 2016, Armitage & Costain 2017).

- *L. japonica* Thunb.: this ornamental liana has become naturalized locally and was thus added to the key and a full account is presented.

- *Dipsacus laciniatus* L. and *D. strigosus* Willd. ex Roem. et Schult.: these ornamental species are increasingly escaping and have locally naturalized. They were added to the key and full accounts are presented.

- An additional species from the genus *Knautia* L. has been recorded as an ephemeral escape from cultivation: *K. macedonica* Griseb. (rather regularly recorded since 2011; wn.be).

- *K. arvensis* (L.) Coulter s.l.: some populations from Lorr. mér. and sept. differ significantly from *K. arvensis* s.str. by the pinkish-purple corollas, the absence of rhizomes, the peduncles with usually numerous glandular hairs and their phenology (flowering slightly earlier, between May and July). These plants were tentatively ascribed to *K. purpurea* (Vill.) Borbás [syn.: *K. timeroyi* Jord. subsp. *collina* (Schübl. et Martens) Breistr.] in NF6. Based on FG, they probably rather belong to *K. timeroyi* s.str. but the issue requires further study. Some populations (e.g. near Nancy) are homogeneous and quite characteristic, while others (e.g. from near Metz) include, in addition to typical individuals, plants more or less intermediate with *K. arvensis*. It should be noted that some authors include all these taxa in a hypervariable *K. arvensis* (e.g. E+M Plantbase).

- Two ornamental species from the genus *Scabiosa* L. have recently been observed as (probably ephemeral) es-

capex from cultivation: *S. lucida* Vill. (a few localities, since 2019; wn.be) and *S. ochroleuca* L. (a few localities, since 2015; wn.be).

- *S. columbaria* L.: the taxonomic value of subsp. *pratensis* (Jord.) Br.-Bl. requires confirmation. According to FG it is of no taxonomic value.

- *Centranthus calcitrapae* (L.) Dufur.: a native from the Mediterranean region, this species is expanding towards the north and reached the Flora area in 2016, first in the Lille metropolitan area in France, where it is locally naturalized in abundance in railway yards. It is a therophyte with a pale pink corolla of approx. 2-5 mm across and with pennatipartite leaves (Verloove *et al.* 2019). It was added to the key and a full account is presented.

- *Valeriana officinalis* L.: the taxonomy and nomenclature of this complex remains controversial. The correct name for the species called *V. repens* Host in NF6 is *V. officinalis*. *V. wallrothii* Kreyer is reduced to subspecies rank under *V. officinalis*, subsp. *tenuifolia* (Vahl) Schübl. et Martens, following FG. According to FG, the widely distributed taxon in the Flora area [subsp. *repens* (Host) O. Bolòs et Vigo] is included in subsp. *sambucifolia* (J.C. Mikan ex Pohl) Čelak. (syn.: *V. sambucifolia* J.C. Mikan ex Pohl). A third subspecies, subsp. *officinalis*, a fairly robust, mesophilic plant, without aerial runners, with medium-sized stem leaves with serrated segments, could also be present in the Flora area. The problem requires further study.

- *Valerianella carinata* Loisel.: according to some authors this species is only a morph of *V. locusta* (L.) Laterr. (FG).

- *V. rimoso* Bast.: according to some authors this species is only a morph of *V. dentata* (L.) Pollich (FG).

## 171. Araliaceae

- *Hedera helix* L.: two subspecies that were distinguished in NF6, subsp. *helix* and subsp. *hibernica* (Kirchn.) McClintock, are now treated as two distinct species, *H. helix* s.str. and *H. hibernica* (Kirchn.) Bean respectively. According to McAllister & Rutherford (1997) they are cytologically and morphologically distinct and have a different geographical distribution. All recent authors therefore accept both as separate species (see also Valcárcel & Vargas 2010).

- *Hedera* L. remains poorly understood in the Flora area. In addition to the aforementioned species and *H. colchica* (K. Koch) K. Koch, all already cited in NF6, at least one further species has recently been recorded as an escape from cultivation, *H. maroccana* McAllister (Lummen, 2010; wn.be).

- Three alien species of *Hydrocotyle* L. are currently known in the Flora area. In addition to the invasive aquatic weed *H. ranunculoides* L. f., two further species were recently reported by Verloove & Heyneman (2021): *H. sibthorpioides* Lam. and *H. verticillata* Thunb. (Bredene, since 2009). The former species has been known since the 1980s as a weed from the Antwerp Zoo but was initially

erroneously ascribed (also in NF6) to *H. novae-zelandiae* DC. It was recently also discovered as a lawn weed in Knokke in Mar. and in Maarheeze in Camp. (the Netherlands).

## 172. Apiaceae

- Recent molecular phylogenetic studies have called into question the delimitation of certain genera of this family. A new generic classification therefore has been adopted (see below for details).

- Three additional ephemeral alien species were added: *Cyclospermum leptophyllum* (Pers.) Sprague ex Britton et P. Wilson [syn.: *Apium leptophyllum* (Pers.) F. Muell.] (Antwerp port area, 2015-16; wn.be), *Opopanax chironium* Koch (Herent, 2019-22; wn.be) and *Trachyspermum ammi* (L.) Sprague ex Turrill (Meerts 1985).

- An additional ephemeral alien species of *Eryngium* L. was recently recorded, *E. bourgatii* Gouan (Kleine Brogel, 2013; wn.be).

- *Chaerophyllum hirsutum* L.: this species, previously unknown in the Flora area, is indicated in Lorr. (including Woëvre, and thus within the Flora area) from several locations by both FLORAINE (2013) and Vernier (2020). FG, on the contrary, does not report this species for northeastern France. These claims require confirmation and were not taken into account (based on comm. S. Antoine May 2021).

- An additional alien (ephemeral) species of *Scandix* L. was recently recorded, *S. stellata* Banks et Sol. (comm. S. Carbonnelle).

- The ephemeral alien *Torilis arvensis* (Huds.) Link subsp. *purpurea* (Ten.) Hayek is now accepted as a distinct species by most contemporary authors, *T. africana* Spreng. (Reduron 2007-2008).

- *T. arvensis* (Huds.) Link: the usual taxon in the Flora area is subsp. *arvensis* (*T. arvensis* s.str.). In FT, these plants (which are not rare in the Moselle valley but mostly outside the Flora area) are ascribed to subsp. *recta* Jury, a synonym of subsp. *arvensis* according to FG although not all authors agree on this. Perhaps the identity of plants in the eastern part of the Flora area needs to be reassessed.

- The correct name for the species named *Orlaya platycarpus* Koch in NF6 is *O. daucooides* (L.) Greuter.

- An additional, ephemeral alien species of *Bupleurum* L. was recently recorded, *B. odontites* L. (Antwerp port area, 2015; comm. D. De Beer).

- The generic limits of *Apium* L. have changed as a result of molecular phylogenetic studies (e.g. Ronse *et al.* 2010). In the Flora area, in a strict sense, it only accommodates *A. graveolens* L., the three other native species having been transferred (again) to *Helosciadium* Koch: *H. inundatum* (L.) Koch, *H. nodiflorum* (L.) Koch and *H. repens* (Jacq.) Koch.

- *H. nodiflorum* (L.) Koch: this species is polymorphic and two varieties were distinguished in NF6. However,

these varieties hardly represent more than local accommodations, resulting for instance from trampling. This applies to var. *ochreatum* (DC.) DC., a slender plant with stems rooting at all nodes, with narrower lower leaf segments and pedunculate umbels. It is doubtlessly of limited taxonomic value but nonetheless worth mentioning because this morph resembles *H. repens*, from which it is distinguished by the involucre with 0-2 (-3) bracts, the size of the fruit and the peduncle of the umbel rarely being longer than the rays.

- *Sison amomum* L.: in NF6, the height of this species was said to be 30-50 cm. It is, however, most of the time much taller, up to 200 cm (pers. obs. author; see also FG, wn.be).
- The generic limits of *Ammi* L. have changed. *Ammi visnaga* (L.) Lam. was transferred to the segregate genus *Visnaga* Mill. (as *V. daucooides* Gaertn.) (e.g. Reduron 2007-2008). Molecular data previously suggested a close relationship of the latter to the morphologically very different genus *Smyrniopsis* Boiss. (Downie *et al.* 2010).
- As a result of recent molecular phylogenetic studies *Carum* L. was re-circumscribed (Zakharova *et al.* 2012). The rare native species *Carum verticillatum* L., which was shown to be sister to the Oenantheae clade, is now accommodated in the monotypic genus *Trocdaris* Raf., as *T. verticillatum* (L.) Raf.
- The generic limits of *Seseli* L. are not entirely resolved yet. *S. libanotis* (L.) Koch was transferred to the segregate genus *Libanotis* Zinn in some recent western European Flora accounts (e.g. FG). However, recent molecular studies seem to indicate that it may not be acceptable as a separate genus (Lyskov *et al.* 2018). A conservative approach was thus applied in NF7.
- *Aethusa cynapium* L.: the three varieties that were distinguished in NF6 are probably of variable taxonomic value. Var. *agrestis* Wallr. is likely a mere post-cultural morphosis (and thus of no taxonomic value whatsoever) while var. *gigantea* Lej. might in fact deserve a higher rank (FG, Reduron 2007-2008).
- *Angelica sylvestris* L. subsp. *bernardae* Reduron: this taxon was mentioned in NF6 from Haute Ard. However, the genuine identity of plants with wider than usual leaf segments needs to be re-assessed. In France, subsp. *bernardae* is confined to mountainous regions and does not occur below 1200 m (FG). Its presence in the Flora area thus seems quite unlikely.
- *A. archangelica* L. subsp. *litoralis* (Fries) Thell.: the assumption, already put forward in NF6, that claims of this taxon in the Flora area (Mar. mér.) are erroneous, was recently confirmed by FG. On the other hand, according to H24, cultivated plants (and potentially thus also those occurring as escapes) are intermediate between subsp. *litoralis* and subsp. *archangelica*. This issue requires further study.
- The generic limits of *Peucedanum* L. have dramatically changed as a result of recent molecular phylogenetic stud-

ies. The six species treated in NF6 are now accommodated in six different genera: *Peucedanum* s.str. (*P. gallicum* Latourr.), *Imperatoria* L. (*I. ostruthium* L.), *Thysselinum* Adans. [*T. palustre* (L.) Hoffmann], *Dichoropetalum* Fenzl [*D. carvifolia* (Vill.) Pimenov et Kljuykov], *Oreoselinum* Mill. (*O. nigrum* Delarbre) and *Cervaria* Wolf (*C. rivini* Gaertn.) (e.g. Spalik *et al.* 2004, Winter *et al.* 2008). These new insights were also followed in other contemporary western European Floras (FG, H24, Stace 2019). *Peucedanum* s.l., however, remains a very critical assemblage and the segregation of these genera on the basis of morphological, karyological and molecular data is rarely supported by other characters (Pimenov *et al.* 2016).

- *Pastinaca sativa* L. subsp. *sativa* var. *sativa*: in NF6, this variety was said to have leaves with an indumentum composed of sparse, short hairs. In reality, this taxon is more often merely glabrous (see also FG).
- An alien, ephemeral species of *Heracleum* L. was recently observed: *H. sibiricum* L. [syn.: *H. sphondylium* L. subsp. *sibiricum* (L.) Simonk.] (Ghent port area, 2017; wn.be).
- The possible existence of putative hybrids between *H. mantegazzianum* Somm. et Lev. and *H. sphondylium*, previously confused with *H. laciniatum* Hornem., was already mentioned in NF6. Such plants have recently been reported several times from Ard. in the Grand-Duchy of Luxembourg (Krippel & Colling 2016, Krippel *et al.* 2018, 2020). These plants, at first glance, resemble very vigorous specimens of *H. sphondylium* but, after closer examination, show certain characteristics typical of *H. mantegazzianum* or intermediate characteristics: shape and cutting of the leaf, hairiness, spots on the stem and especially the smell that strongly reminds of that of the latter species (comm. Y. Krippel, June 2021). Given the complexity of this species group, molecular techniques will be required to elucidate this issue.
- *Daucus carota* L.: recent studies have confirmed that the subspecies of this species are interfertile and thus probably of little taxonomic value (Arbizu *et al.* 2014, Spooner *et al.* 2014; see also FG).
- The non-native genus *Smyrniium* L., with two species in the Flora area, is increasingly observed and locally tends to naturalized, especially *S. perfoliatum* L. It was introduced to the key and a full account is presented. A second species, *S. olusatrum* L., is a more recent introduction and might also naturalize locally in the near future. Characteristics useful for its identification were also added.

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## The seventh edition of the *Nouvelle Flore de la Belgique*: new nomenclatural combinations

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**ABSTRACT.** – The following new combinations are proposed and/or validated: *Crataegus rosiformis* Janka var. *lindmanii* (Hrabětová) Verloove & Galasso, *Jacobaea vulgaris* Gaertn. var. *discoidea* (Wimm. & Grab.) Verloove & Galasso, *J. aquatica* (Hill) Gaertn., B. Mey. & Scherb. subsp. *erratica* (Bertol.) Verloove & Galasso, *J. ×albescens* (Burb. & Colgan) Verloove & Lambinon ex Verloove & Galasso, *Kali tragus* (L.) Scop. var. *tenuifolia* (Tausch) Verloove, *Ononis spinosa* L. [subsp. *procurrens* (Wallr.) Briq.] var. *repens* (L.) Verloove and *Schedonorus arundinaceus* (Schreb.) Dumort. var. *asperus* (Mutel) Verloove.

**RÉSUMÉ.** – La septième édition de la *Nouvelle Flore de la Belgique* : nouvelles combinaisons nomenclaturales. Les combinaisons nouvelles suivantes sont proposées et/ou validées: *Crataegus rosiformis* Janka var. *lindmanii* (Hrabětová) Verloove & Galasso, *Jacobaea vulgaris* Gaertn. var. *discoidea* (Wimm. & Grab.) Verloove & Galasso, *J. aquatica* (Hill) Gaertn., B. Mey. & Scherb. subsp. *erratica* (Bertol.) Verloove & Galasso, *J. ×albescens* (Burb. & Colgan) Verloove & Lambinon ex Verloove & Galasso, *Kali tragus* (L.) Scop. var. *tenuifolia* (Tausch) Verloove, *Ononis spinosa* L. [subsp. *procurrens* (Wallr.) Briq.] var. *repens* (L.) Verloove and *Schedonorus arundinaceus* (Schreb.) Dumort. var. *asperus* (Mutel) Verloove.

**SAMENVATTING.** – De zevende editie van de *Nouvelle Flore de la Belgique* : nieuwe nomenclatorische combinaties. De volgende nieuwe combinaties worden voorgesteld en/of gevalideerd: *Crataegus rosiformis* Janka var. *lindmanii* (Hrabětová) Verloove & Galasso, *Jacobaea vulgaris* Gaertn. var. *discoidea* (Wimm. & Grab.) Verloove & Galasso, *J. aquatica* (Hill) Gaertn., B. Mey. & Scherb. subsp. *erratica* (Bertol.) Verloove & Galasso, *J. ×albescens* (Burb. & Colgan) Verloove & Lambinon ex Verloove & Galasso, *Kali tragus* (L.) Scop. var. *tenuifolia* (Tausch) Verloove, *Ononis spinosa* L. [subsp. *procurrens* (Wallr.) Briq.] var. *repens* (L.) Verloove and *Schedonorus arundinaceus* (Schreb.) Dumort. var. *asperus* (Mutel) Verloove.

In the course of the preparation of the seventh edition of the *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des Régions voisines* (Verloove & Van Rossum 2023), we encountered several cases in which new nomenclatural combinations were required. In the present paper (and as a sequel to Verloove & Lambinon 2006 and 2011), new combinations are proposed in the genera *Crataegus*, *Jacobaea*, *Kali*, *Ononis* and *Schedonorus*. Many other names that were treated in NF6 (mostly at the rank of *forma* or variety) were not recombined under the genera in which these taxa are now treated because they are probably of very limited taxonomic significance. This applies, for instance, to the several different color forms of *Anagallis arvensis* L. [now *Lysimachia arvensis* (L.) U. Manns et Anderb.] or an unawned variety of *Nardurus maritimus* (L.) Murb. [now *Vulpia unilateralis* (L.) Stace].

Author names and abbreviations are according to Rec. 46A Note 1 of the ICN (Turland *et al.* 2018), i.e. to the International Plant Names Index (IPNI: <https://www.ipni.org/>).

### • *Crataegus* L.

In the sixth edition of the *Nouvelle Flore* (Lambinon & Verloove 2012), a variety of *C. rhipidophylla* Gand., with usually ellipsoidal-subcylindrical fruits that are crowned with erect or suberect sepals that are 1.5-3.1 times as long as wide and with lower leaf segments with (7-)12-18 teeth on either side, was referred to var. *lindmanii* (Hrabětová) K.I. Chr. Although the taxonomic value of this variety probably needs to be critically re-assessed, it was upheld pending further studies. However, since the binomial *C. rhipidophylla* is no longer applied (Verloove 2023) and a combination under *C. rosiformis* was apparently lacking for this taxon, it is here proposed and validated:

***Crataegus rosiformis*** Janka var. ***lindmanii*** (Hrabětová) Verloove & Galasso, comb. nov.  
Basionym: *Crataegus lindmanii* Hrabětová, Spisy Přír. Fak. Univ. Brně 491: 98. 1969 [1968 publ. 1969].

• ***Jacobaea*** Mill.

The generic limits of the polyphyletic genus *Senecio* L. have considerably changed as a result of recent molecular phylogenetic studies (Pelser *et al.* 2002). *Jacobaea* Mill. is now segregated and its generic status is furthermore supported by hybridization behavior: there are several hybrids within *Jacobaea* (e.g. Winter *et al.* 2013) while there are none between *Jacobaea* and *Senecio*. However, morphologically both genera are poorly separated. In *Jacobaea* the number of inner involucre bracts usually equals the number of ligules, whereas in *Senecio* s.str. the number of inner involucre bracts is ca. 1.5-2.0 times the number of ligules. Moreover, in *Jacobaea* the surface of the achenes is finely papillose while achenes are usually smooth in *Senecio* s.str. Representatives of the genus *Jacobaea* are mostly biennial or perennial.

This new generic concept is followed in all contemporary western European flora accounts and checklists (e.g. Tison & de Foucault 2014, Bartolucci *et al.* 2018, Stace 2019, Duistermaat 2020) and it was also applied in the new edition of the *Nouvelle Flore*. However, for three taxa no names were available yet in *Jacobaea*; they are here proposed and validated:

***Jacobaea vulgaris*** Gaertn. var. ***discoidea*** (Wimm. & Grab.) Verloove & Galasso, comb. nov.

Basionym: *Senecio jacobaea* L. var. *discoideus* Wimm. & Grab., Fl. Siles. 2(2): 153. 1829.

***Jacobaea aquatica*** (Hill) Gaertn., B. Mey. & Scherb. subsp. ***erratica*** (Bertol.) Verloove & Galasso, comb. nov.

Basionym: *Senecio erraticus* Bertol., Rar. Lig. [Ital.] Pl. 3: 62. 1810.

***Jacobaea* × *albescens*** (Burb. & Colgan) Verloove & Lambinon ex Verloove & Galasso

Basionym: *Senecio* × *albescens* Burb. & Colgan, Irish Naturalist 11(12): 315. 1902.

The new combination that was published by Verloove & Lambinon (2011) was invalid as the page number of the basionym was missing (Art. 41.5 of the ICN).

• ***Kali*** Mill.

Based on molecular phylogenetic analyses of nuclear and chloroplast data sets, the classification of the Old World Salsoleae s.l. was recently revised (Akhani *et al.* 2007). As a result, several new genera were described and some previously described genera, including *Kali*, were resurrected. This viewpoint – although not uncontested (see e.g. Mosyakin *et al.* 2017) – was followed in the new edition of the *Nouvelle Flore*.

In the Flora area, plants of *Kali tragus* (L.) Scop. pre-

dominantly belong to a particular variety for which no name was available yet under this genus. A new combination is here proposed:

***Kali tragus*** (L.) Scop. var. ***tenuifolia*** (Tausch) Verloove, comb. nov.

Basionym: *Salsola kali* L. var. *tenuifolia* Tausch in Flora 11: 326. 1828.

• ***Ononis*** L.

Two species of *Ononis*, often hardly distinguishable, *O. repens* L. and *O. spinosa* L., are now treated as a single variable species (i.e. *O. spinosa*, the binomial that has nomenclatural priority) with two subspecies, respectively subsp. *procurrens* (Wallr.) Briq. and subsp. *spinosa*, following other recent Floras (e.g. Tison & de Foucault 2014, Duistermaat 2020).

In the Flora area, a particular variety from fixed coastal dunes with tiny corollas (ca. 10 mm long), very densely glandular hairy stems and (almost) devoid of spines, has always been referred to as *O. repens* var. *repens* (var. *procurrens* being the more widespread taxon). Although its taxonomic relevance requires confirmation, it is accepted by several contemporary European authors (e.g. Jäger & Werner 2005 who even treated it at subspecies rank). However, this variety has apparently not (yet) been combined under *O. spinosa* [subsp. *procurrens*]:

***Ononis spinosa*** L. [subsp. ***procurrens*** (Wallr.) Briq.] var. ***repens*** (L.) Verloove, comb. nov.

Basionym: *Ononis repens* L., Sp. Pl. 2: 717. 1753.

• ***Schedonorus*** P. Beauv.

The generic circumscription of *Festuca* L. has dramatically changed in recent years (e.g. Soreng & Terrell 2001 and onwards). Among other transfers, three broad-leaved species with auriculate leaf blades were moved (again) to the segregate genus *Schedonorus* P. Beauv. This renewed classification better reflects the natural relationships between the species of these genera and is in accordance with other recent western European Floras (e.g. Tison & de Foucault 2014, Stace 2019, Duistermaat 2020). However, even then further studies are needed. For instance, *Schedonorus* has lately been included in *Lolium* by some authors (see Banfi *et al.* 2017 for an overview) and this point of view is increasingly followed (e.g. Tison *et al.* 2021, Soreng *et al.* 2022).

In the Flora area, a particular variety of ‘*Festuca arundinacea*’, characterized by rough leaf sheaths and a rough stem just below the inflorescence, a narrower and denser inflorescence and lemmas with bidentate apices with protruding veins, was treated as var. *aspera*. However, a name at varietal rank was not available under *Schedonorus*; it is here proposed and validated:

***Schedonorus arundinaceus*** (Schreb.) Dumort. var. ***asperus*** (Mutel) Verloove, comb. nov.

Basionym: *Festuca elatior* L. var. *aspera* Mutel, Fl. Franç. (Mutel) 4: 110, atlas: pl. 88 fig. 620. 1837.

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## De sleutel voor bomen, heesters en lianen in de Belgische Flora: historiek, opzet en wijzigingen in de nieuwe editie van 2023

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**ABSTRACT.** – **The key to trees, shrubs and lianas in the Belgian Flora: history, structure and changes in the new 2023 edition.** This contribution documents the history and design of the determination key for trees, shrubs and lianas in the *Nouvelle Flore de la Belgique/Flora van België*. Ever since the first edition of the Flora, this key has been separate from the keys for families, genera and species. Its use of predominantly vegetative traits makes it complementary to the other keys. All woody species and climbers keyed out in previous editions of the Belgian Flora were always in the key to trees, while only part of them are included in the keys to families, genera and species. About half of the taxa in this key occur only cultivated, a smaller proportion are naturalised taxa or escapes from cultivation, and in last place are the native taxa. In this version, native and feral taxa were added consistently for the first time. The main change is the addition of 32 new taxa.

**RÉSUMÉ.** – **La clé des arbres, arbustes et lianes de la Flore belge : histoire, structure et changements dans la nouvelle édition 2023.** Cette contribution documente l'histoire et la conception de la clé de détermination des arbres, arbustes et lianes de la *Nouvelle Flore de la Belgique/Flora van België*. Depuis la première édition de la Flore, cette clé est distincte des clés des familles, des genres et des espèces. L'utilisation de caractères principalement végétatifs la rend complémentaire aux autres clés. Toutes les espèces ligneuses et grim-pantes répertoriées dans les éditions précédentes de la Flore belge ont toujours été incluses dans la clé des arbres, alors que seule une partie d'entre elles est incluse dans les clés pour les familles, genres et espèces. Environ la moitié des taxons de cette clé sont uniquement cultivés, une plus petite proportion sont des taxons naturalisés ou échappés de culture, et en dernière position se trouvent les taxons indigènes. Dans cette version, les taxons indigènes et sauvages ont été ajoutés de manière cohérente pour la première fois. Le principal changement est l'ajout de 32 nouveaux taxons.

**SAMENVATTING.** – Deze bijdrage documenteert de historiek en het opzet van de determinatie-sleutel voor bomen, heesters en lianen in de *Nouvelle Flore de la Belgique/Flora van België*. Al sinds de eerste uitgave van de Flora staat deze sleutel los van de sleutels voor de families, genera en soorten. Het gebruik van overwegend vegetatieve kenmerken maakt hem complementair met de andere sleutels. Alle houtige soorten en klimplanten die in vorige edities van de Belgische Flora uitgesleuteld worden, stonden steeds in de bomensleutel, terwijl slechts een deel hiervan is opgenomen in de hoofdsleutels voor families, genera en soorten. Ongeveer de helft van de taxa in deze sleutel komt enkel gekweekt voor, een kleiner gedeelte betreft ingeburgerde of verwilderende taxa, en op de laatste plaats komen de inheemse taxa. In deze versie werden voor het eerst ingeburgerde en verwilderde taxa consequent toegevoegd. De belangrijkste wijziging is de toevoeging van 32 nieuwe taxa.

### Inleiding

Zowel in de *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des régions voisines* als in zijn Nederlandstalige tegenhanger de *Flora van België, het Groothertogdom Luxemburg,*

*Noord-Frankrijk en de aangrenzende gebieden* (hierna NF resp. FB) is een afzonderlijke sleutel opgenomen voor het determineren van bomen, heesters en lianen, hoofdzakelijk volgens de bladkenmerken. Voor gebruik in de 7<sup>de</sup> Franstalige en de 4<sup>de</sup> Nederlandstalige editie van de

Belgische Flora (resp. NF7 en FB4), die beide in 2023 worden gepubliceerd, werd deze sleutel geactualiseerd en herwerkt (Verloove & Van Rossum 2023a, b).

Deze bijdrage documenteert en bespreekt ten eerste de opzet en het doel van deze determinatiesleutel aan de hand van de vroegere edities van de NF. Daartoe werd onderzocht welke taxa in de vroegere versies van de sleutel opgenomen waren; daarna worden de in NF7 doorgevoerde wijzigingen aangegeven en besproken. De nieuw ingevoegde taxa worden opgesomd, evenals deze die weggelaten werden uit de sleutel. De criteria die gebruikt werden voor de keuze van nieuwe taxa worden besproken, en de redenen voor het weglaten van taxa uit de sleutel worden aangegeven. De wijzigingen worden vervolgens summier vergeleken met de wijzigingen tussen NF5 en NF6.

Om praktische redenen is de omschrijving ‘sleutel voor het determineren van bomen, heesters en lianen, hoofdzakelijk volgens de bladkenmerken’ hierna afgekort tot ‘bomensleutel’.

### Historiek en opzet van de sleutel

De historiek, opzet en inhoud van de bomensleutel wordt in geen enkele editie van de NF expliciet besproken en werd, voor zover ik weet, evenmin ooit behandeld in *Dumortiera* of in enig ander floristisch tijdschrift. Deze aspecten worden hier besproken met de bedoeling het nut van deze sleutel duidelijk te maken. Bovendien beoogt deze bijdrage de zichtbaarheid van de bomensleutel te verhogen en hem meer bekendheid te geven bij de floristen.

#### • Historiek

Een aparte sleutel voor het determineren van bomen en heesters in vegetatieve toestand vinden we al in de voorloper van de NF, de *Flore de la Belgique, du Nord de la France et des régions voisines* (De Langhe *et al.* 1967). In deze Flora staat de bomensleutel achteraan, na de sleutels voor de plantenfamilies en na de hoofdtekst. Deze sleutel wordt in de inleiding van dit werk niet vermeld, maar door onderzoek van de opgenomen taxa blijkt dat ze zowel inheemse houtachtige soorten als courant gekweekte bomen en struiken in tuinen en parken bevat.

In de opeenvolgende edities van de NF (te beginnen met NF1, De Langhe *et al.* 1973) werd een gelijkaardige sleutel opgenomen; hij is evenwel uitgebreid met lianen (klimplanten). Voortaan stond deze sleutel vlak na de hoofdsleutel voor de families, en bijgevolg vóór de eigenlijke hoofdtekst van de Flora. Dat was ook zo in FB (te beginnen met FB1, De Langhe *et al.* 1983).

Vanaf NF4 (Lambinon *et al.* 1992) is deze sleutel herwerkt door Daniel Geerinck. Hij herwerkte de sleutels nadien ook voor NF5 en NF6; deze laatste editie verscheen in 2012. Geerinck herwerkte ook de sleutel voor FB3 (Lambinon *et al.* 1998). Deze sleutel was op meerdere vlakken een sterk uitgebreide en verbeterde versie, gebaseerd op de sleutel in NF4. D. Geerinck overleed in 2016 ([https://](https://www.cowb.be/hommage-a-daniel-geerinck)

[www.cowb.be/hommage-a-daniel-geerinck](https://www.cowb.be/hommage-a-daniel-geerinck)). Voor het herwerken van de bomensleutel voor de huidige, 7<sup>de</sup> uitgave van de Nouvelle Flore gebruikte ik de meest recente bewerking door Daniel Geerinck als uitgangspunt.

#### • Opzet en inhoud

In de NF en FB staat telkens vooraan eerst de sleutel voor het bepalen van de familie. Pas verderop in de tekst, bij de bespreking van elke familie staan de sleutels tot de genera en de soorten. Deze hoofdsleutels (d.w.z. de sleutels voor het bepalen van families, genera en soorten) maken in hoofdzaak gebruik van de kenmerken van bloemen en vruchten. De bomensleutel daarentegen maakt voornamelijk gebruik van vegetatieve kenmerken, zoals expliciet vermeld in de volledige benaming van deze sleutel.

Dit maakt dat de bomensleutel complementair is met de overige sleutels. Het is niet toevallig dat het gebruik van vegetatieve kenmerken vooral in deze sleutel benadrukt wordt. Deze kenmerken zijn immers vooral nodig of nuttig voor de identificatie van houtige soorten, die meestal niet in bloeiende of vruchtdragende toestand worden aangetroffen, vermits hun juveniele of vegetatieve fase vaak vele jaren beslaat. Bovendien zijn bij houtige soorten de bloemen en/of vruchten, wanneer ze al aanwezig zijn, dikwijls lastig te bekijken of onderzoeken omdat ze zich op grote hoogte bevinden en moeilijk bereikbaar zijn. Dit laatste is eveneens het geval bij klimplanten, die dan ook in de bomensleutel opgenomen zijn. Derhalve zijn houtige taxa en klimplanten dikwijls moeilijk tot zelfs onmogelijk te determineren op basis van uitsluitend hoofdsleutels. Dit lukt beter met de bomensleutel omdat hierin overwegend vegetatieve kenmerken (‘bladkenmerken’) gebruikt worden.

Bij nader inzien blijkt de bomensleutel verschillende categorieën van houtachtige soorten en klimplanten te bevatten: naast inheemse soorten zijn er ook gekweekte soorten en bovendien verwilderende of ingeburgerde soorten. Reeds in de inleiding van de NF4 (Lambinon *et al.* 1992) is vermeld dat de uitstekende kennis van D. Geerinck over de gekweekte houtige gewassen bijgedragen heeft tot de verbetering van de bomensleutel. Dit geeft al aan dat in de bomensleutel de focus niet alleen op inheemse soorten ligt, maar ook op gekweekte soorten. In welke mate de drie categorieën – inheemse, (enkel) gekweekte en verwilderde soorten – vertegenwoordigd zijn in de bomensleutel in NF6 (Lambinon & Verloove 2012), wordt hier onderzocht. Daarnaast wordt onderzocht in hoeverre de soorten van de bomensleutel ook in de hoofdsleutels tot op de soort opgenomen zijn. Hiervoor werd een steekproef genomen in NF6 (Lambinon & Verloove 2012). Deze selectie bevat zes lukraak gekozen genera van houtige soorten en/of klimplanten, die uitgesleuteld worden in hetzij de sleutels voor de soorten van het genus, hetzij in de bomensleutel, of in allebei. Dat werd gedaan door in de alfabetische index van NF6 de eerste drie en de laatste drie genera te selecteren, die aan bovenvermelde voorwaarden voldoen, nl. *Abies*, *Acer*, *Actinidia*, *Vitis*,

**Tabel 1.** In NF6 in de bomensleutel of in de hoofdsleutels uitgesleutelde houtige of klimmende soorten, met hun status in het gebied van de Flora (steekproef van 6 alfabetisch geselecteerde genera). Afkortingen – Sta (status): I: inheems; G: enkel gekweekt; V: verwilderd; B: ingeburgerd. HS: in hoofdsleutels. BS: in bomensleutel.

Genus	Soortnaam	Sta	HS	BS
<i>Abies</i>	<i>alba</i>	G	+	+
	<i>concolor</i>	G		+
	<i>grandis</i>	G		+
	<i>koreana</i>	G		+
	<i>nordmanniana</i>	G		+
	<i>procera</i>	G		+
	<i>veitchii</i>	G		+
	<i>Acer</i>	<i>campestre</i>	I	+
<i>cappadocicum</i>		B		+
<i>monspessulanum</i>		G		+
<i>negundo</i>		B		+
<i>palmatum</i>		G		+
<i>pseudoplatanus</i>		I	+	+
<i>platanoides</i>		I	+	+
<i>rubrum</i>		B		+
<i>rufinerve</i>		B		+
<i>saccharinum</i>		B		+
<i>tataricum</i> subsp. <i>ginnala</i>	B		+	
<i>Actinidia</i>	<i>deliciosa</i>	V		+
<i>Vitis</i>	<i>vinifera</i>	G + I*	+	+
<i>Wisteria</i>	<i>sinensis</i>	G		+
<i>Zelkova</i>	<i>serrata</i>	G		+

\* Van *Vitis vinifera* zijn 2 ondersoorten aanwezig, waarvan één inheems (subsp. *sylvestris*) en de andere gekweekt (subsp. *vinifera*).

*Wisteria* en *Zelkova*. Tabel 1 geeft een overzicht van de uitgesleutelde soorten van deze genera, evenals hun status in het gebied van de Flora (inheems, gekweekt, verwilderd of ingeburgerd), zoals die in de Flora aangegeven is.

Uit de steekproef blijkt dat alle 22 soorten (23 taxa) in de bomensleutel zijn opgenomen, m.a.w. alle houtige soorten en klimplanten die in de hoofdsleutels staan, worden ook in de bomensleutel opgenomen. Omgekeerd is slechts een minderheid van de taxa van de bomensleutel ook in de hoofdsleutels opgenomen; hier is dit zelfs minder dan een kwart (23%) van de taxa. Deze taxa worden wel vaak in een voetnoot in de hoofdtekst vermeld, maar dus niet uitgesleuteld.

De taxa in de bomensleutel hebben een uiteenlopende status: ongeveer de helft ( $12/23 = 52\%$ ) betreft soorten die enkel gekweekt zijn, ongeveer een kwart zijn ingeburgerde soorten ( $6/23 = 26\%$ ), en de rest zijn inheemse (17%) en verwilderende soorten (4%). Mogelijks zijn deze resultaten vertekend door de aanwezigheid in de steekproef van het genus *Abies*, met talrijke gekweekte soorten, zodat het aandeel van gekweekte soorten hoger ligt dan in de totaliteit van de sleutel.

Bij de soorten in de hoofdsleutels ligt de situatie vermoedelijk anders. Traditioneel is de eerste bekommernis om alle ‘inheemse’ soorten op te nemen, maar er worden ook andere categorieën opgenomen. Volgens Filip Ver-

loove, de eerste auteur van NF7/FB4, was er vroeger geen objectief criterium voor het opnemen van soorten in de hoofdsleutels (email 6 jan. 2023): behalve alle inheemse en ingeburgerde soorten, werden ook meerdere soorten opgenomen die in het gebied van de Flora uitsluitend aangeplant voorkomen (zoals diverse coniferen), maar evengoed ook sommige frequent efemer voorkomende soorten (zoals de grassen *Phalaris canariensis* en *Sorghum bicolor*).

### Wijzigingen in NF7 en FB4

Voor de herwerking van de bomensleutel werden meerder soorten wijzigingen doorgevoerd. Nieuwe taxa werden toegevoegd, terwijl ook taxa werden weggelaten. Daarnaast waren er kleinere wijzigingen, zoals naamsveranderingen om te voldoen aan de huidige taxonomische inzichten en nomenclatuur, het vervangen van de namen van genera in de sleutel door de namen van de soorten in deze genera, en omgekeerd het vervangen van de namen van soorten door deze van genera.

#### • Nieuwe taxa

Uit het bovenstaande is duidelijk dat de bomensleutel naast gekweekte en inheemse soorten ook verwilderende, inburgerende of reeds ingeburgerde soorten bevat. Voor deze versie werden voor het eerst systematisch verwilderde en/of ingeburgerde taxa toegevoegd. Daarvoor werd eerst de alfabetische lijst opgesteld van de soorten/taxa die in de bomensleutel in NF6 (Lambinon & Verloove 2012) opgenomen waren. Vervolgens werd de checklist van de *Manual of the Alien Plants in Belgium* gebruikt (<https://alienplantsbelgium.myspecies.info/>, versie 20.10.2020), door er in de eerste plaats de houtige taxa en klimplanten aan te stippen, en dit te vergelijken met de taxa in de bomensleutel. Daarna werden de taxa weerhouden die nog niet in de bomensleutel opgenomen waren. In eerste instantie ging de aandacht naar ingeburgerde en invasieve houtige en klimmende soorten, en in tweede instantie naar soorten die occasioneel verwilderd aangetroffen worden. Van deze selectie werden vervolgens enkel de soorten weerhouden die niet uitgesleuteld worden in de hoofdsleutels Tenslotte werden uit de resulterende lijst deze taxa geschrapt die slechts eenmalig (bv. *Smilax rotundifolia*) of zeer uitzonderlijk verwilderd gevonden zijn, of enkel vlakbij of in een tuin of arboretum.

Dit resulteerde uiteindelijk in een lijst van 32 taxa, die toegevoegd werden aan de bomensleutel; ze behoren tot diverse families; zie tabel 2. De overgrote meerderheid van de taxa is tot op soortniveau uitgesleuteld, inclusief enkele al dan niet spontaan ontstane kruisingen. Één taxon betreft een genus in zijn geheel, namelijk *Phyllostachys*, een genus van bamboes waarvan steeds vaker verwilderde exemplaren voorkomen. De determinatie van de soorten van dit genus is op dit ogenblik op zijn zachtst uitgedrukt een uitdaging, want voor de in NW-Europa gekweekte soorten van dit genus zijn geen goede sleutels voorhanden.

**Tabel 2.** In NF7 in de bomensleutel nieuw toegevoegde soorten/taxa.

Genus	Soort	Familie
<i>Akebia</i>	<i>quinata</i>	Lardizabalaceae
<i>Arundo</i>	<i>donax</i>	Poaceae
<i>Catalpa</i>	<i>ovata</i>	Bignoniaceae
<i>Chaenomeles</i>	<i>japonica</i>	Rosaceae
<i>Chaenomeles</i>	<i>speciosa</i>	Rosaceae
<i>Chaenomeles</i>	× <i>superba</i>	Rosaceae
<i>Clematis</i>	<i>tangutica</i>	Ranunculaceae
<i>Cotoneaster</i>	<i>lacteus</i>	Rosaceae
<i>Hedera</i>	<i>colchica</i>	Araliaceae
<i>Ilex</i>	× <i>meserveae</i>	Aquifoliaceae
<i>Ligustrum</i>	<i>sinense</i>	Oleaceae
<i>Parthenocissus</i>	<i>inserta</i>	Vitaceae
<i>Parthenocissus</i>	<i>quinquefolia</i>	Vitaceae
<i>Phyllostachys</i>	spp.	Poaceae, Bambusoideae
<i>Platanus</i>	<i>orientalis</i>	Platanaceae
<i>Platanus</i>	× <i>hispanica</i>	Platanaceae
× <i>Pseudosasa</i>	<i>japonica</i>	Poaceae, Bambusoideae
<i>Rhododendron</i>	<i>luteum</i>	Ericaceae
<i>Rubus</i>	<i>niveus</i>	Rosaceae
<i>Sambucus</i>	<i>canadensis</i>	Caprifoliaceae
<i>Sasa</i>	<i>palmata</i>	Poaceae, Bambusoideae
× <i>Sasinaria</i>	<i>ramosa</i>	Poaceae, Bambusoideae
<i>Sorbaria</i>	<i>sorbifolia</i>	Rosaceae
<i>Sorbaria</i>	<i>tomentosa</i>	Rosaceae
<i>Syringa</i>	<i>josikaea</i>	Oleaceae
<i>Tamarix</i>	<i>gallica</i>	Tamaricaceae
<i>Tamarix</i>	<i>parviflora</i>	Tamaricaceae
<i>Vaccinium</i>	<i>corymbosum</i>	Ericaceae
<i>Viburnum</i>	× <i>rhytidophylloides</i>	Caprifoliaceae
<i>Vincetoxicum</i>	<i>nigrum</i>	Asclepiadaceae
<i>Yucca</i>	<i>flaccida</i>	Agavaceae
<i>Yucca</i>	<i>gloriosa</i>	Agavaceae

De informatie die nodig was voor het opstellen van de sleutels, te weten de onderscheidende kenmerken van de nieuw toe te voegen taxa, werd opgezocht in dendrologische standaardwerken en diverse West-Europese Flora's (De Koning *et al.* 2009; Roloff *et al.* 2006; Stace 2010; Tison & de Foucault 2014), evenals gespecialiseerde monografieën en andere vakliteratuur en online informatiebronnen. Nogal wat verwilderende soorten zijn afkomstig uit China, en daarvoor was *Flora of China* een nuttige bron ([http://www.efloras.org/flora\\_info.aspx?flora\\_id=2](http://www.efloras.org/flora_info.aspx?flora_id=2)). Voor sommige taxa was bijkomend onderzoek nodig wanneer de beschikbare bronnen een onvoldoende nauwkeurige beschrijving geven van een taxon of wanneer verschillende bronnen elkaar tegenspreken. Een voorbeeld betreft de bamboes, waarvan de naamgeving en taxonomie nog in volle evolutie zijn. Voor bepaalde taxa werd herbariummateriaal uit de collecties van Plantentuin Meise bekeken om de infraspecifieke variatie na te gaan.

Het toevoegen van nieuwe taxa in de sleutels vergde vaak de aanpassing van meerdere vroegere dichotomieën door het toevoegen van nieuwe onderscheidende kenmer-

ken, vooral wanneer de nieuwe soort behoort tot een nog niet in de bomensleutel vermeld genus, zoals voor *Vincetoxicum nigrum*. Voor de reeds in NF6 in de bomensleutel opgenomen genera werden verschillende gevallen onderscheiden. Wanneer een genus zonder soortvermelding was opgenomen, en er geen andere soorten van dit genus in de hoofdsleutels opgenomen zijn, is de naam van het genus vervangen door de namen van de nieuw ingelaste soorten (bv. *Yucca* vervangen door *Y. flaccida* en *Y. gloriosa*, en *Chaenomeles* door *C. japonica*, *C. speciosa* en *C. ×superba*). Indien er al wel andere soorten van het genus in de hoofdsleutels staan, maar met slechts één tot drie taxa, dan werden alle taxa vermeld in de bomensleutel. Indien in de hoofdsleutels meer dan drie taxa van een genus aanwezig zijn, dan wordt enkel de naam van het genus vermeld, samen met de naam van de nieuw ingelaste soort (bv. *Sambucus* en *S. canadensis*; *Clematis* en *Clematis tangutica*; *Hedera* en *Hedera colchica*).

In één geval (*Akebia quinata*) behoorde de nieuw ingelaste soort niet enkel tot een nieuw genus, maar ook tot een nieuwe plantenfamilie voor de Flora (Lardizabalaceae) zodat er aan het systematisch deel van de Flora een beschrijving van de familie toegevoegd werd.

#### • Verwijderde soorten/taxa

In overleg met Filip Verloove werden uit de bomensleutel soorten geschrapt, die in NF7 voor het eerst ook in de hoofdtekst tot op de soort zijn uitgesleuteld. Deze beslissing volgde uit de logica dat de bomensleutel een aanvulling vormt op de overige sleutels. Soorten die al uitgesleuteld worden in de hoofdsleutels, hoeven niet meer in de bomensleutel opgenomen te blijven. Hiervoor werd in de praktijk nagekeken welke taxa in NF7 nieuw toegevoegd zijn, d.w.z.: nieuw uitgesleuteld en met een volledige beschrijving. Deze taxa moeten evenwel in de bomensleutel nog een verwijzing krijgen, tenminste op genusniveau of anders binnen een groep van soorten. Indien er al een vermelding op genusniveau was in de bomensleutel, werd er niets gewijzigd, zoals bv. bij *Aronia prunifolia*, waarvoor al in de bomensleutel het genus *Aronia* werd vermeld.

In deze versie werden 19 taxa van *Cotoneaster* weggelaten, met name *C. bullatus*, *coriaceus*, *dammeri*, *dielsianus*, *divaricatus*, *franchetii*, *hjelmqvistii*, *horizontalis*, *integerrimus*, *integrifolius*, *microphyllus*, *rehderi*, *salicifolius*, *simonsii*, *sternianus*, ×*suecicus*, *villosulus*, ×*watereri*, en *zabelii*. *Cotoneaster lacteus* werd behouden omdat de soort niet uitgesleuteld is in de hoofdtekst. Daarnaast is *Ilex aquifolium* in de bomensleutel weggelaten en vervangen door *I. ×meserveae* en *Ilex*, met verwijzing naar de nieuwe sleutels voor dit genus in de hoofdtekst.

#### • Andere wijzigingen

Zoals in vorige paragraaf vermeld, werden weggelaten soorten vervangen door het genus (zoals bij de meeste *Cotoneaster*-soorten). Andersom werd in NF7 meermaals een genus vervangen door soorten binnen dit genus, zoals *Weigela* dat vervangen is door *Weigela floribunda*. In dit voorbeeld is de reden dat er slechts één soort uit dit genus

in het gebied van de Flora frequent gekweekt wordt. In andere gevallen gaat het om de vervanging van een genus door twee of drie nieuw toegevoegde soorten; zo is bv. *Parthenocissus* vervangen door *P. quinquefolia* en *P. inserta*.

In het genus *Parthenocissus* werd ook nog een andere wijziging doorgevoerd. Behalve de vermelding van *P. tricuspidata* (in groep F) was dit genus in NF6 op twee plaatsen binnen groep B van de sleutel vermeld, waarvan één onder de dichotomie van samengestelde bladeren met 3 deelblaadjes (couplet 68). Deze verwijzing naar het genus in zijn geheel werd echter vervangen door *P. quinquefolia* en *P. inserta*, die beide volgens alle geraadpleegde bronnen nooit minder dan vier deelblaadjes bezitten (uitzonderlijk vier bij *P. quinquefolia*).

In een ander geval werd voor een taxon een tweede vermelding in de sleutel voorzien, namelijk *Catalpa ×erubescens*. Dit taxon was in NF6 opgenomen in Groep E van de sleutel (Bladen gelobd of ingesneden, tegenoverstaand). Herbariumspecimens maken echter duidelijk dat dit hybridogene taxon ook minder sterk ingesneden bladeren kan hebben; het is daarom ook in groep C opgenomen (Bladen gaafrandig of getand, tegenoverstaand). Omdat deze bladvormen samen in één individu naast elkaar kunnen voorkomen, werd bij de dichotomie in het begin van groep E toegevoegd: “Soms een deel van de bladen gaafrandig”.

Tenslotte werden voor enkele taxa naamswijzigingen doorgevoerd als een gevolg van nieuwe taxonomische inzichten. De hiervoor gebruikte referentiebron is (uiteraard) dezelfde als voor de overige tekst van NF7, namelijk TAXREF (<https://www.data.gouv.fr/fr/datasets/referentiel-taxonomique-taxref/>; geraadpleegd 23.1.2023). Voor deze versie werden slechts drie soortnamen aangepast: *Potentilla fruticosa* is nu *Dasiphora fruticosa*, en *Mahonia aquifolium* en *M. japonica* zijn nu resp. *Berberis aquifolium* en *Berberis japonica*. Ook voor de nieuw toegevoegde soorten werd TAXREF gevolgd. In een paar gevallen werden courant gebruikte namen vervangen; zo vervangt *Rubus niveus* Thunb. de vaak ten onrechte voor dit taxon gebruikte naam *Rubus cockburnianus* auct. non Hemsl.

## Bespreking en besluit

De bomensleutel maakt voornamelijk gebruik van vegetatieve kenmerken, in tegenstelling tot de hoofdsleutels. Daardoor is hij complementair met de sleutels voor de families, genera en soorten. De nadruk op vegetatieve kenmerken voor het identificeren van houtige soorten en klimplanten is zinvol, vermits hun bloemen en vruchten vaak ontbreken of moeilijk te onderzoeken zijn.

Uit een vergelijking van de aanwezigheid van soorten uit lukraak gekozen genera in de bomensleutel en in de hoofdsleutels is gebleken dat de complementariteit van de bomensleutel niet opgaat qua keuze van de opgenomen soorten. Alle houtachtige soorten en lianen die in vroegere edities van de NF en FB uitgesleuteld werden staan ook

in de bomensleutel, maar slechts een eerder klein gedeelte hiervan is opgenomen in de sleutels voor de soorten. Hieruit volgt dat taxa die in NF7 voor het eerst in de sleutels voor de families, genera en soorten opgenomen worden, ook in de bomensleutel vermeld kunnen blijven. Om na te gaan of dit in vorige versies het geval was, werd een korte vergelijking gemaakt van de soorten in de bomensleutel in vorige versies van de Flora, met name NF5 (Lambinon *et al.* 2004) en NF6 (Lambinon & Verloove 2012). Het blijkt dat in deze uitgaven 28 nieuwe soorten/kruisingen en twee genera werden toegevoegd, terwijl er slechts twee soorten/kruisingen zijn weggelaten (en twee taxa samen-gevoegd werden).

Uit alle analyses en vergelijkingen wordt duidelijk dat de taxa (soortniveau of lager) die in de bomensleutel opgenomen zijn, best behouden blijven in de toekomstige versies, opdat in deze sleutel alle houtachtigen en klimplanten zouden opgenomen zijn. Behalve inheemse soorten bevat hij vooral verwilderde en ingeburgerde soorten, evenals gekweekte soorten, in totaal een 400-tal soorten en een dertigtal genera. In deze editie werden voor het eerst consequent taxa toegevoegd op basis van hun graad van verwildering en inburgering. Dit zou het vermogen van de bomensleutel om houtachtigen en lianen in het gebied van de Flora te determineren duidelijk moeten verhogen.

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## De behandeling van het genus *Rubus* (Rosaceae) in de nieuwe editie van de *Nouvelle Flore de la Belgique/Flora van België*

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**ABSTRACT.** – Notes on the treatment of the genus *Rubus* (Rosaceae) in the new editions of the Flora of Belgium. The major changes in the treatment of the genus *Rubus* in the seventh edition of the *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des régions voisines* and the fourth edition of the *Flora van België, het Groothertogdom Luxemburg, Noord-Frankrijk en de aangrenzende gebieden* are explained. First, the identification key has been expanded from 63 to 122 species in comparison to the previous edition of the *Nouvelle Flore*. More than 50 new species are recognized for the region. On the other hand, more than 80 species have been excluded in the new edition, mostly because of doubtful identifications. The taxonomical and nomenclatural changes are commented. Finally, changes in the chorology are shortly given. They are mostly based on the revision of old and new herbarium material.

**RÉSUMÉ.** – Notes sur le traitement du genre *Rubus* (Rosaceae) dans les nouvelles éditions de la Flore de Belgique. Les principaux changements dans le traitement du genre *Rubus* dans la septième édition de la *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des régions voisines* et dans la quatrième édition de la *Flora van België, het Groothertogdom Luxemburg, Noord-Frankrijk en de aangrenzende gebieden* sont expliqués. Il s'agit, d'une part, de l'extension de la clef d'identification de 63 à 122 espèces en comparaison avec l'édition antérieure de la *Nouvelle Flore*. Plus de 50 nouvelles espèces ont été trouvées dans la région couverte. D'autre part, plus de 80 espèces ont été exclues de la nouvelle édition, généralement en raison de doutes quant à la détermination. Les changements taxonomiques et nomenclatureux sont commentés. Finalement, les changements chorologiques sont brièvement énoncés. Ils sont, en majeure partie, basés sur la révision de matériel d'herbier ancien et nouveau.

**SAMENVATTING.** – De belangrijkste wijzigingen in de behandeling van het genus *Rubus* in de vierde druk van de *Flora van België, het Groothertogdom Luxemburg, Noord-Frankrijk en de aangrenzende gebieden* en de zevende druk van de *Nouvelle Flore de la Belgique, du Grand-Duché de Luxembourg, du Nord de la France et des régions voisines* worden toegelicht. Enerzijds betreft het de uitbreiding van de sleutel van 63 naar 122 soorten in vergelijking met de vorige editie van de *Nouvelle Flore*. Meer dan 50 nieuwe soorten worden vermeld uit de behandelde regio. Daarnaast worden ruim 80 soorten weggelaten, meestal wegens twijfel over de juiste determinatie. De taxonomische en nomenclatorische wijzigingen worden gecommentarieerd. Tenslotte worden de wijzigingen in de chorologie kort toegelicht. Ze zijn hoofdzakelijk gebaseerd op revisie van oud en nieuw herbariummateriaal.

### Inleiding

De studie van het genus *Rubus* heeft de laatste decennia grote vooruitgang geboekt. Een mijlpaal voor de studie van Europese *Rubi* was de publicatie van het deel over *Rubus* van de *Atlas Florae Europaeae* (Kurto *et al.* 2010). Daarnaast werden talrijke artikelen en een website over het genus in Nederland (van de Beek 2014b; <https://rubus-nederland.nl/nl/>) gepubliceerd, alsook verspreidingskaarten voor Luxemburg (Helminger 2009). In

Frankrijk en België is de hernieuwde belangstelling voor het genus pas later op gang gekomen (zie o.m. Ferrez & Royer 2021). Er is veel vooruitgang geboekt in de kennis van de voortplanting van *Rubus* (Sochor *et al.* 2015, Sochor & Trávníček 2016, Sochor 2016) en de studie van de oude herbaria zoals die van Müller en Sudre, mede dankzij de beschikbaarheid van foto's op het internet, heeft geleid tot veel nomenclatorische wijzigingen en het opsplitsen van soorten.

In de vorige edities van de Flora van België werd de behandeling van *Rubus* uitgevoerd door Herman Vannerom, die in 2018 overleden is. Zijn herbarium werd aan de Plantentuin Meise (BR) afgestaan en is nu toegankelijk voor onderzoekers, net als de herbaria van andere Belgische botanologen zoals J. Van Winkel, J. De Ruyver en E. Jacques. Er wordt momenteel gewerkt aan een revisie van al dit herbariummateriaal, wat leidt tot nieuwe inzichten in de identiteit van de aanwezige soorten en hun verspreiding.

De nieuwe bewerking van het genus *Rubus* in de *Nouvelle Flore* (Verloove & Van Rossum 2023a, hierna NF7) en de *Flora van België* (Verloove & Van Rossum 2023b, hierna FB4) diende evenwel uitgevoerd te worden terwijl de volledige revisie van het Belgische herbariummateriaal nog niet is afgerond, zodat er nog veel onduidelijkheid bestaat over de afgrenzing van tal van soorten en de determinatie van individuele planten. Niettemin werd besloten om een geheel nieuwe sleutel op te stellen. De vorige dateert uit 1983 (De Langhe *et al.* 1983a, 1983b) en werd onveranderd overgenomen in de volgende edities, ondanks het feit dat intussen het aantal in het gebied gevonden soorten meer dan verdrievoudigd was en andere taxonomische inzichten ingang hadden gevonden.

De namen van de fyto geografische districten zijn afgekort zoals in de vorige edities van de Belgische Flora: Ard. (Ardens district), Brab. (Brabants district), Champ. (Champagne-district), Kemp. (Kempens district), Loth. (Lotharingen district), Maasdistr. (Maasdistrict), Mar. (Maritiem district), M.-Eif. (Midden-Eifel, in *Flora van België* 'W.-Eif.' = West-Eifel district), Pic. (Picardisch district), Tert. Par. (district van het noordoostelijke Ile-de-France) en Vl. (Vlaams district).

### Nieuw opgenomen en weggelaten soorten

Voor de nieuwe Franstalige en Nederlandstalige edities van de Belgische Flora (NF7 en FB4) werd een nieuwe sleutel opgesteld met 122 soorten, tegenover 63 in de vorige editie van de *Nouvelle Flore* (Vannerom 2012, hierna NF6 genoemd). Daarnaast worden een 100-tal zeldzame soorten opgesomd met hun verspreiding. Alleen soorten waarvoor de determinatie bevestigd werd door herbariummateriaal, zijn opgenomen. Alle twijfelgevallen werden weggelaten; de verantwoording voor het weglaten wordt in deze toelichting verstrekt. Ondersoorten worden niet meer vermeld omdat het concept van ondersoort moeilijk ligt bij soorten met overwegend apomictische voortplanting.

Er mag verwacht worden dat het aantal soorten in het gebied van de Flora veel hoger ligt dan de ruim 220 opgenomen soorten. Er is inmiddels gebleken dat ook het aantal taxa van *Rubus* in Europa veel groter is dan eerder gedacht, waarbij veel vormen een (zeer) klein verspreidingsgebied hebben. Om het overzicht te bewaren, volgen de meeste bramenskundigen de door Weber (1981) opgestelde gedragslijn om alleen taxa op te nemen die een areaal hebben opgebouwd met een diameter van minstens 50 km. De auteurs van de bewerking van het genus *Rubus* voor de nieuwe edities van de Belgische Flora (NF7 en

FB4) hebben zich aan die regel gehouden. Op deze pragmatische methode is recent veel kritiek gekomen (zie o.m. Haveman & de Ronde 2013), maar ze heeft in de praktijk de studie van de bramen vergemakkelijkt.

In de hiernavolgende paragrafen worden eerst de nieuw opgenomen soorten vermeld (eerst deze in de sleutel, daarna deze in de opmerkingen). Vervolgens worden de in vergelijking met NF6 weggelaten soorten opgesomd. Het betreft Britse soorten die blijkbaar op het Europese continent alleen in België zouden voorkomen, soorten beschreven uit het Forêt de Retz, soorten beschreven uit België, maar die na hun beschrijving nooit meer werden teruggevonden en andere soorten waarvoor de determinatie of de soortstatus onzeker is.

#### • Nieuw in de sleutel opgenomen soorten

De volgende soorten, die niet vermeld werden in NF6, zijn nieuw opgenomen in de determinatiesleutel (volgnummers uit NF7):

29. *R. desarmatus* A. Beek – Dit taxon is recent op soortniveau gebracht (van de Beek 2005); eerder was het beschreven als *R. carpinifolius* var. *denticulatus* Sudre en als zodanig was het al lang in België bekend. In NF6 was het niet afzonderlijk vermeld, waardoor de verspreidingsgegevens van *R. adpersus* niet correct waren (zie hierna).
71. *R. dasyphyllus* (W.M. Rogers) Marshall – Deze soort is algemeen op de Britse eilanden en blijkt ook op het continent een behoorlijke verspreiding te hebben, maar komt alleen lokaal soms in grotere hoeveelheden voor.
91. *R. praticolor* A. Beek – Dit is een in 1998 beschreven soort (A. van de Beek 1998), waarvan het materiaal vroeger gewoonlijk als *R. pallidus* werd beschouwd.
97. *R. edentulus* A. Beek & Meijer – Dit is een recent ontdekte soort (van de Beek 2018), waarvan het materiaal eerder als identiek met *R. picearum* werd beschouwd.
105. *R. neanias* A. Beek – De soort werd reeds in 1997 ontdekt in Zuid-Nederland en aangrenzend België (van de Beek 1998).
115. *R. calvus* H.E. Weber – Deze uit Duitsland beschreven soort werd recent in Zuid-Nederland en België gevonden.
116. *R. praeceptorum* A. Beek – Een recent beschreven soort uit Zuid-Nederland (van de Beek 2017), die ook in België werd gevonden.
119. *R. griesiae* H.E. Weber – Een uit Duitsland beschreven soort (Weber 2003) die ook in Zuid-Nederland en België werd gevonden.
121. *R. luticola* A. Beek – Deze soort werd recent beschreven (van de Beek 2014a); ze werd vroeger voor *R. britannicus* gehouden.
122. *R. echinosepalus* H.E. Weber – Deze uit Duitsland beschreven soort werd recent ook in Zuid-België gevonden.

Daarnaast zijn een 50-tal soorten die in NF6 reeds vermeld werden als verwant met andere soorten, in de sleutel van NF7 en FB4 opgenomen.

• *Nieuw in de opmerkingen bij de secties opgenomen soorten*

Net als in NF6, wordt een groot aantal *Rubus*-soorten enkel vermeld, maar niet opgenomen in de sleutel. Waar het in NF6 ging om soorten die ontdekt werden na 1983, betreft het in NF7 en FB4 zeldzame tot zeer zeldzame soorten.

• Subgenus *Idaeobatus*

*Rubus niveus* Thunb. – Deze gekweekte soort komt vooral voor in Zuidoost-Azië. Soms breidt ze zich uit in parken of verwildert ze een enkele keer. Kenmerkend zijn de opgaande bladloten die wit, als met meel bestoven, lijken en de kleine bloeiwijzen. De soort wordt vaak verward met *R. cockburnianus* Hemsl. die een lichter berijpte bladloot en grotere bloeiwijzen heeft.

• Sectie *Rubus*

- R. aciodontoides* J.-M. Royer – Nieuwe soort, beschreven uit NO-Frankrijk (Ferrez & Royer 2021).  
*R. adulans* A. Beek – Gevonden in Z-Nederland.  
*R. atrovirens* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. bicolor* Opiz – Soort afgesplitst van *R. montanus* Libert (Király et al. 2017).  
*R. canduliger* Bijlsma & Haveman – Gevonden in Z-Nederland.  
*R. chloocladus* W.C.R. Watson – Gevonden in Z-Nederland.  
*R. devitatus* Matzke-Hajek – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. diversus* W.C.R. Watson – Gevonden in de Vlaamse Ardennen.  
*R. elegans* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. genevieri* Boreau – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. glandithyrus* G. Braun – Gevonden in Z-Nederland.  
*R. gloriosus* A. Beek – Nieuwe soort beschreven uit Nederland (van de Beek 2005); ook gevonden in België.  
*R. guestphalicus* (Focke) Utsch – Gevonden in Z-Nederland.  
*R. guestphalicoides* H.E. Weber – Gevonden in Z-Nederland.  
*R. insolatus* L. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. leptothyrus* G. Braun – Gevonden in Z-Nederland.  
*R. macrostachys* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. neerlandicus* A. Beek – Gevonden in Z-Nederland.  
*R. nemophilus* Ripart ex Genev. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. negatus* A. Beek – Gevonden in Z-Nederland.  
*R. ninckii* Sudre – Gevonden in NO-Frankrijk (Ferrez & Royer 2021) en België.  
*R. parthenocissus* Travn. & Holub – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).  
*R. pericrispatus* Holub & Travn. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. poliothyrus* A. Beek – Geen synoniem van *R. subinermoides* Druce, maar een aparte soort.

*R. rubrumcadaver* A. Beek – Geen synoniem van *R. gravetii* (Boulay) W.C.R. Watson, maar een aparte soort.

*R. schlechtendalii* Weihe ex Link – Gevonden in Z-Nederland.

*R. velutinus* Vest et Tratt – Soort afgesplitst van *R. montanus* Libert (Király et al. 2017).

*R. wittigianus* H.E. Weber – Gevonden in Z-Nederland.

Twee soorten die nog in de sleutel van NF6 stonden, werden wegens hun zeldzaamheid in NF7 en FB4 enkel nog vermeld in de opmerkingen bij de sectie *Rubus*:

*R. opacus* Focke (NF6 nr. 12) – De als *R. opacus* gedetermineerde planten blijken een niet homogene verzameling van planten te zijn die nader onderzoek vereist.

*R. ammobius* Focke (NF6 nr. 17) – Deze soort is in België en Zuid-Nederland zeer zeldzaam en daarom niet opgenomen in de sleutel van de nieuwe editie.

• Sectie *Corylifolii*

*R. confinis* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. fasciculatus* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. favillatus* A. Beek – Nieuw beschreven soort uit Nederland (van de Beek 2014).

*R. ferrezii* Royer – Nieuw beschreven soort uit NO-Frankrijk (Ferrez & Royer 2021).

*R. grandiflorus* Kaltenb. (*syn.*: *R. parahebecarpus* H.E. Weber) – Geen synoniem van *R. britannicus* W.M. Rogers, maar een aparte soort.

*R. horrefactus* P.J. Muell. & Lef. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021), België en Nederland.

*R. intricatus* P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. lobatidens* H.E. Weber & Stohr – Gevonden in Nederland.

*R. mougeotii* Billot – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. mus* A. Beek – Nieuw beschreven soort uit Nederland (van de Beek 1998).

*R. paludosus* A. Beek – Nieuw beschreven soort uit Nederland (van de Beek 2014).

*R. phoenicacanthus* A. Beek – Gevonden in Z-Nederland.

*R. psilander* A. Beek – Nieuw beschreven soort uit Nederland (van de Beek 2017).

*R. rotundatifolius* Sudre – Gevonden in NO-Frankrijk (Ferrez & Royer 2021).

*R. rotundatiformis* Sudre – Geen synoniem van *R. conjungens* (Bab.) Rogers, maar een aparte soort.

*R. vandebeekii* K.Meijer – Nieuw beschreven soort uit Nederland en België (Meijer 2020).

• *Weggelaten soorten in NF7 en FB4 t.o.v. NF6*

In vergelijking met NF6 zijn meerdere tientallen soorten niet meer opgenomen in NF7 en FB4. Het betreft verschillende categorieën.

• Soorten die in de sleutel van NF6 waren opgenomen, maar die volledig weggelaten zijn in NF7 en FB4

*R. drymophilus* P.J. Muell. et Lef. (NF6 nr. 50) – Het voorkomen van deze soort buiten het Forêt de Retz is onzeker. De planten die als zodanig gedetermineerd waren, komen niet met het type overeen. Het Belgische materiaal is daarenboven zeer heterogeen en behoort tot meerdere taxa. Ferrez & Royer (2021) geven de soort wel op voor meerdere departementen in Noord-Frankrijk, net buiten het gebied van de Flora.

*R. phaeocarpus* W.C.R. Watson (NF6 nr. 51) – Dit is een Britse soort die ten onrechte met Belgische planten werd geïdentificeerd (zie onder).

• Britse soorten

Herman Vannerom had van A. Newton een bijna complete referentieverzameling ontvangen van de Britse soorten. Na vergelijking met deze verzameling determineerde hij exemplaren als behorend tot die Britse soorten. Voor de meeste is de determinatie evenwel twijfelachtig, omdat er duidelijke verschillen zijn. Buiten België zijn ze niet bekend van het Europese continent. Bijkomende vergelijking met meer authentiek Brits materiaal is nodig.

- R. adenanthoides* A. Newton
- R. adenoleucus* Chaboiss.
- R. amplificatus* Lees
- R. anglocandicans* A. Newton
- R. armipotens* W.C. Barton ex A. Newton
- R. atrebatum* A. Newton
- R. cissburiensis* W.C. Barton & Riddelsd.
- R. conjungens* (Bab.) Rogers
- R. cordatifolius* (Rogers ex Riddelsd.) D. Allen
- R. dentatifolius* (Briggs) W.C.R. Watson
- R. edeesii* H.E. Weber & A.L. Bull
- R. fuscicaulis* Edees
- R. furvicolor* Focke
- R. hylophilus* Ripart ex Genev.
- R. leightonii* Lees ex Leighton
- R. leucostachys* Schleicher ex Sm.
- R. milfordensis* Edees
- R. nobilissimus* W.C.R. Watson – Het Belgisch materiaal in BR is beschadigd en kan niet meer gedetermineerd worden.
- R. phaeocarpus* W.C.R. Watson (NF6 nr. 51) (zie hierboven)
- R. subcarpinifolius* (Rogers ex Riddelsd.) Vannerom
- R. trichodes* W.C.R. Watson – Taxon vermeld in de *Atlas Florae Europaeae* (Kurtto *et al.* 2010) en door Vannerom (2012) beschouwd als een synoniem van *R. erubescens*.

• Taxa beschreven uit het Forêt de Retz

Uit het Forêt de Retz (Tert. Par.) zijn meer dan 200 soorten beschreven door Müller en Lefèvre (Müller 1859) en door Sudre (1908-1913). Herman Vannerom had een referentieverzameling ontvangen van A. Neumann, die veel in het Forêt de Retz had verzameld. Op basis van de beschrijvingen in Müller (1859) en de referentieverza-

meling heeft Vannerom vele soorten gedetermineerd. Uit recent onderzoek (vooral door D. Mercier, in samenwerking met andere Franse batologen) is gebleken dat relatief weinig taxa teruggevonden zijn in het Forêt de Retz; vele taxa kunnen bijgevolg lokale biotypen zijn, die niet de status van soort behoren te krijgen. Daarenboven is het onzeker of de determinaties van Neumann correct zijn (ondanks zijn reputatie als uitstekende soortenkenner; zie Weber 2009).

In de *Atlas Florae Europaeae* (Kurtto *et al.* 2010) staan de meeste soorten van het Forêt de Retz gecatalogeerd als “valueless or doubtful taxa”. Recent zijn de meeste soorten die door Müller en Lefèvre beschreven zijn, getypificeerd (Van de Beek *et al.* 2017). Van de hierna opgelijste taxa dient het Belgische materiaal vergeleken te worden met typemateriaal van Müller. In NF6 werden de soorten ook vermeld voor het Tert. Par.; het Forêt de Retz ligt nog net binnen het gebied.

- R. acutipetalus* P.J. Muell. & Lef.
- R. ancistrophorus* P.J. Muell. & Lef.
- R. cuspidiferus* P.J. Muell. & Lef.
- R. drymophilus* P.J. Muell. & Lef. (NF6 nr. 50) (zie hierboven)
- R. eglandulosus* Lef. & P.J. Muell.
- R. flavescens* P.J. Muell. & Lef.
- R. formidabilis* Lef. & P.J. Muell.
- R. fulcratus* Lef. & P.J. Muell.
- R. granulatus* P.J. Muell. & Lef.
- R. grypacanthus* Lef. & P.J. Muell.
- R. horripilus* Lef. & P.J. Muell.
- R. inopacatus* P.J. Muell. & Lef.
- R. laxiflorus* P.J. Muell. & Lef.
- R. microdontus* P.J. Muell. & Lef.
- R. muelleri* Lef.
- R. nemorensis* P.J. Muell. & Lef.
- R. patulus* P.J. Muell. & Lef.
- R. phyllophorus* Lef. & P.J. Muell.
- R. questieri* Lef. & P.J. Muell.
- R. sciophilus* Lef. & P.J. Muell.
- R. stenacanthus* Lef. & P.J. Muell.
- R. subinermis* P.J. Muell. & Lef.

• Taxa beschreven uit België

Sudre (1910) heeft een aantal taxa uit België beschreven, dikwijls op basis van één exemplaar. De meeste ervan werden nog niet teruggevonden in het gebied. Vannerom (2012) vermeldde ze – soms als synoniem – in NF6.

- R. drymophiloides* Sudre
- R. euchloos* Sudre
- R. opaciformis* Sudre
- R. orthocladoides* Sudre
- R. pseudogravetii* Sudre
- R. semiasperidens* Sudre
- R. semicarpinifolius* Sudre

• Andere taxa

Vannerom (2012) vermeldt in NF6 nog een aantal soorten

voor het gebied van de Flora, waarvan de determinatie en/of status verder onderzocht moeten worden.

- R. aculeolatus* P.J. Muell.  
*R. aggregatus* Kaltenb.  
*R. andegavensis* Bouvet  
*R. apertiflorus* P.J. Muell. ex Bouvet  
*R. apricus* Wimmer  
*R. asperidens* Sudre ex Bouvet  
*R. atrichantherus* E.H.L.Krause – Taxon vermeld in de *Atlas Florae Europaeae* (Kurtto *et al.* 2010). Geen herbariummateriaal gevonden.  
*R. chenonii* Sudre  
*R. clethraphilus* Genev.  
*R. fasciculatiformis* H.E. Weber  
*R. flaccidus* P.J. Muell.  
*R. fontivagus* (Sudre) Prain  
*R. geromensis* P.J. Muell.  
*R. henrici-weberi* A. Beek  
*R. hirtifolius* P.J. Muell. & Wirtg.  
*R. incarnatus* P.J. Muell.  
*R. incultus* P.J. Muell. & Wirtg.  
*R. leptadenes* (Sudre) Sudre  
*R. lesdainii* Sudre ex Gandoger  
*R. lilacinus* Wirtg.  
*R. nemorosoides* H.E. Weber  
*R. neomalacus* Sudre – Taxon vermeld in de *Atlas Florae Europaeae* (Kurtto *et al.* 2010). Geen herbariummateriaal aanwezig.  
*R. obvallatus* Boulay & Gillot  
*R. orthostachyoides* H.E. Weber  
*R. oxyanchus* Sudre  
*R. patuliformis* Sudre  
*R. perplexus* P.J. Muell. ex Wirtg.  
*R. platybelus* Sudre  
*R. praetextus* Sudre  
*R. pruinifer* Sudre  
*R. rubicundus* P.J. Muell. ex Wirtg.  
*R. scaber* Weihe  
*R. schumacheri* (Ade) Matzke-Hajek  
*R. scissoides* H.E. Weber – Status onduidelijk (intermediair tussen *R. nessensis* en *R. scissus*).  
*R. subcordatus* H.E. Weber  
*R. vulgaris* Weihe & Nees

#### Taxonomische en nomenclatorische wijzigingen in vergelijking met NF6

##### • Soorten in de sleutel van NF7 en FB4

Voor de genummerde soorten in NF7 en FB4 die ook in NF6 stonden, is hierna aangegeven waarom veranderingen zijn aangebracht.

12. *R. plicatus* Weihe & Nees – In NF6 (nr. 10) *R. fruticosus* L. genoemd. *Rubus fruticosus* is formeel de correcte naam voor deze soort, maar omdat deze ook gebruikt wordt voor alle zwarte bramen samen, ontstaat er makkelijk verwarring. Daarom hebben de bramendeskundigen internationaal afgesproken om de naam *R. plica-*

*tus* te gebruiken als het niet om de hele groep, maar om deze bepaalde soort gaat (Weber 1986). *Rubus plicatus* is de eerstvolgende naam na *R. fruticosus* die niet op hetzelfde type berust. De paardenbloemendeskundigen volgen een vergelijkbare methode m.b.t. *Taraxacum officinale* (Kirschner & Štěpánek 2011).

14. *R. affinis* Weihe & Nees – Deze naam komt in plaats van *R. vigorosus* P.J. Muell. & Wirtg. (NF6 nr. 16). Er werd een tijd gedacht dat de oudere naam *R. affinis* illegitiem was. Dat is echter een misvatting gebleken. Vandaar dat deze naam weer in ere hersteld is (van de Beek 2014).
17. *R. holerythros* (Focke) Boulay – De verhouding tussen *R. holerythros* en *R. aurora* A. Beek & al. is lang onduidelijk geweest. Recent onderzoek heeft uitgewezen dat het om twee soorten gaat. Het Belgische materiaal behoort vermoedelijk tot *R. holerythros* (van de Beek & Mercier 2022).
20. *R. oxybelus* Sudre – De naam vervangt *R. frederici* A. Beek (NF6 nr. 19), omdat *R. oxybelus* een eerdere naam voor dezelfde soort is (van de Beek & Mercier 2022).
25. *R. favonii* W.C.R. Watson – Dit is de correcte naam van *R. neumannianus* H.E. Weber & Vannerom (van de Beek & Mercier 2022). De soort was al lang bekend uit België en beschreven als *R. pyramidalis* var. *transiens* Sudre. Watson (1946) bracht dit taxon op soortniveau met de nieuwe naam *R. favonii*. Weber en Vannerom (Weber, 1990) publiceerden deze nogmaals als *R. neumannianus*.
26. *R. ambigens* (Boulay) Boulay – Deze soort werd lange tijd voor *R. leucandrus* Focke (NF6 nr. 33) gehouden. Dit blijkt echter een andere soort te zijn, die tot voor kort *R. beijerinckii* K. Meijer werd genoemd. Een later synoniem van *R. ambigens* is *R. hermes* Matzke-Hajek (= *R. leucandrus* ssp. *belgicus* H.E. Weber) (van de Beek & Mercier 2022).
28. *R. sciocharis* (Sudre) Kinsch. – Dit taxon werd eerst door Sudre gepubliceerd als *R. gratus* subsp. *sciocharis* Sudre. Kinscher (1910) is de eerste die het de rang van soort gaf.
38. *R. spina-curva* Boulay & Gillot – Dit is een oudere naam voor *R. cretatus* Matzke-Hajek die in NF6 werd opgegeven als verwant aan *R. ulmifolius*. Het is een van de vele soorten uit een groep van discolorie bramen met bruinrode bladloten met sterharen. De precieze positie en naam worden momenteel onderzocht.
44. *R. grabowskii* Weihe – Deze soort werd in NF6 opgegeven als verwant met *R. montanus*. Beide behoren tot een groep triploïde taxa (met o.m. *R. bicolor*, *R. grabowskii*, *R. montanus*, *R. parthenocissus*, *R. pericrispatus* en *R. velutinus*). Binnen die groep zijn er clusters van variabele vormen, die reproductielijnen schijnen te zijn, maar het afgrenzen van soorten is een moeilijke oefening.
46. *R. procerus* P.J. Muell. ex Boulay – De identificatie van deze soort met *R. praecox* Bertol. (NF6 nr. 43) be-

- rust op een foute interpretatie van de laatste (van de Beek 2014; Matzke-Hajek 2016).
47. *R. aetnicus* Weston – Dit is de correcte naam van de wijdverspreide soort die vroeger ten onrechte *R. tomentosus* Borkh. werd genoemd en later *R. canescens* DC. (NF6 nr. 48) (van de Beek 2016, van de Beek & Domina 2021).
54. *Rubus dejonghii* A. Beek – Dat *R. semicarpinifolius* Sudre (NF6 nr. 25) dezelfde soort zou zijn berust op een verkeerde determinatie. *Rubus semicarpinifolius* is onder andere veel meer bestekeld en behaard. Dit laatste taxon is niet meer teruggevonden.
59. *R. umbrosus* (Weihe) Arrh. – Dit is de correcte naam voor de soort die eerder *R. pyramidalis* Kaltenb. (NF6 nr. 31) werd genoemd. Niet alleen is *R. umbrosus* eerder gepubliceerd, maar het is zeer twijfelachtig of Kaltenbach met *R. pyramidalis* wel dezelfde soort bedoelde als die welke gewoonlijk zo genoemd is (van de Beek 2014).
61. *R. holochlous* Sudre – In NF6 vermeld als synoniem van *R. euchloos* en verwant aan *R. insectifolius*. Al deze taxa zijn evenwel verschillend.
70. *R. hoplotheca* A. Beek & D.P. Mercier – Er was een nieuwe naam nodig voor *R. raduloides* (W.M. Rogers) J.W. White (NF6 nr. 57). Die laatste naam is een later homoniem van *R. raduloides* (Blytt) Neum., de correcte naam voor *R. norvegicus* H.E. Weber & Pedersen, een soort van de *Corylifolii* Lindl. uit Scandinavië. (van de Beek & Mercier 2021).
82. *R. saltuum* Focke – In NF6 vermeld onder de naam *R. flexuosus* P.J. Müller et Lef. als verwant aan *R. foliosus*. De naam *R. flexuosus* P.J. Muell. et Lef. is illegitiem vanwege het vroegere homonym *R. flexuosus* Koch (= *R. serpens* Weihe ex Lej. et Courtois) (van de Beek 2018). De correcte naam is *R. saltuum*.
88. *R. projectus* A. Beek – Overeenkomstig ICN art. 60.6 is de juiste spelling 'projectus' (Turland et al. 2018).
96. *R. nigricans* Danthoine – De wijdverbreide soort die vroeger *R. bellardii* Weihe ex Bluff & Fingerh. en later *R. pedemontanus* Pinkwart (NF6 nr. 61) werd genoemd, bleek al in de achttiende eeuw beschreven. De identiteit (en zelfs de publicatie) van *R. nigricans* is pas sinds kort bekend geworden (van de Beek 2019).
99. *Rubus iuvenis* A. Beek – Het meeste materiaal van wat *R. aculeolatus* P.J. Muell. (NF6 nr. 62) werd genoemd, behoort tot *R. iuvenis*. *Rubus aculeolatus* komt in het gebied niet voor.
101. *R. serpens* Weihe ex Lej. & Courtois – Eén van de klassieke soorten van Lejeune & Courtois, met een duidelijke identiteit (van de Beek 2018). Was opgenomen als verwant aan *R. aculeolatus*.

Sectie *Corylifolii* – In de vorige editie werden de soorten van de *Corylifolii* niet opgenomen in een determinatietabel. De sectie bestaat uit taxa die veel minder gestabiliseerd zijn dan die van de sectie *Rubus*. Ze zijn ontstaan uit hybridisatie van *R. caesius*. Een deel van de planten bestaat uit primaire hybriden, maar sommi-

ge zijn min of meer (tot geheel) fertiel en stabiliseren tot taxa met een duidelijk profiel en een eigen areaal. Men moet niet proberen alle planten uit dit complex op naam te brengen. Alleen de duidelijk gestabiliseerde taxa die in het gebied van de Flora voorkomen zijn opgenomen in NF7 en FB4.

• Soorten uit de opmerkingen bij de secties

• Sectie *Rubus*

*R. lasiocladus* (Focke) Foerster – Naam gecorrigeerd.

*R. stereacanthos* P.J. Muell. ex Boulay – Naam gecorrigeerd.

• Sectie *Corylifolii*

*R. ferus* (Focke) Huber (*syn.*: *R. ferocior* H.E. Weber) – Naam gecorrigeerd, ouder synoniem (van de Beek & Mercier 2022).

*R. macrostemonides* Fritsch – Ouder synoniem van *R. baruthicus* H.E. Weber.

**Wijzigingen in de chorologie in NF7 en FB4 t.o.v. NF6**

• Bronnen

De nieuwe chorologische gegevens zijn in hoofdzaak gebaseerd op herbariummateriaal in BR en het herbarium van de eerste auteur. Aangezien binnen het tijdsbestek van de nieuwe editie niet alle exemplaren van BR (circa 11.000 specimens uit België, waarvan 3.500 in het herbarium van H. Vannerom) konden worden gerevideerd, zijn de chorologische gegevens voorlopig. Voor de verspreiding buiten België waren de bronnen:

– voor Luxemburg: Helminger (2009);

– voor Nederland: *rubus\_nederland* (geconsulteerd in maart-april en december 2021);

– voor Duitsland: Matzke-Hajek (1993) en, specifiek voor het Eifel district, Hand et al. (2016);

– voor Frankrijk: Ferrez & Royer (2021).

Het herbarium Vannerom (in BR) omvat zeer weinig materiaal van de algemenere soorten. Daarom werden de verspreidingsgegevens van die soorten overgenomen uit NF6, maar in vele gevallen werd de algemeenheid naar beneden aangepast. H. Vannerom vermeldt voor vele soorten dat ze zeer algemeen (AA) zijn, maar dit is in werkelijkheid zelden het geval voor soorten uit het genus *Rubus*. Er zijn geen ubiquisten en zelfs binnen een plantengeografisch district komt het zelden voor dat een soort in nagenoeg alle kilometerhokken wordt aangetroffen. De aanpassing betreft dus in geen geval een reële achteruitgang, want bramen doen het meestal zeer goed, vooral in bossen en aan bosranden. Door het verwijderen van hagen is het wel mogelijk dat sommige soorten van zulke standplaatsen regionaal achteruitgaan, maar er zijn geen kwantitatieve gegevens voorhanden.

Uit het onderstaande overzicht blijkt dat er veel determinatiefouten zijn geslopen in de herbaria. Dit heeft twee oorzaken: enerzijds was er vroeger weinig literatuur met goede illustraties beschikbaar en dienden onderzoekers

zich veelal te baseren op literaire beschrijvingen of de opinie van collega's; daarnaast is er een evolutie in wat aanvaard wordt als variatie binnen apomictische soorten. Met name H. Vannerom aanvaardde een grotere variabiliteit, wat tot uitdrukking komt in de door hem opgegeven verspreidingsgegevens. Veel van zijn exemplaren beschouwen wij als lokale biotypen, die niet tot een soort zijn te rekenen.

• Soorten in de sleutel van NF7 en FB4

• Sectie *Rubus*

7. *R. nessensis* – De soort komt veel meer voor in Kemp. en Ard. dan elders.
8. *R. scissus* – Er is weinig herbariummateriaal uit Vl. (in vergelijking met Kemp. en Ard.).
9. *R. libertianus* – Er is weinig herbariummateriaal uit Vl. en Brab. (in vergelijking met Kemp.).
11. *R. integrifolius* – De soort is veel algemener in Kemp. dan in de rest van Laag- en Midden-België.
13. *R. bertramii* – In Kemp. komt de soort weinig voor buiten het Kempens plateau, waar ze wel plaatselijk algemeen is.
14. *R. senticosus* – Er is meer herbariummateriaal uit het Maasdistrict dan uit Kemp.
18. *R. immodicus* – Gevonden in Ard.
23. *R. laciniatus* – De soort is waarschijnlijk algemener, afgaand op waarnemingen.be, maar het is niet altijd duidelijk of het om aangeplante of verwilderde planten gaat.
26. *R. ambigens* – De gegevens uit de verschillende bronnen (o.m. buitenlandse literatuur en eigen waarnemingen) maken een aanpassing van de chorologie nodig.
27. *R. gratus* – De soort is veel algemener in Kemp. dan elders en is vrijwel de enige soort die er overal in grote aantallen kan worden gevonden. Daarbuiten komt ze enkel op zandgronden in bossen voor en is dus zeker niet algemeen in Vl. en Brab.
30. *R. macrophyllus* – De soort komt vooral voor in natte bossen, meer in Kemp. en Brab. dan elders.
33. *R. adspersus* – H. Vannerom onderscheidde de gelijkende *R. desarmatus* niet, die vooral in Kemp. en Ard. voorkomt. Veel herbariummateriaal in BR is fout gede-termineerd. De verspreiding van deze in hagen voorkomende soort is nog onvoldoende bekend.
35. *R. bifrons* – Uit buitenlandse bronnen blijkt dat de soort algemeen is in Loth. Er is relatief weinig herbariummateriaal uit Maasdist.
30. *R. winteri* – Ook gevonden in het Franse deel van Loth.
43. *R. montanus* – De soort is ook op meerdere plaatsen gevonden in Brab.
45. *R. armeniacus* – Het aantal vermeldingen op waarnemingen.be staat in contrast met het schaarse herbariummateriaal. Het is een recent sterk uitbreidende soort.
46. *R. procerus* – Er is geen Belgisch herbariummateriaal uit Kemp. Ook niet bekend uit de Nederlandse Kempen.
49. *R. axillaris* – Plaatselijk algemeen in O-Ard. (provincie Luik), maar weinig herbariummateriaal in BR van daarbuiten (en veel determinatiefouten).
50. *R. sprengelii* – De soort is veel algemener in Ard. dan elders.
51. *R. bracteosus* – De vermelding uit Loth. is gebaseerd op een determinatiefout.
54. *R. dejonghii* – De vermeldingen uit Maasdist. en Loth. zijn gebaseerd op determinatiefouten.
56. *R. vestitus* – De soort is minder algemeen in Vl. en M.-Eif. dan in Brab., Maasdist. en Loth.
60. *R. cinerascens* – In Brab., Kemp. en M-Eif. zijn er slechts enkele vindplaatsen (Duitsland en Nederland).
62. *R. gravetii* – De vermelding uit Brab. is gebaseerd op een determinatiefout.
63. *R. infrarugosus* – De vermeldingen uit Kemp., Brab., Pic., Loth. en Champ. zijn gebaseerd op determinatiefouten.
64. *R. taxandriae* – De vermeldingen uit Brab., Maasdist. en Ard. zijn gebaseerd op determinatiefouten.
65. *R. viscosus* – De vermelding uit Brab. is gebaseerd op een determinatiefout.
70. *R. hoplotheca* – De soort is ook gevonden in Kemp. en Loth.
73. *R. raduliformis* – De vermeldingen uit Brab. en Loth. zijn gebaseerd op determinatiefouten.
75. *R. teretiusculus* – De soort is ook gevonden in Ard. (prov. Luik).
76. *R. schleicheri* – De soort is ook gevonden in Brab., Maasdist. en Loth.
77. *R. rosaceus* – De soort is ook gevonden in Loth.
78. *R. pedica* – De soort is ook gevonden in Ard. (Belgisch grondgebied).
79. *R. louettensis* – De vermeldingen van buiten Ard. zijn gebaseerd op determinatiefouten.
81. *R. foliosus* – De soort is ook bekend uit Tert. Par.
82. *R. saltuum* – De soort is ook bekend uit Champ.
84. *R. wirtgenii* – De vermelding uit Loth. is gebaseerd op een determinatiefout.
87. *R. hasbaniensis* – De vermelding uit Maasdist. is gebaseerd op een determinatiefout.
90. *R. calyculatus* – De soort is ook bekend uit N.-Mar., O.-Brab. en N.-Ard. (Nederland en Duitsland).
92. *R. pallidus* – De vermeldingen uit Brab. en Loth. zijn twijfelachtig.
94. *R. loehrii* – De vermeldingen uit Kemp., en Tert. Par. zijn gebaseerd op determinatiefouten.
95. *R. picearum* – De soort komt niet voor in Vl., Kemp., Loth. (determinatiefouten), maar wel in Brab., Maasdist. en Ard.
96. *R. nigricans* – De soort werd ook gevonden in Vl.
98. *R. rivularis* – De vermeldingen uit Vl., Kemp. en Tert. Par. zijn gebaseerd op determinatiefouten.
99. *R. iuvenis* – De vermeldingen uit Vl. en Loth. zijn gebaseerd op determinatiefouten.
100. *R. hylonomus*. De soort is ook bekend uit Loth.
102. *R. oreades* – De vermeldingen uit Kemp. en Ard. zijn gebaseerd op determinatiefouten.

103. *R. ignoratus* – De vermeldingen uit Brab., Pic. en Maasdistr. zijn gebaseerd op determinatiefouten.

104. *R. flaccidifolius* – De soort is ook bekend uit Loth.

• Sectie *Corylifolii*

108. *R. incisior* – De soort is ook gevonden in Vl.

109. *R. deweveri* – De vermeldingen uit Kemp., Pic., Ard. en Loth. zijn gebaseerd op determinatiefouten. De soort is ook bekend uit Vl.

110. *R. cuspidatus* – De soort is ook bekend uit M.-Eif.

113. *R. vanwinkelii* – De soort is ook bekend uit Ard.

114. *R. camptostachys* – De soort is ook bekend uit Vl. en Kemp. (vooral in Nederland).

118. *R. placidus* – De soort is ook bekend uit Kemp., Brab., Maasdistr. en M.-Eif.

120. *R. vandermeijdenii* – De soort verschilt van *R. pseudogravetii*, *R. semiasperidens* en *R. drymophyloides*, die nog niet teruggevonden zijn buiten hun locus classicus in de omgeving van Brussel.

• Soorten uit de opmerkingen bij de secties

In NF6 werd voor de soorten die niet in de sleutel stonden, enkel een opsomming gegeven van de districten waarin ze voorkomen, zonder zeldzaamheidsgraad. In de nieuwe edities (NF7 en FB4) is die werkwijze gevolgd, met dat verschil dat de soorten in de opgegeven districten (zeer) zeldzaam zijn.

• Sectie *Rubus*

*R. aciodontus* P.J. Muell. & Lef. – Determinatie van materiaal uit Maasdistr. is twijfelachtig.

*R. arrheniiformis* W.C.R. Watson – Verspreiding beperkt tot Kemp.

*R. conspicuus* P.J. Muell. ex Wirtg. – Verspreiding beperkt tot Brab. en Loth.; determinatie van ander materiaal twijfelachtig.

*R. constrictus* Lef. & P.J. Muell. – Gevonden in NO-Frankrijk (Ferrez & Royer, 2021); determinatie van Belgisch materiaal twijfelachtig.

*R. coronatus* Boulay – Determinatie van materiaal buiten Ard. twijfelachtig.

*R. deruyveri* Vannerom & Jacques – Determinatie van materiaal uit Brab. twijfelachtig.

*R. erubescens* Wirtg. – Determinatie van materiaal buiten Ard. twijfelachtig.

*R. fuscus* Weihe – Determinatie van materiaal buiten Loth. twijfelachtig.

*R. melanoxyloides* P.J. Muell. & Wirtg. – Determinatie van materiaal buiten Ard. twijfelachtig.

*R. nigricatus* P.J. Muell. & Lef. – Determinatie van materiaal buiten Ard. twijfelachtig.

*R. opacus* Focke – (Zie hoger) Waarschijnlijk minder algemeen dan vroeger gedacht.

*R. speculatus* Matzke-Hajek – Determinatie van materiaal buiten Maasdistr. en Ard. twijfelachtig.

*R. splendidus* LP.J. Muell. & Lef. – Determinatie van materiaal buiten Vl. twijfelachtig.

• Sectie *Corylifolii*

*R. grandiflorus* Kaltenb. (syn.: *R. parahebecarpus* H.E. Weber) – Enkel de vindplaatsen uit Nederland en Duitsland (Kemp., Brab., Maasdistr., Ard.); ander materiaal moet gereviseerd worden.

## Conclusie

De nieuwe edities van de Belgische Flora geven de huidige stand van de kennis van het genus *Rubus* weer. Het mag duidelijk zijn dat de studie van het genus in België en Noord-Frankrijk nog heel wat inspanningen zal vergen om te komen tot een volledig overzicht van de bramenflora dat de vergelijking met de toestand in Nederland en Duitsland kan doorstaan.

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## De zevende editie van de *Nouvelle Flore de la Belgique*: nieuwe Nederlandse namen

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**ABSTRACT.** – **The seventh edition of the *Nouvelle Flore de la Belgique*: new Dutch vernacular names.** A list of 58 new Dutch plant names in the seventh edition as compared with the sixth is presented and commented upon.

**RÉSUMÉ.** – **La septième édition de la *Nouvelle Flore de la Belgique* : nouveaux noms vernaculaires néerlandais.** Une liste reprenant les nouveautés dans les noms néerlandais des plantes, au nombre de 58, dans la septième édition par rapport à la sixième édition est établie et commentée.

### Inleiding

Bij opname van een nieuwe soort in de sleutels en beschrijvingen in een nieuwe editie van de *Nouvelle Flore/Flora van België* is een ‘nieuwe’ Nederlandse – en ook een Franse en Duitse – naam vereist. Deze bijdrage geeft een overzicht van de nieuwe namen in de 7<sup>de</sup> editie van de *Nouvelle Flore* (Verloove & Van Rossum 2023) in vergelijking met de 6<sup>de</sup> editie (Lambinon & Verloove 2012). Voor een aantal nieuw toegevoegde taxa werden eerder al nieuwe Nederlandse namen voorgesteld in de recentste editie van *Heukels’ Flora van Nederland* (Duistermaat 2020; zie ook Duistermaat *et al.* 2021). Ook in de recent gepubliceerde *Nederlandse namen van cultuurplanten, standaardlijst 2020* (Hoffman & Lemmens 2021) werden een aantal nieuwe namen vastgelegd. In vergelijking met de vorige Nederlandstalige editie van de *Flora van België*, die dateert van een kwarteeuw geleden (Lambinon *et al.* 1998), zijn de verschillen in naamgeving uiteraard nog veel groter. In verschillende schuifjes werden sindsdien al tal van nieuwe Nederlandse namen toegevoegd of gewijzigd, meer bepaald naar aanleiding van de publicatie van de 5<sup>de</sup> editie van de *Nouvelle Flore* (Lambinon *et al.* 2004), de 23<sup>ste</sup> editie van *Heukels’ Flora van Nederland* (van der Meijden 2005) en de 6<sup>de</sup> editie van de *Nouvelle Flore* (Lambinon & Verloove 2012).

De makers van de *Nouvelle Flore/Flora van België* en *Heukels’ Flora* besloten jaren geleden al om voortaan nieuwe Nederlandse namen toe te kennen in onderling overleg. Op die manier wordt, binnen het Nederlandse taalgebied, gestreefd naar een zo groot mogelijke overeenstemming tussen plantennamen in Vlaanderen en Nederland. Deze werkwijze werd ook nu gehanteerd voor het samenstellen van de lijst met nieuwe Nederlandse namen.

### Overzicht van nieuwe namen

In Tabel 1 zijn de 58 taxa die een nieuwe naam behoeften alfabetisch opgelijst. De volgende gegevens worden vermeld: de wetenschappelijke naam (zoals gebruikt in de 7<sup>de</sup> editie van de *Nouvelle Flore*), de nieuwe Nederlandse naam en, zeer beknopt, de reden waarom een nieuwe naam vereist was. Daar waren twee hoofdredenen voor: enerzijds (en logischerwijze) voor nieuw uitgesleutelde taxa die nog geen (officiële) Nederlandse naam hadden, anderzijds voor taxa die weliswaar al in een eerdere editie van de *Nouvelle Flore* waren opgenomen, maar nog geen Nederlandse naam hadden. Het gaat meestal om taxa die in de nieuwe editie op een hogere taxonomische rang worden behandeld (bv. ondersoorten die nu soorten zijn geworden) en waarvoor dus een Nederlandse naam vereist was. Daardoor ontstaat onvermijdelijk het probleem dat onduidelijk dreigt te worden welke vlag welke lading dekt. Zo is bv. Veelkleurig vergeet-mij-nietje (*Myosotis discolor* Pers. in de 6<sup>de</sup> editie van de *Nouvelle Flore*) nu opgesplitst in twee soorten, namelijk *M. discolor* s.str. en *M. dubia* Arrondeau. Voor de tweede soort werd de naam Bleek vergeet-mij-nietje gekozen terwijl de naam Veelkleurig vergeet-mij-nietje betrekking kan hebben op twee taxa, *M. discolor* s.l. en het ‘afgeslankte’ taxon *M. discolor* s.str.

In de 7<sup>de</sup> editie van de *Nouvelle Flore* komen meerdere vergelijkbare gevallen voor van afgeslankte taxa. Er bestaat momenteel geen regel die voorschrijft hoe afgeslankte en afgesplitste taxa Nederlandse namen horen te krijgen. Dit heeft onder meer te maken met het bestaan van kleine taxonomische verschillen bij sommige soorten of ondersoorten/variëteiten in de Belgische en Nederlandse standaard Flora’s. Het afgeslankte taxon is per definitie het taxon met de oudste geldige wetenschappelijke naam. Meestal – maar lang niet altijd! – is het afgeslankte taxon

**Tabel 1.** Alfabetisch overzicht van de nieuwe Nederlandse plantennamen in de 7<sup>de</sup> editie van de *Nouvelle Flore* t.o.v. de 6<sup>de</sup> editie.

Wetenschappelijke naam	Nederlandse naam	Motivering
<i>Aira multiculmis</i>	Akkerzilverhaver	Afgesplitst van <i>A. caryophylla</i>
<i>Anchusa procera</i>	Hoge ossentong	Afgesplitst van <i>A. officinalis</i>
<i>Anisantha rigida</i>	Stijve hoge dravik	Afgesplitst van <i>A. diandra</i>
<i>Arabis planisiliqua</i>	Platte scheefkelk	Afgesplitst van <i>A. hirsuta</i>
<i>Avena barbata</i>	Baardhaver	Nieuw toegevoegd taxon
<i>Bolboschoenus yagara</i>	Vijverbies	Nieuw toegevoegd taxon
<i>Brachypodium phoenicoides</i>	Zuidelijke kortsteel	Nieuw toegevoegd taxon
<i>Cardamine dentata</i>	Getande pinksterbloem	Afgesplitst van <i>C. pratensis</i>
<i>Cardamine pratensis</i>	Pinksterbloem s.str.	Aanduiding 'afgeslankt' taxon
<i>Carex pairae</i>	Paira's bermzegge	Afgesplitst van <i>C. muricata</i>
<i>Centranthus calcitrapae</i>	Kleine spoorbloem	Nieuw toegevoegd taxon
<i>Ceratochloa sitchensis</i>	Alaskadravik	Afgesplitst van <i>C. carinata</i>
<i>Chenopodium betaceum</i>	Late ganzenvoet	Afgesplitst van <i>C. album</i>
<i>Cotoneaster dammeri</i>	Tapijcotoneaster	Nieuw toegevoegd taxon
<i>Cotoneaster fangianus</i>	Fangs cotoneaster	Nieuw toegevoegd taxon
<i>Cotoneaster hjelmqvistii</i>	Ronde cotoneaster	Nieuw toegevoegd taxon
<i>Cotoneaster villosulus</i>	Harige cotoneaster	Nieuw toegevoegd taxon
<i>Cotoneaster ×suecicus</i>	Zweedse cotoneaster	Nieuw toegevoegd taxon
<i>Cotoneaster ×watereri</i>	Schijn-boomcotoneaster	Nieuw toegevoegd taxon
<i>Cytisus lotoides</i>	Schijndwergbrem	Afgesplitst van <i>C. hirsutus</i>
<i>Epilobium brachycarpum</i>	Wijde basterdwederik	Nieuw toegevoegd taxon
<i>Festuca arenaria</i>	Schijnduinzwengkras	Afgesplitst van <i>F. rubra</i>
<i>Festuca heteromalla</i>	Groot rood zwengkras	Afgesplitst van <i>F. rubra</i>
<i>Festuca nigrescens</i>	Polzwengkras	Afgesplitst van <i>F. rubra</i>
<i>Festuca trichophylla</i>	Haarfijn zwengkras	Nieuw toegevoegd taxon
<i>Himantoglossum robertianum</i>	Hyacintorchis	Nieuw toegevoegd taxon
<i>Honorius boucheanus</i>	Witgerande vogelmelk	Afgesplitst van <i>H. nutans</i>
<i>Hordeum murinum</i> subsp. <i>leporinum</i>	Zuidelijk kruipertje	Nieuw toegevoegd taxon
<i>Hordeum murinum</i> subsp. <i>murinum</i>	Kruipertje s.str.	Aanduiding 'afgeslankt' taxon
<i>Leucanthemum ircutianum</i>	Ongeoorde margriet	Afgesplitst van <i>L. vulgare</i>
<i>Leucanthemum vulgare</i>	Geoorde margriet	Aanduiding 'afgeslankt' taxon
<i>Linaria simplex</i>	Ranke leeuwenbek	Nieuw toegevoegd taxon
<i>Lonicera nitida</i>	Buxuskamperfoelie	Nieuw toegevoegd taxon
<i>Lonicera pileata</i>	Struikkamperfoelie	Nieuw toegevoegd taxon
<i>Montia hallii</i>	Middelst bronkruid	Afgesplitst van <i>M. fontana</i>
<i>Myosotis discolor</i>	Veelkleurig vergeet-mij-nietje s.str.	Aanduiding 'afgeslankt' taxon
<i>Myosotis dubia</i>	Bleek vergeet-mij-nietje	Afgesplitst van <i>M. discolor</i>
<i>Oenothera rubricaulis</i>	Roodstengelteunisbloem	Nieuw toegevoegd taxon
<i>Ophrys aranifera</i>	Spinnenorchis s.str.	Aanduiding 'afgeslankt' taxon
<i>Ophrys virescens</i>	Kleine spinnenorchis	Afgesplitst van <i>O. sphegodes</i>
<i>Ornithogalum divergens</i>	Wijde vogelmelk	Afgesplitst van <i>O. umbellatum</i>
<i>Polypogon maritimus</i>	Ruw baardgras	Nieuw toegevoegd taxon
<i>Ranunculus polyanthemoides</i>	Kalkboterbloem	Afgesplitst van <i>R. serpens</i>
<i>Rosa ×deseglisei</i>	Vlaamse heggenroos	Nieuw toegevoegd taxon
<i>R. ×inodora</i>	Schijnkraagroos	Nieuw toegevoegd taxon
<i>R. ×subcanina</i>	Schijnhondsroos	Nieuw toegevoegd taxon
<i>R. ×subcollina</i>	Schijnheggenroos	Nieuw toegevoegd taxon
<i>R. ×suberectiformis</i>	Schijnviltroos	Nieuw toegevoegd taxon
<i>Salix eriocephala</i>	Amerikaantje	Nieuw toegevoegd taxon
<i>Salix irrorata</i>	Zandbankwilg	Nieuw toegevoegd taxon
<i>Scirpus georgianus</i>	Roodbruine bies	Afgesplitst van <i>S. atrovirens</i>
<i>Scirpus hattorianus</i>	Zwarte bies	Afgesplitst van <i>S. atrovirens</i>
<i>Silene uniflora</i>	Kustsilene	Afgesplitst van <i>S. vulgaris</i>
<i>Ulex minor</i>	Dwerggaspeldoorn	Nieuw toegevoegd taxon
<i>Veronica anagalloides</i>	Eenjarige waterereprijs	Afgesplitst van <i>V. anagallis-aquatica</i>
<i>Veronica hederifolia</i>	Akkerklimopereprijs	Aanduiding 'afgeslankt' taxon
<i>Veronica sublobata</i>	Bosklimopereprijs	Afgesplitst van <i>V. hederifolia</i>
<i>Viola tricolor</i> subsp. <i>saxatilis</i>	Rotsviooltje	Nieuw toegevoegd taxon

het minst zeldzame/meest verspreide taxon. In de 7<sup>de</sup> editie van de *Nouvelle Flore* werd het probleem pragmatisch en geval per geval aangepakt (voor de twee soorten uit de Klimopereprijs-groep circuleerden bijvoorbeeld al twee, weliswaar niet-officiële namen, naast Klimopereprijs). Het is echter duidelijk dat, in de toekomst bij vergelijkbare gevallen, over een meer eenduidige en doordachte naamgeving moet nagedacht worden.

Bij het vastleggen van nieuwe Nederlandse namen werd zoveel mogelijk rekening gehouden met eventuele (niet-officiële) namen die al min of meer in gebruik zijn, bv. op Waarnemingen.be of Waarneming.nl. Oude, in vergetelheid geraakte namen uit vroegere Nederlandstalige Flora's (bv. edities van de 'Heimans & Thijsse' Flora) werden eventueel ook opnieuw opgerakeld. Enkel indien geen bestaande namen voorhanden waren, werd een nieuwe naam gecreëerd, zoveel mogelijk in overeenstemming met Franse en/of Duitse vernaculaire namen, of verwijzend naar een nuttig kenmerk.

De (talrijke) afgesplitste genera kregen in principe geen nieuwe Nederlandse namen. Ofwel werd in dergelijke gevallen helemaal geen vernaculaire naam gegeven, ofwel werd de vernaculaire naam van het genus waarvan het werd afgesplitst overgenomen: *Jacobaea* wordt bijvoorbeeld Kruiskruid genoemd, net zoals *Senecio*. Enkel voor *Phelipanche*, een van *Orobanche* afgesplitst genus, werd een nieuwe Nederlandse naam voorzien: Vreter.

**Dankwoord.** – De auteurs danken Rutger Barendse voor zijn kritische bemerkingen tijdens het tot stand komen van de lijst met nieuwe Nederlandse namen.

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## Index of genera mentioned in the notes on chorology (p. 5-98) and taxonomy and nomenclature (p. 99-173)

**Note.** – In order to make the information in the extensive notes on chorology (pages 5-98) and taxonomy and nomenclature (pages 99-173) in *Dumortiera* 122 more easily accessible, an index has been compiled of the genera mentioned in the text. If several species of a genus are commented on consecutively, the index refers only to the page where an introductory note on the genus as a whole or on the first species within the genus is mentioned. Synonyms mentioned in the notes on taxonomy and nomenclature are also included in the index.

### A

- Abies 11, 102  
Acaena 124  
Acanthus 145  
Acer 54, 132  
Achillea 81  
Acinos 145  
Acmella 148  
Aconitum 37  
Aconogonon 135  
Acorus 11  
Acroptilon 148  
Actinidia 66  
Adenostyles 79  
Adiantum 9, 102  
Adonis 38  
Adoxa 85  
Aegonychon 141  
Aesculus 54  
Aethusa 89, 158  
Agave 109  
Ageratina 148  
Agrimonia 46  
×Agropogon 31  
Agrostemma 137  
Agrostis 32, 116  
Aira 30, 115  
Ajuga 76, 146  
Akebia 120  
Alchemilla 46, 125  
Alliaria 55  
Allium 20, 109  
Alnus 50, 128  
Alonsoa 144  
Alopecurus 31  
Althaea 132  
Alyssum 57, 134  
Amaranthus 63, 138  
Amberboa 148, 152  
Ambrosia 80  
Amelanchier 48, 127  
Ammannia 131  
Ammi 88, 158  
Ammophila 115  
Amorpha 40  
Ampelopsis 122  
Amphiachyris 79  
Amsinckia 69, 141  
Anacamptis 18, 107  
Anagallis 140  
Anarrhinum 71  
Anchusa 70, 142  
Andromeda 66  
Androsace 66  
Andryala 148  
Anemone 37, 120  
Angelica 89, 158  
Anisantha 34, 116, 117  
Anisocampium 102  
Antennaria 79  
Anteriorchis 104  
Anthemis 80, 148, 150  
Anthericum 21  
Anthoxanthum 29  
Anthriscus 87  
Anthyllis 44  
Antidesma 128  
Antirrhinum 73  
Apera 32, 116  
Aphanes 46, 125  
Apium 157  
Aponogeton 13  
Aquilegia 37  
Arabidopsis 56, 133  
Arabis 56, 133, 134  
Arachis 122  
Arctium 82  
Arctotheca 148  
Arenaria 136  
Argentina 125  
Argyranthemum 148  
Aria 127  
Aristavena 30, 115  
Armeria 60, 135  
Arnoseris 83  
Aronia 48  
Arrhenatherum 30, 115  
Artemisia 81, 151  
Arum 11, 103  
Aruncus 44  
Arundinaria 113  
Asclepias 68, 141  
Asparagus 109  
Asperula 67  
Asphodelus 109  
Asplenium 10, 102  
Aster 148, 149  
Astragalus 41  
Astrantia 87  
Athyrium 102  
Atocion 137  
Atriplex 64, 139  
Aucuba 67  
Aurinia 134  
Avellinia 113  
Avena 30  
Avenella 30, 115  
Avenula 115  
Azolla 9  
Berberis 37, 120  
Berteroa 57  
Betonica 145  
Bidens 80, 150  
Bistorta 61, 136  
Blackstonia 68  
Blitum 138  
Blysmus 23  
Bolboschoenus 23, 111  
Bombycilaena 79  
Borago 69  
Borkhausenia 127  
Bothriochloa 28  
Botrychium 9  
Brachypodium 32, 116  
Brassica 58, 135  
Briza 33  
Bromopsis 34, 116, 117  
Bromus 33, 116, 117  
Broussonetia 128  
Brunnera 141  
Bryonia 50  
Buddleja 73, 144  
Buglossoides 69, 141  
Bunium 88  
Buphthalmum 80  
Bupleurum 88, 157  
C  
Cabomba 11  
Calamagrostis 32, 115, 116  
Calamintha 145, 146  
×Calammophila 31, 115  
Calepina 59  
Callicarpa 145  
Callitriche 71, 143  
Calluna 140  
Caltha 37  
Calystegia 142  
Camassia 109  
Camelina 57

- Campanula 78, 148  
 Capsella 134  
 Caragana 40  
 Cardamine 56, 133  
 Cardaminopsis 133  
 Cardaria 134  
 Cardiospermum 132  
 Carduus 82, 151  
 Carex 25, 112  
 Carlina 151  
 Carthamus 83  
 Carum 158  
 Caryopteris 145  
 Catabrosa 35  
 Catalpa 145  
 Catapodium 35  
 Caucalis 87  
 Celtis 49  
 Cenchrus 113  
 Centaurea 83, 148, 152  
 Centaurium 68  
 Centranthus 86, 157  
 Centunculus 140  
 Cephalanthera 15  
 Cephalaria 85  
 Cerastium 61, 137  
 Ceratocarpus 37  
 Ceratochloa 34, 116, 117  
 Ceratophyllum 37, 119  
 Ceratostigma 59  
 Cervaria 90, 158  
 Ceterach 102  
 Chaenostoma 144  
 Chaerophyllum 87, 157  
 Chamaecyparis 102  
 Chamaecytisus 122  
 Chamaemelum 80, 150  
 Chamaenerion 132  
 Chamerion 132  
 Chelone 143  
 Chenopodiastrium 64, 138  
 Chenopodium 64, 138, 139  
 Chimaphila 66  
 Chionodoxa 109  
 Chlorophytum 109  
 Chondrilla 84, 153  
 Chrysanthemum 148  
 Cicendia 68  
 Cicerbita 155  
 Cichorium 153  
 Cicuta 88  
 Circaea 54  
 Cirsium 82  
 Cistus 133  
 Citrus 132  
 Cladanthus 148, 150  
 Cladium 25  
 Clarkia 131  
 Claytonia 65  
 Clematis 37, 120  
 Clerodendrum 145  
 Clethra 66  
 Clinopodium 75, 145, 146  
 Cnicus 152  
 Cochlearia 57  
 Coeloglossum 107  
 Coincya 59  
 Colchicum 104  
 Collomia 65  
 Colutea 41  
 Comarum 45, 125  
 Conium 88  
 Conopodium 88  
 Conringia 55, 133  
 Consolida 120  
 Convallaria 20  
 Convolvulus 70, 142  
 Conyza 149  
 Corallorrhiza 16  
 Coreopsis 80, 150  
 Coriandrum 88  
 Cormus 127  
 Cornus 65, 140  
 Coronilla 44, 124  
 Coronopus 134  
 Cortaderia 27, 113  
 Corydalis 37, 120  
 Corylus 50  
 Cosmos 80, 150  
 Cota 150  
 Cotoneaster 48, 126  
 Cotula 81, 148, 150  
 Crassula 39  
 Crataegus 48, 127  
 Crepis 84, 155  
 Crithmum 89  
 Crocosmia 109  
 Crocus 109  
 Crypsis 31  
 Cucubalus 137  
 Cucumis 128  
 Cucurbita 50, 128  
 ×Cupressocyparis 103  
 Cupressus 103  
 Cuscuta 70, 142  
 Cyanus 83, 152  
 Cyclamen 140  
 Cyclosporum 157  
 Cymbalaria 72  
 Cynara 148  
 Cynodon 28  
 Cynoglossum 69, 142  
 Cynosurus 33  
 Cyperus 24, 111  
 Cyripedium 15  
 Cyrtomium 10  
 Cystopteris 9  
 Cytisophyllum 40  
 Cytisus 40, 122, 123
- D**
- Daboecia 140  
 Dactylis 33, 116  
 ×Dactylodenia 15, 104  
 Dactylorhiza 18, 104, 107  
 Danae 109  
 Danthonia 29, 114  
 Daphne 54  
 Darmera 121  
 Dasiphora 125  
 Daucus 158  
 Decaisnea 120  
 Delia 137  
 Delosperma 139  
 Delphinium 120  
 Dendranthema 148  
 Deschampsia 30, 115  
 Descurainia 55  
 Dianthus 63  
 Dichanthelium 113  
 Dichondra 142  
 Dichoropetalum 89, 158  
 Digitalis 73, 144  
 Digitaria 28, 114  
 Dimorphotheca 148  
 Dioscorea 104  
 Diphasiastrum 101  
 Diplachne 113  
 Diplotaxis 58  
 Dipsacus 86, 156  
 Dittrichia 80  
 Doronicum 82, 151  
 Dorycnium 124  
 Draba 57, 134  
 Dracocephalum 145  
 Drosanthemum 139  
 Drosera 61  
 Drymocallis 125  
 Drymochloa 118  
 Dryopteris 11, 102  
 Duchesnea 125  
 Dysphania 64, 138
- E**
- Ecballium 128  
 Echinochloa 27, 114  
 Egeria 12  
 Elaeagnus 49, 127  
 Elatine 51  
 Eleocharis 23, 111  
 Eleusine 28, 114  
 Ellisiophyllum 143  
 Elodea 12  
 Elymus 115  
 Elytrigia 30, 115  
 Empetrum 66  
 Epilobium 53, 132  
 Epimedium 120  
 Epipactis 15, 104  
 Epipogium 15  
 Equisetum 8, 101  
 Eragrostis 28, 114  
 Eranthis 37  
 Erica 66, 140  
 Erigeron 79, 149  
 Eriobotrya 44  
 Eriochloa 113  
 Eriophorum 23  
 Erodium 52, 131  
 Erophila 134  
 Erucastrum 59, 133  
 Ervilia 42, 123  
 Ervum 41, 123  
 Eryngium 87, 157  
 Erysimum 55, 133  
 Erythranthe 77, 146  
 Erythronium 14  
 Eudianthe 136  
 Euonymus 50, 128  
 Eupatorium 148  
 Euphorbia 51, 130  
 Euphrasia 77, 147  
 Euphrosyne 150  
 Eurybia 148, 149  
 Eustachys 113  
 Euthamia 148  
 Eutrochium 148  
 Exaculum 68
- F**
- Fagopyrum 61  
 Falcaria 88  
 Fallopia 61, 136  
 Festuca 36, 117, 118  
 ×Festulolium 118  
 ×Festulpia 27  
 Ficaria 38, 120  
 Ficus 49  
 Filago 79, 149  
 Filipendula 46  
 Foeniculum 88  
 Fourraea 57, 133  
 Fragaria 45, 125  
 Frangula 49  
 Fraxinus 71, 143  
 Fritillaria 14  
 Fumaria 37, 120

## G

Gagea 14  
Gaillardia 80  
Galanthus 20, 109  
Galatella 79, 149  
Galega 41  
Galeobdolon 146  
Galeopsis 75, 146  
Galium 67, 141  
Gamochaeta 148, 149  
Gaudinia 29  
Gaura 131  
Genista 41, 123  
Genistella 123  
Gentiana 68, 141  
Gentianella 68, 141  
Gentianopsis 68, 141  
Geranium 52, 131  
Geum 45, 125  
Gilia 140  
Ginkgo 11  
Gladiolus 19  
Glaucium 119  
Glaux 140  
Glyceria 35, 117  
Glycine 40  
Gnaphalium 80, 148, 149  
Gomphocarpus 141  
Goodyera 16  
Gratiola 73  
Groenlandia 13  
Guizotia 80, 150  
Gutenbergia 148  
Gymnadenia 16, 104, 106  
Gymnocarpium 10  
Gypsophila 63

## H

Halimium 133  
Hammarbya 16  
Hedera 87, 157  
Hedlundia 127  
Helianthemum 55, 133  
Helianthus 150  
Helichrysum 80  
Helictochloa 30, 115  
Heliotropium 69  
Helleborus 37  
Helminthotheca 83, 153  
Helosciadium 88, 157  
Hemerocallis 20  
Hepatica 120  
Heracleum 90, 158  
Herminium 16

Herniaria 62  
Herorchis 104  
Hesperis 55  
Hesperocodon 148  
Heteranthemis 148  
Hieracium 85, 156  
Hierochoe 29  
Himantoglossum 17, 107  
Hippocrepis 44  
Hippophae 127  
Hippuris 71  
Holcus 29  
Holosteum 61  
Honckenya 61  
Honorius 110  
Hordeum 31, 115  
Hornungia 58, 134  
Houttuynia 103  
Humulus 128  
Huperzia 8  
Hyacinthoides 20  
Hydrangea 65  
Hydrocharis 12  
Hydrocotyle 87, 157  
Hylotelephium 40, 122  
Hymenophyllum 9, 102  
Hypericum 50, 129  
Hypochaeris 83  
Hyssopus 75

## I

Iberis 58, 134  
Ilex 78, 147  
Illecebrum 62  
Impatiens 65  
Imperatoria 158  
Inula 80, 148, 150  
Ipheion 109  
Ipomoea 142  
Iris 19, 109  
Isatis 55  
Isoetes 8  
Isolepis 23  
Isotoma 148  
Iva 150

## J

Jacobaea 82, 151  
Jasminum 71  
Juglans 49, 128  
Juncus 22, 110  
Juniperus 11

## K

Kali 138  
Karpatisorbus 127

Knautia 86, 156  
Kniphofia 109  
Koeleria 29, 115  
Koelreuteria 54

## L

Lachnagrostis 116  
Lactuca 84, 155  
Lagarosiphon 12  
Lagurus 31  
Lamiastrum 146  
Lamium 75, 146  
Landoltia 103  
Lantana 145  
Laphangium 80, 149  
Lapsana 83  
Laser 90  
Laserpitium 90  
Lathraea 77  
Lathyrus 42, 123  
Lavandula 145  
Lavatera 132  
Leersia 29  
Legousia 78  
Lemna 12, 103  
Leontodon 83, 153  
Leonurus 76, 146  
Lepidium 58, 134  
Leptinella 148  
Leptochloa 113  
Leucanthemum 81, 148, 150  
Leucothoe 140  
Liatris 148  
Ligularis 148  
Ligustrum 71, 143  
Lilium 14, 104  
Limbarda 78, 148  
Limnobiium 103  
Limodorum 16  
Limonium 59, 135  
Limosella 73  
Linaria 72, 144  
Lindernia 73, 144  
Linum 52  
Lipandra 64, 138, 139  
Liparis 16, 105  
Liriope 109  
Lithospermum 69, 141  
Littorella 71  
Lobelia 78, 148  
Logfia 79, 149  
Lolium 31, 118, 119  
Lomelosia 156  
Loncomelos 20, 110  
Lonicera 85, 156  
Lotus 44, 124

Ludwigia 53, 131  
Lunaria 57  
Lupinus 123  
Luronium 12  
Luzula 21, 110  
Lychnis 137  
Lycium 70  
Lycopersicon 142  
Lycopodiella 8  
Lycopodium 8, 101  
Lycopsis 70, 142  
Lycopus 74  
Lysimachia 66, 140  
Lythrum 53

## M

Mahonia 120  
Maianthemum 110  
Malcolmia 133  
Malus 126  
Malva 54, 132  
Manihot 130  
Marrubium 76  
Matricaria 150  
Mauranthemum 148  
Meconopsis 37, 119  
Medicago 42, 124  
Melampyrum 147  
Melica 32, 116  
Melilotus 124  
Melittis 75  
Mentha 74, 145  
Menyanthes 78  
Mercurialis 51  
Mespilus 127  
Micropyrum 35  
Microthlaspi 134  
Milium 29  
Mimulus 146  
Minuartia 61, 136  
Modiola 132  
Moehringia 61  
Moenchia 62  
Monarda 145  
Monolepis 138  
Monotropa 67  
Montia 65, 139  
Moricaudia 133  
Morus 49, 128  
Muehlenbeckia 135  
Mummenhoffia 134  
Muscari 21, 109, 110  
Mycelis 155  
Myosotis 69, 142  
Myosoton 61  
Myosurus 38  
Myriophyllum 40, 122

**N**

Najas 13, 104  
 Narcissus 109  
 Nardurus 117  
 Nardus 29  
 Nassella 113  
 Nasturtium 56  
 Neillia 124  
 Nemophila 141  
 Neoschischkinia 116  
 Neotinea 17  
 Neottia 16  
 Nepeta 146  
 Neslia 57  
 Nicandra 70  
 Nicotiana 143  
 Nigella 37  
 Noccaea 58, 134  
 Notobasis 148  
 Nymphaea 11, 103

**O**

Obione 139  
 Ochlopa 116  
 Odontites 78, 147  
 Oenanthe 89  
 Oenothera 53, 131  
 Oloptum 113  
 Omphalodes 141  
 Oncosiphon 148  
 Onobrychis 44  
 Ononis 42, 124  
 Onopordum 152  
 Ophioglossum 9  
 Ophiopogon 109  
 Ophrys 17, 106  
 Opopanax 157  
 Orchis 17, 104, 107, 109  
 Oreopteris 10  
 Oreoselinum 90, 158  
 Origanum 145  
 Orlaya 87, 157  
 Ornithogalum 20, 110  
 Ornithopus 44  
 Orobanche 77, 147  
 Orthilia 66  
 Oryza 113  
 Osmunda 9  
 Oxalis 50, 128  
 Oxybasis 64, 138, 139  
 Oxyria 135

**P**

Paeonia 121  
 Paludorchis 104  
 Panicum 27, 113

Papaver 119  
 Parapholis 30  
 Parentucellia 78, 147  
 Parietaria 49  
 Parnassia 50, 128  
 Paronychia 136  
 Parthenocissus 40, 122  
 Paspalum 113  
 Pastinaca 90, 158  
 Paulownia 77, 146  
 Pedicularis 78  
 Pelargonium 131  
 Pennisetum 113  
 Penstemon 143  
 Pentaglottis 70  
 Pentanema 150  
 Persicaria 60, 136  
 Petasites 81, 151  
 Petrorhagia 63  
 Petroselinum 88  
 Peucedanum 158  
 Phacelia 142  
 Phalaris 29, 114  
 Phedimus 122  
 Phelipanche 77, 147  
 Phleum 31  
 Phlox 140  
 Photinia 124  
 Phragmites 29  
 Phyla 145  
 Phyllostachys 113  
 Physalis 70  
 Physocarpus 45  
 Phyteuma 78  
 Phytolacca 64, 139  
 Picea 11  
 Picris 83, 153  
 Pilosella 84, 155  
 Pilularia 9  
 Pinguicula 74  
 Pinus 11  
 Piptatherum 113  
 Pisum 42, 123  
 Plantago 71, 143  
 Platanthera 105  
 Platanus 39  
 Platycodon 148  
 Poa 33, 116  
 Podospermum 83  
 Polemonium 65  
 Polycarpon 62  
 Polycnemum 64, 138  
 Polygala 44, 124  
 Polygonatum 20  
 Polygonum 60, 136  
 Polypodium 11, 102  
 Polypogon 31, 115, 116

Polystichum 10, 102  
 Pontederia 21  
 Portulaca 65, 139  
 Potamogeton 13, 104  
 Potentilla 45, 125  
 Poterium 125  
 Pratia 148  
 Prenanthes 78  
 Primula 65, 140  
 Prunella 76, 146  
 Prunus 48, 126  
 Psephellus 148  
 Pseudofumaria 37  
 Pseudomuscari 109  
 Pseudorchis 16  
 ×Pseudosasa 113  
 Pseudosclerochloa 35, 117  
 Pseudoturritis 57, 133  
 Pteris 102  
 Pterocarya 50, 128  
 Ptychotis 88  
 Puccinellia 35, 117  
 Pulicaria 80, 150  
 Pulmonaria 69, 141  
 Pulsatilla 120  
 Puschkinia 109  
 Pycnanthemum 145  
 Pyrola 66  
 Pyrus 48, 126

**Q**

Quamoclit 142  
 Quercus 49

**R**

Rabelera 137  
 Radiola 52  
 Ranunculus 38, 120  
 Raphanus 59, 135  
 Rapistrum 59, 135  
 Reseda 55  
 ×Reyloppia 136  
 Reynoutria 61, 136  
 Rhamnus 127  
 Rhaponticum 148  
 Rhinanthus 78  
 Rhododendron 66, 140  
 Rhynchospora 25  
 Ribes 39, 121  
 Robinia 123  
 Roemeria 119  
 Rorippa 56, 133  
 Rosa 46, 125  
 Rostraria 29, 115  
 Rubia 67, 141  
 Rubrivena 61, 136

Rubus 45, 125  
 Rumex 60, 135  
 Ruppia 14, 104

**S**

Sabulina 136  
 Sagina 62, 137  
 Sagittaria 12  
 Salicornia 64, 138  
 Salix 51, 129  
 Salsola 138  
 Salvia 74, 145  
 Salvinia 9  
 Sambucus 85  
 Samolus 66  
 Sanguisorba 125  
 Saponaria 63  
 Sasa 113  
 Sasaella 113  
 ×Sasinaria 113  
 Sauromatum 103  
 Saururus 11  
 Saxifraga 39  
 Scabiosa 86, 156  
 Scandix 157  
 ×Schedolium 118, 119  
 Schedonorus 36, 118, 119  
 Scheuchzeria 13  
 Schoenoplectus 24, 111  
 Schoenus 25  
 Scilla 20, 109  
 Scirpoides 24  
 Scirpus 24, 111  
 Scleranthus 62  
 Sclerochloa 33  
 Scorpiurus 122  
 Scorzoneroideis 153  
 Scrophularia 73, 144  
 Scutellaria 76  
 Secale 115  
 Securigera 124  
 Sedum 39, 121, 122  
 Selaginella 8  
 Selinum 89  
 ×Semiarundinaria 113  
 Sempervivum 121  
 Senecio 81, 151  
 Serapias 104  
 Sesamum 145  
 Sesbania 122  
 Seseli 89, 158  
 Sesleria 32  
 Setaria 28, 114  
 Sherardia 67  
 Sibbaldiopsis 124  
 Sideritis 74

- Silaum 89  
 Silene 62, 136, 137  
 Silybum 83  
 Sison 88, 158  
 Sisymbrium 55, 133  
 Sisyrinchium 19, 109  
 Sium 88  
 Skimmia 54  
 Smilacina 110  
 Smyrniopsis 158  
 Smyrnum 90, 158  
 Solanum 70, 142  
 Soleirolia 49  
 Solidago 148  
 Soliva 81, 150  
 Sonchus 84, 155  
 Sorbaria 45, 124  
 Sorbus 48, 127  
 Sorghum 28  
 Sparganium 21, 110  
 Spartina 28, 114  
 Spartium 41  
 Spergula 62, 137  
 Spergularia 62, 137  
 Sphaeralcea 132  
 Spinulum 101  
 Spiraea 45, 125  
 Spiranthes 15, 105  
 Spirobassia 138  
 Spirodela 12, 103  
 Sporobolus 28, 114  
 Stachys 76, 145, 146  
 Staphylea 54  
 Stellaria 61, 136  
 Stephanandra 124  
 Stipa 113  
 Stranvaesia 124  
 Stratiotes 12  
 Strigosella 133  
 Stuckenia 14, 104  
 Styphnolobium 122  
 Suaeda 64  
 Subularia 58  
 Sutura 144  
 Symphyotrichum 149  
 Symphytum 69, 142  
 Syringa 143
- T**
- Tamus 14, 104  
 Taraxacum 84, 153  
 Taxus 11, 103  
 Teesdalia 58  
 Telekia 80, 150  
 Tellima 39, 121  
 Teloxys 138  
 Tephrosia 81  
 Tetragonia 139  
 Tetragonolobus 124  
 Teucrium 76, 146  
 Thalictrum 39, 121  
 Thamnocalamus 113  
 Thelypteris 10  
 Thesium 59, 135  
 Thladiantha 128  
 Thlaspi 58, 134  
 Thunbergia 145  
 Thymelaea 54  
 Thymus 75, 145  
 Thysselinum 89, 158  
 Tiarella 121  
 Tinantia 110  
 Tithonia 148  
 Tolmiea 39  
 Tordylium 90  
 Torilis 87, 157  
 Torminalis 127  
 Trachyspermum 157  
 Trachystemon 69  
 Tragopogon 83, 153  
 Tragus 29, 113  
 Trapa 53  
 Trichophorum 23  
 Trientalis 140  
 Trifolium 43, 124  
 Triglochin 13  
 Trigonella 42, 124  
 Trinia 87  
 Triodanis 148  
 Tripleurospermum 150  
 Tripolium 148, 149  
 Trisetaria 113  
 Tristagma 109  
 Tritoleia 109  
 Trocдарis 88, 158  
 Tuberaria 54  
 Tulipa 14  
 Turgenia 88  
 Turritis 57, 133  
 Typha 21, 110  
 Typhonium 103
- U**
- Ulex 41, 123  
 Ulmus 49, 128  
 Umbilicus 39  
 Urochloa 113  
 Urtica 128  
 Utricularia 74, 145
- V**
- Vaccinium 66, 140  
 Valeriana 86, 157  
 Valerianella 86, 157  
 Vallisneria 12, 103  
 Vandenboschia 9, 102  
 Ventenata 29  
 Verbascum 73, 144  
 Verbena 74, 145  
 Vermeulenia 104  
 Vernonia 148  
 Veronica 71, 143  
 Veronicastrum 143  
 Viburnum 85, 156  
 Vicia 41, 123  
 Vinca 68, 141  
 Vincetoxicum 68  
 Viola 51, 129  
 Viscaria 62, 137  
 Viscum 59  
 Visnaga 158  
 Vitis 40, 122  
 Vulpia 35, 117, 118
- W**
- Wahlenbergia 148  
 Wisteria 122  
 Wolffia 11, 103
- X**
- Xanthium 150
- Y**
- Yucca 20, 109
- Z**
- Zannichellia 14  
 Zantedeschia 103  
 Zelkova 49  
 Ziziphus 127  
 Zostera 13