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Alien grasses (Poaceae) in the flora of the Eastern Alps: Contribution to an excursion flora of Austria and the Eastern Alps

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A b s t r a c t : This overview presents the recent knowledge on non-native (archaeophytic, neophytic and regionally neophytic) grasses in Austria and the Eastern Alpine territory. In total, 220 taxa are discussed, 175 of them are neophytes, 19 are regional neophytes, 3 are subspontaneous garden escapes and 23 are quoted as archaeophytes. By comparison with Walter & al. (2002) and Fischer & al. (2008), the impact of neophytes in the recent past can be estimated for the Austrian part of the territory, where 152 alien taxa are actually known, 32 (21 percent) were newly recorded in the last decade, among them, 6 are invasive or suspectedly invasive.

Meanwhile, several species are naturalized, but the share of invasive and potentially invasive taxa (44 species, 20 percent) is surprisingly low. They are subject of enhanced attention. Commonly, invasive characteristics are considered only as a suppression of the native flora, but an impact is also caused by introgression (via hybridization of aliens with closely related native taxa), and such processes may remain undetected for a long time.

Increasing traffic, fitout of transport routes and their maintenance support the propagation of alien species as well as globalized product flows in general, especially trading of ornamental plants, seeds and horticultural accessories. Moreover, climatic change may facilitate a spread of species requiring warmer environmental conditions. It will need some more legal regulations to control this trend. Considering that, expertise of botanists, as well as of experienced horticulturists is indispensable.

K e y w o r d s : alien plants, distribution, disturbed sites, naturalization, invasive species

Z u s a m m e n f a s s u n g : Gräser-Neophyten (Poaceae) in der Flora der Ostalpen: Beitrag zu einer Exkursionsflora der Ostalpen

Im vorliegenden Überblick wird der aktuelle Kenntnisstand über nicht heimische (archaeophytische, neophytische und auch regional neophytische) Gräser in Österreich und im Ostalpenraum zusammengestellt. Es handelt sich um 220 Taxa, wovon 175 als Neophyten, 19 als regionale Neophyten, 3 als subspontane Gartenflüchtlinge und 23 als Archäophyten eingestuft werden. Nur für den österreichischen Anteil sind Vergleichszahlen verfügbar (Walter & al. 2002 sowie Fischer & al. 2008), um den Neuzugang abschätzen zu können. Demnach sind von den 152 in Österreich erfassten neophytischen Gräsern 32 im letzten Jahrzehnt neu aufgefunden worden, was einem Anteil von 21 Prozent entspricht. Davon sind 6 als invasiv bekannt oder verdächtig.

Etliche Arten können nunmehr als eingebürgert gelten, als invasiv bzw. potentiell invasiv erscheinen dabei aber überraschend wenige (44 Arten, 20 Prozent des Gesamtbestandes), denen aber verstärkte Aufmerksamkeit zu widmen ist. Vielfach wird die invasive Eigenschaft nur hinsichtlich einer Verdrängung heimischer Arten gesehen, doch können invasive Eigenschaften auch durch Introgression in heimische Arten zum Ausdruck kommen und bleiben so, obwohl von ähnlicher Konsequenz wie Verdrängung, oft lange Zeit unbeachtet.

Die Zunahme des Verkehrs und der Ausbau der Verkehrswege sowie deren Instandhaltung leisten der Ausbreitung gebietsfremder Arten zunehmend Vorschub, aber auch die globalisierten Waren-

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ströme im allgemeinen, besonders der Handel mit Zierpflanzen, Saatgut und Gartenprodukten, tragen wesentlich dazu bei. Klimaveränderungen können zudem die Etablierung wärmebedürftiger Arten begünstigen. Es wird also der weiteren Entwicklung von legistischen Regulativen bedürfen, um hier wirksam gegensteuern zu können. Die Expertise von Botanikern, aber auch erfahrenen Gärtnern ist hiefür unerläßlich.

Introduction

Almost 15 years have passed since Walter & al. (2002) had listed the neophytic plants in Austria, and a decade has gone since the last edition of the Austrian excursion flora (Fischer & al. 2008) was published. Meanwhile numerous records of new or recently confirmed alien grasses were noted in various floristic publications, periodicals and web forums. Planning the forthcoming 4th edition of this excursion flora as a flora of Austria and the entire Eastern Alps (Fischer 2018, M. A. Fischer, pers. comm.), an update for the whole, extended territory, including the Bavarian, Swiss, Italian and Slovenian part of the Eastern Alps is urgently required. This conspectus covers spontaneously occurring alien grasses in Austria and the Eastern Alps in their geographical, not geological circumscription, westwards delimited by a line following the Rhine valley up to the Splügen pass and the Val S. Giacomo down to Chiavenna and the Lake Como along its eastern shoreline, southwards by the Vipava valley system (Vipavska dolina) and eastwards by the Austrian border.

With small, easily germinating caryopses, a lot of grasses are well suited for long-distance dispersal, and they are also fit for survival in various habitats, even under extreme, artificial conditions, annuals as well as perennials. Resistance against disturbances and against various herbicides together with rapid regeneration help them to survive even urban and roadside maintenance.

Neophytes are not a recent phenomenon: some historical records, even of less frequent species are quite astonishing: *Aira elegantissima*, known since 1883 from Innernstein in Upper Austria by a specimen from herbarium J. Wiesbaur (LI 041430); *Alopecurus rendlei*, known from Graz (Styria) since 1826 (Janchen 1960); *Cynosurus echinatus* (early record from Upper Austria in Hödl 1877: 14); *Eragrostis minor* (herbarium specimen from Linz, Upper Austria: "Urfahr, Kapellenmauer am Rosenauer Wiesengrunde", 1829, leg. J. Mor, cited by Hohla 2006a); *Eragrostis multicaulis*, known from Graz since 1840 (in the old botanical garden and unintentionally transferred to the botanical garden at its new location, 8958/2: Melzer 1989); *Eragrostis pilosa* (since 1866 known from Innsbruck, Pagitz 2012; further early record from Upper Austria was published by Vierhapper 1891: 150); *Festuca valesiaca* subsp. *parviflora* (herbarium specimen from Upper Austria: "Bahndämme zwischen Ried und Mehrnbach", 1885, leg. F. Vierhapper, cited by Hohla 2012a); *Panicum capillare* (in Upper Austria evident since 1855 by a herbarium specimen "Neubau", near Oftering, leg. J. Duftschmid, Hohla & al. 1998), its subsp. *barbipulvinatum* ("Aus einem Garten in Wr. Neustadt", Lower Austria, 14. 7. 1831, hb. Altmann, W 2009-13874, Hohla & al. 2015) and *Tragus racemosus* (first record in Lower Austria by Dollinger 1842: 141 [554]). Murr (1931) already named 17

alien species from North Tyrol. Among all of the wild *Setaria* species, Dalla Torre & Sarnthein (1906) named *Setaria verticilliformis* (sub nom. *Panicum ambiguum*) from Bolzano and Trento. Conert (1998) named a lot of early records from Germany. Data of Kleesadl & Brandstätter (2013), including some cross-references to historical herbarium specimens, allow a good overview over the history of alien introduction in Upper Austria.

In historic times, specific pathways of introduction were limited to seed aliens (mainly archaeophytic species in crop cultures), wool aliens (caryopses in imported sheep's wool, with the well-known example of *Festuca trachyphylla* Hack. ex Druce, "Alien, S. Amer. Galashiels, Selkirk, 1913, [from seeds grown by] Miss I. M. Hayward": Druce 1915: 29, non *F. trachyphylla* (Hack.) Kraj. 1930) or forage aliens. Several species of the latter are known, for example, from the surrounding of Bolzano (*Hordeum marinum* subsp. *marinum*, *Festuca ligustica* [sub nom. *Vulpia ligustica*], *Gaudinia fragilis*, *Polypogon monspeliensis*, and *Trisetaria panicea* at First World War horse-stations Kardaun and Oberau, Pfaff 1923, Kiem 1974). Meanwhile, these pathways have lost importance, leading to a disappearance of most of these alien species named above. Nowadays, globalized product flows and increasing traffic support an enhanced introduction of alien species. Well-known examples of such transport aliens are several Mediterranean species coming with imported Mediterranean fruits (e.g. *Bromus madritensis*, frequently found at cargo railway stations). Some other species, like *Puccinellia distans*, *Festuca valesiaca* subsp. *parviflora* (= *F. pseudovina*), *Sporobolus neglectus* and *S. vaginiflorus* unspecifically came with road traffic.

Recently, a lot of new species are intentionally or accidentally introduced with trading of ornamental plants, seeds and horticultural accessories, indicated by their early occurrence near nurseries and gardening companies (*Coix lacryma-jobi*: Essl 2003, *Digitaria setigera*: Hohla 2011a, *Stenotaphrum secundatum* var. *variegatum*: Hohla & al. 2015). Abandoned public plantations may also be responsible for alien occurrence in their neighbourhood (e.g. *Calamagrostis brachytricha*, *Cenchrus purpurascens* and *Nassella tenuissima* in Vienna). Furthermore, seed aliens become again more frequent: landscaping (e.g. *Festuca brevipila*, see Englmaier 2009) and amelioration seeding (*Festuca nigrescens* for example) open new stands for neophytes in grassland habitats, even examples of aliens distributed by seed mixtures for attractive flowery meadows were discussed (e.g. *Aegilops cylindrica* in Essl & Stöhr 2006).

Sometimes trading with seeds as a deliberate introduction pathway may be overestimated: Melzer (1985) assumed *Hordeum jubatum* to be unintentionally introduced as an impurity of seed mixtures of American origin. Later on, Melzer (in Hohla & Melzer 2003) found a more exaggerated wording "Gleich *Puccinellia distans* wird es mit amerikanischem Saatgut zur Begrünung von Straßenrändern und -böschungen eingebracht", with an additional citation (Melzer 1987, dealing with *Hordeum jubatum*, but not with seed mixtures of American origin). Melzer never gave any solid evidence on origin and application rate of such seed mixtures. Indeed, Zahlheimer (1986) mentioned *Puccinellia distans* seed material offered by an Austrian company (HESA, Him-

berg), but this came from Eastern Europe and was of very low market impact. *Puccinellia distans* is not native to America, and no evidence on American commercial import of *P. distans* seed could be found. Nowadays, the only seed mixture containing *P. distans* is available from Kärntner Saatbau company, but with comparably low market impact. With *Sporobolus* species, Melzer (1994, 2003) also assumed an introduction by American seed material, whereas Wilhalm (1998) did not find solid indications suggesting this pathway. Usually, roadside and winter maintenance by machinery is sufficient for a rapid spread of such species along long road sections, not only motorways or main roads, but also secondary roads maintained by supraregional centers, as impressively exemplified with recently recorded *Sporobolus neglectus* in Deutsch-Griffen, Carinthia (obs. P. Englmaier, 2017).

Besides wasteland at roadsides, railway stations and rail tracks, a lot of similar habitats are nowadays accessible for neophytes, such as abandoned industrial or commercial areas. Change of habitat properties of extensively used pastureland (abandonment of community pastures) may also open new stands for aliens, the same for wetlands after melioration (with *Dichanthelium acuminatum* in the Rhine corridor as an example, see Aschauer & Grabher 2017). Once introduced in such habitats, further distribution may occur with civil engineering and road construction (seeds unintentionally transported by construction machinery). Moreover, mechanized and monocultural farming facilitate the spread of several crop weeds, especially maize weeds.

Today's hot topic of climate change, together with heat spots in urban microclimate may be responsible for further introduction and spread of species requiring warm environmental conditions and may also lead to a continuous increase of several alien species in seminatural areas. It seems to enhance invasiveness as well as to favour regional neophytes in Alpine valleys (e.g. *Bromus inermis*), but at present, these effects are unpredictable. Considerate research is essential to elucidate the complex interaction of steering factors with introduction and invasiveness of plant aliens.

In many cases, spontaneity and invasiveness of newly introduced species are not easily assessable. Some local escapes will not become persistent, for many reasons (as specialized habitat preferences, ineffective seed dispersal, lacking competitive abilities). Nevertheless, no alien grass can be seen as harmless and without influence on natural or semi-natural habitats and vegetation, as Scholz (2011) does. Prosser & Bertolli (2015), for example, discussed a negative impact on biotopes even by regionally invasive *Bromus inermis*. In agricultural science, some crop weeds are rated to reduce crop harvest, such as *Alopecurus myosuroides* (e.g. Lutman & al. 2013). Even annual grasses germinating in temporal gaps of grassland vegetation may suppress native annuals. So any newly recognized alien, for instance *Calamagrostis brachytricha* or *Festuca rubra* subsp. *litoralis*, needs attention: every invasive incident began on a local scale.

Usually, invasive characteristics are only considered as suppression of the native flora, but also introgressions into indigenous species are possible, as they frequently occur between hexaploids of the *Festuca rubra* group, between diploids of the *Festuca*

valesiaca group or in the *Bromus erectus* group, for example. These may remain undetected for a long time. In most cases, they are only recognized in floristic work, when some uncertainties will be detected using common determination keys.

In future, additional legal regulations will be needed to control this trend. The list of invasive alien species of Union concern, recently updated (European Union 2017), only contains two grass species (*Microstegium vimineum* and *Cenchrus setaceus*, sub nom. *Pennisetum setaceum*), both not yet observed in the wild within the territory. EU-supported research papers and publications on this topic (e.g. Prosser & Bertolli 2015) are thus of special importance.

Organization of the species catalogue

Source of data

Most data came from literature review: If not individually cited, records from Austrian federal states came from Fischer & al. (2008) and from Walter & al. (2002), including comprehensive references considered herein, e.g. Forstner & Hübl (1971) and were supplemented with Maurer (2006), Hohla & al. (2009), Pflugbeil & Pilsl (2013), and Polatschek & Neuner (2013), with some additional status information from Vorarlberg's Red List (Amann 2016). Records from the Bavarian Alps came from BIB ("Botanischer Informationsknoten Bayern", http://daten.bayernflora.de/de/index.php), additionally from Dörr & Lippert (2001), from FL from Fischer & al. (2008), from GRB from Info Flora (https://www.infoflora.ch/de/). Records from Italy came from Celesti-Grapow & al. (2009, 2010), Pignatti (1982, 2017), G. Galasso (pers. comm.), Galasso & al. (2018) and from the Poaceae section of the site "Flora Italiana" (http://luirig.altervista.org/flora/taxa/floraindice.php), all on region level. Records from Italian provinces came from Martini & al. (2012) (BG, BS), Kiem (1978) (BS, BZ, TN, VR) Wilhalm (2001) or the web portal "FloraFaunaSüdtirol" (http://www.florafauna.it/) (BZ), Poldini (2002), Nimis & al. (2013) (UD) and Jogan (1997, 2001) (SLO). Personal observations of the authors and data from several local contributors were also considered.

All recent evidence is individually cited, as well as earlier, still overseen, first or single references for less frequent species and detailed treatises or revisions of herbarium specimens. First records without additional information are not cited individually if already mentioned in other references. All references were cross-checked for credibility, herbarium specimens, if necessary, are individually cited. Herbarium abbreviations are in accordance with the Index Herbariorum (New York Botanical Garden Herbarium, http://sweetgum.nybg.org/science/ih/). Single records of special interest are completed with the quadrant of the floristic mapping scheme for Central Europe (Niklfeld 1971).

The status of floristic knowledge and data processing varies markedly between different federal states or provinces. New records from underestimated regions are thus highly appreciated.

Taxonomy

Generally, taxonomy is in conformance with Fischer & al. (2008) and the novelties in Fischer & Englmaier (2018), including previous updates cited herein. Inevitable nomenclatural changes are explained in annotations and indicated by cross references. Commonly used synonyms and misused names are listed in brackets after the accepted name.

Some genera and species groups urgently need revision, this is also explained in annotations, completed with information on some highly confusable taxa.

General information on taxonomy, origin and distribution, if not individually cited, consistently came from e-monocot (Royal Botanic Gardens Kew, Oxford University and Natural History Museum, http://e-monocot.org/), GrassBase (Royal Botanic Gardens, Kew: Clayton W. D., Vorontsova M. S., Harman K. T. & Williamson H. 2006 onwards: The Online World Grass Flora, http://www.kew.org/data/grasses-db.html), World Grass Synonymy database (Royal Botanic Gardens, Kew: Clayton W. D. & Harman K. T. 2002 onwards), The Plant List (Royal Botanic Gardens Kew and Missouri Botanical Garden, http://www.theplantlist.org/), and Conert (1998).

Distribution within the territory

Distribution is indicated in the style of Fischer & al. (2008), completed with the Bavarian, Swiss, Italian and Slovenian part of the territory, abbreviated as follows:

Austrian federal states: **B** (Burgenland); **W** (Vienna); **N** (Lower Austria); **O** (Upper Austria): **ST** (Styria); **K** (Carinthia); **S** (Salzburg); **T** (Austrian Tyrol, if separately treated: **NT** = North Tyrol, **OT** = East Tyrol); **V** (Vorarlberg)
Germany: **BAV** (Bavarian Alps)
Principality of Liechtenstein: **FL**
Switzerland: **GRB** (Grisons)
Italian provinces: **CO** (Como); **LC** (Lecco); **SO** (Sondrio); **BG** (Bergamo); **BS** (Brescia); **BZ** (Bolzano, "SüdT" in Fischer & al. 2008); **TN** (Trento); **VR** (Verona); **VI** (Vicenza); **BL** (Belluno); **PO** (Pordenone); **UD** (Udine)
Slovenia: **SLO** (Alpine part)

- Additional information
  - Doubtful **[?]**: Published record not supported by herbarium specimen or data source not reliable.
  - Missing or extinct **[–]**: Once found in the territorial unit referred to, but no more recent findings (e.g. some forage aliens like *Bromus diandrus*, *Hordeum marinum* subsp. *marinum*, *Festuca ligustica*, *Gaudinia fragilis*, *Polypogon monspeliensis*, and *Trisetaria panicea*, found near military facilities until the end of World Wars I and II).

Definition of terms regarding the floristic status

- Era of introduction
  - Archaeophytic: Species probably introduced before Christoph Columbus's discovery of the "New World", 1492, mainly together with crop cultivars. In several floras, some of these species are accidentally indicated as "indigenous".
  - Neophytic: Species introduced after 1492.
- Status (according to Wilhalm 2001: 277 and Celesti-Grapow & al. 2009: 387):
  - Indigenous (native): Belonging to the species set of suitable natural habitats, independent of human involvement.
  - Naturalized: Once introduced, such species will become established and able to grow in suitable natural habitats.
  - Established: Once introduced, such species (annuals as well as perennials) may permanently remain on their (mainly wasteland) stands, even outlasting temporal devastation (especially along roadsides).
  - Persistent: Once introduced, such species (mainly perennials) may survive for several years, but without seed production or vegetative spread sufficient for establishment, thus any temporal devastation may disrupt their occurrence.
  - Ephemeral (casual): Once introduced, such species may survive for at least one (annuals) or two vegetation periods (perennials). Re-introduction is needed to achieve occurrence for a longer period. With some of these species it may be doubtful, if they really escaped spontaneously to open landscapes. Several crop species are used for intercropping or erosion control and will also spontaneously grow in open landscapes. Cultivated crops, only exceptionally found outside of cultures, such as maize and wheat, are not considered here.
- Invasiveness: Species with high competitive abilities may first enter temporal gaps in natural or semi-natural habitats (mainly grassland) on replace indigenous species. Potentially invasive species are suspected to become abundant in some semi-natural habitats in the near future.

  All invasiveness ratings refer to the highest level achieved anywhere in the whole territory. Several territorial units or habitat types markedly threatened by invasive alien grasses are named individually.

Origin

Describing areas, terms are used in the following circumscriptions: "Mediterranean area" (countries or regions adjacent to the Mediterranean Sea), "Asia minor" (Turkey peninsula, if separately treated), "Pannonian area" (the whole Pannonian basin), "Pontic area" (countries or regions adjacent to the Black Sea), "Middle East" (sometimes named as "Near East" in the sense of a word-to-word translation from German, including modern states of Mesopotamia, Iran and Afghanistan), "Central Asia" (Asian steppe belt).

Species catalogue

Achnatherum bromoides (*Aristella bromoides*, *Stipa bromoides*)
Assessing the available data (Hamasha & al. 2012), the genus *Aristella* is sufficiently supported for a morphologically and genetically distinct group around its generic type (*A. bromoides*), but leaving the *Achnatherum* core group with its somewhat isolated type *A. calamagrostis* (Romaschenko & al. 2011, 2012) still unresolved. Following Soreng & al. (2017), to leave *Achnatherum* and treat *Aristella* as a synonym is considered to more closely correspond to available data.
BG [–] (only one historical record in 0223/4, leg. Corti 7. 1894, MI)**; TN** (Mezzocorona: Dalla Torre & Sarnthein 1906, 9732/4: Prosser 1999)**; VR [–]** (herbarium citation "Lago di Garda, tra Malcesine e Torbole", leg. Comboni 1933, FI, Moraldo 1986: 264 was recognized as erroneous and identified as *Bromus erectus*: Prosser 1999: 206)
Perennial neophyte (near the northern border of natural distribution), naturalized, not invasive.
Origin: Mediterranean area, Pannonian area, Crimea, Middle East.

Annotation: ***Achnatherum calamagrostis*** (*Lasiagrostis calamagrostis*), indigenous in most of the territory, was found as a regional neophyte in **W** (Gilli 2018a) and **ST** (Frohnleiten, 8758/1: Zernig 2015).

Achnatherum miliaceum → Oloptum miliaceum

Achnatherum virescens (*Piptatherum virescens*, *Oryzopsis virescens*)
According to findings of Romaschenko & al. 2011, 2012, nomenclature follows Banfi & al. 2018.
B; N (already in Teyber 1909)**; O; SLO**
Perennial. Indigenous in SLO (at the foothills of Kamniške Alps, N. Jogan, pers. comm.) near the western border of its area, otherwise neophytic, established, not invasive.
Origin: Mediterranean area, Pontic area, Middle East.

Aegilops
A consolidation with *Triticum* is still controversely discussed, even Bordbar & al. (2011) did not succeed in finding convincing arguments for a decision. Following the arguments of Perrino & al. (2014), *Aegilops* was left separately at generic rank. Taxonomy and nomenclature mainly follows van Slageren (1994).

Aegilops biuncialis (*A. lorentii*, *A. biaristata*, *Triticum biunciale*)
VR (van Slageren 1994, Perrino & al. 2014)
Annual neophyte (near the northern border of its natural distribution), ephemeral, not invasive.
Origin: Mediterranean area, Pontic area, Middle East.

Aegilops cylindrica (*Triticum cylindricum*)
B (Barta 2015)**; W** (van Slageren 1994, Essl & Stöhr 2006, Lefnaer 2016)**; N** (Essl & Stöhr 2006)**; ST** (Melzer 1954)**; K; CO; BZ** (9434/3, obs. B. Boisin, 1974: Kiem 1974)**; VR; BL; PO; UD; SLO**
Annual. Possibly indigenous or archaeophytic at the southern and eastern fringe of the Alps, otherwise neophytic, locally established, not invasive.
Origin: Eastern Mediterranean area, Balkans, Pontic area, Central Asia, Middle East.

Aegilops geniculata (*Aegilops ovata* L. p.p., *A. vagans*, *Triticum vagans*, non *T. geniculatum*, *Elymus bungeanus*, *Agropyron geniculatum*)
BG (at Treviglio, 0423/4 and Romano, 0424/3, leg. Rota and Rodegher, PAV)**; BS** (historical records in Pollini 1822, Rota 1853 and Zersi 1871 [Castenedolo, 0527/2]; M. Fratta near Botticino Mattina, 0427/2, obs. Crescini, 1985)**; BZ; UD**
Annual neophyte (near the northern border of natural distribution), naturalized, not invasive.
Origin: Eastern Mediterranean area (Arrigo & al. 2010), spread to the whole Mediterranean area, Caucasus, Middle East.

Aegilops neglecta (*Aegilops ovata* L. p.p., *A. ovata* Roth, nom. illeg., *A. contracta*, *Triticum neglectum*)
BS; TN; VR
Annual. Possibly indigenous at the southern fringe of the Alps, otherwise neophytic, established, not invasive.
Origin: Mediterranean area, Western Central Asia, Middle East.

Aegilops triuncialis (*Triticum triunciale*)
TN; VR; SLO (9459/2: Király & al. 2007)
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Western Central Asia, Middle East.

Aegilops ventricosa (*Triticum ventricosum*)
VR; BL
Annual neophyte, ephemeral, not invasive.
Origin: Western and Southern Mediterranean area, Caucasus.

Agropyron desertorum
W (Titz 1966)**; BZ**
Perennial neophyte, locally established, not invasive. Introduced with seed mixtures for erosion control on extremely dry slopes (Wilhalm 2001).
Origin: Central Asia.

Agropyron pectiniforme (*A. cristatum* subsp. *pectinatum*)
B; W; N; ST; BZ (9434/3, obs. E. Bückle, 1964: Kiem 1974, sub *A. pectinatum*)**; TN; VR**
Perennial. Indigenous in northeastern Austria, otherwise neophytic, locally established, not invasive. Mainly introduced with seed mixtures or seed impurities (Wilhalm 2001).
Origin: Eastern Pannonian area, Central Asia.

Agrostis castellana (incl. the Eastern Mediterranean subsp. *byzantina*)
O (Hohla & al. 1998, Hohla 2012a)**; ST; K** (Melzer 1993)**; NT; BZ** (Wilhalm & al. 2008)**; SLO**
Perennial neophyte, persistent to naturalized (in BZ and SLO near the northern border of its natural distribution), potentially invasive.
Origin: Mediterranean area.

Annotation: ***Agrostis hyemalis*** was occasionally reported from Austria, either confused or synonymized with *Agrostis scabra* (F. Vierhapper, label of a specimen from Lower Austria, LI 104063, Vierhapper 1925, Walter & al. 2002). It is smaller-flowered (*A. hyemalis*: spikelets 1.5–1.7 mm, lemmas 1–1.2 mm, anthers 0.2 mm) with leaves less than 1 mm wide (*A. scabra*: spikelets 2–2.7 mm, lemmas 1.5–1.7 mm, anthers 0.4–0.5 mm, leaves 1–3 mm wide: Kalveram 2016, similar morphometric data in Barkworth & al. 2007). Not any occurrence is verified from the territory. Other European records need critical examination: populations characterized by relatively small flowers, with spikelets only slightly longer than 2 mm led Vollrath & al. (2009) to doubtful records of *A. hyemalis* from Bavaria.

Agrostis scabra
N (surroundings of Gmünd: Hoheneich, Teyber 1909; Kleedorf, leg. F. Vierhapper 1913, WU s.n.; Kamp valley: Stiefern, 7460/3, leg. T. Barta 1998, LI 390105, rev. W. Gutermann: Melzer & Barta 2000)**; O** (7747/1: Hohla 2002, LI 418456, det. M. Štech, conf. W. Gutermann, see Hohla & al. 2009; 7547/2: Hohla 2011b, LI 01133493, rev. W. Gutermann)
Short-living perennial neophyte, ephemeral, not invasive.
Origin: North America.

Aira caryophyllea
B; W [–]; N; O [?] (Hohla & al. 2009)**; ST [–]; OT [–]; S** (8144/3: Stöhr & al. 2012)**; NT** (Innsbruck: Polatschek & Neuner 2013)**; V [–]; CO; LC; SO; BS; BZ; TN; VR**
Annual. Indigenous mainly at the southern and eastern surroundings of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Western Europe, Mediterranean area, Northwest and East Africa.

Aira elegantissima (*A. elegans*, *A. capillaris*)
B; W; N (Melzer & Barta 2005)**; O** (7754/2: Stöhr & al. 2006)**; CO; BG; BS; BZ; TN; VR**
Annual. Possibly indigenous at the southern and southeastern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Alopecurus myosuroides
B; W; N (Melzer & Barta 1993)**; O** (Hohla 2000, Hohla & al. 1998, 2005, 2009)**; ST** (Melzer 1954, 1996c)**; S [–]** (Fischer 1946, Pilsl & al. 2008, Eichberger & al. 2015b)**; NT** (M. Thalinger, pers. obs.)**; OT; V** (8424/3: Dörr & Lippert 2001)**; BAV** (8427/4: Dörr & Lippert 2001)**; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; VI; BL; PO; UD**
Annual. Possibly indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral to established, potentially invasive. In northwestern Europe (Great Britain, France, Germany), herbicide multiresistent *Alopecurus myosuroides* grew up to a major problem in winter crop culture (Maréchal & al. 2012).
Origin: Mediterranean area, Western Central Asia, Middle East.

Alopecurus rendlei (*A. utriculatus*)
W [–]; ST; K; S (Pilsl & al. 2008)**; LC; SO; BG; BS; BZ; TN; VR; BL**
Annual. At the southern fringe of the Alps (northern border of its natural distribution) known since historic times, but nowadays very rare due to habitat loss (e. g. in VF: Prosser, pers. obs.). Elsewhere neophytic, ephemeral to naturalized, not invasive.
Origin: Western Europe, Mediterranean area.

Anthoxanthum aristatum (*A. puelii*)
B; O; ST (Melzer 1954)**; NT [–]; V [–]**
Annual neophyte, locally naturalized, not invasive.
Origin: Western Mediterranean area.

Apera interrupta
B; W (Melzer & Barta 1992, 2005)**; N** (Melzer & Barta 1999)**; O** (Hohla & al. 2000)**; CO; TN** (Kiem 1978; near Ala, obs. Prosser)**; VR**
Annual archaeophyte, locally (TN) neophytic, naturalized, not invasive.
Origin: Mediterranean area, Middle East, Central Asia.

Apera spica-venti
B; W; N; O; ST; K; S; T; V; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR [–]; BL [–]; PO; UD; SLO
Annual archaeophyte (as a crop weed), naturalized, regionally invasive.
Origin: Mediterranean area, Middle East, Central Asia.

Annotation: ***Arrhenatherum elatius*** was introduced, together with several other grassland species, early on with grassland cultivation throughout the territory (Scholz 1975, Hejcman & al. 2013, Roehrs & al. 2013), nowadays increasingly spreading into wasteland. Some unawned cultivars were occasionally reported (e.g. Hohla 2009, Stöhr & al. 2012).

Arundo donax

O (Hohla 2014)**; S** (Pilsl & al. 2008)**; CO; SO; BG; BS; BZ; TN; VR; VI; BL; PO; UD**

Perennial neophyte, locally naturalized at the southern fringe of the Alps, elsewhere locally distributed as rhizome fragments via garden refuse, potentially invasive.

Origin: Western Central Asia, Southern Asia.

Avena

Within the territory, all oat (*Avena*) species are archaeophytic, their ancestors originate from the Middle East. Evolutionary analyses show that there are two centres relevant for the development of cultivated oats in Europe, the Western Mediterranean centre for *A. strigosa* (including Western Europe for *A. nuda* and *A. brevis*), with only diploids and the Western Asian centre for *A. sativa*, up to hexaploids (mainly following Loskutov 2008). Nearly all of the oat taxa were confused in times past, so some historical records will be doubtful. Systematics and taxonomy of the *A. sterilis* group mainly follows Scholz (1991). Hybrids between wild and cultivated oats within the *A. sterilis* group are occasionally reported (e.g. Scholz 1996), but not considered here.

Avena barbata

ST (Melzer 1954)**; NT [–]; V; CO; BG; BS; BZ** (9534/1: Kiem 1974)**; TN; VR; VI; BL; PO; UD**

Annual archaeophyte, ephemeral to persistent, not invasive.

Origin: Middle East, Central Asia.

Avena brevis (*A. nuda* subsp. *brevis*, *A. sativa* subsp. *brevis*)

B [–]: "Unter der Saat auf Äckern bei Eisenstadt gegen St. Margareten und gegen Sopron zu nicht selten" (Pill 1916, primary source of Janchen 1960, probably also of Traxler 1982), no recent confirmation available, but formerly cultivated in Austria (herbarium specimen "Österreich, kultiviert, Hohenacker" cited by Baum 1977).

Annual archaeophyte, ephemeral, not invasive.

Origin: Western Mediterranean area.

Avena fatua

Loskutov (2008) designates it as a separate evolutionary line from *A. sterilis*, besides *A. sativa*, and not as a feral form of *A. sativa*.

B; W; N; O (Hohla & al. 1998)**; ST** (Melzer 1954)**; K; S** (Schröck & al. 2004)**; T; V; BAV; GRB; CO; LC; BG; BS; BZ; TN; VR; BL; VI; PO; UD; SLO**
Annual archaeophyte, as a crop weed, ephemeral, not invasive.
Origin: probably Central Asia, spread to the whole Mediterranean area.

Annotation: ***Avena hybrida*** was frequently ignored (so in Fischer & al. 2008 and Loskutov 2008), confused or treated as a synonym of *A. fatua* itself (so in Conert 1998 and in all databases used here) or of its subsp. *septentrionale* (Scholz 1991). When describing it, Petermann suspected a hybrid of *A. sterilis* and *A. fatua*, but Baum (1977) treated it as a separate species with micromorphological characteristics (shape of lodiculae) similar to *A. sterilis*. Baum (1977) already recorded it from **O** (Aistersheim, ex hb. Keck), Scholz (2002b) recorded it from Germany, later on it was repeatedly found in **O** (Hohla & al. 2005a, Stöhr & al. 2006). Moreover, *A. fatua* is typified with a specimen showing characteristics usually ascribed to *A. hybrida.* A proposal to designate a neotype for *A. fatua* (Baum 1991) was rejected (Brummitt 1994: 114–115). The status of *A. hybrida* and its relationship to either *A. sativa* or *A. fatua* need further investigations – unfortunately *A. hybrida* is ignored in recent molecular genetic studies, e.g. Tomás & al. (2016).

Annotation: ***Avena nuda***, a further diploid historically cultivated mainly in Western Europe, is morphologically well distinguishable from *A. strigosa*, nevertheless Walter & al. (2002) include all historical records of *A. nuda* from Austria in *A. strigosa*. However, Baum (1977) cites one specimen in PRC, originating from "Neosstadt", without any further information. At least, an occurrence, especially in Northern Austria, is possible, but all records need a critical re-evaluation. Records in Fischer & al. (2008) from B, W, N, and S could not be verified.

Avena sativa (incl. *A. orientalis* = *A. sativa* var. *contracta*)
Cultivated crop, but also used for intercropping and erosion control, thus allowing spontaneous growth of feral plants.
B; W; N; O; ST; S; T; V; GRB; BG; BS; BZ; TN; VR; UD; SLO
Annual archaeophyte, ephemeral, not invasive.
Originally cultivated in Central Asia.

Avena sterilis* subsp. *sterilis
BZ; TN; VR; VI
Records of *A. sterilis* not differentiated from subsp. *ludoviciana* come from **W; ST** (Melzer 1954)**; NT; V [–]; CO; BG; BS; PO; UD**
Annual archaeophyte, ephemeral, not invasive.
Origin: probably Central Asia, spread to the whole Mediterranean area.

Avena sterilis* subsp. *ludoviciana
Loskutov (2008) designates it as the direct ancestor of *A. sativa*. Some morphological characteristics are overlapping between subsp. *sterilis* and subsp. *ludoviciana* and complicate reliable determinations.
O (Hohla 2006c)**; BZ; TN; VR**
Annual archaeophyte, ephemeral, not invasive.
Origin: Central Asia.

Avena strigosa (*A. nuda* subsp. *strigosa*)
Formerly cultivated, nowadays rarely used for erosion control, most of the records concern spontaneously growing feral plants.
B; W; N; O (Werneck 1954)**; ST** (Melzer 1954)**; S [?]** (Pflugbeil & Pilsl 2013)**; BZ**
Annual archaeophyte, ephemeral, not invasive.
Origin: Western Mediterranean area.

Beckmannia eruciformis
TN (2013, Luserna, leg. L. Sottovia, hb. Sottovia: F. Prosser, pers. comm.)
Perennial neophyte, ephemeral, not invasive.
Origin: Eastern Mediterranean area, Central Asia.

Beckmannia syzigachne
B [?] (a record in Fischer & al. 2008 could not be verified, see Wallnöfer & Barta 2012)**; N** (Wallnöfer & Barta 2012)**; NT** (Kufstein, Niederndorf: Smettan 2006)
Annual or short-living perennial neophyte, ephemeral, not invasive.
Origin: temperate Asia, North America.

Bothriochloa ischaemum
B; W; N; O (Hohla & al. 1998)**; ST; K; S [–]** (Eichberger & al. 2016)**; NT** (already in Murr 1931); **V [–] BS; BZ; TN; VR; PO; UD; SLO** (most recent record: 9853/2: Mihorič 2016)
Perennial. Indigenous in Europe, regionally neophytic (outside of natural dry habitats, see Pilsl & al. 2008), established, locally invasive.
Origin: Central Europe, Mediterranean area, Central and Southern Asia.

Brachypodium distachyon
ST (Melzer 1954)**; LC** (only one record: P. Rossi, 1929)**; BG; BS** (Kiem 1983)**; TN; VR; UD**
Annual neophyte, ephemeral to naturalized (in VR), not invasive.
Origin: Mediterranean area, North Africa, Middle East, India.

Briza maxima
O (Hohla & al. 2015)**; BG; TN; VR; UD**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, North Africa.

Briza minor
ST [–] (Melzer 1954)**; LC** (Chiarugi 1956)**; TN; VR**
A record from Salzburg (Walter & al. 2002) was falsified by Pflugbeil & Pilsl (2013).
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, North Africa, Middle East.

Bromus
Bromus s. lat. is monophyletic (Saarela & al. 2007) and thus treated further on in the circumscription as in Fischer & al. (2008).

Bromus arvensis (*Serrafalcus arvensis*)
The relationship between *B. arvensis* subsp. *arvensis*, subsp. *segetalis* and subsp. *parviflorus* (characterization in Scholz 2002b) seem to be the same as between *B. secalinus* subsp. *secalinus*, subsp. *grossus* and subsp. *decipiens*, see there.
B (Stöhr & al. 2007)**; W; N; O** (7850/1: Hohla & al. 1998, Kleesadl 2009, 7447/2: Hohla 2011b)**; ST; K; S [–]** (Leeder 1923, Leeder & Reiter 1959)**; NT** (Pagitz & Lechner Pagitz 2015)**; V [–]; BAV** (Dörr & Lippert 2001)**; GRB; CO; BG; BS; BZ; TN; VR; VI; BL; PO; UD; SLO**
Annual archaeophyte, introduced as a crop weed, today very rare in crop cultures, but occasionally found in wastelands, ephemeral, not invasive.
Origin: Middle East.

Bromus briziformis Fischer & C.A. Meyer 1837, Index Sem. Hort. Petrop. 3, No. 299: 30 as *B. brizaeformis* (*Serrafalcus briziformis*; non "*B. brizaeformis* Willk." in Willkomm & Lange 1861, Prodr. Fl. Hispan. 1: 101 = *B. squarrosus*)
ST [–] (Melzer 1954, but no further observations)
Annual neophyte, cultivated as an ornamental grass, ephemeral, not invasive.
Origin: Caucasus, Iran.

Bromus carinatus (*Ceratochloa carinata*)
Member of an intricate group, see *B. sitchensis* for details.
W; O; ST (Melzer 1989, 1995)**; K; S** (Pilsl & al. 2008)**; NT** (Pagitz & Lechner Pagitz 2015)**; V; BG; BS; BZ; TN; VR; BL; PO**
Mainly distributed as a seed contamination in landscaping and road embankment maintenance.
Annual or short-living perennial neophyte, ephemeral, locally persistent, not invasive.
Origin: Western North and Central America.

Bromus catharticus (*B. unioloides*, *B. willdenowii*, *Ceratochloa cathartica*)
W (Diran 2016)**; N; ST** (Melzer 1954)**; K; S** (Schröck & al. 2004, Eichberger & al. 2015b)**; NT** (Murr 1931)**; OT; V; FL; CO; BG; BS; BZ; BL; PO; UD**
Mainly distributed as a seed contamination in landscaping.
Annual or short-living perennial neophyte, ephemeral, locally persistent, locally invasive.
Origin: Central and South America.

Bromus diandrus (*Anisantha diandra*, *B. gussonei*, *Zerna gussonei*)
Polymorphic. Often confused with *B. rigidus* (Wilhalm & Pagitz 2001), various morphotypes are not correlated with one of these taxa (Veldkamp 1991).
O (7646/3, Hohla 2006b)**; ST [–]; K [–]** both historical records of forage aliens, no recent confirmation; **T** (Wilhalm & Pagitz 2001)**; V; CO; BG; BS; BZ; TN; VR; BL; PO**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive, possibly introduced with feedingstuff from Central Italy (Wilhalm 2001).
Origin: Mediterranean area, Middle East.

Bromus hordeaceus
Bromus hordeaceus is an insufficiently known, polymorphic species with several infraspecific taxa, divergently treated in some territorial units, some with unclear origin (subsp. *longipedicellatus*, subsp. *pseudothominei*), but all of them probably best placed on rank of subspecies. Details in Portal (2004) and Scholz (2008a).

Annotation: ***Bromus hordeaceus* subsp. *hordeaceus*** (incl. subsp. *bicuspis*) is an indigenous (or archaeophytic) taxon, distributed throughout the territory, with several, slightly different, but insufficiently recognized populations. One of them, tall grown, was newly described from Upper Austria as a "neo-anecophyte", subsp. *bicuspis* (Scholz & Hohla 2008). It needs further investigation, even rank of subspecies is probably not supported.

Bromus hordeaceus* subsp. *lepidus (*B. lepidus*, *B. gracilis* Krösche, non Leysser, non Weigel, incl. *B. incisus*)
Bromus incisus, newly described from Bavaria and also recorded from Upper Austria, Raab (7647/2), in a seed production company (Scholz 2008a) seems to represent only tall-grown populations of *Bromus hordeaceus* subsp. *lepidus.*
W [–]; O (7746/4: Hohla 2009)**; ST** (Melzer 1961)**; NT [?]** (Aeschimann & al. 2004, highly doubtful, as neither cited with its original reference nor confirmed elsewhere)**; BZ; TN**
Annual neophyte, persistent, not invasive.
Origin: Western Europe.

Bromus hordeaceus* subsp. *longipedicellatus (incl. var. *parviglumis*)
Recently described from Great Britain: Spalton (2001)
O (Scholz & Hohla 2008, Hohla 2011b)
Annual neophyte, persistent, not invasive.
Origin: Probably Western Europe.

Bromus hordeaceus* subsp. *molliformis (non *B. hordeaceus* subsp. *mediterraneus* = subsp. *divaricatus* auct.: Scholz 2008b)
This taxon needs critical re-evaluation and delimitation from subsp. *mediterraneus* (Scholz 2008a, Portal 2004).
TN; VR (historical records by Goiran 1897–1904)
Annual neophyte, persistent, not invasive.
Origin: Western Mediterranean area, Western Europe.

Bromus hordeaceus* subsp. *pseudothominei
First treated as a hybrid between subsp. *hordeaceus* and subsp. *lepidus*, but probably resulting from introgression, followed by distribution with commercial seed. Original material came from cultivated grassland in Great Britain (Scholz 1970).
B; W (Melzer & Barta 2008)**; N** (Melzer & Barta 1999)**; O** (Hohla & al. 1998, det. H. Scholz, Hohla & al. 2000, Kleesadl 2009)**; ST; K** (Melzer 1998)**; S** (Pilsl & al. 2008, Wittmann & Pflugbeil 2017)**; T; V** (Dörr & Lippert 2001)**; BZ** (Wilhalm & al. 2005)
Annual anecophyte, established, not invasive.
Origin, time and pathway of introduction unknown.

Bromus hordeaceus* subsp. *thominei
B (Melzer & Barta 2005)**; NT [?]** (Maier & al. 2001, but highly doubtful)
Annual neophyte, ephemeral, not invasive.
Origin: coastlines of Western Europe.

Bromus inermis* subsp. *inermis (*Bromopsis inermis*, *Zerna inermis*)
B; W; N; O; ST; K; S; T; V; FL; BAV; GRB; CO; BG; BS; BZ; TN; VR; BL; PO; UD; SLO
Perennial. Indigenous in Europe, in inneralpine valleys, as already recorded by Murr (1931) from the surrounding of Innsbruck and later on by Wilhalm (2001) from BZ and Prosser & Bertolli (2015) from TN, rapidly spreading as a regional neophyte. Established to naturalized, regionally highly invasive.
Origin: Eurasia.

Bromus inermis* subsp. *pumpellianus (*B. pumpellianus*, *B. arcticus*, *B. sibiricus*, *Bromopsis pumpelliana*, *Zerna pumpelliana*)
Asian–North American vicariant of *B. inermis*. They have overlapping distribution areas in Asia (distribution map in Conert 1998) and records of transitional forms as a result of possible hybridization and hybridogenic introgression (Elliott 1949) substantiate, according to Wagnon (1952), a treatment as subspecies. Confusable with several *B. inermis* cultivars for agricultural use.
W [?] (Diran 2016, no herbarium specimen available), **O** (7943/4: Hohla 2009)**; S (**hb. P. Pilsl: Hohla 2009**); OT [?]** (O. Stöhr, 2017, ined.)
Collections from Upper Austria and Salzburg were revised by H. Scholz, but it is evident, that "*B. pumpellianus*-like" plants often represent only *B. inermis* cultivars of undocumented origin (U. Amarell, pers. comm.). On the other hand, an occurrence of this species of cool-temperate climatic regions just in Vienna, at the abandoned "Nordbahnhof" area, as reported by Diran (2016) seems to be particularly doubtful, although several distinctive characteristics are discussed.
Perennial neophyte, ephemeral, not invasive.
Origin: Temperate Asia, North America, mainly Canada.

Bromus japonicus (*Serrafalcus japonicus*)
B; W; N; O (Hohla 2002, Hohla & al. 2005a, Kleesadl 2009)**; ST** (Melzer 1954, 1995)**; K** (Melzer 1996a)**; S** (Reiter 1952, Pilsl & al. 2008, Stöhr & al. 2012)**; NT** (Pagitz & Lechner Pagitz 2015)**; V [–]; GRB; BG; BS; BZ; TN; VR; VI; BL; UD**
Subsp. *subsquarrosus* (*B. japonicus* var. *porrectus*, *B. japonicus* var. *transsilvanicus*) was additionally recorded from **BZ** (St. Georgen near Bolzano, 1998, leg. T. Wilhalm, BOZ) and **TN** (F. Prosser, pers. comm.).
Annual. Indigenous in Europe. In inneralpine valleys as a regional neophyte, naturalized, not invasive.
Origin: Southeastern Europe, Eastern Mediterranean area, Central Asia. Early introduced in Japan (as already implied by its epitheton).

Bromus lanceolatus (*B. macrostachys*, *Serrafalcus lanceolatus*, *Zerna macrostachys*)
ST (Melzer 1981)**; BZ** (Wilhalm & al. 2007)
Annual neophyte, ephemeral, not invasive. Occasionally cultivated as ornamental plant.
Origin: Mediterranean area, Western Central Asia, Middle East.

Bromus madritensis (*Anisantha madritensis*, *B. villosus* Forssk., non Scop.)
ST (Melzer 1954, 1996c)**; NT; CO; LC; BG; BS; BZ; TN; VR; VI; BL; PO; UD**
Mainly distributed with transport of Mediterranean fruits.
Annual neophyte, locally naturalized at the southern fringe of the Alps, elsewhere ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Bromus pannonicus (*Bromopsis pannonicus*, *Zerna pannonicus*)
Details on distinctive characteristics can be found in Melzer (1981).
B (Melzer 1984)**; N; ST** (Melzer 1981)**; TN** (Prosser & Bertolli 2015, annotation at *B. inermis* page)
Intentionally introduced in Val di Sole with seed mixtures; few large, persistent patches, mainly at roadsides (F. Prosser, pers. obs.). Possibly more frequent.
Perennial. Indigenous in Eastern Austria, in TN recorded as neophytic, ephemeral, not invasive.
Origin: southeastern Europe.

Bromus racemosus **subsp. *lusitanicus***
B (Scholz & Hohla 2008)**; O** (Scholz & Hohla 2008)
Annual. Seems to be an archaeophytic, widespread variety of *B. racemosus* in cultivated grassland. Needs further investigation to support its subspecies rank. Established, not invasive.
Origin, time and pathway of introduction unknown.

Bromus rigidus (*Anisantha rigida*, *Genea rigida*, *B. maximus*)
Confusable with *B. diandrus* (Wilhalm & Pagitz 2001). Records from BG and BS in Aeschimann & al. (2004) were recognized as erroneous: Martini & al. (2012).
UD
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Bromus riparius (*Bromopsis riparius*, *Zerna riparia*)
O (Hohla & al. 2015)**; S** (Hohla 2011a: 8544/4, det. H. Scholz)**; GRB**
Perennial neophyte, ephemeral, not invasive.
Origin: Eastern Mediterranean area, Eastern Europe, parts of Central to Eastern Asia.

Bromus secalinus (*Serrafalcus secalinus*)
Bromus secalinus is one of the archaeophytic crop weeds introduced with crop species and closely associated with their cultures and cultivation techniques. This fact results in a co-evolution mainly driven by selection of caryopse size enlargement in accordance with grain size. Thus, *B. secalinus* caryopses were no longer removed during seed cleaning. This process is also observable with other taxa, e. g. *B. arvensis*.

In modern seed separation processes, together with changing agricultural techniques, such a selection process is no longer effective, and mainly a trend to smaller caryopses is observable in recent times, enhancing the similarity of these plants to their ancestry. Consequently, Bomble & Scholz (1999) described a "subsp. *decipiens*" and discussed a hypothesis on their origin as a "secondary weed" for only a simple ferality process. In some characteristics subsp. *decipiens* resembles *B. commutatus*, the closest indigenous relative of *B. secalinus* (for differentiation characteristics see Spalton

2002). For this reason, Scholz changed his mind and transferred his subsp. *decipiens* to *B. commutatus* (Scholz 2003), but there are no stringent criteria for this argumentation. In contrast to *B. commutatus*, *B. secalinus* is much more variable in its morphological and ecological characteristics, nowadays frequently occupying various wasteland with such smaller-shaped, smaller-flowering and -fruiting plants. Thus subsp. *decipiens* will be still treated under *B. secalinus*, together with subsp. *velutinus*, representing the opposite trend of maximum adaptation to cultivated crop, as with *B. arvensis* subsp. *segetalis*, for example (see Scholz 1970: 145 and Scholz 2008b: 4).

B; N; O (Kleesadl 2017)**; ST; S; T; V [–]; BAV** (Dörr & Lippert 2001)**; GRB; LC; BG; BS; BZ; TN; VR [–]; BL [–]; PO; UD; SLO**

Subsp. *decipiens* was recorded from **B** (Melzer & Barta 2008)**; N** (Gilli 2018b)**; O; ST; S** (Stöhr & al. 2009)**; NT** (Pagitz & Lechner Pagitz 2015)**; BZ; UD**

Subsp. *velutinus* (*B. grossus*, *B. secalinus* subsp. *grossus*, see Holub 1983) was recorded from **B [–]; N; O [–]; ST; V [–]; FL [–]; BG [?]; BS [?]** (the last two entries by Aeschimann & al. 2004 are highly doubtful, not cited with its original reference or confirmed elsewhere)

Annual archaeophyte, as a crop weed, today nearly extinct in crop cultures, but expanding to wastelands, ephemeral, not invasive.

Origin: Middle East.

Bromus sitchensis (*Ceratochloa sitchensis*)

Bromus sect. *Ceratochloa* in the New World covers two easily distinguishable groups, the octoploid North to Central American "*B. carinatus* complex" characterized by lemmas with mainly 7(–9) flat vascular bundles ("nerves") and the hexaploid South to Central American *B. catharticus* group characterized by lemmas with 9–11 prominent vascular bundles. Within the predominantly cleistogamous "*B. carinatus* complex" all attempts of morphological differentiation were of limited success, as well as all taxonomic concepts, varying from distinct species (Pavlick 2003) to varieties (Brainerd & al. 2016). *Bromus sitchensis* has priority on species rank, for other taxa on species rank several names were used, in Europe traditionally *B. carinatus* only (e.g. Verloove 2006, also in Fischer & al. 2008). Later on, Verloove (2012) presented a concept with two species notable for Europe, *B. sitchensis* with broad leaves and long, drooping panicle branches with spikelets at the tips of the branches and *B. carinatus* with narrow leaves and short, mainly erect panicle branches with spikelets also on shorter side-branches. Both names are used here in Verloove's sense, but one must keep in mind, that on species rank, *B. luzonensis* will have priority over *B. carinatus*, if the origin of its type and its conspecificity with *B. carinatus* are confirmed (Saarela & al. 2014). The whole "carinatus complex" needs a critical re-evaluation, a species rank for all of its members is not sufficiently supported.

Bromus sitchensis seems to be the most frequently occurring taxon in Central Europe (Verloove 2012) and all former *B. carinatus* records need a critical revision, whereas in South Tyrol, *B. sitchensis* is the less frequent species (Wilhalm & al. 2017).

O (Hohla 2012a, confirm. F. Verloove; Kleesadl 2017)**; BG; BS** (confusion with *B. carinatus* not completely excluded)**; BZ; TN; VR; BL**
Mainly distributed as a seed contamination in landscaping and road embankment maintenance.
Annual or short-living perennial neophyte, ephemeral, locally persistent, locally invasive.
Origin: Western North and Central America.

Calamagrostis brachytricha (*C. arundinacea* var. *brachytricha*, *C. varia* var. *longiaristata*, *Deyeuxia brachytricha*)
East Asian vicariant of *C. arundinacea* characterized by Tateoka (1969), placed within a subclade including *C. arundinacea* (Saarela & al. 2017), semiapomictic, with apomictic aneuploids as well as fertile hexaploids used in commercial gardening. Ornamental grass ("Diamond grass"), nowadays frequently used in ornamental gardening, mainly offered as "*Achnatherum brachytrichum*" or "*Stipa brachytricha*".
W (2017, leg. P. Englmaier, in abandoned public green areas, previously not known in the wild all over the territory)
Perennial neophyte, persistent. Observed so far only as a garden escape, not really spontaneous. No data available on its possible invasiveness, but some cultivars are known as easily germinating and thus commercially grown from seed (M. Münch, pers. comm.). Potentially growing in the wild in areas with cool and humid summers, even in slightly shaded stands. Highly confusable with native *Calamagrostis*, mainly *C. arundinacea*, so possibly overseen and thus undiscovered up to now.
Origin: Eastern Asia, in deciduous woodland (Krestov & al. 2006).

Catapodium balearicum (*C. marinum* var. *balearicum*)
Species rank possibly not supported, for characteristics see Brullo & al. (2003).
TN; VR
Annual neophyte, ephemeral, not invasive.
Origin: (Western) Mediterranean area.

Catapodium rigidum (*Scleropoa rigida*, *Desmazeria rigida*)
W (Barta 2018a)**; O** (7950/3: Kleesadl 2017)**; ST [–]** (Melzer 1954)**; S** (Stöhr & al. 2009)**; BG; BS** (Kiem 1983)**; BZ [–]** (Kiem 1974)**; TN; VR; BL; PO; UD**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area.

Cenchrus
Molecular genetic data suggest an inclusion of *Pennisetum* into *Cenchrus* (Chemisquy & al. 2010). Due to ambiguous use of some common epitheta on species rank, several nomenclatural changes are necessary.

Cenchrus americanus (*Panicum americanum*, *Pennisetum glaucum*, non *Cenchrus glaucus*)
Tropical crop ("Pearl millet"), for 4500 years cultivated in western Africa and soon spread to Southern Asia (Veldkamp 2014). Mainly distributed with bird seed.
VR
Annual neophyte, ephemeral, not invasive.
Origin: Tropical Africa (Veldkamp 2014).

Cenchrus flaccidus (*Pennisetum flaccidum*, *P. centralasiaticum*)
BZ (Wilhalm & al. 2014)
Perennial neophyte, ephemeral, not invasive.
Origin: Central and East Asia.

Cenchrus longisetus (*Pennisetum villosum*, *Cenchrus villosus*)
BG; VR
Perennial neophyte, ephemeral, not invasive.
Origin: Eastern Africa, South Arabian peninsula (Veldkamp 2014).

Cenchrus macrourus (*Pennisetum macrourum*)
S (8344/2: Stöhr & al. 2007)
Perennial neophyte (in temperate Europe rarely overwintering), ephemeral, not invasive.
Origin: South Africa.

Cenchrus purpurascens Thunb., in Trans. Linn. Soc. London 2: 329, 1794 (*Pennisetum alopecuroides*, *Panicum alopecuroides* L., non *Cenchrus alopecuroides* Thunb., Prodr. Pl. Cap. 1: 24, 1794)
Frequently cultivated as an ornamental clump grass, especially in public areas. Scarcely spreading, thus mainly found in abandoned public cultivations or as garden refuse, but not really spontaneous.
W (Gilli 2016a)**; N** (Hohla & al. 2015)**; O** (Hohla 2002, 2006a, 2006c)**; ST** (Stöhr & al. 2009)**; BZ** (Wilhalm & al. 2014)
Perennial neophyte, persistent, not invasive.
Origin: Southeastern Asia, Japan, Australia (Veldkamp 2014).

Cenchrus spinifex (*C. incertus*, *C. pauciflorus*)
ST [–] (Graz, Melzer 1954, only one observation)**; VR**
Perennial neophyte, ephemeral, in VR naturalized, not invasive in the territory, but highly invasive in sandy habitat types, e.g. in the Pannonian basin.
Origin: Central and South America (Verloove & Sánchez Gullón 2012).

Chrysopogon gryllus
B; N; CO; SO; BG; BS; BZ (Kiem 1978)**; TN; VR; VI; PO; UD; SLO**
Perennial. Indigenous at the southern and eastern fringe of the Alps, elsewhere neophytic, ephemeral to persistent, not invasive.
Origin: Mediterranean, Pannonian and Pontic area, Middle East, Southern Asia.

Cleistogenes serotina (*Kengia serotina*, *Diplachne serotina*)
B; N; NT (Murr 1931, Handel-Mazzetti 1964, Hölzel 1996; treated as extinct for NT in Maier & al. 2001)**; CO; LC; BG; BS; BZ** (Kiem 1974)**; TN; VR; VI; BL; PO; UD**
Perennial. Possibly indigenous at the southern and eastern fringe of the Alps, elsewhere neophytic, ephemeral to established, not invasive.
Origin: Northern Mediterranean area, Pannonian area, Western Central Asia.

Coix lacryma-jobi
N (7459/4: Essl 2003)**; O** (7448/3: Hohla 2018)**; TN; VR**
Annual neophyte, ephemeral (both records from Austria not really spontaneous, as short-distance garden escapes), not invasive.
Origin: Southeastern Asia.

Cortaderia selloana
Ornamental grass, dioecious, mainly females vegetatively breeded (Jelitto & al. 2002), but also cultivated and distributed as seedlings, so spontaneous growth of feral plants is possible, in the Mediterranean area locally invasive (B. Knickmann & M. Münch, pers. comm.).
BS (0027/2)**; TN; VR**
Perennial neophyte, ephemeral, not invasive.
Origin: Temperate South America.

Cynodon dactylon (*Panicum lineare* L., non Krock.)
B; W; N; O (Hohla & al. 1998, Hohla 2012a)**; ST; S** (8344/4: Hohla & Melzer 2003, Pilsl & al. 2008)**; NT** (already in Murr 1931)**; OT** (Stöhr & Brandes 2014)**; V [–]; FL; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; PO; UD; SLO** (Jogan 2014)
Perennial, in Eastern Austria as an archaeophyte, otherwise neophytic, established to naturalized, potentially invasive. Mainly introduced with seed material.
Origin: subtropical Africa and Asia, extending to the Mediterranean area and to Central Asia.

Cynosurus echinatus
W [–]; N; O; ST (Melzer 1954)**; K; S [–]** (Pilsl & al. 2008)**; T [–]** (already in Murr 1931)**; BAV** (8237/2)**; GRB; CO; LC; BG; BS; BZ; TN; VR; UD**

Annual neophyte, ephemeral or established, not invasive.
Origin: Mediterranean area, Middle East.

Dasypyrum villosum (*Haynaldia villosa*)
W; ST (Melzer 1954)**; K; BG; BS; BZ** (Kiem 1983)**; TN; VR** (first recorded by Pollini 1822: 93, sub nom. *Secale villosum*, recently observed in several places)**; BL; UD**
Annual neophyte, persistent, not invasive.
Origin: Eastern Mediterranean area, Balkans, Pontic area, Caucasus.

Desmazeria rigida → Catapodium rigidum

Dichanthelium acuminatum (*Panicum acuminatum*)
V (delta of river Rhine, degraded areas, observed since 2008: Aschauer & Grabher 2017)
Perennial neophyte, locally naturalized, locally highly invasive.
Origin: North and Central America.

Digitaria ciliaris
In historical records, *D. sanguinalis* subsp. *pectiniformis* was occasionally named as *D. ciliaris* (Wilhalm 2001).
ST; K; S (City of Salzburg: Fischer 1946, Vigaun, 8344/2, confirm. T. Wilhalm: Pflugbeil & al. 2017)**; BS; BZ** (Wilhalm 2001)**; TN; VR; BL**
Annual neophyte, ephemeral, not invasive.
Origin: Africa, Southeastern Asia.

Digitaria filiformis
NT (Murr 1931, doubtful: no informative description, no herbarium sheet cited)
Generally, historical records of *D. filiformis* are doubtful, as confusion with *D. ischaemum* frequently occurred. For that reason, some records are excluded here. In Neilreich (1859: 33) for example, the description clearly refers to *D. ischaemum*.
Annual neophyte, ephemeral, not invasive.
Origin: Southern North America, Central Andes mountains.

Digitaria ischaemum (*Panicum lineare* Krock., non L.)
B; W; N; O; ST; K; S; T; V; BAV (8527/2, Altstädten, railway station: Dörr & Lippert 2001)**; GRB; BG; BS; BZ; TN; VR; BL; PO; UD; SLO**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, persistent, regionally invasive. Mainly occurring in maize fields, but also in rural surroundings and along country lanes (Wilhalm 2001).
Origin: Southern Europe, Central and Southeastern Asia.

Digitaria sanguinalis* subsp. *sanguinalis
B; W; N; O (Hohla & al. 1998)**; ST; K; S; T; V; FL; BAV** (8138/4)**; BG; BS; BZ; TN; VR; BL; VI; PO; UD; SLO**
Annual neophyte, established, locally invasive. Mainly occurring in maize fields.
Origin: Mediterranean area, Central and Southeastern Asia.

Digitaria sanguinalis* subsp. *pectiniformis
Possible confusion with *Digitaria ciliaris* in historical records (Wilhalm 2001).
B; W; N; O (herbarium specimen by M. Hohla, rev. T. Wilhalm, Hohla & al. 2009), Stöhr & al. 2012, Hohla 2016)**; ST; K; S (**Stöhr & al. 2012)**; NT** (Smettan 2012)**; OT** (Pagitz & Lechner Pagitz 2015)**; V; BZ; TN; VR; BL; SLO** (9856/3: Jogan 2014)
Annual neophyte, locally persistent or established, locally invasive.
Origin: Mediterranean area, Central and Southeastern Asia.

Digitaria setigera
O (7744/4, det. H. Scholz: Hohla 2011a)
Annual neophyte, ephemeral (not really spontaneous), not invasive. Status similar to a relative, *D. radicosa*, newly discovered in Corse (Verloove 2008).
Origin: East Africa, Southern Asia.

Digitaria violascens
For differentiation between *D. ischaemum* and *D. violascens* see Verloove (2008).
BG (0525/1, det. F. Verloove: Martini & al. 2012)**; BL**
Annual neophyte, ephemeral, not invasive.
Origin: Southern Asia.

Dinebra retroflexa
TN [–] (Trento, only some time after the Second World War: Dalla Fior 1955)
Annual neophyte, ephemeral, not invasive.
Origin: Africa, Middle East, India.

Echinochloa colona
Wild relative of *E. frumentacea* (Yamaguchi & al. 2005).
W; ST (Melzer 1961)**; K; BAV** (only one single record in the Allgäu region: 8427/4: Dörr & Lippert 2001) and along their southern fringe, but not inside of the Alps (G. Galasso, pers. comm.)
Annual neophyte, ephemeral, not invasive.
Origin: Africa, Southern Asia.

Echinochloa crus-galli

Wild relative of *E. esculenta* (Yamaguchi & al. 2005, incl. subsp. *spiralis* and var. *submutica*).

B; W; N; O; ST; K; S (Hohla & Melzer 2003: subsp. *spiralis*)**; T; V; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; VI; PO; UD; SLO**

Annual. Archaeophytic, persistent to naturalized (possibly indigenous at the southern fringe of the Alps), locally invasive. Mainly occurring in maize fields.

Origin: Mediterranean area, Southern Africa, Central and Southern Asia.

Echinochloa esculenta (*E. utilis*)

Formerly confused with *E. frumentacea* by some Japanese authors, see Ohwi 1962).

Cultivated relative of *E. crus-galli.*

W (Melzer & Barta 1999)**; N; O** (Hohla 2001)**; ST; K** (Melzer 1989)**; S** (Schröck & al. 2004, Pilsl & al. 2008)

Annual neophyte, ephemeral to persistent, not invasive. Mainly distributed with bird seed (Melzer 1985).

Originally cultivated in Southeastern Asia.

Echinochloa frumentacea (cultivated relative of *E. colona*)

W (Melzer & Barta 1999)**; O** (Hohla 2000)**; ST; K** (9352/3: Melzer 1989)**; S** (Schröck & al. 2004, Pilsl & al. 2008)**; NT; V; BAV** (sparsely recorded in the Allgäu region: 8427/4, 8527/4: Dörr & Lippert 2001)**; BZ** (Wilhalm & al. 2006)

Annual neophyte, ephemeral to persistent, not invasive. Mainly distributed with bird seed.

Originally cultivated in India.

Echinochloa muricata

Wiegand (1921) described several varieties, especially var. *microstachya*, here all included in *E. muricata*.

O (8150/2: Hohla & al. 1998, Hohla 2001, 2002)**; ST** (Melzer 1996c)**; S** (Pilsl & al. 2008)

Annual neophyte, ephemeral to to persistent, potentially invasive.

Origin: North America.

Echinochloa oryzoides

S [–] (Fritsch 1891. No more observations). Presumably outside of the Alps, along their southern fringe (G. Galasso, pers. comm.).

Its occurrence was marked as doubtful in Pflugbeil & Pilsl (2013), but Fritsch (1891) clearly differentiates between *Echinochloa crus-galli* and *E. oryzoides*, the latter with a synonym: "*Panicum crus-galli* var. *aristatum* auct.", meaning a common use by various authors, but not Pursh; *Panicum crus-galli* var. *aristatum* Pursh is quoted as conspecific with *E. crus-galli* (s. str.). A local, spontaneous and ephem-

eral occurrence is possible, as several cultivars of *Echinochloa* species, among them *E. oryzoides*, were historically cultivated in the surroundings.
Annual neophyte, ephemeral, not invasive.
Origin: Central and Southeast Asia.

Annotation: ***Echinochloa hispidula***, sometimes improperly treated as a synonym of *E. oryzoides* and of the same origin, is presumably found outside of the Alps, along their southern fringe (G. Galasso, pers. comm.). For differential characteristics see Costea & Tardif (2002).

Echinochloa turneriana
O (7847/1, det. H. Scholz, Hohla 2011a).
Annual neophyte, ephemeral (seems to be a single occurrence from seed introduced with goods transportation), not invasive.
Origin: Australia.

Eleusine indica
W, N; ST (9260/4, Mureck: Melzer 2000; Andritz, 2017: obs. S. Leonhartsberger)**; CO; SO** (Val Bregaglia: Borgonuovo di Piúro, 440 msm, T. Wilhalm & P. Englmaier pers. obs., 2017)**; BG; BS; BZ** (Kiem 1974 as rapidly spreading)**; TN** (Prosser & Bertolli 2015)**; VR; BL; PO; UD; SLO** (9954/2: Jogan 2012)
Subsp. *africana* is evident in **N** by a single herbarium specimen from Mannswörth, 7864/4, 12. 10. 1969, leg. W. Forstner, W: Wallnöfer 2014)
Annual neophyte, ephemeral to established, regionally invasive.
Origin: Africa, Middle East, Southern Asia.

Eleusine tristachya
W (7763/4, 4. 8. 1983, leg. M. Strudl, W: Wallnöfer 2014)**; ST** (Graz: Melzer 1983, still present there, at Franziskanerplatz, 8958/2, leg. & det. M. Hohla, 2014, LI 01313185)
Short-living perennial neophyte (sometimes first flowering in the year of germination), ephemeral, not invasive.
Origin: South America.

Elymus athericus (*Elytrigia atherica*)
N; O (Hohla 2002)**; K** (Melzer 1994, herbarium H. Melzer/LI); **NT; BS; BZ; TN; VR; BL; PO; UD**
Hohla & Scholz (2011) verified records from Austrian federal states and from the province of Bolzano.
Perennial neophyte, ephemeral, not invasive.
Origin: Western European and Mediterranean coastlines, Asia minor, Middle East.

Elymus canadensis
O (only one single observation: Linz, Ruderalboden, 1894, leg. J. Murr, det. E. Hackel, confirm. H. Scholz 2009, LI: Murr 1894)
Perennial neophyte, ephemeral, not invasive.
Origin: North America.

Elymus elongatus* subsp. *ponticus (*E. obtusiflorus*, *E. ponticus*)
Although the taxonomy of the whole *Elymus*-*Elytrigia*-complex is unclear (see Mason-Gamer 2013) and no data on molecular genetics of these taxa are available, a species rank for both *E. elongatus* and *E. obtusiflorus* (as in Euro+Med plantBase, Valdés & Scholz 2006) is not supported. In most other databases, they are merged into only one taxon. Thus, *E. obtusiflorus* is treated here on subspecies rank, annotating this group for further investigations.
B (Hohla & al. 2015)**; W; N** (Diran 2016 sub nom. *E. obtusiflorus*, tries to distinguish between *E. obtusiflorus* and *E. elongatus*, no herbarium specimen available)**; O** (Hohla 2011a, Hohla & al. 2015)**; K; BZ** (Wilhalm & al. 2003)**; TN** (Bertolli & Prosser 2014 sub nom. *Elytrigia obtusiflora*)**; UD**
Perennial neophyte, ephemeral to persistent, not invasive.
Origin: Mediterranean, Pannonian and Pontic area, Middle East, Western Central Asia.

Elymus hystrix (*Hystrix patula*, *Hordeum hystrix* (L.) Schenck, nom. illeg., non Roth)
O (Hohla 2014)
Perennial neophyte, ephemeral, not invasive.
Origin: Eastern and Central North America.

Eragrostis
Eragrostis, with one crop species (*E. tef*) and many closely related, similar and confusable taxa, is a rather complicated genus. Due to the lack of reliable characteristics, some micromorphological details were already considered and may be of increasing interest (e.g. Giraldo Cañas & al. 2012, Wróbel & al. 2017). Several determinations, especially of rare and newly recognized species, even if performed by specialists, are doubtful and need a critical re-examination. This genus needs a comprehensive and critical revision.

Eragrostis albensis (repeatedly treated as a synonym of *E. pilosa*)
First recognized from shores of rivers Elbe and Oder (Scholz 1995). First actually known evidence in Europe from Warsaw, 1947 (Scholz & Ristow 2005).
W (Diran 2016, Hohla & al. 2016)**; O** (7755/3, det. H. Scholz, Hohla & Kleesadl 2006)**; K** (Stöhr & Brandes 2014)**; S** (Pflugbeil & Pilsl 2013)**; NT** (Pagitz 2012, but this population may possibly be identical with *E. amurensis*, as reported by Hohla 2013)**; OT** (Stöhr & Brandes 2014)
Annual. Ephemeral to persistent. Not invasive in the territory, but estimated as regionally invasive in the Polish Carpathians (Zając & al. 2011).

Origin, time and pathway of introduction unknown. Possibly conspecific with *E. imberbis* from the Russian Far East, meanwhile well-established as an alien in European Russia (Seregin 2012).

Eragrostis amurensis (incl. *E. voronensis*)
O (7744/1 and 7744/2, confirm. F. Verloove: Hohla 2013)
Annual neophyte, ephemeral, not invasive at present.
Origin: Temperate Asia, seems to be rapidly spreading to Eastern Europe.

Eragrostis barrelieri
BS; BZ (Wilhalm & al. 2014)**; TN; VR; UD**
Annual neophyte, ephemeral, not invasive.
Origin: Western Mediterranean area, North Africa, Asia minor, Middle East.

Eragrostis cilianensis (*E. megastachya*)
B; W; N; ST (Melzer 1954, 1959: 84)**; K; NT [–]** (Pagitz 2012)**; V [?]** (a record in Fischer & al. 2008 could not be verified)**; CO; LC; BG; BS; BZ** (decreasing: Kiem 1974 considered it as lost, but some stands remained: Wilhalm 2001)**; TN; VR; UD**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, locally invasive.
Origin: Mediterranean area, Africa, Central and Southern Asia.

Eragrostis curvula
W; BZ
Annual neophyte, ephemeral to established, not invasive.
Origin: Southern Africa.

Eragrostis frankii
NT (Pagitz 2012)**; BS; BZ [?]** (determination by H. Scholz may be doubtful)**; TN** (Bertolli & Prosser 2014)**; BL; PO; UD** (Melzer 1988)**; SLO** (Melzer 1988, 1996b)
Annual neophyte, ephemeral to persistent, not invasive.
Origin: Eastern North America (Koch 1974).

Eragrostis mexicana (incl. *E. neomexicana*)
ST, as Nr. 194 in Melzer (1954: 116), with the only additional information "Bahnhof Puntigam, 1949". Hohla (2006a) argued for confusion with *E. pectinacea*, citing a specimen of undoubted *E. pectinacea* from the same locality (leg. W. Burri, 14. 8. 1949, LI), but Melzer himself (1959: 84) had revised his determination to *E. diffusa* (see *E. pectinacea*), together with a new record of *E. mexicana* (sub nom. *E. neomexicana*) from Graz (Melzer 1959).
Annual neophyte, ephemeral, not invasive.
Origin: Central and South America, scattered in southern North America.

Eragrostis minor (*E. poaeoides*)
B; W; N; O; ST (leg. Heinrich, in Fritsch 1923)**; K; S** (Reiter 1952, Schröck & al. 2004)**; NT** (Pagitz 2012)**; OT; V; FL; BAV; GRB; CO; LC; BG; BS; BZ; TN; VR; VI; BL; PO; UD; SLO**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, persistent to established, regionally invasive.
Origin: Mediterranean area, Central and South Asia, scattered in Northern and Eastern Africa.

Eragrostis multicaulis (*E. damiensiana*, *E. peregrina*)
W (Hohla 2013)**; N** (Hohla 2006a)**; O** (7647/4, Hohla 2006b)**; ST** (Melzer 1954, 1959: 84, 8958/2: Melzer 1989)**; K** (Melzer 1999: 26)**; S** (8444/2: Hohla & Melzer 2003, Schröck & al. 2004, both partially confused with *E. pilosa*, see Pilsl & al. 2008, Pilsl & Pflugbeil 2012, Pflugbeil & Pilsl 2013; Wittmann & Pflugbeil 2017)**; NT** (Pagitz 2012)**; OT** (Stöhr & al. 2012)**; V** (Hohla 2014)**; BAV; BZ; TN** (Prosser 1999)**; BL**
Annual neophyte, ephemeral to established, not invasive.
Origin: Eastern Asia.

Eragrostis pectinacea (incl. *E. diffusa* and *E. tephrosanthos*)
ST (herbarium specimen from railway station Puntigam, 1949, leg. Burri, LI: Hohla 2006a)**; BG; BS; BZ; TN** (Prosser & Bertolli 2015)**; VR; BL; PO; UD**
Annual neophyte, ephemeral to established, locally invasive.
Origin: North, Central and northern South America.

Eragrostis diffusa is repeatedly treated as a synonym of *E. pectinacea*, e.g. by Koch 1974 and Giraldo Cañas & al. 2012). It is only reported from Styria (Melzer 1959). *E. pectinacea* is verified from the same localities (Hohla 2006a, see *E. mexicana* entry).

Eragrostis tephrosanthos (*E. delicatula*, *E. pectinacea* var. *miserrima*), a close relative to *E. pectinacea* of unclear rank, with the only difference of divaricate lateral pedicels (while *E. pectinacea* should have adpressed lateral pedicels, Koch 1974, Portal & Duhem 2002) was additionally reported from BZ (Moritzing, near Bolzano, 9433/4, 2. 9. 2001 leg. T. Wilhalm, BOZ, det. H. Scholz: Wilhalm & al. 2003).

Eragrostis pilosa
Wild relative of the East African crop *Eragrostis tef* and sometimes confused with it (Ingram & Doyle 2003, 2007).
B; W; N; O (Hohla 2000, 2011b, Hohla & al. 2005a)**; ST** (leg. Heinrich, in Fritsch 1923)**; K; S** (Eichberger & al. 2016)**; NT [–]** (Pagitz 2012)**; OT** (Pagitz 2012)**; V** (Hohla 2014)**; GRB; CO; LC; BG; BS; BZ; TN; VR; BL; PO; UD**

Markedly decreasing: Fritsch (1922: 660) still named all Austrian federal states except Salzburg, later on not found until – sparsely – in recent times (Hohla 2006a).
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral to persistent, locally invasive.
Origin: Mediterranean area, Africa, Central and South Asia.

Eragrostis planiculmis
O (7645/4: Hohla & al. 2015)
Annual neophyte, ephemeral (not really spontaneous), not invasive.
Origin: South Africa.

Eragrostis tef
BAV [–] (8527/2: (Dörr & Lippert 2001)
Annual neophyte, ephemeral (not really spontaneous), not invasive. Occasionally introduced at roadsides with seed mixtures. Occurrences already expected by Hohla (2003), but no further records available within the territory.
Origin: Eastern Africa (cultivated as a crop in Ethiopia), indigenous probably also in the south of the Arabian peninsula.

Eragrostis trichodes
Distributed as an ornamental grass under several misleading names, e.g. "*Eragrostis splendens*" (see Hohla 2006a). Confused with *E. spectabilis*, also originating from North America and occasionally cultivated for ornamental gardening.
O (Hohla 2006a, b, Hohla & al. 2009)**; S [–]** (1941, det. K. Ronninger & H. Gams: Fischer 1946, Leeder & Reiter 1959, a single record, no other evidence, see Pflugbeil & Pilsl 2013)
Annual neophyte, ephemeral, not invasive.
Origin: North America.

Eragrostis virescens (*E. mexicana* subsp. *virescens*)
W (Gilli & al. 2018)**; O** (Hohla & Kleesadl 2006, Hohla & al. 2015)**; ST** (Melzer 1959)**; BS** (Martini & Scholz 1998)**; BZ** (Martini & Scholz 1998)**; TN; VR; BL; PO** (Martini & Scholz 1998)**; UD** (Martini & Scholz 1998)
Annual neophyte, persistent, not invasive.
Origin: Western North America, South America.

Festuca
The splitting of the large genus *Festuca*, especially its broad-leaved part into several genera as proposed by Soreng & al. (2015) is neither supported by cited data (p. 131) nor by available additional data, e.g. in Catalán & al. (2007), de Nova & al. (2006), Cheng & al. (2016). *Festuca* s. latiss., including mainly *Vulpia* and *Lolium* was demonstrated to be monophyletic in all these studies. The only reasonable and well-balanced

split would be into two genera, following the main subclades, where the entire "broad-leaved" subclade needs to be named *Lolium*. As this requires a fundamental nomenclatural setup exceeding that of Darbyshire (1993), *Festuca* is provisorily left here in the sense of Fischer & al. 2008 to retain usability, but including *Vulpia* and others, with *Lolium* treated separately.

Annotation: Hohla (2011a) recorded ***Festuca apennina*** (*F. pratensis* subsp. *apennina*, *Lolium pratense* subsp. *apenninum*) from Upper Austrian lowlands (Innviertel) near St. Peter am Hart, 7744/2, det. H. Scholz. As several *F. pratensis* cultivars used for grassland amelioration may be occasionally awned, this single record is highly doubtful and may refer to such a feral *F. pratensis*-cultivar.

Festuca arundinacea* subsp. *fenas
BZ (herbarium sheet "Nals", 2003, leg. T. Wilhalm, BOZ, Wilhalm & al. 2014)
Perennial neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Festuca arundinacea* subsp. *mediterranea
O (Hohla 2011a, subg. *Schedonorus*, det. H. Scholz)
Perennial neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Festuca arundinacea* subsp. *uechtritziana
B; N; O (Hohla & al. 1998, Hohla 2006b)**; ST** (Melzer 1992)**; K; S** (Pflugbeil & Pilsl 2013)**; BZ** (Wilhalm & al. 2014)
Introduced with seed mixtures and subsequently spread, e.g. along roadsides.
Perennial neophyte, ephemeral, not invasive.
Origin: probably Western Mediterranean area (Hackel 1882). Conert (1998) argues for Southern France.

Annotation: Scattered indigenous populations of ***Festuca brevipila*** (s. lat.) are mainly known from the Bohemian Massif in Austria and from the Central Alps (Arndt, Wilhalm & Englmaier, unpublished data). Nearly all other stands are derived from seeds of various commercially distributed cultivars used in landscaping (Englmaier 2009), frequently traded as "*Festuca duriuscula*". They are found on recultivated areas with disturbed soils, especially on roadsides (e.g. Hohla 2006b). Subsequently spread by machinery and tools, probably even by hikers on their shoes, this species is meanwhile distributed anywhere and, especially in Austria, rapidly spreading: in lowlands (e.g. Burgenland, Eisenberg, roadsides at wine cellars, 385 msm, 2017, hb. P. Englmaier) as well as in alpine regions (e.g. Carinthia, southeastern slope of Mauthner Alm, near Enzianhütte, 1550 msm, obs. P. Englmaier, 2017, far away from public roads). Also spreading in the Southern Alps (first finding in BZ by Kiem 1983). These cultivars

are to be quoted as highly invasive, spreading themselves as well as anthropogenously distributed.

Festuca bromoides (*Vulpia bromoides*)
B; N; ST (Melzer 1954, Sengl 2015)**; T [–]; V** (8424/3: Dörr 1992)**; GRB; PO**
Annual. Naturalized to indigenous at the eastern fringe of the Alps, but nowadays rare due to habitat loss, elsewhere neophytic, ephemeral to persistent, not invasive.
Origin: Europe, Mediterranean area, including Northern Africa, East Africa.

Festuca danthonii (*Vulpia ciliata*, *F. ciliata* Danthoin ex DC, nom. illeg., non Gouan, non Link)
W; N (Reich & al. 2018a)**; S** (Wittmann & Pflugbeil 2017, Reich & al. 2018a)**; GRB; CO; LC; BG; BS; BZ; TN; VR** (Kiem 1983)**; PO; UD**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Annotation: ***Festuca filiformis*** (*F. tenuifolia*), indigenous in most of the territory, occasionally adventive in wasteland (e.g. Hohla & al. 2005a, even in Vienna: Melzer & Barta 2008). In BZ known as distributed with seed mixtures in landscaping, especially along forestry roads (T. Wilhalm, pers. obs.).

Festuca geniculata (*Vulpia geniculata*)
BL
Annual neophyte, ephemeral, not invasive.
Origin: Western Europe, extending to Northern Africa.

Annotation: ***Festuca heteromalla*** (*F. diffusa*), remarkable due to its tall growth and its many-flowered spikelets, indigenous in mountain regions but also appearing in (slightly humid) wastelands, such as landslides or various embankments as a local neophyte (e.g. Melzer 1996c, 1998, 2000, even in Vienna: Melzer & Barta 2008). Confusion is possible with tall grown *F. rubra*-cultivars and should be considered in any wasteland stands.

Festuca incurva (*Psilurus incurvus*, *Nardus aristatus*)
BG (Avogadri 1995)**; TN** (9932/4: Prosser1999)**; VR**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Annotation: ***Festuca lachenalii*** (*Micropyrum tenellum*, *Nardurus halleri*, "*Festuca tenella*"), was erroneously recorded from Upper Austria, meaning *Festuca myuros* (see Hohla & al. 2009: 246 sub nom. *Micropyrum tenellum*).

Festuca ligustica (*Vulpia ligustica*)
BZ [–] (9534/1: Kiem 1978) **TN; VR**
Annual neophyte, ephemeral, not invasive.
Origin: Central Mediterranean area, Northern Africa, Asia minor.

Festuca maritima (*Vulpia unilateralis*, *Triticum unilaterale*, non *F. maritima* var. *loliacea* = *Cutandia maritima*)
TN; VR
Annual neophyte, ephemeral, not invasive.
Origin: Western Europe, Western Mediterranean area, Balkans, Asia minor, Western Central Asia, Middle East.

Festuca myuros (*Vulpia myuros*)
B; W; N (Melzer & Barta 1999)**; O** (Hohla & al. 1998)**; ST** (Melzer 1954, 1989, 1995, 1996c)**; K** (9246/2: Melzer 1996a, 9155/1: Melzer 1998)**; S** (Pilsl & al. 2008, Wittmann & Pflugbeil 2017)**; NT** (Pagitz & Lechner Pagitz 2015)**; V** (8424/3, 8524/1: Dörr & Lippert 2001)**; FL; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; VI; BL; PO; UD; SLO** (Jogan 2012, 2014)
Annual. Naturalized to indigenous at the eastern fringe of the Alps, elsewhere neophytic, ephemeral to persistent, not invasive.
Origin: Western Europe, Mediterranean area, Western Central Asia, Middle East, extending to India.

Annotation: ***Festuca nigrescens***, indigenous and widespread in montaneous to subalpine grasslands in the Alps, rapidly distributed with deforestation and grassland establishment also in lowlands, bred in numerous cultivars and mainly used for grassland amelioration and landscaping (Englmaier 2009). Nowadays neophytic everywhere outside natural montane grassland.

Festuca pseudovina* → *Festuca valesiaca* subsp. *parviflora

Festuca pulchra* → *Festuca valesiaca* subsp. *parviflora

Annotation: ***Festuca rubra* subsp. *juncea***, indigenous, sporadically found on alluvial soils, but also on wasteland, railway tracks and roadsides as a local neophyte (Melzer 1996c, Melzer & Barta 1994, Hohla & al. 1998, Niklfeld 2003, Hohla & Melzer 2003, Melzer & Barta 2008). Observations on pastures in the upper Veltlin valley (SO, Parolo & Foggi ined.) may be based on confusions with similar, rigid *F. rubra* cultivars, occasionally distributed with seed mixtures for grassland amelioration.

Festuca rubra* subsp. *litoralis
Numerous cultivars are marketed, mainly under the misused name "*F. rubra trichophylla*", used for golf greens, sport and play lawns (Englmaier 2009: 67). Slightly salt tolerant, thus expected above all along salt-treated roads.
N (Riegersburg, hb. P. Englmaier, 2015: Englmaier 2018)
Perennial neophyte, persistent. Absolutely no data available on its possible invasiveness. Highly confusable with any native *Festuca rubra*, mainly with small-grown *F. nigrescens*, so possibly overseen and thus undiscovered up to now.
Origin: European coastlines.

Annotation: ***Festuca valesiaca* subsp. *parviflora*** (*F. pseudovina*, ?*F. pulchra*), indigenous in the Pannonian lowlands, extending to Central Asia, but easily spread by traffic, thus a local neophyte along roads and railways. (**N**: rural roadside at Rosenthal, Heufurth, near Hardegg, 2012, hb. P. Englmaier, **O**: Linzer Hafen, 2004, leg. G. Kleesadl, LI: Hohla & al. 2009; Wels, railway track, 7850/1: Hohla & al. 2005a; Mining, 7745/1: Hohla 2012a; **S**: Puch: Reiter 1952, det. I. Markgraf-Dannenberg, Leeder & Reiter 1959; **BZ:** Bolzano, railway station: Wilhalm & al. 2007). Easily hybridizing with *Festuca valesiaca* subsp. *valesiaca*, resulting in hybrid swarms with much better fitness on wasteland as any of the parent species, thus readily distributed along roadsides, in wasteland and in dry grassland (numerous obs. P. Englmaier, 2017 in **N; B; ST**). In most cases, these hybrids are of intermediate shape between *F. pseudovina* and *F. valesiaca*, thus frequently confused with any of them. Locally invasive.

Gastridium ventricosum (*G. lendigerum*)
ST (Melzer 1954)**; CO [–]** (only historical records)
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Gaudinia fragilis
The genus *Gaudinia* is placed in close proximity to *Koeleria* (Saarela & al. 2017, Wölk & Röser 2017), but can be left separately.
ST (Melzer 1954)**; BS** (Desenzano, 0529/1: Giacomini 1950) **TN; VR; BL; VI**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Glyceria grandis
O (Hohla 2012b, Kleesadl 2017)**; S** (Pflugbeil & Pilsl 2013, Wittmann & Pflugbeil 2017)**; BL (**Mareson in Val di Zoldo, leg C. Argenti: Portal 2014)
Perennial neophyte, ephemeral, potentially invasive, poisonous (has been known to cause cyanide poisoning in cattle, like *G. striata*: Puls & al. 1978).
Origin: North America.

Glyceria striata* subsp. *striata
O; ST; K (9355/1: Jogan 1997; Melzer 1998)**; S** (8244/4: Schröck & al. 2004, Stöhr & al. 2012, Wittmann & Pflugbeil 2017); **T; V; BAV; GRB; BZ** (Wilhalm & al. 2008)**; TN** (9832/4: Prosser 1999)**; BL; SLO** (9953/3, 9954/2: Jogan 1997, 2012)
Perennial neophyte, ephemeral to naturalized, potentially invasive.
Origin: North America.

Glyceria striata* subsp. *difformis
Newly described by Portal (2014). Differs from subsp. *striata* in habitus and has spikelets with fewer florets and markedly smaller lemmas. Hohla (2018) gives a list of identifications by R. Portal and a new record from Upper Austria:
O; ST; S
Perennial neophyte, ephemeral to persistent, potentially invasive.
Origin: North America.

Heteropogon contortus
CO; LC; SO; BG; BS; BZ (Kiem 1978)**; TN; VR; VI**
Perennial. Indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral to persistent, not invasive.
Origin: Western Mediterranean area, Africa, Southern Asia.

Hordelymus europaeus
B; W; N; O; ST; K; S; NT; V; FL; BAV, GRB; TN; VR; BL; SLO
Perennial. Indigenous in most of Europe and the Alps, regionally naturalized at the southern fringe of the Alps, not invasive.
Origin: Europe, Western Mediterranean area, Asia minor, Caucasus.

Hordeum
Hordeum consists of four distinct genomic groups (see El-Rabey & al. 2002): (1) the barley group, including *H. vulgare* subsp. *spontaneum*, its cultivated relatives *H. vulgare* subsp. *vulgare* and subsp. *distichon*, and the most isolated *H. bulbosum*; (2) *H. murinum* with its subsp. *murinum*, subsp. *leporinum* and subsp. *glaucum*; (3) *H. marinum* (and its allotetraploid relative, *H. secalinum*) and (4) a heterogenous Eastern Asian–American group containinig diploids and polyploids, *H. jubatum* among the latter.

Hordeum bulbosum
Wild relative of *H. vulgare*.
TN; UD
Annual neophyte, ephemeral to naturalized, not invasive.
Origin: Mediterranean area, Middle East.

Hordeum jubatum
B; N; O (Hohla & al. 1998)**; ST** (Melzer 1954, 1985, 1987, 1995)**; K; S** (Hohla & Melzer 2003, Schröck & al. 2004)**; T** (8530/1, 8728/1: Dörr & Lippert 2001)**; V** (Feldkirch, railway station: Polatschek & Neuner 2013)**; BAV** (8427/4: Dörr & Lippert 2001)**; BZ; BL**
Annual neophyte, ephemeral to persistent, not invasive.
Origin: Eastern Asia, North America.

Hordeum marinum* subsp. *marinum (*H. maritimum* With., non Roth, non O. F. Müll.)
ST (Melzer 1954)**; K; BZ [–]** (Pfaff 1923)**; TN**
Annual neophyte, ephemeral, not invasive.
Origin: Western Europe, Mediterranean area, Pontic area, Middle East.

Hordeum marinum* subsp. *gussoneanum (*H. geniculatum*, *H. hystrix* Roth, non (L.) Schenck)
B [–] (former occurrences in Seewinkel probably indigenous, Fischer & al. 2008); **W [–]; N[–]; UD**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Western Central Asia, Middle East.

Hordeum murinum* subsp. *murinum
B; W; N; O; ST; K; S; NT; OT (Stöhr 2007)**; V; FL; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; PO; UD; SLO**
Indigenous in Europe, naturalized in Alpine valleys as a regional neophyte, naturalized, locally invasive.
Origin: Europe, Northern Africa, Western Central Asia, Middle East.

Hordeum murinum* subsp. *glaucum (*H. glaucum*)
BS (0427/3)
Annual neophyte, ephemeral, not invasive.
Origin: Northern Africa, Asia minor, Caucasus, Middle East.

Hordeum murinum* subsp. *leporinum (*H. leporinum*)
ST (Melzer 1989)**; S** (Pilsl & Pflugbeil 2012)**; GRB; CO** (doubtful: M. Kleih, pers. comm.)**; BZ; TN; VR; UD**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral to established, not invasive.
Origin: Mediterranean area, Western Central Asia, Middle East.

Hordeum secalinum
S (Pilsl & al. 2008)**; T; BZ [–]** (Kiem 1978)
Annual. Indigenous in Europe, ephemeral in Alpine valleys as a regional neophyte, not invasive.
Origin: Europe, extending to North Africa.

Hordeum vulgare* subsp. *vulgare
Cultivated crop, occasionally used for intercropping and erosion control, thus allowing spontaneous growth of feral plants.
B; W; N; O; ST; K; S; T; V; GRB; BG; BS; BZ; TN; VR; SLO
Annual archaeophyte, ephemeral, not invasive.
Originally cultivated in the Middle East.

Hordeum vulgare* subsp. *distichon (*H. distichon*)
Cultivated crop, especially for brewery. Occasionally used for intercropping and erosion control, thus allowing spontaneous growth of feral plants.
W; N; O (Hohla & al. 1998)**; ST; K; S** (Pilsl & al. 2008)**; V [–]** (only historical records)**; GRB [–]** (only historical records)**; BZ; TN; VR; SLO**
Annual archaeophyte, ephemeral, not invasive.
Originally cultivated in the Middle East.

Kengia → Cleistogenes

Koeleria glauca
N; S (Pflugbeil 2015)
Perennial. Indigenous in Eastern Austria, regionally neophytic, introduced as seed impurities, ephemeral, not invasive.
Origin: Eastern Europe, Central Asia.

Lagurus ovatus
W (since 1890: Conert 1998)**; ST; K; V** (8425/4: Dörr & Lippert 2001)**; BG; TN; VR; UD**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Leersia oryzoides (*Oryza clandestina*, *Oryza oryzoides*)
B; W; N; O; ST; K; S (Stöhr & al. 2012)**; NT** (already in Murr 1931, recently obs. 2016 by O. Stöhr)**; V; BAV** (Dörr & Lippert 2001)**; GRB; BG; BS; BZ; TN; VE; BL; PO; UD; SLO**
Perennial. Indigenous, regionally neophytic, established to naturalized, not invasive. Whereas frequently stated in Dalla Torre & Sarnthein (1906), Kiem (1974) considered it already as extinct around Bolzano, but nowadays spreading again (recently

at Montan-Castelfeder, around a pond: T. Wilhalm & P. Englmaier, 2016, BOZ and hb. P. Englmaier).
Origin: Europe, Western Asia, (Eastern Asia, North America).

Leymus arenarius
Frequently used as an ornamental grass.
O (Kleesadl & Brandstätter 2013)**; ST** (Graz, 2017, local, subspontaneous appearance as a garden escape: S. Leonhartsberger, pers. obs.)
Perennial neophyte, ephemeral, not invasive.
Origin: European Atlantic coasts.

Lolium multiflorum (incl. subsp. *gaudinii*)
B; W; N; O; ST; K; S; T; V; BS; CO; LC; BG; BS; BZ; TN; VR; BL; PO; UD; SLO
Annual or short-living perennial neophyte, naturalized, introduced in early times and thus present in historical floras (Rota 1853 and Zersi 1871 from BS), potentially invasive.
Origin: Mediterranean area, Middle East, Western Central Asia.

Lolium remotum
Probably extinct almost in the whole territory.
B [–]; W [–]; N [–]; O [–]; ST [–]; K [–]; S [–]; T [–]; V [–]; BAV [–] (8427/4: Dörr & Lippert 2001)**; GRB [–]; BZ [–]; UD**
Annual archaeophyte (introduced mainly with flax cultivation), ephemeral, not invasive.
Origin: Northwestern India, Pakistan (e-monocot: http://e-monocot.org/taxon/urn:kew.org:wcs:taxon:422871 and comprehensive citations therein).

Lolium rigidum* subsp. *rigidum (*L. strictum*, *L. subulatum* Vis., non Degen ex Lojac.)
ST (Melzer 1954)**; K; T** (Pagitz & al. 2006, no herbarium specimen available)**; BAV** (8427/4: Dörr & Lippert 2001)**; GRB [–]; LC; BS; BZ; VR [–]**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Northern Africa, Crimea, Caucasus, Middle East, Eastern Asia.

Lolium rigidum* subsp. *lepturoides (*L. loliaceum* (Bory & Chab.) Hand.-Mazz., non *Festulolium loliaceum* (Huds.) P. Fournier, species rank not supported: Mirjalili & al. 2008)
ST (Melzer 1954)
Annual neophyte, ephemeral, not invasive.
Origin: probably Middle East.

Lolium temulentum
W [–]; N [–]; O (7551/4, Kleesadl 2009)**; ST [–]** (Melzer 1954) **K [–]; S [–]; T [–]; V** (Lochau-Hörbranz, 8424/3: 1989, obs. E. Sutter: Dörr & Lippert 2001)**; BAV**

(8427/4, 8428/3, 8527/2)**; GRB [–]; CO; LC; BS; BZ; TN [–]; VR [–]; BL [–]; UD**

Annual archaeo- and neophyte, ephemeral, not invasive.

Origin: Mediterranean area, Eastern Europe, Central and Eastern Asia, Middle East, extending to India.

Lophochloa cristata → Trisetaria cristata

Melica altissima

W (7764/3: Essl & Stöhr 2006, Franz-Josefs-Bahnhof in Vienna: 2017, obs. P. Englmaier)**; O** (Zahlheimer in Hohla 2003)**; ST** (Kniely 2015, as var. *atropurpurea*)

Perennial. Indigenous in Northern Austria (Thaya valley near Hardegg), but sometimes cultivated as an ornamental grass with local, spontaneously growing populations as garden escapes, then neophytic, ephemeral, not invasive.

Origin: Eastern Europe (typical in forest-steppe communities in the eastern part of the Pannonian area), Middle East, temperate Asia.

Annotation: ***Mibora minima***, recorded from SO (Aeschimann & al. 2004) is neither cited with its original reference nor confirmed elsewhere and thus highly doubtful.

Micropyrum tenellum → Festuca lachenalii

Miscanthus sacchariflorus

N (Melzer & Barta 1999)**; O** (Hohla 2001, 2002, 2006c, 2011b, Hohla & al. 2005a)**; ST** (Graz, 2017: obs. S. Leonhartsberger)**; K (**Melzer 1994)**; S** (Schröck & al. 2004)**; FL**

Perennial neophyte, ephemeral, not invasive.

Origin: Eastern Asia.

Miscanthus sinensis

Cultivated as an ornamental plant, but astonishingly rare as a neophyte in the territory. In North America it is quoted as a highly invasive weed (Swearingen & Bargeron 2016).

O (7646/3: Hohla 2000)**; ST** (Graz, 2017: obs. S. Leonhartsberger)**; S** (8947/2: Stöhr & al. 2006)**; BZ** (recent occurrence in St. Jakob, Leifers, near Bolzano, 2017, hb. P. Englmaier).

Perennial neophyte, ephemeral, not invasive.

Origin: Eastern Asia.

Muhlenbergia frondosa

TN (9933/3: Bertolli & Prosser 2014, see also Verloove & Ardenghi 2015)

Perennial neophyte, ephemeral, not invasive.

Origin: Eastern and Central North America.

Muhlenbergia mexicana
W (Gilli 2016b)**; O** (7844/2: Hohla 2011a, 7843/1: Hohla 2012a, confirm. F. Verloove)**; S [–]** (8143/4: Stöhr & al. 2009, Pflugbeil & Pilsl 2013)
Perennial neophyte, ephemeral, not invasive.
Origin: North America.

Muhlenbergia schreberi
CO; SO; BZ; TN (0131/1: Bertolli & Prosser 2014)**; VR; BL; PO; SLO** (9954/2: Jogan 2012)
Perennial neophyte, ephemeral, not invasive.
Origin: Temperate North and South America.

Nassella tenuissima (*Stipa tenuissima*)
Nomenclature: Barkworth (1990).
B (Knickmann & al. 2018)**; W** (Knickmann & al. 2018)**; N** (Knickmann & al. 2018)**; S** (Pflugbeil 2015)**; BZ** (Wilhalm & al. 2017)
Perennial neophyte, ephemeral, not invasive in the territory, but high invasive potential (as known from Australia: McLaren & al. 2004).
Origin: Central and South America.

Oloptum
The genus was introduced by Röser in Hamasha & al. (2012) for the isolated and well-circumscribed "*miliacea*-group" of *Piptatherum* (Romaschenko & al. 2012), with the generic type *Agrostis miliacea* ≡ *Oloptum miliaceum*.

Oloptum miliaceum (*Oryzopsis miliacea*, *Achnatherum miliaceum*, *Piptatherum miliaceum*)
W; K; CO; BG; BS; TN; VR
Perennial. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Oplismenus undulatifolius (*O. hirtellus* subsp. *undulatifolius*)
CO; LC; SO; BG; BS [–] (Kiem 1978)**; BZ** (Kiem 1974, 1983)**; TN** (Prosser 1999)**; VI; PO; UD; SLO** (Dakskobler 2013)
Perennial neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Asia Minor, Caucasus, Eastern Africa, Southern Asia.

Oryzopsis miliacea → Oloptum miliaceum

Oryzopsis virescens → Piptatherum virescens

Panicum

Besides one crop species, *P. miliaceum*, this genus comprises some closely related, similar and confusable taxa. Some neophytic species from the most complex North American *Panicum capillare* group were recorded from the territory, giving rise to confusion. Amarell (2013), Amarell & al. (2014) and Király & Alegro (2015) tried to clarify this group and give some reliable distinctive characteristics between *P. capillare* and *P. barbipulvinatum*. Following the solid arguments of Amarell (2013), the supposed "neoendemic" *P. riparium* (Scholz 2002a) is treated as a synonym of *P. barbipulvinatum*. In general, nomenclature follows Verloove (2001), with *P. barbipulvinatum* as a subspecies of *P. capillare.*

Panicum capillare* subsp. *capillare

B; W; N; O (Hohla & al. 1998)**; ST; K; S; T; V; LC; SO; BG; BS; BZ; BL**

Records of *P. capillare* (s. lat.) are available from **TN; VR; PO; UD** and **SLO** (Jogan 2014).

Annual neophyte, ephemeral to established, regionally invasive.

Origin: North America.

Panicum capillare* subsp. *barbipulvinatum (*P. barbipulvinatum*, *P. capillare* var. *occidentale*, *P. riparium*)

In Europe it is readily distinguishable from *P. capillare* subsp. *capillare* (Amarell 2013, see also Verloove & Ardenghi 2015), but in North America its status is in debate (in many cases merged with *P. capillare*), therefore it is treated here on subspecies rank.

B (Raabe & Király 2015 sub nom. *P. riparium*)**; W** (Hohla & al. 2015)**; N** (Melzer & Barta 2008 sub nom. *P. riparium*; Hohla & al. 2015)**; O** (Hohla & al. 1998 sub nom. var. *occidentale*; Hohla 2006c sub nom. *P. riparium*, det. H. Scholz; Stöhr & al. 2007 sub nom. *P. riparium*; Hohla & al. 2009 sub nom. *P. riparium;* Hohla 2013)**; ST** (Hohla & al. 2015)**; K** (Hohla & al. 2015)**; S** (Pflugbeil & Pilsl 2013 sub nom. *P. riparium*)**; NT** (Pagitz 2012)**; V** (Hohla 2014)**; BZ; TN** (Wilhalm 2011)**; BL; SLO** (9853/2, 9854/1: Mihorič 2015 sub nom. *P. riparium*)

Annual neophyte, ephemeral, potentially invasive.

Origin: North America.

Panicum dichotomiflorum

B; O (7647/1: Hohla & al. 1998, Kleesadl 2009)**; ST** (Melzer 1954, 1987)**; K; S** (Hohla & Melzer 2003, Pflugbeil & al. 2017)**; NT** (Smettan 2012)**; V; FL; GRB** (historical records around Sargans)**; CO** (M. Kleih, pers. obs.)**; BG; BS; BZ; TN** (Prosser 1993, Prosser & Bertolli 2015)**; VR; BL; PO; UD; SLO** (Jogan 2014)

Annual neophyte, ephemeral to persistent, regionally invasive.

Origin: North and South America.

Panicum hillmanii
B; W; N; O (Hohla & al. 1998, Kleesadl 2009)**; ST** (Melzer 1995)**; K; S** (8545/3: Hohla & Melzer 2003)
Annual neophyte, ephemeral, not invasive.
Origin: Southwestern North America.

Panicum miliaceum* subsp. *miliaceum
W; N; O; ST; K; S; NT (Dörr & Lippert 2001)**; V; BAV** (Dörr & Lippert 2001)**; TN; VR; BL; PO; UD; SLO**
Annual archaeophyte, as a crop, ephemeral, not invasive. Nowadays frequently introduced with birdseed.
Originally cultivated in Northeastern China (Lu & al. 2009), nowadays mainly in India.

Panicum miliaceum* subsp. *ruderale
Includes wild and feral relatives of the common millet, *P. miliaceum* subsp. *miliaceum*, such as *P. spontaneum*.
B; W (7863/2: Essl & Stöhr 2006)**; N** (Melzer & Barta 2008)**; O** (Kleesadl 2009)**; ST; K; NT; FL; BZ; BL**
Another, probably feral relative of *P. miliaceum* subsp. *miliaceum* was described from Carinthia as subsp. *agricolum* (Scholz & Mikoláš 1991; subsp. *agricola* in Fischer & al. 2008), habitually differing from subsp. *ruderale* by cernuous panicles and with slightly broader grains (width 1.9–2.3 mm, whereas grains of subsp. *ruderale* should be more slender, 1.6–2.1 mm). Melzer (1993) additionally refers to its persistent glumes in the stage of ripeness. It was recorded from **B** (Melzer & Barta 2008)**; W** (Pachschwöll & al. 2018)**; N** (Melzer & Barta 2008)**; O** (Hohla 2001)**; ST** and **K** (Melzer 1993)**; OT** (obs. O. Stöhr, 2017: http://forum.flora-austria.at/viewtopic.php?f=10&t=465&hilit=Panicum).
Annual neophyte, ephemeral to naturalized (as a weed in maize fields), regionally invasive.
Origin: Eastern Central Asia.

Panicum philadelphicum* subsp. *gattingeri (*P. capillare* subsp. *gattingeri*, *P. gattingeri*)
Confusions with *P. capillare* occurred in some parts of Europe (Verloove & Ardenghi 2015).
N (Melzer & Barta 2008)**; O** (Hohla & al. 2015)**; ST; BL; PO; UD; SLO** (9647/3: Melzer 1996b, 9747/3: Jogan 2014 as *P. capillare* subsp. *gattingeri*)
Records of *P. philadelphicum* (incl. subsp. *gattingeri*) are available from **BG; TN**.
Annual neophyte, ephemeral, not invasive.
Origin: Eastern North America.

Panicum schinzii (*P. laevifolium*)
B; O (Hohla 2000, 2002)**; ST** (Graz, 2017: obs. S. Leonhartsberger)**; K**
Annual neophyte, ephemeral, not invasive.
Origin: South Africa.

Panicum virgatum
W (Barta 2018b)**; O** (7847/2, Hohla 2011a)**; S** (Schröck & al. 2004)
Annual neophyte, ephemeral, not invasive.
Origin: North America.

Parapholis incurva
TN (Torbole, leg. F. Zoller, 2010, det. F. Prosser, ROV)
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Northern Africa, Crimea, Caucasus, Middle East.

Paspalum dilatatum
BG; BS (Arietti & Crescini 1974)**; TN** (0031/3: Bertolli & Prosser 2014)**; VR; UD**
Perennial neophyte, ephemeral, not invasive.
Origin: South America.

A similar species of South American origin, ***Paspalum dasypleurum*** (*Paspalum pachyrrhizum*) was recently recorded from the south of Lecco, near the southwestern edge of the territory considered here (Verloove & al. 2016, with a key to the alien *Paspalum* species from South America).

Paspalum distichum (*P. paspalodes*, incl. var. *digitaria*)
ST (Melzer 1954, as "subsp. *digitaria*")**; BG; BS; VR; VI; PO**
Perennial neophyte, ephemeral, not invasive.
Origin: Southern North America, Central and South America.

Pennisetum alopecuroides → Cenchrus purpurascens

Pennisetum macrourum → Cenchrus macrourus

Pennisetum villosum → Cenchrus longisetus

Pennisetum flaccidum → Cenchrus flaccidus

Pennisetum glaucum → Cenchrus americanus

Phalaris aquatica
TN; VR
Perennial neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Phalaris arundinacea* var. *picta
This variety originates from a spontaneous mutation and was already familiar to Linnaeus (Sp. Pl. 1: 55, 1753). It summarizes several ornamental cultivars of the "European" genotype of *P. arundinacea* (Nelson & al. 2014), mainly 'picta' and 'aureovariegata'.
B; W; N (Essl 2003)**; O** (Hohla 2000)**; ST** (Essl 2003)**; K; S** (Pflugbeil 2015)**; NT** (already in Murr 1931, Pagitz & Lechner Pagitz 2015)**; V; BZ** (abundant at Haider See in Upper Vinschgau, obs. T. Wilhalm)**; TN; VR; BL**
Perennial neophyte, persistent, potentially invasive.
Origin: unknown.

Phalaris brachystachys
ST (Melzer 1954)**; CO; LC; TN; BL**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Middle East.

Phalaris canariensis
B; W; N; O (Hohla 2001)**; ST** (Melzer 1954)**; K; S** (Schröck & al. 2004)**; T** (Pagitz & Lechner Pagitz 2015)**; V; BAV** (Dörr & Lippert 2001)**; GRB; CO; LC; BZ; TN; VR; BL; PO; UD; SLO**
Annual neophyte, persistent to established, potentially invasive.
Origin: Morocco.

Phalaris coerulescens
BG; BZ [–] (9533/4, Kiem 1978)**; TN**
Perennial neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Phalaris minor
ST (Melzer 1954)**; BG** (0223/3, 2004, hb. Perico: Martini & al. 2012)**; BZ [–]** (9330/4, single record: Wilhalm 2001)
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Northern Africa, Crimea, Caucasus, Middle East, extending to India.

Phalaris paradoxa
ST (Melzer 1954)**; V** (8424/3: Dörr 1992)**; BAV** (8527/2: Dörr & Lippert 2001)**; TN**
Annual neophyte, persistent, not invasive.
Origin: Mediterranean area, Middle East.

Phleum arenarium
W [–] (Forstner & Hübl 1971 cited a herbarium sheet "Wüste Stellen im Prater", 1879, W, no further records)**; TN**

Annual neophyte, ephemeral, not invasive.
Origin: Western Europe, Western Mediterranean area.

Phleum paniculatum
W [–]; V (8423/3: Dörr & Lippert 2001)**; BG; BS; BZ; TN; VR**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral to established, not invasive.
Origin: Mediterranean area, Middle East, Central and Eastern Asia.

Phleum subulatum (*P. bellardii*)
W; ST (Melzer 1954)**; TN**
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area.

Phyllostachys
Among cultivated ornamental bamboos, *Phyllostachys* is most common. Several species are commercially available, mainly *P. aurea* and *P. nigra*. Thus, both are most frequently found as garden escapes, but the majority of them concern rhizomatous growth from cultivated stands. These are not really spontaneous and thus underrepresented in observations. Any bamboo determination needs typical (fresh) material and the help of experienced specialists or gardeners.

Phyllostachys aurea
BS; VR
Perennial neophyte, persistent, in Italian provinces locally invasive.
Origin: China, Vietnam.

Phyllostachys aureosulcata
O (Hohla & al. 2015)
Perennial neophyte, persistent, not invasive.
Origin: China.

Phyllostachys nigra
N [?] (2001, A. Drescher & M. Magnes in an unpublished project study, see Walter & al. 2002, determination doubtful)**; O** (Hohla 2011a)
Perennial neophyte, established, in Italian provinces locally invasive.
Origin: China.

Piptatherum miliaceum → Oloptum miliaceum

Piptatherum virescens → Achnatherum virescens

Poa bigelovii
O (7745/1, det. H. Scholz: Hohla 2009)
Annual neophyte, ephemeral, not invasive.
Origin: Southwestern North America.

Poa infirma
W (Forstner & Hübl 1971, Diran 2016)
Annual neophyte, ephemeral, not invasive.
Origin: Mediterranean area, Middle East, Eastern Asia.

Annotation: ***Poa supina***, indigenous in most of the territory, even in lowland areas (Melzer 1969, Melzer & Barta 1995, Hohla & al. 2005b), is occasionally introduced with seed mixtures in urban gardens and parks as a regional neophyte: **ST** (Graz: Melzer 2005)**; W** (Melzer & Barta 2008).

Poa trivialis* subsp. *sylvicola
Its taxonomic value is controversely discussed. Neither Teppner & Wetschnig (1980) nor Duckert-Henriod & Favarger (1987) could find any karyological differences, but with material for Teppner's studies, morphological characteristics were demonstrated to be stable under cultivation (W. Gutermann, pers. comm.).
K (9448/1: Melzer 1996a)**; BS; BZ; TN; VR; VI; BL; PO** (2014, obs. T. Wilhalm & P. Englmaier, BOZ and hb. P. Englmaier)**; UD**
Perennial. Indigenous at the southern fringe of the Alps, elsewhere, especially in K, naturalized, not invasive.
Origin: Mediterranean area.

Polypogon monspeliensis
W; N (Barta & Modl 2018)**; O [–]** (one single finding by J. Böck: Eisenbahndamm nächst Gasslhof b. Wels, 1871: Hohla & al. 2009)**; ST** (Melzer 1954)**; K** (Melzer 1989)**; S** (8144/3: Hohla 2011a; 8445/3: Wittmann & Pflugbeil 2017)**; V [–]** (Polatschek & Neuner 2013)**; BG** (0223/4, 1943, PAV: Martini & al. 2012)**; BS** (0427/1: Zersi 1871)**; BZ [–]** (Kiem 1983)**; TN** (Prosser 1993)**; VR; DU [–]**
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area, Northern and Eastern Africa, Central and Southern Asia.

Polypogon viridis
O (7646/4: Hohla 2014)**; ST** (Berg 2015a)**; CO; BG; BS; BZ; TN; VR**
Short-living perennial. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area, Northern and Eastern Africa, Western Central Asia, Southern Asia.

Psathyrostachys juncea (*Elymus junceus*)
BZ (9330/3: Wilhalm 2001)
Perennial neophyte, ephemeral, locally established, not invasive. Introduced with seed mixtures for erosion control on extremely dry slopes.
Origin: Temperate Asia.

Pseudosasa japonica (*Arundinaria japonica*)
O (7744/1, confirm. F. Verloove: Hohla 2018)**; BZ** (one location near Merano, 9333/1, 1976, leg. H. Vondrovsky: Niklfeld 2003)
Perennial neophyte, persistent (not really spontaneous), potentially invasive.
Origin: Japan, Korea.

Psilurus incurvus → Festuca incurva

Puccinellia distans
Mainly distributed along European shorelines and some continental places with saline or alkaline earth-saturated soils (Englmaier 1982). Historical records on saline or magnesitic soils (e.g. on magnesite deposits or high-magnesium ophiolitic bedrocks as in Kraubath, Styria: Melzer 1961) possibly refer to indigenous distribution, elsewhere, on wasteland, this species was introduced with salt trade (e.g. J. v. Mor in Linz, "Donaudamm beim Salzamtsgebäude", 1830, or several records in Dalla Torre & Sarnthein 1906: 252, sub nom. *Festuca distans*), even with use of pickling salt (Murr 1931, sub nom. *Atropis distans*: "Höttingerau, Schlachthof"). In the recent past rapidly spreading along roads due to use of thawing salts, in the Northern and Central Alps as well as in the Bavarian and Austrian forelands and the Bohemian Massif; further on distributed with road maintenance or with traffic itself, thus found even along secondary, rural or forestry roads (e.g. Salzburg, Kremstal/Bundschuhtal, near Dr. Josef-Mehrl-Hütte, roadside, 1725 msm, 30. 6. 2017, obs. P. Englmaier). Rarely added to seed mixtures for roadsides ("ReNatura B6 Bankettmischung", product of Kärntner Saatbau), but with poor market impact. Rare or missing at the southern fringe of the Alps.
B; W; N; O (Hohla 2001)**; ST; K; S; T** (Stöhr 2007)**; V** (Hohla 2014)**; BAV** (Dörr & Lippert 2001)**; CO [?]; LC [?]** (both records by Aeschimann & al. 2004, doubtful: origin not cited, not confirmed elsewhere)**; BZ; TN; BL; PO; UD; SLO** (Jogan 2012, 2014)
Perennial. Mainly neophytic, established, regionally invasive.
Origin: Eurasian coastlands and inland saline habitats.

Puccinellia fasciculata
UD [?] (Melzer 1997: 75 "Oberhalb Pontebba (Pontafel) auf einer Planierung in und um einen flachen Tümpel ein großer Bestand, seit 1990", doubtful: not recently confirmed, no other records)

Perennial neophyte, ephemeral, not invasive.
Origin: Western European and Western Mediterranean coastlands, extending to Morocco.

Rostraria cristata → Trisetaria cristata

Sclerochloa dura
B; W; N; O [–]; ST (Berg 2015c)**; CO; BG** (0323/2, 1911, PAV: Martini & al. 2012)**; BS** (0227/1: Zersi 1871)**; TN; VR**
Annual. Indigenous in Eastern Austria, naturalized, possibly indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediteranean area, Pannonian area, Western Central Asia, Middle East.

Scleropoa rigida → Catapodium rigidum

Secale cereale
B; W; N; O; ST; K; S; T; V; FL; GRB; BG; BS (historical records)**; TN; VR; SLO**
Cultivated crop, but also used for intercropping and occasionally for erosion control, thus allowing spontaneous growth of feral plants.
Annual archaeophyte, ephemeral, not invasive.
Origin: Asia minor.

Setaria
Setaria has a rather complex evolutionary history. Dekker (2003) assumed all *Setaria* originate in Africa. Molecular genetic analyses gave a rather unclear pattern: A group of African *Setaria*, including *S. pumila* is related to American species (*S. parviflora*), while other Central and South American taxa, e.g. *S. grisebachii* are spread in several other clades (Kellogg & al. 2009). One of the rare well-identifiable clades is a "temperate Asian clade" (Kellogg 2017) with most of the alien *Setaria* species present in Europe: *S. faberi*, *S. verticillata*, *S. verticilliformis*, *S. viridis* subsp. *viridis* and subsp. *pycnocoma*, and *S. italica*, the foxtail millet, originating from *S. viridis* (Benabdelmouna & al. 2001), domesticated in Northern China since the Neolithic era (Diao & Jia 2017) and related with its wild ancestors by a complex backcrossing history (Darmency 2005).

Taxonomy follows Dekker (2003), but *S. italica* is treated on species rank.

Setaria faberi
B; O (Hohla 2000, Kleesadl 2009)**; ST** (Melzer 1981, 1989)**; K** (Melzer 1989, 1993)**; S** (8143/2: Stöhr & al. 2006; Wittmann & Pflugbeil 2017)**; NT** (Smettan 2012)**; V; VR; SLO** (9954/2: Jogan 2012)
Annual neophyte, ephemeral to naturalized, not invasive.
Origin: Eastern Asia.

Setaria grisebachii
W (Melzer & Barta 1999)
Annual neophyte, ephemeral, not invasive.
Origin: Central and South America.

Setaria italica (incl. subsp. *moharia* = subsp. *germanica*)
B; W; N; O; ST; K; S (Schröck & al. 2004)**; T; V; BAV; GRB; BG; BS; BZ; TN; VR; BL; PO**
Annual neophyte, ephemeral, not invasive. Mainly distributed with bird seed (Melzer 1985).
Originally cultivated in Eastern Asia.

Setaria parviflora (*S. geniculata* P. Beauv., non Sieber ex Kunth)
W; BS
Perennial neophyte, ephemeral, not invasive.
Origin: Central and South America.

Setaria pumila (*S. glauca*, S. *helvola*)
B; W; N; O; ST; K; S; T; V; FL; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; VI; PO; UD; SLO
Annual neophyte, persistent to naturalized, potentially invasive. Mainly occurring in maize fields.
Origin: Mediterranean area, Africa, Southern and Eastern Asia.

Setaria verticillata (incl. *S. gussonei*)
B; W; N; O (Melzer & Barta 1995, Hohla & al. 1998)**; ST; K; S; NT; V; FL; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; VI; PO; UD [–]; SLO**
Annual neophyte, persistent to naturalized, potentially invasive.
Origin: Eastern Asia.

Setaria verticilliformis (*S. decipiens*, *S. gussonei*, *S. verticillata* var. *ambigua*)
W; N (Melzer & Barta 1999)**; O** (7651/4: Melzer & Barta 1995)**; ST** (Melzer 1987)**; NT** (Pagitz & Lechner Pagitz 2015)**; BAV; GRB; BG; BS; BZ; TN** (F. Prosser, pers. obs.)**; BL**
Annual neophyte, persistent, potentially invasive.
Origin: Eastern Asia.

Setaria viridis* subsp. *viridis (incl. *S. viridis* var. *weinmannii*)
B; W; N; O; ST; K; S (Stöhr & al. 2009: var. *weinmannii*)**; T; V; FL; BAV; GRB; CO; LC; SO; BG; BS; BZ; TN; VR; BL; VI; PO; UD; SLO**
Annual neophyte, persistent to naturalized, potentially invasive.
Origin: Eastern Asia.

Setaria viridis* subsp. *pycnocoma (*S. viridis* var. *major*)
B (Melzer & Barta 2008)**; N** (Melzer & Barta 2008)**; O (**Hohla & Melzer 2003)**; ST** (Melzer 1981)**; K; S; T; V; BG; BS; BZ; TN; VR; BL; PO; UD**
Annual neophyte, persistent, not invasive.
Origin: Eastern Asia.

Sorghum bicolor (*S. vulgare*, *S. saccharatum*, *S. sativum*, *S. dochna*)
Cultivated crop, at present grown from Subsaharan Africa to India.
B; W; N; O (Hohla 2006c)**; ST; K; S; T; V; FL; BAV; BG; BS; BZ; TN; VR**
Annual neophyte, ephemeral to persistent, not invasive. Mainly distributed with bird seed (feral cultivars without bitter substances).
Originally cultivated in Ethiopia.

Sorghum drummondii* (S. sudanense***)**
Hybridogenous, derived from the cultivated crops *S. bicolor* and *S. arundinaceum* (Ibrahim & al. 2016). Formerly grown even in Austria as a forage crop, nowadays rare, occasionally introduced with bird seed.
B; N
Annual neophyte, ephemeral, not invasive.
Originally cultivated in Sudan.

Sorghum halepense
Ancestor of the various cultivated *Sorghum* crops (Sun & al. 1994). Mainly occurring in maize fields.
B; W; N; O; ST; K; S; T; V; FL; BAV; GRB; CO; LC; BG; BS; BZ; TN (Prosser & Bertolli 2015)**; VR; VI; BL; PO; UD; SLO**
Perennial neophyte, ephemeral to persistent, regionally invasive.
Origin: Northern Africa, Asia minor, Western Central Asia, Middle East, extending to India.

Sporobolus
Some genera, among them *Crypsis* and *Spartina*, need to be included in *Sporobolus*, as proposed by Peterson & al. (2014).

Sporobolus cryptandrus
T [–] (Murr 1931)
Perennial neophyte, ephemeral to persistent, not invasive.
Origin: North America.

Sporobolus indicus
W (Pachschwöll & al. 2016)**; S** (8144/3, confirm. F. Verloove: Eichberger & al. 2015a)**; BG; BS; TN; VR**

Perennial neophyte, ephemeral, locally established, locally invasive.
Origin: North America.

Annotation: ***Sporobolus michauxianus*** (*Spartina pectinata* Bosc ex Link, non *Sporobolus pectinatus* Hack.) from North America, was recently observed for the first time in Italy, subspontaneously growing east of the centre of Milan (Banfi & Galasso 2016). As this species is increasingly used as ornamental grass and this new record is not far away from the Alps, its occurrence along the southern fringe of the Alps may be expected in the near future.

Sporobolus neglectus

O (Hohla 2014)**; K** (Melzer 2003, at Deutsch-Griffen, 800 msm, as a mass occurrence, 2017, obs. P. Englmaier)**; S** (Hohla & Melzer 2003, Stöhr & al. 2007, Pflugbeil & al. 2017)**; NT** (T. Wilhalm in Stöhr & al. 2007, Stöhr & al. 2012, Pagitz & Lechner Pagitz 2015) **OT** (Stöhr 2009)**; V** (Hohla 2014)**; BG; BS; BZ; TN; VR; BL; PO; UD; SLO** (9853/2: Mihorič 2016, Jogan 2017)

Annual (or short-living perennial) neophyte, ephemeral, locally established, regionally invasive.

Origin: North America.

Sporobolus vaginiflorus (*Muhlenbergia vaginiflora*)

B (Gilli & Pachschwöll 2018)**; O** (Hohla & al. 2015)**; K** (Melzer 2003)**; S** (Pilsl in Hohla & al. 2015, Wittmann & Pflugbeil 2017, Reich & al. 2018b)**; NT** (Pagitz & Lechner Pagitz 2015)**; V** (Hohla 2016)**; FL; BG; BS; BZ** (Wilhalm 1998)**; TN** (Prosser 1993)**; VR; BL; PO; UD; SLO** (Jogan 2017)

Annual (or short-living perennial) neophyte, ephemeral, locally established, regionally invasive.

Melzer (1994) argued for an introduction of *Sporobolus* species with seed material. This is highly implausible for seed mixtures, but impurities in seed material originating from North America are possible. Wilhalm (1998) could not observe any introduction by seed material. *Sporobolus* seeds are easily distributed along roadsides during autumnal road maintenance (Hohla & al. 2015). Jogan (2017) proposed several, possibly independent centers of spread, one of them, in western Slovenia and in the Sava river corridor, seems to be responsible for a successive colonization of the southeastern Alpine valleys (a similar concept as in Wilhalm 1998). Nowadays, *S. vaginiflorus* was found even in southwestern Hungary (Király & Hohla 2015) and in Eastern Austria (Gilli & Pachschwöll 2018). Another local center seems to establish in the Alpine Rhine valley (Tinner 2013), with a following successive colonization of western Austrian federal states.

Origin: North America.

Stenotaphrum secundatum* var. *variegatum
Warm-temperate, rhizomatous grass, in several cultivars (e.g. 'Texas Common' or 'Floratine') used for lawn, in its var. *variegatum* cultivated as ornamental plant.
O (Hohla & al. 2015)
Perennial neophyte, ephemeral (not really spontaneous), not invasive.
Origin: Western Africa, Central and South America.

Trachynia distachya* → *Brachypodium distachyon

Tragus racemosus
B (Melzer & Barta 2008)**; W** (Diran & al. 2016)**; N** (Diran & al. 2016)**; O** (Kleesadl 2009)**; ST** (Berg 2015b)**; S** (Pilsl & al. 2008)**; BS; BZ** (Kiem 1978 and Wilhalm 2001 note decreasing abundance)**; TN; VR; BL; VI; PO; UD**
Annual neophyte, ephemeral, regionally established to naturalized, not invasive within the territory, but invasive throughout the Pannonian Basin (G. Király, pers. comm.).
Origin: Mediterranean area, extratropical Africa, Western Central Asia, Middle East.

Trisetaria cristata (*Rostraria cristata*, *Lophochloa cristata*, *Koeleria phleoides*, *K. gerardii*)
Data of Wölk & Röser (2017) suggest a re-integration of *Rostraria* into *Trisetaria.*
W; ST; CO; LC; BG; BS; BZ; TN; VR
Annual. Naturalized to indigenous at the southern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive.
Origin: Mediterranean area, Northern Africa, Middle East, extending to India.

Trisetaria panicea (*Koeleria panicea*, *Trisetum paniceum*)
Data of Wölk & Röser (2017) suggest a re-integration of *Trisetaria panicea* in *Koeleria*, whereas in the dataset of Saarela & al. (2017) its position is more apart from *Koeleria*, and, unlike *Koeleria*, it is annual. Thus, it is provisionally left under *Trisetaria.*
V (8424/3: Dörr & Lippert 2001)**; BZ [–]** (Kiem 1978)**; TN; BL; BS**
Annual neophyte, as a forage alien, ephemeral, not invasive.
Origin: Western Europe, Western Mediterranean area.

Annotation: ***Triticum*** crop species will rarely become feral.

Triticum biunciale* → *Aegilops biuncialis

Triticum durum (*Triticum turgidum* subsp. *durum*)
Cultivated crop, spontaneously occurring on wasteland and along rail tracks.
V (8424/3: Dörr & Lippert 2001)**; BAV** (8427/4, 8527/2: Dörr & Lippert 2001)
Annual archaeophyte, ephemeral, not invasive.
Origin: Egypt.

Triticum cylindricum → Aegilops cylindrica

Triticum neglectum → Aegilops neglecta

Triticum polonicum
Occasionally cultivated as crop. Sometimes spontaneously occurring.
S (Pflugbeil & Pilsl 2013)
Annual archaeophyte, ephemeral, not invasive.
Origin: Palestine, Egypt.

Triticum spelta
Occasionally cultivated as crop. Sometimes spontaneously occurring.
O (Hohla 2006b)
Annual archaeophyte, ephemeral, not invasive.
Origin: Caucasus.

Triticum triunciale → Aegilops triuncialis

Triticum turgidum
Occasionally cultivated as crop. Sometimes spontaneously occurring.
K; BZ; TN
Annual archaeophyte, ephemeral, not invasive.
Origin: Palestine, Syria.

Triticum vagans → Aegilops geniculata

Triticum ventricosum → Aegilops ventricosa

Ventenata dubia
B; W [–]; N; O [–] (leg. Hübner, 1858, LI: Hohla & al. 2009: 301)**; ST [–]; GRB; VR** (F. Prosser, pers. obs., 2001–2002, not found again since then)**; VI**
Annual. Possibly indigenous at the eastern fringe of the Alps, elsewhere neophytic, ephemeral, not invasive, but reported as highly invasive in the US Pacific Northwest by Washington State Noxious Weed Control Board (https://www.nwcb.wa.gov/weeds/ventenata).
Origin: Southern Europe, North Africa, Pontic area, Western Central Asia.

Vulpia alopecuros → Festuca danthonii

Vulpia bromoides → Festuca bromoides

Vulpia ciliata → Festuca danthonii

Vulpia geniculata → Festuca geniculata

Vulpia ligustica → Festuca ligustica

Vulpia myuros → Festuca myuros

Vulpia unilateralis → Festuca maritima

Conclusions

Within the last decade, 32 spontaneously occurring grass taxa were found as new for the Austrian territory (compared with Walter & al. 2002 and Fischer & al. 2008), this is a share of 21% of the total alien grass flora of Austria (152 taxa). Sixty-eight additional alien grass species occur in the surrounding Eastern Alps, mainly their Italian part, resulting in a total of 220 alien species in this study.

Some neophytes are known for their invasive potential, among grasses e.g. some maize weeds or roadside aliens. Impressive examples from abroad are documented with New-world Stipeae (*Nassella*) in Australia (McLaren & al. 2004) or with *Ventenata dubia* in the US Pacific Northwest. Despite of this fact, the share of invasive or potentially invasive species in the territory covered here is surprisingly low: 20% are invasive or potentially invasive at any level, an unexpected low number, compared with 80% non-invasive taxa and only 1.5% occasional short-distance garden escapes. Most of them are only locally (e.g. at roadsides) or regionally invasive (e.g. in maize cropping areas), only a few may severely influence natural or semi-natural vegetation in large areas, most of all *Festuca brevipila*-cultivars.

Due to climatic change, global trade and increasing ornamental plant offers, a continuous increase of alien species, their spread and their invasiveness is expected.

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