The alien vascular flora of Tuscany (Italy): update and analysis

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SUMMARY. Here it is provided the updated checklist of the alien vascular flora of Tuscany. Together with those *taxa* that are considered alien to the Tuscan vascular flora amounting to 510 units, also locally alien *taxa* and doubtfully aliens are reported in three additional checklists. The analysis of invasiveness shows that 241 *taxa* are casual, 219 naturalized and 50 invasive. Moreover, 13 *taxa* are new for the vascular flora of Tuscany, of which one is also new for the Euromediterranean area and two are new for the Mediterranean basin.
Keywords: Vascular plants, Xenophytes, New records, Invasive species, Mediterranean.

RIASSUNTO. Si fornisce la checklist aggiornata della flora vascolare aliena della regione Toscana. Insieme alla lista dei taxa *che si considerano alieni per la Toscana che ammontano a 510 unità, si segnalano in tre ulteriori liste anche i* taxa *che si ritengono essere presenti nell'area di studio anche con popolazioni non autoctone o per i quali sussistono dubbi sull'effettiva autoctonicità. L'analisi dello status di invasività mostra che 241* taxa *sono casuali, 219 naturalizzati e 50 invasivi. Inoltre, 13* taxa *rappresentano una novità per la flora vascolare di Toscana, dei quali uno è nuovo anche per l'area Euromediterranea e altri due sono nuovi per il bacino del Mediterraneo.*
***Parole chiave**: Piante vascolari, Xenofite, Nuovi ritrovamenti, Specie invasive, Mediterraneo.*

Introduction

The Mediterranean basin is considered as one of the world most biodiverse areas, especially as far as its vascular flora is concerned. In fact, apart hosting more than nearly 25000 plant *taxa* of which at least 50% are exclusive to the basin (Blondel *et al.* 2010), it includes some areas that have been named as "hot spots" due to their high endemic rate (Médail, Quézel, 1999). On the other hand, the Mediterranean has been the scene of a long human colonization process and the rise of societies that date back to some millennia ago with the consequences of the drastic changes in the inhabited areas and the subsequent issues for the conservation of the biodiversity. In particular, plants have always migrated but have also strongly increased their movement following the establishment of long-lasting economic exchanges between close or distant countries. As a result of this context, non-native plant species have become an important component of the various Mediterranean floras. Since there is a tight link between biological invasions and human activities, alien species nowadays are considered as one of the most important causes of biodiversity loss all over the world and this state of things characterized by a severe threat for the conservation of native entities is now a major source of concern in the whole Mediterranean basin as well as in other Mediterranean-type areas (Gaertner *et al.*, 2009), especially in a climate change scenario (Gritti *et al.*, 2006). As regards, alien plant species (APS) are known to represent a menace for the existing native flora and habitats in various ways, among which their ability to replace partly or

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completely the original vegetation thus determining a net decrease in free space for native plants and up to drastic changes in the invaded environments (McKinney, Lockwood, 1999). Other means of threat as far as the ecological impacts of APS are concerned are represented by their involvement in the flower-pollinators web (Morales, Traveset, 2009), the possibility to change soil properties and animal species fitness (Vilà *et al.* 2011), to promote fires and to trigger the subsequent erosion (Brooks *et al.* 2004). Moreover, also humanity is resulted to be affected by plants invasions from an economic and health point of view due to the possible impacts on agriculture and the high costs of the interventions of eradication as well as the possibility that APS may be harmful, for example, through allergic reactions to pollen or plant exudates (Pyšek, Richardson 2010). At policy level, alien species have been pinpointed in 2014 as one of the major causes of biodiversity loss by the Convention on Biological Diversity (CBD 2014) while, in the same year, the European Union has adopted a specific Regulation concerning invasive alien species and, after two years, the first list of invasive alien entities of Union concern has been released.

Among the Italian regions, Tuscany is one that displays a particularly rich flora with an endemic rate that nearly reaches 5% (Conti *et al.* 2005, 2007, Peruzzi *et al.* 2014). Apart being rich in habitats that deserve protection (Blasi *et al.*, 2010), many of them are among those that are more sensitive to the impacts of alien plants (Chytrý *et al.*, 2008), Tuscany is also a rather highly populated region, with the subsequent problems related to the loss of natural environments and the arrive and/or establishment of alien species. Recently, two surveys on the Tuscan alien vascular flora reported an alien component of 308 and 367 *taxa*, respectively (Arrigoni *et al.* 2010, Arrigoni, Viegi, 2011) with the first that also reported a total of 67 naturalized and 14 invasive units. Moreover, the Tuscan territory comprises also an archipelago of seven islands and several islets that harbours a rich vascular flora characterized by the presence of 18 *taxa* that are strictly endemic together with other endemics related to the Italian and the Cyrno-Sardinian elements (Foggi *et al.* 2014, Mannocci *et al.*, 2016). If, on the one hand, there is not a common view on the supposed higher susceptibility of island ecosystems to alien plants invasions (Sax, Gaines, 2008; Vilà *et al.*, 2011), on the other it is undoubtedly true that the relatively high number of APS there reported (Lazzaro *et al.*, 2014) represent a serious source of risk for native biodiversity conservation.

Given this premise, it is necessary to face the issue of APS also at national and at local level. In this light, it is of fundamental importance to update the list of alien plant *taxa* that grows in a specific area together with their invasiveness status.

In the present work the updated checklist of the Tuscan alien vascular flora is provided together with the analysis of the invasiveness as well as those of the biological and chorological spectra, the pathways of introduction and the invaded habitats.

Materials and methods

The two previous checklists of the Tuscan alien vascular flora (Arrigoni *et al.*, 2010; Arrigoni, Viegi, 2011) have been revised and updated on the basis of field observations as well as taking into account the most recent floristic works.

Only those *taxa* that have been considered as surely present in the Tuscan territory have been included in the checklist (Annex A1). The list includes also those *taxa* which recent diffusion in the studied territory has revealed to be exceptionally fast and evidently fostered by the human intervention and environmental changes despite having been considered in the past as native to Tuscany. These latter entities have been considered as locally alien (Annex A2). Moreover also the *taxa* that are presumably alien to the Tuscan vascular flora have been taken into account as doubtfully alien (Annex A3) as well as those that locally have possibly formed non-native populations (Annex A4). *Taxa* that have not been found growing in the wild since 1950 together with those that are clearly not escaped from cultivation, those that have doubtfully escaped from cultivation and those that are likely absent or disappeared from Tuscany have not been included in the checklist and excluded from the alien vascular flora of Tuscany (Annex B).

For nomenclature we have followed with slight modifications Celesti-Grapow *et al.* (2010a) and the online databases The Plant List (2013) and Euro+Med (2006-onwards) with slight modifications as well as having took into account the most recent taxonomic works. Genera have been attributed to families following Peruzzi (2010) in accordance to the Angiosperm Phylogeny Group III (APG III 2009) and the Angiosperm Phylogeny Group IV (APG IV 2016).

The evaluation of status of invasiveness has been carried out on the basis of what proposed by Blackburn *et al.* (2011), Celesti-Grapow *et al.* (2010a, 2010b, 2009) and Pyšek *et al.* (2004) with some modifications:

Invasive species: entities found growing in the wild, capable both of self-sustaining and long-distance dispersal.

Naturalized species: entities found growing in the wild, capable of self-sustaining and spreading in close proximity but for which there are no evidences of long-distance dispersal.

Casual species: entities found growing in the wild but not capable of self sustaining and/or spreading, not even in close proximity.

As far as the period of introduction is concerned, if before or after 1500 A. D., *taxa* have been subdivided in archaeophytes and neophytes, respectively. Both biological forms and chorology have been analyzed according to Podda *et al.* (2012). Regarding the ways of introduction, they have been first evaluated as intentional or unintentional if the presence of a given *taxon* is the result of the human will or not, respectively, and then attributed to the classes already proposed by Hulme *et al.* (2008) with slight modifications. Moreover, *taxa* have been evaluated on the basis of the habitats where they have been more often found or, in the case of invasive units, where they show their highest degree of invasiveness.

Novelties for the alien vascular flora of Tuscany are shown in the checklist with the following codes:
- new findings for the alien vascular flora of Tuscany: **NN**;
- *taxa* that were previously considered doubtfully present in Tuscany or excluded from the vascular flora of Tuscany but have been confirmed in the present study: **C**;
- *taxa* that were previously considered native but have been transferred among the alien units in the present study: **N**;
- *taxa* that were previously considered doubtfully alien or excluded from the alien vascular flora of Tuscany but have been confirmed as alien in the present study: **CA**.

Locally alien *taxa* that previously have been subjected to a different treatment are shown in the checklist with the following codes:
- *taxa* that were previously considered doubtfully alien: **DA**;
- *taxa* that were previously considered alien: **A**;
- *taxa* already reported as locally alien: **LA**.
- *taxa* that were previously considered native: **N**.

Doubtfully alien *taxa* that previously have been subjected to a different treatment are shown in the checklist with the following codes:
- *taxa* that were previously considered native: **N**;
- *taxa* that were previously considered alien: **A**;

Taxa that are here excluded from the alien flora of Tuscany are shown in the checklist with the following codes:
- *taxa* that are here considered doubtfully escaped: **DE**;
- *taxa* that are here considered not escaped: **NE**;
- *taxa* that are here considered doubtfully present: **DP**;
- *taxa* that are here considered not present: **NP**;
- *taxa* that are here considered not alien: **NA**;
- *taxa* which presence in Tuscany is here considered unconfirmed: **U**.

The Tuscan alien vascular flora has been also compared to the following lists and databases:
- Commission Implementing Regulation (EU) 2016/1141 of 13 July 2016 (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1141);
- EPPO A1/A2 Lists of pests recommended for regulation as quarantine pests (https://www.eppo.int/INVASIVE_PLANTS/ias_lists.htm#A1A2Lists);
- EPPO List of invasive alien plants (https://www.eppo.int/INVASIVE_PLANTS/ias_lists.htm#IAPList);

- EPPO Observation List of invasive alien plants (https://www.eppo.int/INVASIVE_PLANTS/ias_lists.htm#ObservList);
- EPPO Alert List (https://www.eppo.int/INVASIVE_PLANTS/ias_lists.htm#AlertList);
- EPPO List of other documented plant species, DAISIE '100 of the worst' invasive aliens in Europe (http://www.europe-aliens.org/speciesTheWorst.do);
- The Global Invasive 'Species Database 100 of the World's Worst Invasive Alien Species' (http://www.iucngisd.org/gisd/100_worst.php);
- The Global Invasive Species Database (http://www.iucngisd.org/gisd/);
- The European Alien Species Information Network (https://easin.jrc.ec.europa.eu/).

Results

The alien vascular flora of Tuscany is currently made up of 583 *taxa* (Annex A), comprising locally aliens and doubtfully aliens that amount to 35 and 34 units (Annex A2 and A3), respectively, while for other 4 *taxa* it has been hypothesized that locally they have formed non-native population (Annex A4). Therefore, those *taxa* that are considered as surely alien are 510 (Annex A1) equalling to the 14,7% of the whole Tuscan vascular flora (Conti *et al.* 2005, 2007) and belonging to 93 families and 298 genera. Moreover, 145 *taxa* have been here definitively excluded from the alien vascular flora of Tuscany (Annex B) until new evidences of their presence in the region or regarding their alien status to the Tuscan flora will be provided.

The analysis of the degree of invasiveness shows that most of the alien *taxa* fall in the classes of the casual and the naturalized entities (respectively 241 and 219) while the invasive units amount to 50 (Fig. 1) corresponding nearly to 10% of the whole alien flora. As far as the year of introduction is concerned, the alien *taxa* are subdivided in 402 neophytes and 108 archaeophytes (ratio=3,7:1; Fig. 1). The ratio increases in favour of neophytes when only invasives are taken into account (ratio≈7,3:1; Fig. 1).

The Tuscan alien vascular flora comprises 124 *taxa* that have been listed as invasive of a certain concern in various databases (Annex A1), of

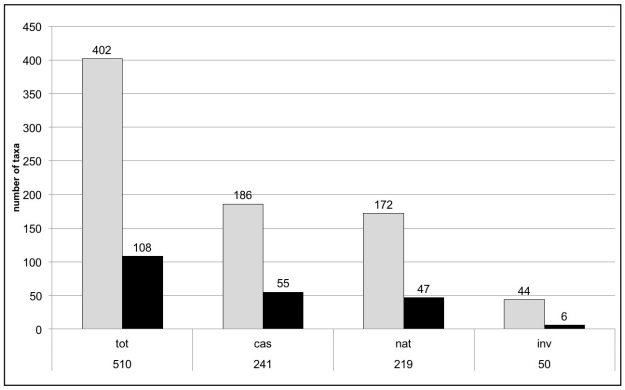

Fig. 1 – Repartition of archaeophytes (grey bars) and neophytes (black bars) in the total alien vascular flora of Tuscany and among the three classes of invasiveness. Cas, casual *taxa*; Nat, naturalized *taxa*, Inv, invasive *taxa*.
Fig. 1 – Distribuzione delle archeofite (barre grigie) e delle neofite (barre nere) nella flora esotica totale della Toscana e nelle tre classi di invasività. Cas, taxa *casuali; Nat,* taxa *naturalizzati, Inv,* taxa *invasivi.*

which 4 *taxa*, *Baccharis halimifolia* L., *Eichhornia crassipes* (Mart.) Solms, *Hydrocotyle ranunculoides* L. f. and *Myriophyllum aquaticum* (Vell.) Verdc., have been included among the invasive alien species of European concern (Commission Implementing Regulation (EU) 2016/1141). Moreover, 43 *taxa* are featured in the EPPO Lists, 12 are present in the DAISIE '100 of the worst' invasive aliens in Europe list and other four in the GISD 100 of the World's Worst Invasive Alien Species. In the end, 61 *taxa* have been found in the Global Invasive Species Database and 83 are considered of high impact in the European Alien Species Information Network database.

13 *taxa* represent new findings for the regional vascular flora (Fig. 2-4; Tab. 1), of which one *taxon*, *Helenium amarum* (Raf.) H. Rock, is new to the Euromediterranean flora and two are new to both the Italian and the Mediterranean floras, *Polypogon fugax* Steud. (Fig. 2 A-D) and *Rosa bracteata* J. C. Wendl. (Fig. 2 E-I) (Valdés, Scholz, 2009; Kurtto, 2009). Finally, *Hedera algeriensis* Hibberd × *Hedera hibernica* (G. Kirchn.) Bean is a hybrid previously undiscovered for Italy (fig. 3 G-I). As regards Hugh Mc Allister, who previously hypothesized its hybrid origin on photographic material, has confirmed its identification on the basis of both morphology and karyotype observations (McAllister, pers. com.).

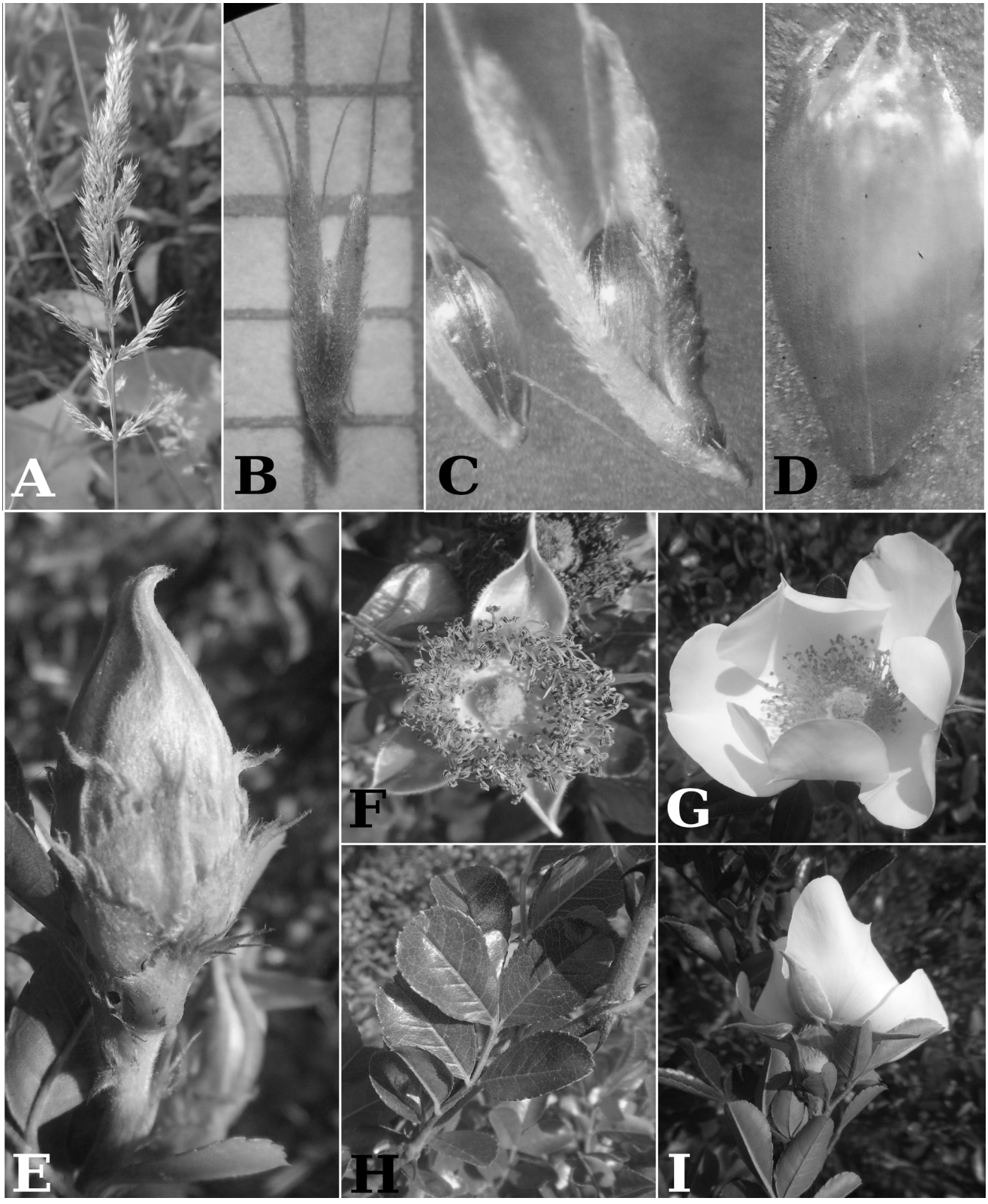

Fig. 2 – Polypogon fugax: A, inflorescence; B, spikelet; C, fruiting spikelet; D, lemma. Rosa bracteata: E, flower bud; F, flower without petals; G, corolla; H, leaf; I, flowering branch.
Fig. 2 – Polypogon fugax: A, infiorescenza; B, spighetta; C, spighetta fruttificante; D, lemma. Rosa bracteata: E, boccio; F, fiore senza petali; G, corolla; H, foglia; I, ramo fiorito.

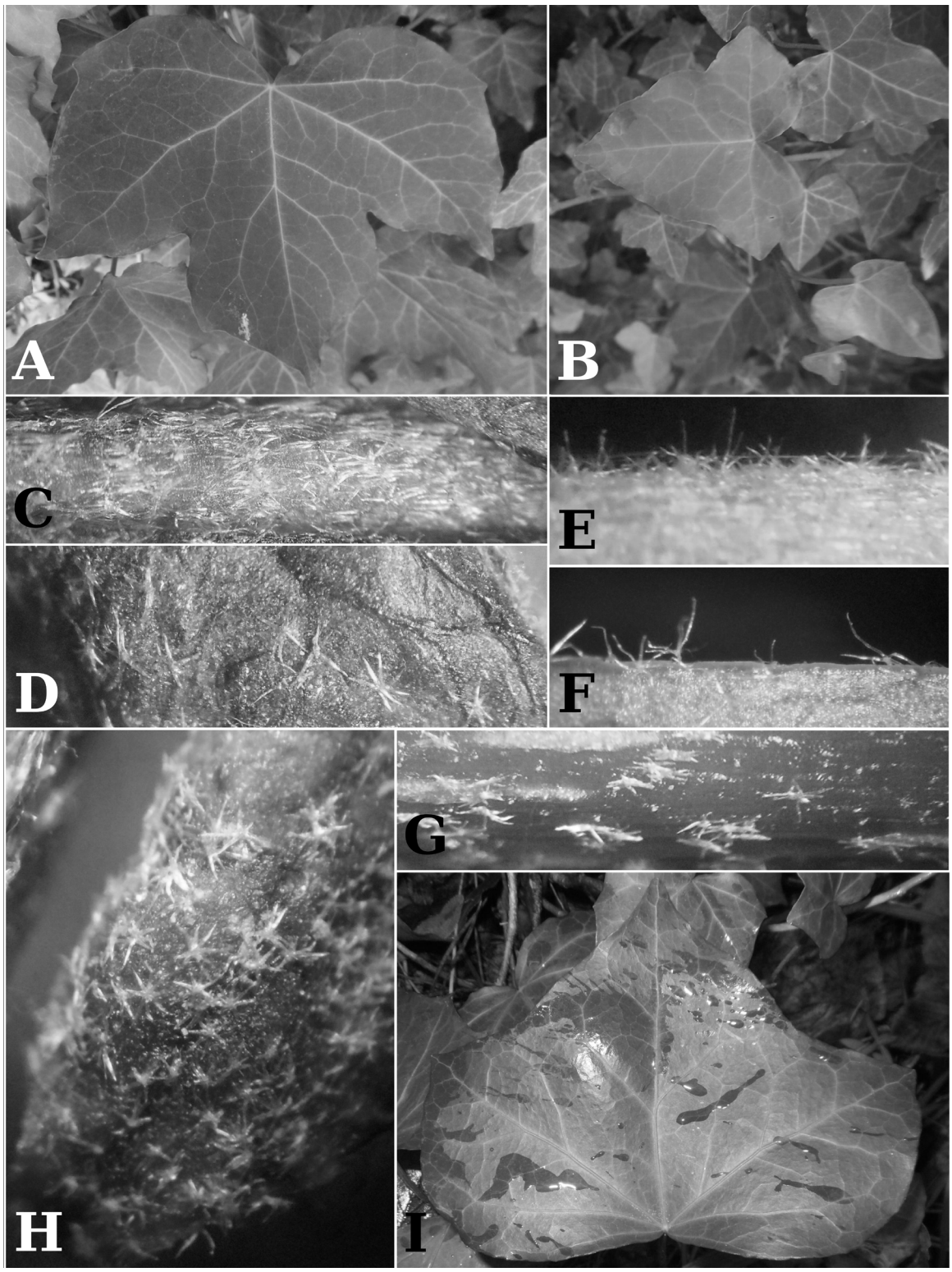

Fig. 3 – Hedera hibernica: A, mature leaf; B, young leaves; C, trichomes on young twig; D, trichomes on young leaf. Hedera helix subsp. helix: E, trichomes on young twig; F, trichomes on young leaf. Hedera algeriensis × H. hibernica: G, trichomes on young twig; H, trichomes on young leaf; I, mature leaf.

Fig. 3 – Hedera hibernica: A, foglia adulta; B, foglie giovani; C, tricomi su fusto giovane; D, tricomi su foglia giovane. Hedera helix subsp. helix: E, tricomi su fusto giovane; F, tricomi su foglia giovane. Hedera algeriensis × H. hibernica: G, tricomi su fusto giovane; H, tricomi su foglia giovane; I, foglia adulta.

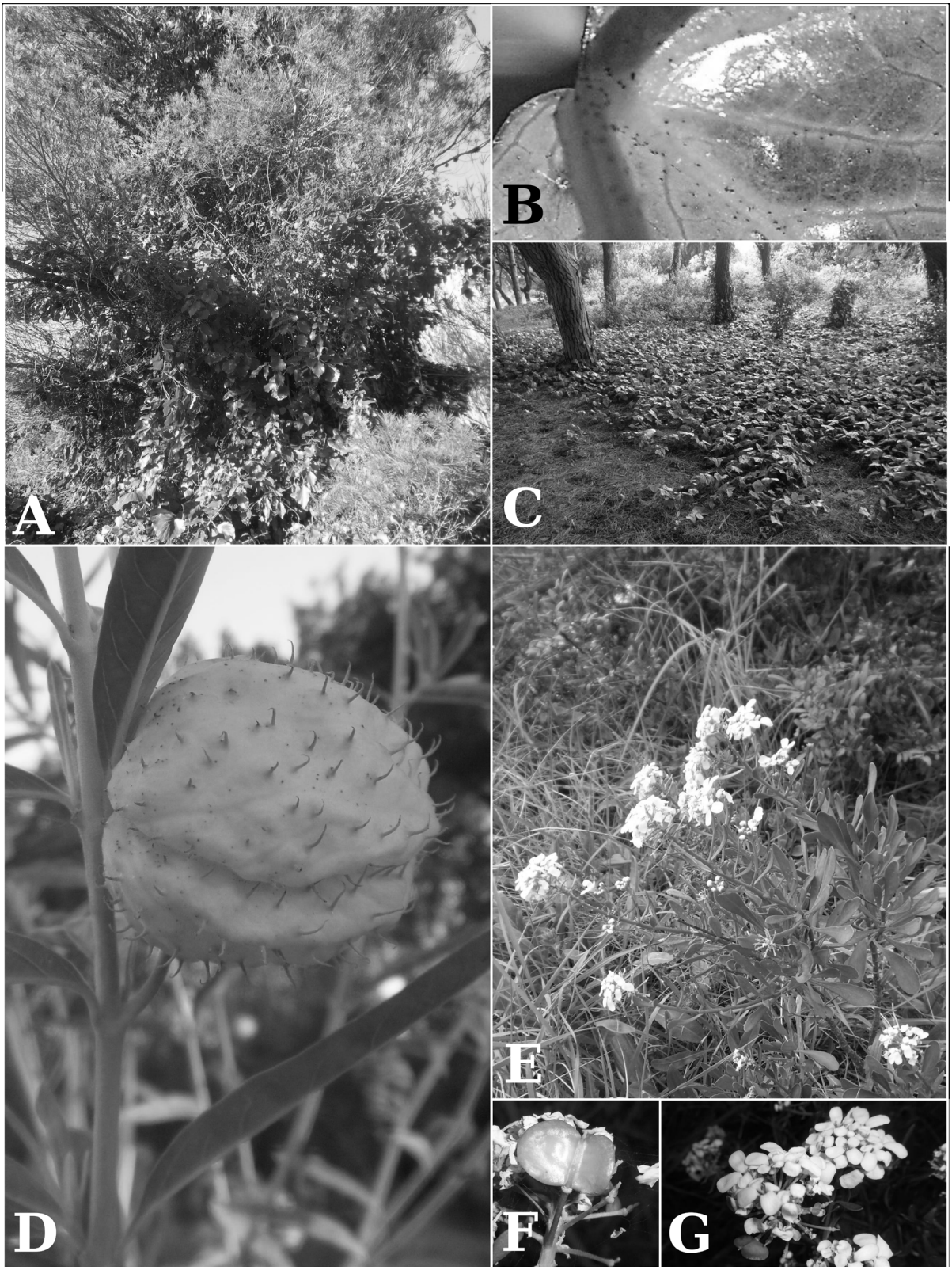

Fig. 4 – Hedera algeriensis: A, whole plant; B, trichomes on young leaf; C, whole plant. Asclepias physocarpa: D: fruit. Iberis sempreflorens: E, whole plant; F, silicule; G, inflorescence.
Fig. 4 – Hedera algeriensis: A, pianta intera; B, tricomi su foglia giovane; C, pianta intera. Asclepias physocarpa: D: frutto. Iberis sempreflorens: E, pianta intera; F, siliquetta; G, infiorescenza.

Taxon	Site	Status	Habitat	Introduction pathway	Frutification	New(N)/ confirmed(C)	Finder/ Identifier
Asclepias physocarpa (E. Mey.) Schltr.	Grotti, Rosignano Marittimo (LI)	Naturalized	wetlands	Ornamental gardening	Y	N	V. Lazzeri
Chasmanthe floribunda (Salisb.) N. E. Br.	Island of Capraia	Naturalized	Synanthropic	Ornamental gardening	Y	N	V. Lazzeri
Echinochloa crus-galli (L.) P. Beauv. var. praticola Ohwi	Cafaggio, Campiglia Marittima (LI)	Casual	Olive grove	Seeds contaminant	Y	N	V. Lazzeri
Euphorbia hyericifolia L.	Livorno (LI)	Casual	Urban area	Nursery weed	Y	N	V. Lazzeri
Hedera hibernica (G. Kirchn.) Bean	Marina di Cecina, Cecina (LI)	Casual	Lowland deciduous wood	Ornamental gardening	Y	C	V. Lazzeri, L. Sarti
Hedera algeriensis Hibberd	Tirrenia, Marina di Pisa	Naturalized	2270* Wooded dunes with Pinus pinea and/or Pinus pinaster	Ornamental gardening	N	N	V. Lazzeri
	Nugola, Collesalvetti (LI)	Naturalized	Lowland deciduous wood		N		V. Lazzeri
	Quercianella, Livorno (LI)	Naturalized	9340 Quercus ilex and Quercus rotundifolia forests		N		V. Lazzeri
	Castiglioncello, Rosignano Marittimo (LI)	Naturalized	9539 Mediterranean pine forests with endemic Mesogean pines		Y		V. Lazzeri
	Rosignano Solvay (LI)	Naturalized	Cultivated stone pine wood		N		V. Lazzeri
	Marina di Cecina, Cecina (LI)	Naturalized	2270* Wooded dunes with Pinus pinea and/or Pinus pinaster		N		V. Lazzeri, L. Sarti
	Marina di Bibbona, Bibbona (LI)	Naturalized	2270*		Y		V. Lazzeri
Hedera algeriensis Hibberd × Hedera hibernica (G. Kirchn.) Bean	Rosignano Marittimo (LI)	Casual	9340	Ornamental gardening	N	N	V. Lazzeri
Helenium amarum (Raf.) H. Rock	Colognole, Collesalvetti (LI)	Casual	6130 Calaminarian grasslands of the Violetalia calaminariae	Ornamental gardening	Y	N	V. Lazzeri
Hordeum distichon L.	Gabbro, Rosignano Marittimo (LI)	Casual	Uncultivated field	Cultivation	Y	C	V. Lazzeri
Iberis semperflorens L.	Calafuria, Livorno (LI)	Casual	5210 Arborescent matorral with Juniperus spp.	Ornamental gardening	Y	C	V. Lazzeri
Phyllostachys nigra (Lodd. ex Lindl.) Munro	Livorno (LI)	Casual	Synanthropic	Ornamental gardening	N	N	F. Sammartino
Plumbago auriculata Lam.	Quercianella, Livorno (LI)	Casual	Synanthropic	Ornamental gardening	N	N	V. Lazzeri, G. Gestri
Polypogon fugax Steud.	Monti Livornesi	Naturalized	9340 Quercus ilex and Quercus rotundifolia forests	Accidental	Y	N	V. Lazzeri,
Populus deltoides W. Bartram ex Marshall	Rosignano Marittimo (LI)	Casual	Urban area	Urban roadside trees	N	C	V. Lazzeri
Rosa bracteata J. C. Wendl.	Villa Maria, Monti Livornesi, Livorno (LI)	Naturalized	Meadows	Ornamental gardening	Y	N	V. Lazzeri
Washingtonia robusta H. Wendl.	Tesorino, Cecina (LI)	Naturalized	Retrodunal vegetation	Ornamental gardening	N	N	V. Lazzeri, L. Sarti

Tab. 1 – New and confirmed *taxa* alien to the vascular flora of Tuscany.
Tab. 1 – Taxa *di nuova segnalazione e confermati per la flora aliena vascolare della Toscana.*

Key for the Tuscan ivies:

1- Trichomes on young leaves and twigs scale-like. Trichomes rays appressed to the epidermis, a least some fused in lower half or more, reddish, sessile, hardly visible to the naked eye. Mature leaves on vegetative parts large, glossy, mostly shallowly 3(-5)-lobed or unlobed. Petiole almost always reddish: ***H. algeriensis***.

1′ - Trichomes on young leaves and twigs mostly stellate. Trichomes rays appressed to the epidermis or erecto-patent, mostly free or fused only at the very base, yellowish or whitish, reddish or not in the centre, sessile or stalked, rather well visible to the naked eye. Mature leaves on vegetative parts medium to small-sized, glossy or not, usually distinctly 3-5-lobed, extremely rarely unlobed. Petiole reddish or green: 2.

2 - Trichomes stalked, with erecto-patent rays (young leaves and twigs looking "spiny"), whitish: ***H. helix*** subsp. ***helix*** [incl. f. poetarum (Nicotra) McAll. & A. Rutherf.].

2′ - Trichomes sessile, with rays appressed to the epidermis, mostly whitish or yellowish: 3.

3 - Most frequent trichomes with 8 rays, some intermediate between the stellate and the scaly shape. Leaves mostly 3-lobed, rarely 4-5-lobed: ***H. algeriensis* × *H. hibernica***.

3′ - Most frequent trichomes with fewer than 8 rays, all stellate. Leaves mostly 5-lobed, rarely 3-lobed: ***H. hibernica***.

Moreover, four alien *taxa* that were previously considered doubtfully present in Tuscany or excluded from the vascular flora of Tuscany have been here confirmed, while three *taxa* previously considered native have been here transferred among the alien units and, finally, for other seven alien *taxa* that were recently considered doubtfully alien by other authors their allochtonicity has been here reaffirmed. Most of the novelties come from cultivation for ornamental purposes (13 *taxa*), while only one *taxon* is commonly cultivated as a crop and three other *taxa* are accidental presences, among which one unit is a nursery weed and another one is a seed contaminant.

The majority of the *taxa* here reported as locally alien represent a novelty for the alien flora of Tuscany with the exception of one *taxon* that had been already reported as locally alien (*Laurus nobilis* L.; Filibeck, 2006). Among the others, one *taxon* was previously considered alien, one native and four other *taxa* were previously considered doubtfully alien.

Family	Whole alien flora	Invasive units
Asteraceae	68	14
Poaceae	48	5
Fabaceae	28	5
Rosaceae	21	0
Solanaceae	21	0
Onagraceae	16	0
Amaranthaceae	15	3
Brassicaceae	15	0
Asparagaceae	14	2
Cactaceae	12	1
Amaryllidaceae	11	0
Vitaceae	10	5
Others	230	15

Tab. 2 – Most represented families in the alien vascular flora of Tuscany.
Tab. 2 – Famiglie maggiormente rappresentate nella flora aliena vascolare della Toscana.

As far as the doubtfully alien units are concerned, eight *taxa* were previously reported as native to the flora of Tuscany and other eight *taxa* were considered alien.

Asteraceae, apart being the most represented family in the whole alien vascular flora of Tuscany (68 *taxa*), have turned out to provide the highest number of invasive units with 14 *taxa*, while other notable contributions come from Fabaceae and Poaceae (both with 5 *taxa*) and Vitaceae (4 *taxa*) (Tab. 2).

Regarding the biological spectrum, the most represented groups are therophytes (161 *taxa*) and phanerophytes (144 *taxa*) followed by hemicryptophytes, geophytes, chamaephytes, nanophanerophytes and hydrophytes with 82, 64, 33, 15 and 11 *taxa*, respectively. Among invasive *taxa*, therophytes and phanerophytes are nearly equal (16 and 14 *taxa*), followed by geophytes with 10 units (Fig. 5).

The chorological spectrum shows that the APS from the American continent, from Asia and the Mediterranean basin are the most numerous chorotypes with, respectively, 189, 102 and 61 *taxa* if

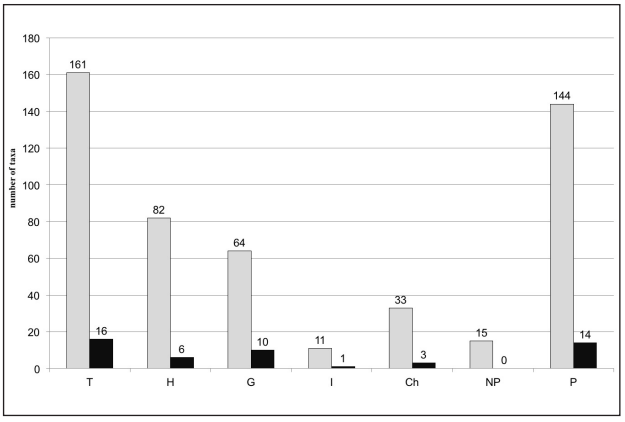

Fig. 5 – Biological forms of the alien vascular flora of Tuscany: T, terophytes, H, hemicryptophytes; G, geophytes; I, hydrophytes; Ch, chamaephytes; NP, nanophanerophytes; P, phanerophytes. Grey bars: whole alien vascular flora; black bars: invasive *taxa*.
Fig. 5 – Forme biologiche della flora vascolare aliena della Toscana: T, terofite; H, emicriptofite; G, geofite; I, idrofite; Ch, chamefite; NP, nanofanerofite; P, fanerofite. Barre grigie: flora aliena vascolare totale; barre nere: taxa *invasivi.*

the whole alien flora is taken into account (Fig. 6). Concerning invasive *taxa*, the American species far remain the most numerous (28 *taxa*) followed by the Asian (5 *taxa*) and the widely distributed species together with the Mediterranean ones (both with 4 *taxa*) (Fig. 6).

The present analysis has also been conducted on the habitats that are colonized by APS. In the case of the total alien flora, the habitat where the human presence has produced the stronger modifications to the landscape, the synanthropic areas, is the one where the highest number of APS has been recorded (278 *taxa*) followed by wetlands and cultivated areas (73 and 67 *taxa*, respectively) (Fig. 7). On the other hand, when invasive *taxa* are considered, wetlands hosts only a slightly lower number of APS than the synanthropic ones (15 and 22 *taxa*, respectively; Fig. 7).

As far as the ways of introduction are concerned, the APS that have purposely been introduced in the regional territory represent the larger group when taking into account the whole alien flora (396 *taxa*), while among invasive species intentionally and accidentally introduced *taxa* are nearly equal (respectively 26 and 24 *taxa*) (Fig. 8). If, on the one hand, in the case of the whole alien flora those *taxa* that are deliberately cultivated for ornamental purposes are the most numerous group (264 *taxa*) followed by crops (118 *taxa*), on the other hand, the analysis of the invasive flora shows that the hitchhikers are slightly more numerous than the ornamental species (21 and 19 *taxa*, respectively) (Fig. 8).

Discussion

The 510 *taxa* that are currently alien to the vascular flora of Tuscany correspond to an increase of 39% if compared to the last checklist (Arrigoni, Viegi, 2011). This increase is to be addressed to both the ongoing process of plant invasions that Tuscany, as well as many other densely populated areas, is subjected to and to the growing attention towards this issue. In this light, Tuscany now falls in the category of those Italian regions which display an alien rate higher than 12% of the total vascular flora (Celesti-Grapow *et al.*, 2010). As regards, both high population and urbanization rates, synathropization and exploitation of natural environments, especially those of coastal and riverine habitats, propagule pressure, tourism and movements of people and means of transportation (Foxcroft *et al.*, 2013; Lockwood *et*

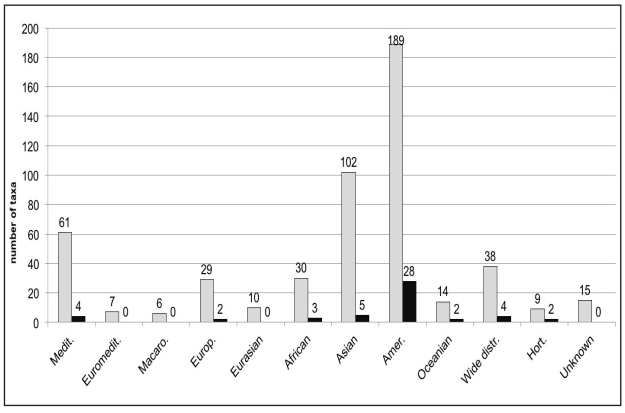

Fig. 6 – Chorotypes of the alien vascular flora of Tuscany: Medit., Mediterranean *taxa*; Euromedit., Euromediterranean *taxa*; Macaro., Macaronesian *taxa*; Europ., European *taxa*; Amer., American *taxa*; Wide distrib., widely distributed *taxa*; Hort., *taxa* of horticultural origin. Grey bars: whole alien vascular flora; black bars: invasive *taxa*. Grey bars: whole alien vascular flora; black bars: invasive *taxa*.
Fig. 6 – Corotipi della flora vascolare aliena della Toscana: Medit., taxa *mediterranei; Euromedit.,* taxa *euromediterranei; Macaro.,* taxa *macaronesici; Europ.,* taxa *europei; Amer.,* taxa *americani; Wide distrib.,* taxa *ad ampia distribuzione; Hort.,* taxa *di origine orticulturale. Barre grigie: flora aliena vascolare totale; barre nere:* taxa *invasivi.*

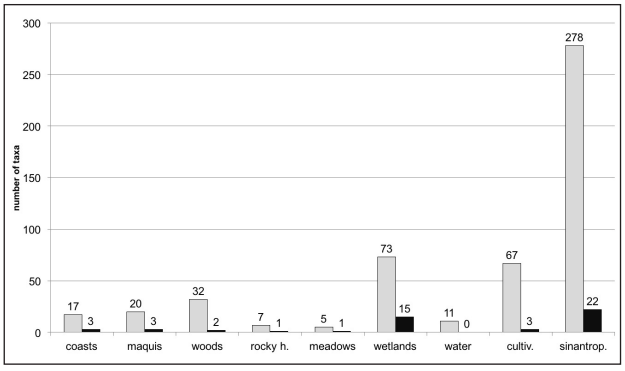

Fig. 7 – Distribution of the alien vascular flora of Tuscany among the invaded habitats: rocky h., rocky habitats; cultiv., cultivated areas; synanthrop., synanthropic habitats. Grey bars: whole alien vascular flora; black bars: invasive *taxa*.
Fig. 7 – Distribuzione della flora vascolare aliena della Toscana negli habitat invasi: coasts, habitat costieri; rocky h., habitat rocciosi; cultiv., aree a coltivi; synanthrop., habitat sinantropici. Barre grigie: flora aliena vascolare totale; barre nere: taxa *invasivi.*

al., 2009; McKinney, 2002) could be addressed as factors that likely have led to this situation.

Regarding the invasiveness status of the entities that are alien to Tuscany, here it is reported that invasive units have increased in comparison to one of the previous works (Celesti-Grapow *et al.*, 2010) by 36 *taxa* nearly doubling their percentage over the whole alien vascular flora. Notwithstanding Tuscany still not results the Italian region with the highest number of invasives.

As far as the period of introduction is concerned, similar results with a majority of neophytes over archaeophytes and a low percentage of invasive archaeophytes in comparison with neophytes have already been observed in other areas where the Mediterranean climate is widespread, or at least well represented, such as Sardinia (Podda *et al.*, 2012), Greece (Arianoutsou *et al.*, 2010) and Balearic Islands (Podda *et al.*, 2010).

The flora comprises certain APS that are currently considered as some of the most dangerous invaders in Europe as well as in the rest of the world. Among them, *Alternanthera philoxeroides* (Mart.) Griseb., *Amorpha fruticosa* L., *Azolla filiculoides* Lam., *Baccharis halimifolia* L., *Cortaderia selloana* (Schult. & Schult. f.) Asch. & Graebn., *Egeria densa* Planch., *Eichhornia crassipes* (Mart.) Solms, *Helianthus tuberosus* L., *Hydrocotyle ranunculoides* L. f., *Impatiens glandulifera* Royle, *Myriophyllum aquaticum* (Vell.) Verdc., *Paspalum distichum* L. subsp. *distichum*, *Reynoutria* spp., *Salvinia molesta* D. S. Mitch. and *Xanthium italicum* Moretti are important wetlands and freshwaters invaders which, in turn, are considered as some of the most sensitive habitats to plant invasions (Zedler, 2004). As regards, wetlands and freshwaters in Tuscany, if not as far as the number of APS is concerned, but surely if their own vulnerability together with the overall riskiness of the related alien *taxa* are taken into account, have resulted two of the habitats which status of conservation raises major concerns. Similarly, also coastal environments and maquis host a relatively low number of, more or less, highly specialized and dangerous invaders such as *Acacia dealbata* Link subsp. *dealbata*, *Acacia saligna* (Labill.) Wendl., *Carpobrotus* spp., *Cenchrus* spp. and *Lonicera japonica* Thunb. As regards, whether they are currently limited to one or few Tuscan sites like *A. saligna*, whether they are commoner, also the APS that have spread in these latter habitats represent a severe menace to native biodiversity (Del Vecchio *et al.*, 2013; Affre *et al.*, 2010; Schierenbeck, 2004). Another important invader, *Robinia pseudoacacia* L., exerts its highest invasiveness in wooden areas (Benesperi *et al.*, 2012), while *Opuntia stricta* (Haw.) Haw., despite still not being widespread, has succeeded in establishing some rather large populations exclusively on rocky habitats, both coastal and inland, thus turning out to represent there a severe threat

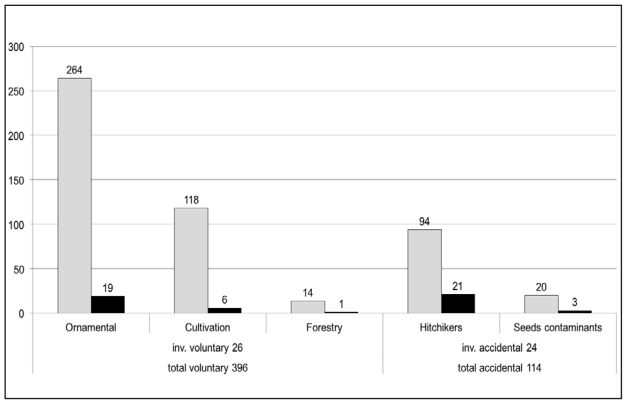

Fig. 8 – Introduction pathways of the alien vascular flora of Tuscany. Grey bars: whole alien vascular flora; black bars: invasive *taxa*.
Fig. 8 – Vie di introduzione della flora vascolare aliena della Toscana. Barre grigie: flora aliena vascolare totale; barre nere: taxa *invasivi.*

(Vilà *et al.*, 2003). In the end, cultivated areas and synanthropic habitats have shown to host together more than half of the total Tuscan alien flora thus demonstrating that, as already seen in other geographical contexts (Chytrý *et al.*, 2008), the places being the most affected by human activities are, at the same time, the most prone to plants invasions. If on the hand, notwithstanding that these two latter habitats, in most cases, could give the impression of being already compromised, anyway it is still important not to lower the attention towards the control of APS that grow there. Some possible drawbacks of a further spread of alien plants in man-made habitats are the menace for the, although usually few, *taxa* growing in these habitat that deserve protection, the spread from the fatally invaded synanthropic sources to the more natural neighbouring habitat that could act as sinks and the likely increased risk for human health represented by allergenic species. Some APS that elsewhere have reached the status of important weeds such as *Ambrosia* spp., *Araujia sericifer*a Brot., *Delairea odorata* Lem., *Fallopia baldschuanica* (Regel) Holub, *Humulus japonicus* Siebold & Zucc., *Impatiens glandulifera* Royle, *Lantana camara* L., *Senecio angulatus* L. f., *S. inaequidens* DC., *Sicyos angulatus* L., *Solanum elaeagnifolium* Cav., and *Solidago canadensis* L. are currently extremely to moderately localized in Tuscany. Notwithstanding, it is still needed to monitor the respective populations and, if possible, to plan their eradication. On the contrary, other APS that still have not received worldwide or European recognition have shown the potential to gain more visibility as threatening invaders right in Tuscany. As regards, *Acacia pycnantha* Benth. (Lazzaro *et al.*, 2015), *Helianthus* × *laetiflorus* Pers., *Vitis* spp. and *Parthenocissus quinquefolia* (L.) Planch. seem to have laid the foundations for a possible future broader spread. In particular, regarding the hybrid sunflower, even if not being able of sexual reproduction or almost so, the findings related to its presence are growing so that it could turn out to be even more widespread than its parent *H. tuberosus* with which it shares the ability to colonize vast spaces in wetlands such as muddy fields and river banks. Some *taxa* belonging to the Vitaceae family, mostly relying on an high propagule pressure that is tightly linked to the old and widespread Tuscan wine-making tradition, can now be found from naturalized to invasive in a rather large variety of habitats such as abandoned vineyards, wooden areas and rivers. In particular, in these two latter habitats, the alien Vitaceae are likely to become serious competitors with the native *Vitis vinifera* L. subsp. *sylvestris* (C. C. Gmel.) Hegi.

Among the newly found alien *taxa* (Tab. 1), *Rosa bracteata* (Fig. 2 E-I) is of a certain interest having already been reported as an important invasive elsewhere (Enloe *et al.*, 2013; Richardson, Rejmánek, 2011; Randall, 2001). As regards, despite found in only one site, it has turned out to be well established with a certain number of adult individuals that regularly flower and set fruits. Similarly, despite having been confirmed for Tuscany on the basis of a single finding, also *Hedera hibernica* (G. Kirchn.) Bean (Fig. 3 A-D) could give rise to some concern since it has turned out to be responsible for most of the ivies invasions in north-western North America (Clarke *et al.* 2006). Given that it is extremely similar to *H. helix* L. being the two *taxa* distinguished with some certainty only by the shape of trichomes on young twigs and leaves (Fig. 3 A-F; McAllister, Rutherford, 1990), there is the possibility that it could be is somehow overlooked in the studied territory. Although regarding the congeneric *H. algeriensis* Hibberd practically no data related to its possible attitude towards invading natural habitats are available, with an exception of an old paper (Costello, 1986), it has proven to be the best adapted alien ivy to the Tuscan natural and semi-natural environments (Fig. 4 A-C). Indeed, it has been often found growing and often forming large populations in wooden areas, especially in coastal stone pine woods that are attributable to the priority habitat 2270* where it succeeds in growing on the pine needles litter. Moreover, also the hybrid between these two ivies has been found growing in the wild (Fig. 3 G-I). This latter finding comes from two sites near Rosignano Marittimo where it has overgrown a certain extension of soil in a holm oak wood and a mixed oak wood, repectively. As regards, the two parental species have not been observed growing together with the hybrid. In this light, it is conceivable that this hybrid could be sold

in local nurseries as *H. helix L. or H. hibernica*. Alternatively, it could be the result of a crossing between the commonly cultivated *H. algeriensis* and the presumably rarer in cultivation *H. hibernica* and the following ornithocorous dispersal.

Asclepias physocarpa (E. Mey.) Schltr. (Fig. 4 D) is listed as an invasive weed in Australia (Ward *et al.*, 2012) along with being fully naturalized elsewere, while the congeneric *A. fruticosa* L. has been locally reported as invasive in the Mediterranean (e.g. Podda *et al.*, 2012). In consideration of the fact that *A. physocarpa*, at least once, seems to have acquired self-compatibility during its invasion history and that it is known the potential for hybridization with *A. fruticosa* (Ward *et al.*, 2012), the presence of this two *taxa* in Tuscany raises the necessity for a strict surveillance of the respective populations and, possibly, also for a prompt eradication. The prevalence of "garden thugs" among the newly found species is indicative of which is the main way of introduction for the APS into Tuscany along with the fact that home and urban gardening represents an important source of "newcomers".

In the present study the class of locally APS has been added. Despite being considered as locally native, some of them have shown a rapid spread in man-made and in natural habitats, probably taking advantage of the net of communication routes or spreading from cultivation into the neighbouring natural habitats. Among these latter class, at least two *taxa*, *Crepis bursifolia* L. and *Pinus halepensis* Mill. subsp. *halepensis*, have shown the ability to rapidly colonize new areas in the region. In contrast, no doubtfully APS has shown any invasiveness in the studied area being all, at most, naturalized. The concern about locally APS has been already raised since, mainly as apophytes, elsewhere they have shown a high rapidity in colonizing even vast areas thus becoming, together with "true" alien *taxa*, one of the major threat for the conservation of the native flora and vegetation (Zając, Zając, 2009; Sukopp, 2006). Moreover, the anomalous spread of certain native species could be an effective indicator of an ongoing synanthropization (Sudnik-Wójcikowska, Moraczewski, 1994). In this light, particular attention must be paid also to those *taxa* that are locally naturalized, demonstrating to be able to form stable populations outside their historic distribution. *P. halepensis* subsp. *halepensis* has been reported as a major invader in Mediterranean climate countries (e.g. South Africa; Richardson *et al.*, 1990), especially in relation to its post-fire germination ecophysiology (Ne'eman *et al.*, 2004; Richardson, 1988). Although in at least one Tuscan area the Aleppo pine has been considered native (Di Tommaso, Signorini, 1990), this *taxon* has been often employed in the region in reforestations and afforestations thus determining its spread well beyond its limited presumed native range. Given that *P. halepensis* plantations can exert deep detrimental effects on soil stability, water use and local biodiversity (Maestre, Cortina, 2004), it would be important to severely ban its use and to start eradication actions where it is clearly not native. *Crepis bursifolia*, originally described from Sicily, is always linked to man-made habitats and is rapidly invading the Mediterranean Basin from Italy westwards. In the end, *Sulla coronaria* in Tuscany is at the same time locally an invader often spreading from the many cultivations in the regional region and a *taxon* for which the native status of most populations is hard to be ascertained.

What has emerged from the analysis of the most represented families is that Asteraceae, Poaceae and Fabaceae are those that most contribute to the Tuscan alien vascular flora. These data share many similarities with what observed in other Mediterranean countries (e.g. Portugal and Spain, Domingues de Almeida, 2012; Sanz Elorza *et al.*, 2006) as well as in the case of a geographycally broader analysis (Pyšek, 1998), but, at the same time, comprising those that are some of the most numerous families of the total vascular flora of Tuscany.

As far as the biological forms of the Tuscan alien vascular flora are concerned, the predominance of therophytes and phanerophytes is consistent with the prevalence of voluntarily introduced *taxa* for ornamental and cultivation purposes and vice-versa, especially those coming from the American continent, as well as already observed elsewhere in the Mediterranean and in Europe (Hulme *et al.*, 2008; Lambdon *et al.*, 2008). As regards, the prevalence of widely cultivated aliens is consistent with the positive

relationship found in northern Italy by Marini *et al.* (2012) between local richness in APS and propagule pressure together with the availability of free niches to be invaded. In this light, the highest number of aliens found in man-influenced habitats could demonstrate that, also in Tuscany, human activities and the following habitat changes could play a key role for the success of plant invasions. Notwithstanding, the large woody habit seems to be a favourable trait for the establishment of stable populations in Tuscany since phanerophytes are the most represented life form among naturalized and invasive *taxa*. The invasion patterns regarding the habitats of Tuscany that here have been took into account share remarkable similarities with those observed for the Italian territory as well as in other Mediterranean countries (Lambdon *et al.*, 2008) with the aforementioned net prevalence of man-made and man-influenced areas together with a relatively high number of aliens found in wetlands, especially if only invasive *taxa* are considered. Interestingly, *taxa* that are not purposely introduced such as hitchhikers and seed contaminants almost equal those that are directly linked to human will in the case of the invasive units. This latter results show that, in order to develop a successful strategy to face the issue of alien plants invasions, it is important not to lower the attention towards any means and pathways that are used by alien plants to enter the region or to broaden their distribution.

In conclusion, the data here reported show that Tuscany is affected by a rather severe state of plants invasion as far as the number of APS and the invasiveness of some *taxa* are concerned together with the presence of some serious invader in fragile and rare habitats. In this light, the recently adopted European policy is a tool that could usefully be integrated with regional, or even more circumscribed, regulations that could better fit with the local needs in terms of the actual state of the invasion and the peculiarities that regard the shape of the territory and the potential sources of invaders.

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Riassunto esteso

Il bacino del Mediterraneo è un'area caratterizzata da una elevatissima ricchezza floristica e da un alto tasso di endemismi. Similmente, la Toscana è tra le regioni italiane continentali che ospitano delle flore vascolari tra le più ricche del paese, anche in considerazione del relativamente alto numero di specie endemiche. Pertanto, è di primaria importanza l'attuazione delle misure atte a fronteggiare tutte quelle minacce che possono rappresentare un rischio per la conservazione di tale patrimonio naturalistico. Tra le fonti di rischio per la biodiversità autoctona che sono annoverate tra quelle che destano maggiori preoccupazioni vi sono le specie vegetali aliene. In considerazione degli importanti effetti dannosi che queste ultime possono esercitare sia sulla flora autoctona, sia sull'ambiente in generale, vi è la necessità di mantenere continuamente aggiornate le checklist della flore aliene vascolari. In quest'ottica, nel presente lavoro si fornisce l'aggiornamento della flora vascolare aliena della Toscana che è risultata composta da 510 taxa, di cui 243 sono casuali, 217 naturalizzati e 50 invasivi, mentre le neofite sono 402 e le archeofite 108. Inoltre, 13 taxa rappresentano una novità per la flora vascolare della Toscana, dei quali uno è nuovo anche per l'area Euromediterranea, Helenium amarum (Raf.) H. Rock, altri due sono nuovi per il bacino del Mediterraneo, Polypogon fugax Steud. e Rosa bracteata J. C. Wendl e, infine, si riporta il ritrovamento di un nuovo ibrido di Hedera, H. algeriensis Hibberd × H. hibernica (G. Kirchn.) Bean. Inoltre, 124 specie della flora aliena vascolare della Toscana risultano tra quelle incluse nelle liste delle specie aliene che destano le maggiori preoccupazioni, sia a livello europeo che mondiale, comprese quattro entità presenti nella lista del Regolamento di esecuzione 2016/1141 delle specie esotiche invasive di rilevanza unionale.

Per quanto riguarda le famiglie maggiormente rappresentate, le Asteraceae sono quella che contribuisce con il maggior numero di taxa sia per la flora vascolare esotica totale, sia per quanto riguarda le entità invasive. Relativamente alla analisi delle forme biologiche, terofite e fanerofite sono quelle che presentano il maggior numero di taxa nella flora vascolare esotica totale e tra le entità invasive, mentre, per quanto riguarda i corotipi, quello americano è risultato decisamente dominante sugli altri. Tra gli habitat dove si rinvengono il maggior numero di taxa della flora vascolare aliena totale vi sono le aree sinantropiche, le aree umide e i coltivi. Tuttavia, nel caso delle sole entità invasive, nelle aree umide si riscontra un numero di taxa alieni solo di poco inferiore rispetto alle aree sinantropiche. Infine, per quanto concerne le vie sfruttate dalle specie vegetali aliene per introdursi nel territorio toscano, è da notare come il maggior numero di taxa della flora aliena vascolare totale sia stato introdotto volontariamente dall'uomo e, in particolare, allo scopo di utilizzarli come piante da ornamento, mentre nel caso delle entità invasive le specie introdotte casualmente risultano solo di poco inferiori a quelle introdotte di proposito.

Alla luce dei dati mostrati, la Toscana risulta una delle regioni caratterizzate da uno dei più alti tassi di taxa alieni, sia limitatamente al numero totale delle entità, sia per quanto riguarda il numero di unità invasive. Altri fattori di preoccupazioni sono rappresentati dal notevole incremento dei taxa alieni di cui è riportata la presenza nel territorio regionale, cosa che potrebbe suggerire la possibilità che tale numero sia destinato ad un ulteriore incremento. Inoltre, la presenza di entità altamente invasive in alcuni habitat particolarmente suscettibili alle invasioni biologiche quali gli ambiti costieri, le zone umide e le aree ripariali fa sorgere la necessità dello studio approfondito delle cause di tale fenomeno e di interventi per il ripristino ambientale, quantomeno laddove possibile.

In definitiva, i risultati ottenuti nella presente ricerca mostrano un quadro in cui la regione Toscana risulta affetta in modo importante dal problema della specie vegetali esotiche. Alla luce di ciò, anche in considerazione del prezioso patrimonio naturalistico della regione, si ritiene necessario lo sviluppo di piani di azione volti alla mitigazione del processo di introduzione di specie aliene nel territorio e, contemporaneamente, indirizzati anche all'eradicazione di quelle specie maggiormente invasive e che minacciano ambienti e specie autoctoni di maggior valore conservazionistico.

Annex A1: alien *taxa*

	Familly	Taxon	Status	Introduction	Lists
	Malvaceae	Abutilon theophrasti Medik.	Inv	archaeo	l
	Fabaceae	Acacia dealbata Link subsp. dealbata	Inv	neo	c,g,l
	Fabaceae	Acacia melanoxylon R. Br.	Nat	neo	i.l.
	Fabaceae	Acacia provincialis A.Camus	Cas	neo	
	Fabaceae	Acacia pycnantha Benth.	Inv	neo	
	Fabaceae	Acacia saligna (Labill.) Wendl.	Nat	neo	i.l.
	Euphorbiaceae	Acalypha virginica L.	Cas	neo	
	Acanthaceae	Acanthus mollis L.	Nat	archaeo	i
	Sapindaceae	Acer negundo L.	Nat	neo	l
	Crassulaceae	Aeonium arboreum (L.) Webb & Berthel.	Nat	neo	
	Crassulaceae	Aeonium haworthii (Webb & Berthel.) Webb & Berthel.	Cas	neo	
	Asparagaceae	Agave americana L.	Inv	neo	i
	Simaroubaceae	Ailanthus altissima (Mill.) Swingle	Inv	neo	c,g,i,l
	Fabaceae	Albizia julibrissin Durazz.	Cas	neo	i.l.
	Malvaceae	Alcea rosea L.	Nat	archaeo	
	Amaryllidaceae	Allium cepa L.	Cas	archaeo	
	Amaryllidaceae	Allium sativum L.	Cas	archaeo	
	Betulaceae	Alnus cordata (Loisel.) Duby	Nat	archaeo	
	Xanthorrhoeaceae	Aloe arborescens Mill.	Cas	neo	
	Verbenaceae	Aloysia citriodora Palau	Cas	neo	
	Amaranthaceae	Alternanthera philoxeroides (Mart.) Griseb.	Inv	neo	b.i.l.
	Amaranthaceae	Amaranthus albus L.	Nat	neo	
	Amaranthaceae	Amaranthus blitoides S. Watson	Nat	neo	
	Amaranthaceae	Amaranthus bouchonii Thell.	Nat	neo	
	Amaranthaceae	Amaranthus caudatus L.	Cas	neo	
	Amaranthaceae	Amaranthus cruentus L.	Nat	neo	
	Amaranthaceae	Amaranthus deflexus L.	Inv	neo	
	Amaranthaceae	Amaranthus emarginatus Uline & W. L. Bray	Cas	neo	
	Amaranthaceae	Amaranthus hybridus L.	Nat	neo	l
	Amaranthaceae	Amaranthus hypochondriacus L.	Nat	neo	
	Amaranthaceae	Amaranthus retroflexus L.	Inv	neo	l

Cas: casual taxa; Nat: naturalized taxa, Inv: invasive taxa.
archaeo: archaeophytes; neo: neophytes
a: Commission Implementing Regulation (EU) 2016/1141
b: EPPO A1/A2 Lists of pests recommended for regulation as quarantine pests
c: EPPO List of invasive alien plants
d: EPPO Observation List of invasive alien plants
e: EPPO Alert List
f: EPPO List of other documented plant species
g: DAISIE '100 of the worst' invasive aliens in Europe
h: Global Invasive 'Species Database 100 of the World's Worst Invasive Alien Species'
i: the Global Invasive Species Database
l: European Alien Species Information Network (high impact taxa)

	Amaranthaceae	Amaranthus spinosus L.	Cas	neo	l
	Amaranthaceae	Amaranthus tuberculatus (Moq.) J. D. Sauer	Cas	neo	
	Amaranthaceae	Amaranthus viridis L.	Cas	neo	l
	Asteraceae	Ambrosia artemisiifolia L.	Inv	neo	c,f,g,i,l
	Asteraceae	Ambrosia psilostachya DC.	Nat	neo	f,l
	Asteraceae	Ambrosia tenuifolia Spreng.	Cas	neo	f,l
	Asteraceae	Ambrosia trifida L.	Cas	neo	
	Fabaceae	Amorpha fruticosa L.	Inv	neo	c,l
CA	Ranunculaceae	Anemone pavonina Lam.	Nat	archaeo	
	Basellaceae	Anredera cordifolia (Ten.) Steenis	Nat	neo	i
	Apiaceae	Anthriscus cerefolium (L.) Hoffm.	Cas	archaeo	
	Plantaginaceae	Antirrhinum majus L. subsp. majus	Nat	archaeo	
	Apocynaceae	Araujia sericifera Brot.	Cas	neo	d
	Asteraceae	Argyranthemum frutescens (L.) Sch. Bip. s.l.	Cas	neo	
	Aristolochiaceae	Aristolochia sempervirens L.	Nat	neo	
N	Asteraceae	Artemisia absinthium L.	Nat	archaeo	
	Asteraceae	Artemisia annua L.	Nat	neo	
	Asteraceae	Artemisia verlotiorum Lamotte	Inv	neo	
	Poaceae	Arundo donax L.	Inv	archaeo	h,i,l
	Apocynaceae	Asclepias fruticosa L.	Nat	neo	
NN	Apocynaceae	Asclepias physocarpa (E. Mey.) Schltr.	Cas	neo	
	Asparagaceae	Asparagus falcatus L.	Cas	neo	
N	Asparagaceae	Asparagus officinalis L. subsp. officinalis	Nat	archaeo	i
	Asparagaceae	Aspidistra elatior Blume	Cas	neo	
	Asteraceae	Aster ageratoides Turcz.	Cas	neo	
	Brassicaceae	Aubrieta deltoidea (L.) DC.	Nat	neo	
	Cactaceae	Austrocylindropuntia subulata (Muehlenpf.) Backeb.	Nat	neo	
	Poaceae	Avena byzantina K. Koch	Cas	archaeo	
	Poaceae	Avena georgica Zuccagni	Cas	archaeo	
	Poaceae	Avena sativa subsp. macrantha (Hack.) Mordv.	Nat	archaeo	
	Poaceae	Avena sativa L. subsp. sativa	Nat	archaeo	
	Salviniaceae	Azolla filiculoides Lam.	Cas	neo	d,l
	Asteraceae	Baccharis halimifolia L.	Inv	neo	a,b,l
	Lamiaceae	Ballota pseudodictamnus (L.) Benth. subsp. pseudodictamnus	Cas	neo	
	Poaceae	Bambusa mitis (Lour.) Poir.	Cas	neo	
	Chenopodiaceae	Bassia scoparia (L.) A. J. Scott	Cas	archaeo	
	Begoniaceae	Begonia evansiana C. Andrews	Nat	neo	
	Chenopodiaceae	Beta vulgaris L. subsp. vulgaris	Cas	archaeo	
	Asteraceae	Bidens aureus (Aiton) Sherff	Cas	neo	
	Asteraceae	Bidens bipinnatus L.	Nat	neo	
	Asteraceae	Bidens frondosus L.	Inv	neo	d
	Asteraceae	Bidens pilosus L.	Nat	neo	i,l
	Asteraceae	Bidens vulgatus Greene	Nat	neo	
	Brassicaceae	Brassica napus L.	Nat	archaeo	

	Brassicaceae	Brassica nigra (L.) W. D J. Koch	Nat	archaeo	
	Brassicaceae	Brassica oleracea L. subsp. oleracea	Nat	archaeo	
	Brassicaceae	Brassica rapa L. subsp. campestris (L.) A. R. Clapham	Nat	archaeo	
	Moraceae	Broussonetia papyrifera (L.) L'Hér. ex Vent.	Nat	neo	e,l
	Boraginaceae	Brunnera macrophylla (Adams) I. M. Johnst.	Nat	neo	
	Scrophulariaceae	Buddleja davidii Franch.	Nat	neo	c,i,l
	Apiaceae	Bupleurum rotundifolium L.	Nat	archaeo	
	Asteraceae	Calendula officinalis L.	Nat	archaeo	
	Bignoniaceae	Campsis radicans (L.) Bureau	Nat	neo	
	Cannaceae	Canna indica L.	Cas	neo	i,l
	Brassicaceae	Cardamine occulta Hornem.	Cas	neo	
	Aizoaceae	Carpobrotus acinaciformis (L.) L. Bolus	Inv	neo	c
	Aizoaceae	Carpobrotus edulis (L.) N. E. Br.	Inv	neo	g,i,l
	Casuarinaceae	Casuarina equisetifolia L. s.l.	Nat	neo	i
	Apocynaceae	Catharanthus roseus (L.) G. Don	Nat	neo	
	Amaranthaceae	Celosia cristata L.	Cas	neo	
	Poaceae	Cenchrus longisetus M. C. Johnst.	Nat	neo	
	Poaceae	Cenchrus longispinus (Hack.) Fernald	Nat	neo	e
	Poaceae	Cenchrus spinifex Cav.	Nat	neo	d
	Asteraceae	Centaurea diluta Aiton	Nat	neo	
	Caprifoliaceae	Centranthus macrosiphon Boiss.	Cas	neo	
	Poaceae	Ceratochloa cathartica (Vahl) Herter	Nat	neo	
	Fabaceae	Ceratonia siliqua L.	Nat	archaeo	
	Iridaceae	Chamaeiris orientalis (Mill.) M. B. Crespo	Cas	neo	
NN	Iridaceae	Chasmanthe floribunda (Salisb.) N. E. Br.	Cas	neo	
	Fabaceae	Cicer arietinum L.	Cas	archaeo	
	Asteraceae	Cichorium endivia L.	Cas	neo	
	Lauraceae	Cinnamomum glanduliferum (Wall.) Meisn.	Cas	neo	
	Cistaceae	Cistus ×pulverulentus Pourr.	Cas	neo	
	Cistaceae	Cistus ×skanbergii Lojac.	Cas	neo	
	Cucurbitaceae	Citrullus lanatus (Thunb.) Matsum. & Nakai	Cas	archaeo	
	Commelinaceae	Commelina communis L.	Cas	neo	
	Commelinaceae	Commelina virginica L.	Cas	neo	
	Convolvulaceae	Convolvulus tricolor L. subsp. cupanianus (Tod.) Cavara & Grande	Cas	neo	
	Apiaceae	Coriandrum sativum L.	Cas	archaeo	
	Poaceae	Cortaderia selloana (Schult. & Schult. f.) Asch. & Graebn.	Inv	neo	c,g,i,l
	Asteraceae	Cosmos bipinnatus Cav.	Cas	neo	
	Rosaceae	Cotoneaster lacteus W. W. Sm.	Nat	neo	
	Crassulaceae	Cotyledon orbiculata L.	Cas	neo	
	Crassulaceae	Crassula lycopodioides Lam.	Cas	neo	
	Rosaceae	Crataegus azarolus L.	Nat	archaeo	
	Rosaceae	Crataegus germanica (L.) Kuntze	Nat	archaeo	
	Asteraceae	Crepis dioscoridis L.	Nat	archaeo	
CA	Asteraceae	Crepis sancta (L.) Bornm. subsp. nemausensis (P. Fourn.) Babc.	Inv	neo	

	Iridaceae	Crocosmia ×crocosmiiflora (Lemoine) N.E.Br.	Inv	neo	
	Cucurbitaceae	Cucurbita maxima Duchesne	Cas	neo	
	Cucurbitaceae	Cucurbita pepo L.	Cas	neo	
	Cupressaceae	Cupressus sempervirens L.	Nat	archaeo	l
	Convolvulaceae	Cuscuta campestris Yunck.	Inv	neo	f
	Convolvulaceae	Cuscuta epilinum Weihe	Nat	archaeo	f
	Apiaceae	Cyclospermum leptophyllum (Pers.) Sprague ex Britton & P. Wilson	Nat	neo	
	Rosaceae	Cydonia oblonga Mill.	Cas	archaeo	
	Asteraceae	Cynara scolymus L.	Cas	archaeo	i
	Cyperaceae	Cyperus difformis L.	Nat	neo	l
	Cyperaceae	Cyperus eragrostis Lam.	Inv	neo	
	Cyperaceae	Cyperus glomeratus L.	Nat	neo	
	Cyperaceae	Cyperus involucratus Rottb.	Cas	neo	
	Cyperaceae	Cyperus odoratus L.	Nat	neo	
	Cyperaceae	Cyperus serotinus Rottb.	Inv	archaeo	
	Dryopteridaceae	Cyrtomium falcatum (L. f.) C. Presl	Nat	neo	
	Asparagaceae	Danaë racemosa (L.) Moench	Nat	neo	
	Solanaceae	Datura ferox L.	Nat	neo	
	Solanaceae	Datura inoxia Mill.	Cas	neo	
	Solanaceae	Datura stramonium L. subsp. stramonium	Nat	neo	l
	Solanaceae	Datura wrightii Regel	Cas	neo	
	Asteraceae	Delairea odorata Lem.	Nat	neo	i,l
	Aizoaceae	Delosperma cooperi (Hook. f.) L. Bolus	Cas	neo	
	Hydrangeaceae	Deutzia scabra Thunb.	Cas	neo	
	Convolvulaceae	Dichondra micrantha Urb.	Nat	neo	
	Plantaginaceae	Digitalis purpurea L.	Cas	neo	
	Poaceae	Digitaria ciliaris (Retz.) Koeler	Cas	neo	l
	Ebenaceae	Diospyros lotus L.	Cas	neo	
	Bignoniaceae	Dolichandra unguis-cati (L.) L. G. Lohmann	Nat	neo	
	Aizoaceae	Drosanthemum floribundum (Haw.) Schwantes	Nat	neo	
	Chenopodiaceae	Dysphania ambrosioides (L.) Mosyakin & Clemants	Nat	neo	
	Chenopodiaceae	Dysphania multifida (L.) Mosyakin & Clemants	Nat	neo	
	Poaceae	Echinochloa colona (L.) Link	Cas	neo	l
NN	Poaceae	Echinochloa crus-galli (L.) P. Beauv. var. praticola Ohwi	Cas	neo	
	Poaceae	Echinochloa oryzicola (Vasinger) Vasinger	Cas	neo	
	Asteraceae	Eclipta prostrata (L.) L.	Nat	neo	l
	Hydrocharitaceae	Egeria densa Planch.	Cas	neo	c,i,l
	Pontederiaceae	Eichhornia crassipes (Mart.) Solms	Cas	neo	a,b,h,i,l
	Elaeagnaceae	Elaeagnus angustifolia L.	Nat	neo	i,l
	Cyperaceae	Eleocharis caduca (Delile) Schult.	Nat	neo	
	Poaceae	Eleusine indica (L.) Gaertn. subsp. africana (Kenn.-O'Byrne) S. M. Phillips	Cas	neo	
	Poaceae	Eleusine indica (L.) Gaertn. subsp. indica	Nat	neo	
	Hydrocharitaceae	Elodea canadensis Michx.	Nat	neo	g,i,l

	Poaceae	Eragrostis curvula (Schrad.) Nees	Nat	neo	d
	Poaceae	Eragrostis pectinacea (Michx.) Nees	Cas	neo	
	Asteraceae	Erigeron annuus (L.) Pers. subsp. annuus	Inv	neo	
	Asteraceae	Erigeron bonariensis L.	Inv	neo	l
	Asteraceae	Erigeron canadensis L.	Inv	neo	l
	Asteraceae	Erigeron karvinskianus DC.	Inv	neo	i,l
	Asteraceae	Erigeron sumatrensis Retz.	Inv	neo	l
	Rosaceae	Eriobotrya japonica (Thunb.) Lindl.	Cas	neo	i
	Brassicaceae	Erysimum cheiri (L.) Crantz	Nat	archaeo	
	Fabaceae	Erythrostemon gilliesii (Wall. ex Hook.) Klotzsch	Cas	neo	
	Papaveraceae	Eschscholzia californica Cham.	Cas	neo	
	Myrtaceae	Eucalyptus camaldulensis Dehnh.	Nat	neo	l
	Myrtaceae	Eucalyptus globulus Labill.	Nat	neo	
	Myrtaceae	Eucalyptus resinifera Sm.	Nat	neo	
	Celastraceae	Euonymus japonicus L. f.	Nat	neo	
	Euphorbiaceae	Euphorbia humifusa Willd.	Cas	neo	
NN	Euphorbiaceae	Euphorbia hypericifolia L.	Cas	neo	
	Euphorbiaceae	Euphorbia maculata L.	Inv	neo	
	Euphorbiaceae	Euphorbia nutans Lag.	Cas	neo	
	Euphorbiaceae	Euphorbia prostrata Aiton	Inv	neo	
	Euphorbiaceae	Euphorbia serpens Kunth	Nat	neo	
	Polygonaceae	Fagopyrum dibotrys (D. Don) H. Hara	Nat	archaeo	
	Polygonaceae	Fagopyrum esculentum Moench	Nat	archaeo	
	Polygonaceae	Fallopia baldschuanica (Regel) Holub	Nat	neo	c
	Araliaceae	Fatsia japonica (Thunb.) Decne. & Planch.	Cas	neo	
	Oleaceae	Forsythia viridissima Lindl.	Cas	neo	
	Iridaceae	Freesia alba (G. L. Mey.) Gumbl.	Cas	neo	
	Asteraceae	Galinsoga parviflora Cav.	Nat	neo	l
	Asteraceae	Galinsoga quadriradiata Ruiz & Pav.	Nat	neo	l
	Asteraceae	Gamochaeta americana (Mill.) Wedd.	Cas	neo	
	Asteraceae	Gamochaeta pensylvanica (Willd.) Cabrera	Cas	neo	
	Asteraceae	Gazania linearis (Thumb.) Druce	Cas	neo	
	Asteraceae	Gazania rigens (L.) Gaertn.	Cas	neo	
	Fabaceae	Gleditsia triacanthos L.	Cas	neo	l
	Molluginaceae	Glinus lotoides L.	Cas	neo	
	Fabaceae	Glycyrrhiza echinata L.	Cas	neo	
	Asteraceae	Grindelia ciliata (Nutt.) Spreng.	Cas	neo	
	Asteraceae	Guizotia abyssinica (L. f.) Cass.	Cas	neo	
	Caryophyllaceae	Gypsophila elegans M. Bieb.	Cas	neo	
NN	Araliaceae	Hedera algeriensis Hibberd	Nat	neo	
C	Araliaceae	Hedera hibernica (G. Kirchn.) Bean	Nat	neo	
NN	Araliaceae	Hedera algeriensis Hibberd × Hedera hibernica (G. Kirchn.) Bean	Nat	neo	
NN	Asteraceae	Helenium amarum (Raf.) H. Rock	Cas	neo	
	Asteraceae	Helianthus annuus L.	Cas	neo	

	Asteraceae	Helianthus tuberosus L.	Inv	neo	c,l
	Asteraceae	Helianthus ×laetiflorus Pers.	Inv	neo	
	Boraginaceae	Heliotropium amplexicaule Vahl	Nat	neo	
	Xanthorrhoeaceae	Hemerocallis fulva (L.) L.	Nat	neo	
	Cupressaceae	Hesperocyparis arizonica (Greene) Bartel	Cas	neo	
	Cupressaceae	Hesperocyparis glabra (Sudw.) Bartel	Nat	neo	
	Pontederiaceae	Heteranthera reniformis Ruiz & Pav.	Cas	neo	
	Malvaceae	Hibiscus syriacus L.	Cas	neo	
	Malvaceae	Hibiscus trionum L.	Nat	neo	l
C	Poaceae	Hordeum distichon L.	Cas	archaeo	
	Poaceae	Hordeum vulgare L.	Cas	archaeo	
	Cannabaceae	Humulus japonicus Siebold & Zucc.	Cas	neo	c
	Asparagaceae	Hyacinthoides hispanica (Mill.) Rothm. subsp. hispanica	Nat	neo	
	Asparagaceae	Hyacinthoides non-scripta (L.) Chouard ex Rothm.	Nat	neo	
NN	Asparagaceae	Hyacinthoides ×massartiana Geerinck	Cas	neo	
	Asparagaceae	Hyacinthus orientalis L.	Cas	archaeo	
	Hydrangeaceae	Hydrangea macrophylla (Thunb.) Ser.	Cas	neo	
	Araliaceae	Hydrocotyle ranunculoides L. f.	Nat	neo	a,b,l
	Hypericaeae	Hypericum calycinum L.	Cas	neo	
	Hypericaeae	Hypericum mutilum L.	Nat	neo	
C	Brassicaceae	Iberis semperflorens L.	Cas	neo	
	Balsaminaceae	Impatiens balfourii Hook. f.	Nat	neo	
	Balsaminaceae	Impatiens glandulifera Royle	Nat	neo	c,g,i,l
	Balsaminaceae	Impatiens parviflora DC.	Nat	neo	f,l
	Asteraceae	Inula germanica L.	Cas	neo	
	Convolvulaceae	Ipomoea indica (Burm.) Merr.	Nat	neo	
	Convolvulaceae	Ipomoea purpurea (L.) Roth	Cas	neo	
	Iridaceae	Iris albicans Lange	Cas	neo	
	Iridaceae	Iris germanica L.	Nat	archaeo	
	Iridaceae	Iris unguicularis Poir. subsp. unguicularis	Nat	neo	
	Brassicaceae	Isatis tinctoria L. subsp. tinctoria	Cas	archaeo	
	Oleaceae	Jasminum officinale L.	Cas	archaeo	
	Juglandaceae	Juglans regia L.	Nat	archaeo	
	Juncaceae	Juncus tenuis Willd.	Nat	neo	i
	Crassulaceae	Kalanchoë ×houghtonii D. B. Ward	Nat	neo	
	Asteraceae	Lactuca sativa L.	Cas	archaeo	
	Verbenaceae	Lantana camara L.	Nat	neo	h,l
	Fabaceae	Lathyrus odoratus L.	Cas	neo	
	Fabaceae	Lathyrus sativus L.	Cas	archaeo	
	Araceae	Lemna minuta Kunth	Cas	neo	
	Fabaceae	Lens culinaris Medik. subsp. culinaris	Cas	archaeo	
	Brassicaceae	Lepidium didymum L.	Nat	neo	
	Brassicaceae	Lepidium sativum L. subsp. sativum	Cas	archaeo	
	Brassicaceae	Lepidium virginicum L. subsp. virginicum	Nat	neo	i

	Oleaceae	Ligustrum lucidum W. T. Aiton	Nat	neo	i
	Oleaceae	Ligustrum sinense Lour.	Cas	neo	i,l
	Liliaceae	Lilium candidum L.	Nat	archaeo	
	Linderniaceae	Lindernia dubia (L.) Pennell	Nat	neo	
	Linaceae	Linum usitatissimum L.	Nat	archaeo	
	Caprifoliaceae	Lonicera japonica Thunb.	Inv	neo	i,l
	Fabaceae	Lupinus albus L. subsp. albus	Cas	archaeo	
	Solanaceae	Lycium chinense Mill.	Cas	neo	
	Moraceae	Maclura pomifera (Raf.) C. K. Schneid.	Cas	neo	
	Berberidaceae	Mahonia aquifolium (Pursh) Nutt.	Nat	neo	l
	Rosaceae	Malus pumila Mill.	Cas	archaeo	
	Asteraceae	Matricaria discoidea DC.	Cas	archaeo	
N	Brassicaceae	Matthiola incana (L.) R. Br. subsp. incana	Nat	archaeo	
CA	Fabaceae	Medicago sativa L. subsp. sativa	Inv	archaeo	
	Meliaceae	Melia azedarach L.	Cas	neo	i
	Lamiaceae	Mentha ×piperita L.	Cas	neo	
	Aizoaceae	Mesembryanthemum cordifolium L. f.	Nat	neo	
	Aizoaceae	Mesembryanthemum crystallinum L.	Nat	neo	
	Nyctagynaceae	Mirabilis jalapa L.	Nat	neo	
	Moraceae	Morus alba L.	Nat	archaeo	i,l
	Moraceae	Morus nigra L.	Cas	archaeo	
	Scrophulariaceae	Myoporum insulare R. Br.	Cas	neo	
	Scrophulariaceae	Myoporum laetum G. Forst.	Cas	neo	
	Haloragaceae	Myriophyllum aquaticum (Vell.) Verdc.	Nat	neo	a,c,i,l
	Amaryllidaceae	Narcissus jonquilla L. subsp. jonquilla	Cas	neo	
	Amaryllidaceae	Narcissus papyraceus Ker Gawl. subsp. papyraceus	Nat	neo	
	Amaryllidaceae	Narcissus pseudonarcissus L. subsp. pseudonarcissus	Nat	neo	
	Amaryllidaceae	Narcissus ×incomparabilis Mill.	Cas	neo	
	Amaryllidaceae	Narcissus ×medioluteus Mill.	Cas	archaeo	
	Amaryllidaceae	Narcissus ×odorus L.	Cas	neo	
	Poaceae	Nassella neesiana (Trin. & Rupr.) Barkworth	Nat	neo	d,i
	Poaceae	Nassella trichotoma (Nees) Hack. & Arechav.	Nat	neo	d,l
	Asparagaceae	Nectaroscilla hyacinthoides (L.) Parl.	Cas	neo	
	Nelumbonaceae	Nelumbo nucifera Gaertn.	Cas	neo	
	Lomariopsidaceae	Nephrolepis cordifolia C. Presl	Nat	neo	i
	Solanaceae	Nicandra physalodes (L.) Gaertn.	Cas	neo	
	Solanaceae	Nicotiana glauca Graham	Nat	neo	i
	Solanaceae	Nicotiana rustica L.	Cas	neo	
	Amaryllidaceae	Nothoscordum gracile (Aiton) Stearn	Nat	neo	
	Lamiaceae	Ocimum basilicum L.	Cas	archaeo	
	Onagraceae	Oenothera biennis L.	Nat	neo	
	Onagraceae	Oenothera depressa Greene	Cas	neo	
	Onagraceae	Oenothera fallacoides Soldano & Rostanski	Cas	neo	
	Onagraceae	Oenothera glazioviana Micheli	Nat	neo	

	Onagraceae	Oenothera indecora Cambess.	Cas	neo	
	Onagraceae	Oenothera italica Rostanski & Soldano	Cas	neo	
	Onagraceae	Oenothera laciniata Hill	Cas	neo	
	Onagraceae	Oenothera latipetala (Soldano) Soldano	Cas	neo	
	Onagraceae	Oenothera marinellae Soldano	Cas	neo	
	Onagraceae	Oenothera oehlkersi Kappus	Cas	neo	
	Onagraceae	Oenothera parviflora L.	Cas	neo	
	Onagraceae	Oenothera pellegrini Soldano	Cas	neo	
	Onagraceae	Oenothera pycnocarpa Atkinson & Bartlett	Nat	neo	
	Onagraceae	Oenothera rosea L'Hér. ex Aiton	Cas	neo	
	Onagraceae	Oenothera speciosa Nutt.	Cas	neo	
	Onagraceae	Oenothera stricta Link	Cas	neo	
	Oleaceae	Olea europaea L. subsp. europaea	Nat	archaeo	i
	Asparagaceae	Oncostema peruvianum (L.) Speta	Nat	neo	
	Cactaceae	Opuntia dillenii (Ker Gawl.) Haw.	Nat	neo	
	Cactaceae	Opuntia elata Salm-Dyck	Nat	neo	
	Cactaceae	Opuntia engelmannii Salm-Dyck ex Engelm.	Nat	neo	
	Cactaceae	Opuntia ficus-indica (L.) Mill.	Nat	neo	g,i
	Cactaceae	Opuntia humifusa (Raf.) Raf.	Nat	neo	
	Cactaceae	Opuntia leucotricha DC.	Nat	neo	
	Cactaceae	Opuntia microdasys (Lehm.) Pfeiff.	Nat	neo	
	Cactaceae	Opuntia monacantha (Willd.) Haw.	Nat	neo	i
	Cactaceae	Opuntia phaeacantha Engelm.	Nat	neo	
	Cactaceae	Opuntia robusta H.L.Wendl. ex Pfeiff.	Nat	neo	
	Cactaceae	Opuntia stricta (Haw.) Haw.	Inv	neo	h,i
	Lamiaceae	Origanum majorana L.	Cas	archaeo	
	Poaceae	Oryza sativa L.	Cas	archaeo	
	Asteraceae	Osteospermum ecklonis (DC.) Norl.	Cas	neo	
	Oxalidaceae	Oxalis articulata Savigny	Inv	neo	
	Oxalidaceae	Oxalis bowiei Herb. ex Lindl.	Cas	neo	
	Oxalidaceae	Oxalis debilis Kunth	Nat	neo	
	Oxalidaceae	Oxalis dillenii Jacq.	Nat	neo	
	Oxalidaceae	Oxalis latifolia Kunth	Nat	neo	i,l
	Oxalidaceae	Oxalis pes-caprae L.	Inv	neo	c,g,i
	Oxalidaceae	Oxalis stricta L.	Nat	neo	
	Poaceae	Panicum capillare L. subsp. capillare	Nat	neo	
	Poaceae	Panicum dichotomiflorum Michx. subsp. dichotomiflorum	Nat	neo	
	Poaceae	Panicum miliaceum L. subsp. miliaceum	Cas	neo	
	Papaveraceae	Papaver somniferum L.	Nat	archaeo	
	Fabaceae	Paraserianthes lophantha (Willd.) I. C. Nielsen subsp. lophantha	Nat	neo	
	Vitaceae	Parthenocissus quinquefolia (L.) Planch.	Inv	neo	
	Poaceae	Paspalum dilatatum Poir.	Inv	neo	
	Poaceae	Paspalum distichum L. subsp. distichum	Inv	neo	c,g,l
	Poaceae	Paspalum quadrifarium Lam.	Cas	neo	

	Poaceae	Paspalum vaginatum Sw.	Nat	neo	i
	Passifloraceae	Passiflora caerulea L.	Nat	neo	
	Geraniaceae	Pelargonium zonale (L.) L'Hér. ex Aiton	Cas	neo	
	Polygonaceae	Persicaria capitata (Buch.-Ham. ex D. Don) H. Gross	Cas	neo	
	Polygonaceae	Persicaria orientalis (L.) Spach	Cas	neo	
	Apiaceae	Petroselinum crispum (Mill.) Fuss	Cas	archaeo	
	Solanaceae	Petunia ×hybrida Vilm.	Cas	neo	
	Boraginaceae	Phacelia tanacetifolia Benth.	Cas	neo	
	Arecaceae	Phoenix canariensis Chabaud	Cas	neo	i,l
	Arecaceae	Phoenix dactylifera L.	Cas	neo	
	Verbenaceae	Phyla canescens (Kunth) Greene	Cas	neo	
	Verbenaceae	Phyla nodiflora (L.) Greene	Nat	neo	
NN	Poaceae	Phyllostachys nigra (Lodd. ex Lindl.) Munro	Nat	neo	
	Poaceae	Phyllostachys reticulata (Rupr.) K. Koch	Cas	neo	
	Poaceae	Phyllostachys viridiglaucescens (Carrière) Rivière & C.Rivière	Nat	neo	
	Solanaceae	Physalis peruviana L.	Cas	neo	i,l
	Phytolaccaceae	Phytolacca americana L.	Nat	neo	
	Apiaceae	Pimpinella anisum L.	Cas	archaeo	
	Pinaceae	Pinus canariensis C. Sm.	Nat	neo	
	Pinaceae	Pinus mugo Turra subsp. mugo	Cas	neo	l
CA	Pinaceae	Pinus nigra J. F. Arnold subsp. laricio Maire	Nat	archaeo	
	Pinaceae	Pinus nigra J.F.Arnold subsp. nigra	Nat	archaeo	
	Pinaceae	Pinus pinea L.	Nat	archaeo	
	Pinaceae	Pinus strobus L.	Cas	neo	
CA	Fabaceae	Pisum sativum L. subsp. sativum	Cas	archaeo	l
	Pittosporaceae	Pittosporum tobira (Thunb.) W. T. Aiton	Nat	neo	
	Platanaceae	Platanus hispanica Mill. ex Münchh.	Nat	neo	
NN	Plumbaginaceae	Plumbago auriculata Lam.	Cas	neo	
	Cleomaceae	Polanisia trachysperma Torr. & A. Gray	Inv	neo	
NN	Poaceae	Polypogon fugax Steud.	Nat	neo	
C	Salicaceae	Populus deltoides W. Bartram ex Marshall	Cas	neo	
	Salicaceae	Populus ×canadensis Moench	Cas	neo	
	Portulacaceae	Portulaca sativa Haw.	Nat	archaeo	
	Rosaceae	Potentilla indica (Jacks.) Th. Wolf	Nat	neo	
	Rosaceae	Prunus armeniaca L.	Cas	archaeo	
	Rosaceae	Prunus cerasifera Ehrh.	Cas	archaeo	
	Rosaceae	Prunus cerasus L.	Cas	archaeo	
	Rosaceae	Prunus domestica L. subsp. domestica	Cas	archaeo	
	Rosaceae	Prunus domestica L. subsp. insititia (L.) Bonnier & Layens	Cas	archaeo	
	Rosaceae	Prunus dulcis (Mill.) D. A. Webb	Nat	archaeo	
	Rosaceae	Prunus laurocerasus L.	Nat	neo	
	Rosaceae	Prunus persica (L.) Batsch	Cas	archaeo	
	Pinaceae	Pseudotsuga menziesii (Mirb.) Franco	Cas	neo	
	Juglandaceae	Pterocarya fraxinifolia (Lam.) Spach	Cas	neo	

	Caprifoliaceae	Pterocephalus plumosus (L.) Coult.	Nat	neo	
	Asteraceae	Ptilostemon gnaphaloides (Cirillo) Soják subsp. gnaphaloides	Nat	neo	
	Lythraceae	Punica granatum L.	Cas	archaeo	
	Rosaceae	Pyracantha fortuneana (Maxim.) H. L. Li	Cas	neo	
	Rosaceae	Pyracantha rogersiana (A. B. Jacks.) Coltm.-Rog.	Nat	neo	
	Rosaceae	Pyrus communis L. subsp. communis	Nat	archaeo	
	Brassicaceae	Raphanus sativus L.	Cas	archaeo	
CA	Resedaceae	Reseda odorata L.	Cas	neo	
	Polygonaceae	Reynoutria japonica Houtt.	Nat	neo	g,l
	Polygonaceae	Reynoutria sachalinensis (F. Schmidt) Nakai	Nat	neo	c,l
	Polygonaceae	Reynoutria ×bohemica Chrtek & Chrtková	Inv	neo	c
	Anacardiaceae	Rhus coriaria L.	Nat	archaeo	
	Anacardiaceae	Rhus typhina L.	Cas	neo	l
	Grossulariaceae	Ribes rubrum L.	Nat	archaeo	
	Euphorbiaceae	Ricinus communis L.	Cas	archaeo	i,l
	Fabaceae	Robinia hispida L.	Nat	neo	
	Fabaceae	Robinia pseudoacacia L.	Inv	neo	g,i,l
NN	Rosaceae	Rosa bracteata J. C. Wendl.	Nat	neo	i
	Rosaceae	Rosa multiflora Thunb.	Nat	neo	i
	Rosaceae	Rubus armeniacus Focke	Nat	neo	
	Polygonaceae	Rumex patientia L. subsp. patientia	Cas	neo	
	Asparagaceae	Ruscus hypophyllum L.	Cas	neo	
	Asparagaceae	Ruscus ×microglossus Bertol.	Cas	neo	
	Salicaceae	Salix babylonica L.	Cas	neo	i
CA	Salicaceae	Salix viminalis L.	Nat	archaeo	
	Salicaceae	Salix ×fragilis L.	Nat	archaeo	
	Salicaceae	Salix ×salamonii (Carrière) Carrière	Cas	neo	
	Solanaceae	Salpichroa origanifolia (Lam.) Baill.	Nat	neo	
	Lamiaceae	Salvia officinalis L. subsp. officinalis	Cas	archaeo	
	Salviniaceae	Salvinia molesta D. S. Mitch.	Cas	neo	c,i,l
	Asteraceae	Santolina chamaecyparissus L.	Nat	archaeo	
	Lamiaceae	Satureja hortensis L.	Cas	archaeo	
	Poaceae	Secale cereale L. subsp. cereale	Cas	archaeo	
	Crassulaceae	Sedum sarmentosum Bunge	Cas	neo	
	Asteraceae	Senecio angulatus L. f.	Nat	neo	i
	Asteraceae	Senecio inaequidens DC.	Nat	neo	c,i,l
	Poaceae	Setaria faberi R. A.W. Herrm.	Cas	neo	
	Poaceae	Setaria italica (L.) P. Beauv.	Nat	neo	
	Poaceae	Setaria parviflora (Poir.) Kerguélen	Nat	neo	l
	Poaceae	Setaria pycnocoma (Steud.) Henrard ex Nakai	Nat	neo	
	Cucurbitaceae	Sicyos angulatus L.	Nat	neo	c,l
	Asteraceae	Sigesbeckia orientalis L.	Cas	neo	
	Brassicaceae	Sinapis alba L. subsp. alba	Nat	archaeo	
	Solanaceae	Solanum bonariense L.	Nat	neo	

	Solanaceae	Solanum chenopodioides Lam.	Nat	neo	
	Solanaceae	Solanum elaeagnifolium Cav.	Cas	neo	b,l
	Solanaceae	Solanum heterodoxum Dunal	Cas	neo	
	Solanaceae	Solanum lycopersicum L.	Cas	neo	
	Solanaceae	Solanum melongena L.	Cas	archaeo	
	Solanaceae	Solanum pseudocapsicum L.	Cas	neo	
	Solanaceae	Solanum rostratum Dunal	Cas	neo	f
	Solanaceae	Solanum triflorum Nutt.	Cas	neo	l
	Solanaceae	Solanum tuberosum L. s.l.	Cas	neo	
	Asteraceae	Solidago canadensis L.	Cas	neo	c,l
	Asteraceae	Solidago gigantea Aiton	Nat	neo	c,l
	Asteraceae	Soliva sessilis Ruiz & Pav.	Cas	neo	l
	Poaceae	Sorghum bicolor (L.) Moench	Cas	archaeo	
	Poaceae	Sorghum halepense (L.) Pers.	Inv	archaeo	i,l
	Chenopodiaceae	Spinacia oleracea L.	Cas	archaeo	
	Poaceae	Sporobolus cryptandrus (Torr.) A. Gray	Nat	neo	
	Poaceae	Sporobolus indicus (L.) R. Br.	Nat	neo	
	Lamiaceae	Stachys byzantina K. Koch	Cas	neo	
	Poaceae	Stenotaphrum secundatum (Walter) Kuntze	Nat	neo	
	Caprifoliaceae	Symphoricarpos albus (L.) S. F. Blake	Nat	neo	
	Asteraceae	Symphyotrichum lanceolatum (Willd.) G. L. Nesom	Nat	neo	
	Asteraceae	Symphyotrichum novae-angliae (L.) G.L.Nesom	Cas	neo	
	Asteraceae	Symphyotrichum novi-belgii (L.) G. L. Nesom	Nat	neo	l
	Asteraceae	Symphyotrichum pilosum (Willd.) G. L. Nesom	Cas	neo	
	Asteraceae	Symphyotrichum squamatum (Spreng.) G. L. Nesom	Inv	neo	
	Asteraceae	Symphyotrichum ×salignum (Willd.) G. L. Nesom	Cas	neo	
	Boraginaceae	Symphytum orientale L.	Cas	neo	
	Boraginaceae	Symphytum tanaicense Steven	Nat	neo	
	Oleaceae	Syringa vulgaris L.	Cas	archaeo	
	Asteraceae	Tagetes erecta L.	Cas	neo	
	Asteraceae	Tagetes minuta L.	Cas	neo	l
	Asteraceae	Tagetes patula L.	Cas	neo	
	Tamaricaceae	Tamarix arborea (Sieber ex Ehrenb.) Bunge	Nat	neo	
	Tamaricaceae	Tamarix canariensis Willd.	Nat	neo	l
	Tamaricaceae	Tamarix parviflora DC.	Cas	neo	i,l
	Asteraceae	Tanacetum balsamita L.	Cas	archaeo	
	Asteraceae	Tanacetum cinerariifolium (Trevir.) Sch. Bip.	Cas	neo	
	Asteraceae	Tanacetum parthenium (L.) Sch. Bip.	Nat	archaeo	
	Cleomaceae	Tarenaya spinosa (Jacq.) Raf.	Cas	neo	
	Aizoaceae	Tetragonia tetragonioides (Pall.) Kuntze	Cas	neo	
	Araliaceae	Tetrapanax papyrifer (Hook.) K. Koch	Cas	neo	
	Commelinaceae	Tradescantia fluminensis Vell.	Nat	neo	i,l
	Fabaceae	Trifolium alexandrinum L. s.l.	Nat	archaeo	
	Fabaceae	Trigonella foenum-graecum L.	Cas	archaeo	

	Amaryllidaceae	Tristagma uniflorum (Lindl.) Traub	Nat	neo	
	Poaceae	Triticum aestivum L.	Cas	archaeo	
	Poaceae	Triticum turgidum L. subsp. durum (Desf.) Husn.	Cas	archaeo	
	Tropaeolaceae	Tropaeolum majus L.	Cas	neo	
	Liliaceae	Tulipa clusiana DC.	Cas	neo	
	Liliaceae	Tulipa gesneriana L.	Cas	neo	
	Liliaceae	Tulipa raddii Reboul	Nat	neo	
	Liliaceae	Tulipa saxatilis Sieber ex Spreng.	Cas	neo	
	Ulmaceae	Ulmus laevis Pall.	Cas	neo	
	Ulmaceae	Ulmus minor Mill. subsp. canescens (Melville) Browicz & Ziel.	Cas	neo	
	Fabaceae	Vachellia karroo (Hayne) Banfi & Galasso	Nat	neo	l
	Verbenaceae	Verbena bonariensis L.	Cas	neo	
	Verbenaceae	Verbena brasiliensis Vell.	Nat	neo	i
	Plantaginaceae	Veronica filiformis Sm.	Cas	neo	
	Plantaginaceae	Veronica peregrina L.	Cas	neo	
	Plantaginaceae	Veronica persica Poir.	Inv	neo	
	Fabaceae	Vicia ervilia (L.) Willd.	Cas	archaeo	
	Fabaceae	Vicia faba L.	Cas	archaeo	
	Fabaceae	Vigna unguiculata (L.) Walp. s.l.	Cas	archaeo	
	Vitaceae	Vitis labrusca L.	Nat	neo	
	Vitaceae	Vitis riparia Michx.	Nat	neo	
	Vitaceae	Vitis rupestris Scheele	Nat	neo	
	Vitaceae	Vitis vinifera L. subsp. vinifera	Inv	archaeo	
	Vitaceae	Vitis ×bacoi Ardenghi, Galasso & Banfi	Nat	neo	
	Vitaceae	Vitis ×goliath Ardenghi, Galasso & Banfi	Nat	neo	
	Vitaceae	Vitis ×instabilis Ardenghi, Galasso, Banfi & Lastrucci	Inv	neo	
	Vitaceae	Vitis ×koberi Ardenghi, Galasso, Banfi & Lastrucci	Inv	neo	
	Vitaceae	Vitis ×ruggerii Ardenghi, Galasso, Banfi & Lastrucci	Nat	neo	
NN	Arecaceae	Washingtonia robusta H. Wendl.	Nat	neo	
	Fabaceae	Wisteria sinensis (Sims) Sweet	Cas	neo	i
	Araceae	Wolffia arrhiza (L.) Horkel ex Wimm.	Cas	neo	
	Asteraceae	Xanthium italicum Moretti	Inv	neo	l
	Asteraceae	Xanthium spinosum L.	Nat	neo	i
	Asteraceae	Xeranthemum annuum L.	Cas	neo	
	Asparagaceae	Yucca aloifolia L.	Nat	neo	
	Asparagaceae	Yucca gloriosa L.	Inv	neo	
	Araceae	Zantedeschia aethiopica (L.) Spreng.	Nat	neo	i
	Poaceae	Zea mays L.	Cas	neo	
	Amaryllidaceae	Zephyranthes candida (Lindl.) Herb.	Cas	neo	
	Rhamnaceae	Ziziphus jujuba Mill.	Nat	archaeo	

Annex A2: locally alien *taxa*

	Familly	Taxon	Status
	Pinaceae	Abies alba Mill.	Nat
N	Plantaginaceae	Antirrhinum siculum Mill.	Cas
	Apiaceae	Apium graveolens L.	Nat
	Capparaceae	Capparis orientalis Veill.	Nat
	Fagaceae	Castanea sativa Mill.	Nat
	Cannabaceae	Celtis australis L. subsp. australis	Nat
	Caprifoliaceae	Centranthus ruber (L.) DC. subsp. ruber	Nat
DA	Caryophyllaceae	Cerastium tomentosum L.	Cas
	Fabaceae	Cercis siliquastrum L.	Nat
	Arecaceae	Chamaerops humilis L.	Nat
	Asteraceae	Crepis bursifolia L.	Inv
	Moraceae	Ficus carica L.	Nat
	Crassulaceae	Hylotelephium maximum (L.) Holub subsp. maximum	Cas
	Iridaceae	Iris pallida Lam. subsp. pallida	Cas
LA	Lauraceae	Laurus nobilis L.	Nat
A	Brassicaceae	Lunaria annua L. s.l.	Nat
	Malvaceae	Malva arborea (L.) Webb & Berthel.	Nat
	Amaryllidaceae	Narcissus tazetta L. subsp. aureus (Jord. & Fourr.) Baker	Nat
	Amaryllidaceae	Narcissus tazetta L. subsp. tazetta	Nat
	Lamiaceae	Nepeta cataria L.	Nat
	Apocynaceae	Nerium oleander L. subsp. oleander	Nat
	Nymphaeaceae	Nymphaea alba L.	Nat
	Apocynaceae	Periploca graeca L.	Nat
DA	Solanaceae	Physalis alkekengi L.	Nat
DA	Pinaceae	Pinus halepensis Mill. subsp. halepensis	Inv
DA	Pinaceae	Pinus pinaster Aiton subsp. escarena (Risso) K.Richt.	Nat
	Rosaceae	Prunus avium (L.) L.	Cas
	Lamiaceae	Rosmarinus officinalis L. subsp. officinalis	Cas
	Amaryllidaceae	Sternbergia lutea (L.) Ker Gawl. ex Spreng.	Nat
	Fabaceae	Sulla coronaria Medik.	Inv
	Tamaricaceae	Tamarix africana Poir.	Nat
	Tamaricaceae	Tamarix gallica L.	Nat
	Apocynaceae	Vinca difformis Pourr.	Nat
	Apocynaceae	Vinca major L. subsp. major	Nat
	Violaceae	Viola odorata L.	Nat

Cas: casual taxa; Nat: naturalized taxa, Inv: invasive taxa.

Annex A3: doubtfully alien *taxa*

	Familly	Taxon	Status
	Caryophyllaceae	Agrostemma githago L. subsp. githago	Nat
N	Asteraceae	Calendula suffruticosa Vahl subsp. fulgida (Raf.) Guadagno	Nat
	Brassicaceae	Camelina sativa (L.) Crantz	Cas
N	Asteraceae	Centaurea benedicta (L.) L.	Cas
	Ranunculaceae	Delphinium ajacis L.	Nat
	Ranunculaceae	Delphinium consolida L. subsp. consolida	Nat
A	Ranunculaceae	Delphinium consolida L. subsp. paniculatum (Host) N. Busch	Cas
A	Ranunculaceae	Delphinium hispanicum Willk. ex Costa	Nat
N	Brassicaceae	Eruca vesicaria (L.) Cav.	Nat
	Euphorbiaceae	Euphorbia lathyris L.	Nat
N	Fabaceae	Glycyrrhiza glabra L.	Nat
	Asteraceae	Inula helenium L. subsp. helenium	Nat
A	Solanaceae	Lycium europaeum L.	Nat
	Malvaceae	Malva trimestris (L.) Salisb.	Nat
	Asteraceae	Matricaria chamomilla L.	Nat
A	Fabaceae	Melilotus dentatus (Waldst. & Kit.) Pers.	Cas
	Amaryllidaceae	Narcissus tazetta L. subsp. italicus (Ker Gawl.) Baker	Cas
A	Fabaceae	Onobrychis viciifolia Scop.	Nat
	Papaveraceae	Papaver apulum Ten.	Nat
	Papaveraceae	Papaver argemone L.	Nat
	Papaveraceae	Papaver dubium L.	Nat
	Papaveraceae	Papaver hybridum L.	Nat
	Papaveraceae	Papaver rhoeas L.	Inv
N	Papaveraceae	Papaver setigerum DC.	Nat
A	Poaceae	Phalaris canariensis L.	Nat
	Hydrangeaceae	Philadelphus coronarius L.	Nat
	Lamiaceae	Salvia viridis L.	Cas
N	Caryophyllaceae	Saponaria officinalis L.	Nat
A	Poaceae	Setaria adhaerens (Forssk.) Chiov.	Nat
N	Tamaricaceae	Tamarix dalmatica B. R. Baum	Nat
A	Campanulaceae	Trachelium caeruleum L.	Nat
N	Fabaceae	Trifolium incarnatum L. subsp. incarnatum	Nat
	Caryophyllaceae	Vaccaria hispanica (Mill.) Rauschert subsp. hispanica	Nat
	Lamiaceae	Vitex agnus-castus L.	Nat

Cas: casual taxa; Nat: naturalized taxa, Inv: invasive taxa.

Annex A4: possibly locally alien *taxa*

Familly	Taxon	Status
Lamiaceae	Lavandula angustifolia Mill. subsp. angustifolia	Nat
Lamiaceae	Lavandula latifolia Medik.	Nat
Rosaceae	Pyracantha coccinea M. Roem.	Nat
Fabaceae	Spartium junceum L.	Nat

Nat: naturalized taxa.

Annex B: excluded *taxa*

Familly	Taxon	Status
Acanthaceae	Acanthus spinosus L.	DP
Acoraceae	Acorus calamus L.	U
Sapindaceae	Aesculus hippocastanum L.	NE
Poaceae	Agropogon ×littoralis (Sm.) C. E. Hubbard	NA
Poaceae	Agrostis curtisii Kerguélen	NP
Amaryllidaceae	Allium fistulosum L.	NE
Amaryllidaceae	Allium moly L.	NE
Amaryllidaceae	Allium scorodoprasum L.	NP
Amaryllidaceae	Allium siculum Ucria subsp. siculum	NP
Xanthorrhoeaceae	Aloe vera (L.) Burm. f.	DP
Amaranthaceae	Amaranthus graecizans L. subsp. graecizans	DP
Amaranthaceae	Amaranthus graecizans L. subsp. silvestris (Vill.) Brenan	NA
Lythraceae	Ammannia verticillata (Ard.) Lam.	U
Boraginaceae	Anchusa ochroleuca M. Bieb.	U
Apiaceae	Angelica archangelica L. subsp. archangelica	NP
Brassicaceae	Armoracia rusticana P. Gaertn., B. Mey. & Scherb.	U
Asteraceae	Artemisia abrotanum L.	U
Chenopodiaceae	Atriplex hortensis L.	U
Chenopodiaceae	Atriplex sagittata Borkh.	NA
Chenopodiaceae	Atriplex tatarica L.	NA
Azollaceae	Azolla caroliniana Willd.	NP
Asparagaceae	Bellevalia dubia (Guss.) Kunth subsp. dubia	NP
Brassicaceae	Berteroa incana (L.) DC.	U
Malvaceae	Brachychiton populneus (Schott & Endl.) R. Br.	NE
Brassicaceae	Brassica rapa L. subsp. rapa	NP
Cyperaceae	Bulbostylis cioniana (Savi) Lye	U
Cannabaceae	Cannabis sativa L.	NP
Asteraceae	Carthamus tinctorius L.	U
Bignoniaceae	Catalpa bignonioides Walter	U
Asteraceae	Centaurea hyalolepis Boiss.	U
Caprifoliaceae	Cephalaria syriaca (L.) Roem. & Schult.	U

Ranunculaceae	Ceratocephala falcata (L.) Pers.	U
Poaceae	Chaetopogon fasciculatus (Link) Hayek	U
Iridaceae	Chasmanthe aethiopica (L.) N. E. Br.	NP
Chenopodiaceae	Chenopodium giganteum D. Don	NP
Asteraceae	Cichorium pumilum Jacq.	NA
Convolvulaceae	Convolvulus betonicifolius Mill.	U
Convolvulaceae	Convolvulus pentapetaloides L.	NA
Asteraceae	Crepis suffreniana (DC.) Steud.	NA
Cucurbitaceae	Cucumis melo L.	DP
Cucurbitaceae	Cucumis sativus L.	DP
Convolvulaceae	Cuscuta approximata Bab. subsp. approximata	NA
Convolvulaceae	Cuscuta cesatiana Bertol.	DP
Convolvulaceae	Cuscuta scandens Brot.	NP
Convolvulaceae	Cuscuta suaveolens Ser.	U
Chenopodiaceae	Cycloloma atriplicifolium (Spreng.) J. M. Coult.	U
Apocynaceae	Cynanchum acutum L.	U
Cyperaceae	Cyperus esculentus L.	NA
Cyperaceae	Cyperus rotundus L.	NA
Caryophyllaceae	Dianthus caryophyllus L.	NE
Caryophyllaceae	Dianthus plumarius L.	U
Poaceae	Echinochloa crus-pavonis (Kunth) Schult.	DP
Poaceae	Echinochloa oryzoides (Ard.) Fritsch	U
Asteraceae	Echinops strigosus L.	NP
Cyperaceae	Eleocharis geniculata (L.) Roem. & Schult.	NP
Cyperaceae	Eleocharis ovata (Roth) Roem. & Schult.	NP
Poaceae	Eragrostis pilosa (L.) P. Beauv.	NA
Apiaceae	Eryngium creticum Lam.	U
Euphorbiaceae	Euphorbia oblongata Griseb.	U
Cyperaceae	Fimbristylis dichotoma (L.) Vahl	NA
Cyperaceae	Fimbristylis squarrosa Vahl	NA
Papaveraceae	Fumaria agraria Lag.	NP
Papaveraceae	Fumaria muralis W. D. J. Koch	NP
Fabaceae	Galega officinalis L.	NA
Primulaceae	Glaux maritima L.	U
Asteraceae	Helianthus giganteus L.	NP
Boraginaceae	Heliotropium supinum L.	DP
Apiaceae	Heracleum mantegazzianum Sommier & Levier	U
Asparagaceae	Honorius nutans (L.) Gray	U
Juglandaceae	Juglans nigra L.	NE
Cupressaceae	Juniperus virginiana L.	DP
Malvaceae	Kosteletzkya pentacarpos (L.) Ledeb.	U
Asteraceae	Lactuca macrophylla (Willd.) A. Gray	DP
Lamiaceae	Leonurus cardiaca L.	U
Brassicaceae	Lepidium latifolium L.	DP

Brassicaceae	Lepidium perfoliatum L.	DP
Apiaceae	Levisticum officinale W. D. J. Koch	NP
Liliaceae	Lilium chalcedonicum L.	U
Magnoliaceae	Liriodendron tulipifera L.	NE
Poaceae	Lolium remotum Schrank	U
Fabaceae	Lupinus polyphyllus Lindl.	NE
Magnoliaceae	Magnolia grandiflora L.	NE
Asteraceae	Mantisalca salmantica (L.) Briq. & Cavill.	NA
Fabaceae	Medicago arborea L.	NA
Fabaceae	Medicago blancheana Boiss.	U
Fabaceae	Medicago secundiflora Durieu	U
Fabaceae	Medicago soleirolii Duby	NA
Lamiaceae	Melissa officinalis L. subsp. officinalis	NA
Phrymaceae	Mimulus guttatus DC.	U
Ranunculaceae	Myosurus minimus L.	U
Hydrocharitaceae	Najas gracillima (Engelm.) Magnus	U
Asparagaceae	Narcissus bulbocodium L.	NP
Amaryllidaceae	Nerine bowdenii W. Watson	DP
Solanaceae	Nicotiana alata Link & Otto	NE
Solanaceae	Nicotiana tabacum L.	NE
Ranunculaceae	Nigella sativa L.	U
Boraginaceae	Nonea lutea (Desr.) DC.	U
Brassicaceae	Ochthodium aegyptiacum (L.) DC.	NP
Boraginaceae	Omphalodes linifolia (L.) Moench	U
Boraginaceae	Omphalodes verna Moench	NA
Cactaceae	Opuntia maxima Mill.	NP
Cactaceae	Opuntia tuna (L.) Mill.	NP
Asparagaceae	Othocallis amoena	U
Oxalidaceae	Oxalis purpurata Jacq.	NP
Oxalidaceae	Oxalis purpurea L.	NP
Oxalidaceae	Oxalis violacea L.	NP
Paulowniaceae	Paulownia tomentosa (Thunb.) Siebold & Zucc.	NE
Fabaceae	Phaseolus vulgaris L.	U
Arecaceae	Phoenix dactylifera L.	NE
Rosaceae	Photinia serratifolia (Desf.) Kalkman	DP
Poaceae	Phyllostachys aurea Rivière & C. Rivière	NE
Pinaceae	Pinus brutia Ten.	DE
Pinaceae	Pinus cembra L.	DE
Pinaceae	Pinus radiata D. Don	DE
Pinaceae	Pinus strobus L.	DE
Platanaceae	Platanus occidentalis L.	NE
Platanaceae	Platanus orientalis L.	NE
Cupressaceae	Platycladus orientalis (L.) Franco	NE
Plumbaginaceae	Plumbago europaea L.	NA

Polygalaceae	Polygala myrtifolia L.	NE
Fagaceae	Quercus rubra L.	NE
Papaveraceae	Roemeria hybrida (L.) DC.	U
Chenopodiaceae	Rorippa austriaca (Crantz) Besser	U
Rubiaceae	Rubia tinctorum L.	DP
Anacardiaceae	Schinus molle L.	NE
Cyperaceae	Scirpus atrovirens Willd.	U
Cucurbitaceae	Sechium edule (Jacq.) Sw.	NE
Poaceae	Setaria viridis (L.) P. Beauv.	NA
Brassicaceae	Sisymbrium orientale L.	NA
Solanaceae	Solanum citrullifolium A. Braun	NP
Solanaceae	Solanum linnaeanum Hepper & P.-M. L. Jaeger	U
Solanaceae	Solanum sisymbrifolium Lam.	U
Rosaceae	Sorbaria sorbifolia (L.) A. Braun	NP
Poaceae	Spartina versicolor Fabre	NA
Rosaceae	Spiraea japonica L.	NP
Poaceae	Sporobolus junceus (Beauv.) Kunth	NP
Asteraceae	Symphyotrichum tradescantii (L.) G. L. Nesom	NP
Malvaceae	Tilia americana L.	NE
Malvaceae	Tilia tomentosa Moench	NE
Fabaceae	Trifolium hybridum L. subsp. hybridum	NA
Liliaceae	Tulipa agenensis DC.	U
Fabaceae	Vicia sativa L. subsp. sativa	NA
Violaceae	Viola bertolonii Pio emend. Merxm. & W. Lippert	NP
Asteraceae	Xanthium orientale L.	NP
Lamiaceae	Ziziphora capitata L.	U