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Chorological novelties for the alien flora of northeastern Catalonia (Iberian Peninsula)

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Abstract

Recent fieldwork in the maritime influence area of the provinces of Barcelona and Girona (NE Spain, Catalonia) yielded several interesting new records of non-native vascular plants. *Abelia* ×*grandiflora*, *Bauhinia forficata* subsp. *pruinosa*, *Bidens vulgata*, *Celosia argentea*, *Chamaecyparis lawsoniana*, *Cyperus esculentus* var. *heermannii*, *Firmiana simplex*, *Hypericum canariense*, *Mollugo verticillata* and *Ruscus* ×*microglossus* are reported for the first time from Catalonia (most of them also for the first time from the Iberian Peninsula, and some even from Europe). Miscellaneous additional records are presented for numerous further alien taxa that have only rarely been recorded before in the study area or that otherwise are of interest.

Key words: vascular plants, chorology, Mediterranean, northeastern Spain.

Resum

Novetats corològiques sobre flora ahlòctona al nord-est de Catalunya (península Ibèrica)

Com a resultat del treball de camp realitzat recentment a la zona litoral i prelitoral de les províncies de Barcelona i Girona (NE Espanya, Catalunya), s'han obtingut noves dades sobre plantes vasculares ahlòctones. *Abelia* ×*grandiflora*, *Bauhinia forficata* subsp. *pruinosa*, *Bidens vulgata*, *Celosia argentea*, *Chamaecyparis lawsoniana*, *Cyperus esculentus* var. *heermannii*, *Firmiana simplex*, *Hypericum canariense*, *Mollugo verticillata* i *Ruscus* ×*microglossus* són citades per primera vegada a Catalunya (la major part també per primera vegada a la península Ibèrica, i algunes fins i tot a Europa). A més, es presenten dades addicionals sobre altres tàxons ahlòctons, que només han estat citats rars vegades de la zona d'estudi o que són interessants per altres motius.

Paraules clau: plantes vasculares, corologia, Mediterrània, nord-est Espanya.

Introduction

Catalonia (NE Spain) has a fairly long but irregular tradition of studies on its non-native flora. After the Casasaayas (1989) synthesis effort, the information decreased until a decade ago. Since then, new taxonomic and distributional data are published almost every year, which allowed the publication of a recent, notably extended list of the local alien flora (Aymerich & Sáez, 2019). So, despite being particularly well-studied, the Catalonian non-native flora is still imperfectly known and the number of new introductions (deliberate as well as accidental) seems to increase.

In this paper new records are presented for species, infraspecific taxa and hybrids that are either firstly reported from Catalonia (or even the Iberian Peninsula or Europe as a whole) or that are otherwise of interest.

A considerable number of the taxa mentioned in this paper were observed near to the Pinya de Rosa Botanical Garden and most likely escaped from it. Botanic gardens are known

to have played a significant role in the process of invasion biology. An unexpected consequence of the introduction of many thousands of plant species into cultivation was the escape of considerable numbers of them (Heywood & Sharrock 2013).

Materials and methods

The new records presented in this paper are the result of fieldwork by both authors in 2019, with some additional, targeted research in early 2020. The study area encompasses the maritime influence area of the provinces of Barcelona and Girona (northeastern Catalonia).

All records are documented by voucher specimens and/or photographs. Herbarium collections are preserved in the herbarium of Meise Botanic Garden, Belgium (BR).

The paper is divided in two parts and for each entry the following data are presented: the county, municipality, loca-

tion, UTM 1×1 km (ETRS89), altitude, habitat, population-al date and day of observation. All UTM squares are included within the 31T zone. In the first part, taxa reported for the first time in Catalonia are presented, whereas in the second an overview of numerous other records is provided. These mostly refer to taxa with few previous records in the study area and/or taxa that are otherwise of interest (e.g. change of degree of naturalization, range extension, etc.). For each taxon in this part the particular importance of the record is indicated.

Results

Novelties for the alien flora of Catalonia

Abelia \times *grandiflora* (Ravelli ex André) Rehder [*A. chinensis* R. Br. \times *A. uniflora* R. Br.] (Fig. 1)
(Caprifoliaceae)

SELVA: Blanes, Boscos de Sant Francesc area, DG8414, 65 m, margin of a forest track in a *Quercus suber* woodland, 4 reproductive individuals, 12 April 2019, P. Aymerich s.c.; Blanes, below Santa Bàrbara hill, DG8314, 110 m, roadside, growing with several *Coronilla glauca*, one apparently



Figure 1. *Abelia* \times *grandiflora*. Blanes, October 2019, P. Aymerich.

spontaneous reproductive plant found 20 m away from many cultivated individuals, 3 October 2019, P. Aymerich s.c.

Not previously reported from Catalonia and the Iberian Peninsula.

This shrub is an artificial hybrid between two species of Chinese origin, *A. chinensis* and *A. uniflora*. It is often cultivated in gardens but rarely escapes, probably due to a weak viable seed production (Landrein *et al.*, 2017). It has been reported as a casual alien plant from Australia (Randall, 2007), New Zealand (Howell & Sawyer, 2006) and several areas in the southern United States (e.g. Serviss & Peck, 2019). In Europe, only an imprecise record from Croatia is known (<http://www.europe-aliens.org/>; accessed July 2019). In Blanes it is also a casual alien. The conditions in both places are very different: the Sant Francesc individuals grow in a forest, several hundred meters away from cultivated *Abelia*, while in Santa Bàrbara there are a few dozen individuals planted nearby.

Bauhinia forficata Link subsp. *pruinosa* (Vogel) Fortunato & Wunderlin (Fig. 2)
(Fabaceae)

SELVA: Blanes, next to east boundary of Pinya de Rosa Botanical Garden, DG8414, 40 m, disturbed vacant lot with lots of weeds and low woody plants, c. 20 individuals, 12 April 2019, P. Aymerich s.c.



Figure 2. *Bauhinia forficata* subsp. *pruinosa*. Blanes, April 2019, P. Aymerich.

Not previously reported from Catalonia and Europe.

The vegetative characters (i.e., stems with spines less than 5 mm; leaves to 11×10 cm, bilobed for half of their length or more, ovate-lanceolate, with lower side pubescent and upper side glabrous) of this group of naturalized *Bauhinia* plants observed in Blanes refer to *B. forficata* (Wunderlin, 1983; Vaz & Tozzi, 2005; Ventoso & Mongiardino, 2014). These plants did not have flowers nor fruits, which are the main characters that distinguish the two recognized subspecies of *B. forficata*. However, according to Vaz & Tozzi (2005), the presence of basally cordate leaves points to the subsp. *pruinosa*. *B. forficata* subsp. *pruinosa* inhabits subtropical areas from southern

Brazil, Uruguay, northern Argentina, Paraguay and Bolivia. It is often cultivated in the Mediterranean region as an ornamental tree. The Blanes individuals are low and shrubby and we ignore if they were born from seeds or originated from vegetative multiplication (re-sprouting). A vegetative origin is most likely, considering this population characteristics and the well-known re-sprouting capacity of this species when affected by disturbance (Hayashi & Appezzato-da-Glória, 2009). Although this population is small, it shows signs of an incipient naturalization. We do not know any record of *B. forficata* as allochthonous plant outside America, but it was reported as naturalized from Córdoba province in northern Argentina, outside its native area (Giorgis & Tecco, 2014).

It is highly probable that a former Catalan record of *Bauhinia* also belongs to *B. forficata*. Casasayas (1989) reported *B. aculeata* L. subsp. *grandiflora* (Juss.) Wunderlin [*B. grandiflora* Juss.] from Montjuïc, in the Barcelona urban area. This taxon is a true tropical American plant (from Central America to Bolivia) that is rarely cultivated in the Mediterranean region whereas *B. forficata* is cultivated in Montjuïc and other areas in Barcelona. It is known that in gardening it is often incorrectly named «*Bauhinia grandiflora*». So, it is plausible that Casasayas (1989) confused the «garden *B. grandiflora*» (*B. forficata*) with true *B. grandiflora*.

A further species of *Bauhinia*, the Asian *B. variegata* L., has also been reported as escaping from cultivation in the Mediterranean region, in Portugal (Domingues de Almeida & Freitas, 2012), Rhode island, Greece (Galanos, 2015) and Turkey (Uludag *et al.*, 2017). This species is also known from the Canary Islands (Otto & Verloove, 2018; Verloove *et al.*, 2018).

***Bidens vulgata* Greene (Fig. 3)**
(Asteraceae)

ALT EMPORDÀ: Castelló d'Empúries, river Muga, EG0677, 2 m, riverside, common, 9 September 2019, *F. Verloove* 13644 (BR); GIRONÈS: Girona, river Ter at Avinguda de França, DG8548, 76 m, riparian woodland, river bank, common, 8 September 2019, *F. Verloove* 13635 (BR).

Not previously reported from Catalonia and the Iberian Peninsula.

A native of North America, *Bidens vulgata* is naturalized in various parts of southern Europe, for instance in Bulgaria, former Yugoslavia, Italy and France (Debray, 1968; Tatic & Žukowski, 1973; Petrova & Vladimirov, 2009; Verloove & Ardenghi, 2015). It is very similar to *B. frondosa* L. and this certainly contributed to the fact that it was overlooked for quite a long time in Europe. It is usually more robust but is best distinguished based on the number of calyculus bractlets [10–16(–21) vs. 5–8–10 in *B. frondosa*]. Both species are, however, phenotypically plastic.

Bidens vulgata was frequently encountered in riparian woodland along river Ter and, to a lesser extent, river Muga. In these river systems this species is obviously naturalized and it should be looked for in other river valleys in the area.



Figure 3. *Bidens vulgata*. Castelló d'Empúries, September 2019, *F. Verloove*. The numerous, leaf-like bracts separate this species from the similar-looking *B. frondosa*.

***Celosia argentea* L. (Fig. 4)** [*Celosia linearis* Sweet ex Hook. f.]
(Amaranthaceae)

MARESME: Malgrat de Mar, river Tordera close to the sea, DG8111, 2 m, sandy exposed riverbank, a single individual, 2 September 2019, *F. Verloove* 13663 (BR).



Figure 4. *Celosia argentea*. Malgrat de Mar, September 2019, *F. Verloove*.

Not previously reported from Catalonia, the Iberian Peninsula and probably Europe.

Celosia argentea is a weed from the Old World tropics. A very similar species with a cristate, colorful inflorescence is commonly grown as an ornamental, *C. cristata* L. Both are sometimes considered to belong to a single species, see however Iamonico (2013). In the Iberian Peninsula and elsewhere in Europe the latter is sometimes recorded as an ephemeral escape from cultivation (Castroviejo, 1990). From Catalonia there are a few ancient records from the 19th century from the Empordà area (Casasayas, 1989). All these records clearly relate to escaped plants and thus to *C. cristata*. *Celosia argentea*, in turn, is a weedy, non-ornamental species with long cylindrical, not branched spikes and white perianths. The plant recently observed in Malgrat de Mar also had linear-lanceolate leaves (like in *C. linearis*, now considered to be conspecific with *C. argentea*) whereas those of *C. cristata* are ovate.

This may well be the first European record of genuine *C. argentea*. Interestingly, the species was found in one of its preferred native habitats, namely the exposed sandy bank of a dried-out river, along with other weeds from Amaranthaceae, Cyperaceae, etc. families. Only a single individual was observed and thus the species is considered to be ephemeral, at least for the time being.

Chamaecyparis lawsoniana (A. Murray) Parl. (Fig. 5)
(Cupressaceae)

ALT EMPORDÀ: Maçanet de Cabrenys, Salines massif, Boscos del Serís, DG7894, 750-800 m, *Quercus suber* and *Castanea sativa* woodland with exotic trees planted locally (*Acacia dealbata*, *Acacia provincialis*, *Robinia pseudoacacia*, *Pinus radiata*, *Chamaecyparis lawsoniana*), at least eight young spontaneous individuals, 15 June 2020, P. Aymerich s.c.



Figure 5. *Chamaecyparis lawsoniana*, Maçanet de Cabrenys, June 2020, P. Aymerich.

Not previously reported from Catalonia.

This conifer from the western coast of North America is rarely planted as an ornamental tree in Catalonia, exceptionally also in programs of afforestation. Although it is a fairly common alien plant in western and Central Europe (e.g. Stace, 2010), very few reports are known from southern Europe. It is known from non-Mediterranean regions like the Basque Country in the Iberian Peninsula (Campos & Herrera, 2009) and Lombardy in northern Italy (Celesti-Grappo *et al.*, 2010). In nearby regions of southern France this species is reported as rarely planted for afforestation purposes, but not as an alien species (Tison *et al.*, 2014). On the slopes of the Salines massif, in the easternmost Pyrenees, a few dozens of planted adult individuals are scattered in an area of some 20-30 hectares. The young individuals were observed close to the planted trees, in seminatural forest. *Chamaecyparis lawsoniana* has been listed as an invasive species, for instance in the British Isles and New Zealand (Richardson & Rejmánek, 2004). Currently, it is a casual alien in Catalonia.

Cyperus esculentus L. var. ***heermannii*** (Buckley) Britton
(Fig. 6)
(Cyperaceae)

MARESME: Malgrat de Mar, river Tordera close to the sea, DG8111, 2 m, sandy dried-out river bed, a single population with scattered individuals, 2 September 2019, F. Verloove 13623 (BR).

Not previously reported from Catalonia and the Iberian Peninsula.

This is a peculiar variety that is native to California, Florida and Utah in the U.S.A. and adjacent parts of Mexico where it occurs in croplands and disturbed places (Tucker *et al.*, 2002). Its spikes are more dense (two or more spikelets



Figure 6. *Cyperus esculentus* var. *heermannii*. Malgrat de Mar, September 2019, F. Verloove.

per mm of rachis) with spikelets ascending-erect which gives the plant a rather particular jizz.

Var. *heermannii* has a restricted native distribution area but increasingly occurs as a weed in Europe as well, at first in the Netherlands (Schippers *et al.*, 1995). Meanwhile it was also observed in northeastern Italy (pers. obs. first author) and now for the first time in the Iberian Peninsula. Scattered individuals were found on the dried-out river bed of the Tordera river. Since this is primarily a weed of agricultural fields, it probably also occurs in the numerous surrounding crop fields at the mouth of river Tordera where it probably is naturalized but has been overlooked so far.

It should be noted that although var. *heermannii* is a fairly distinct variety, there is little molecular support for recognizing taxonomic varieties in *Cyperus esculentus* (De Castro *et al.*, 2015).

***Firmiana simplex* (L.) W. Wight (Fig. 7)**
(Malvaceae)

GIRONÈS: Salt, Carrer d'Alfons Moré, DG8346, 80 m, foot of fence on the verge of rough ground, a self-sown individual (also planted nearby), 11 September 2019, F. Verloove 13642 (BR).

Not previously reported from Catalonia, the Iberian Peninsula and Europe.



Figure 7. *Firmiana simplex*. Salt, September 2019, F. Verloove. A self-sown individual.

This ornamental tree is native to China but commonly planted as a street tree elsewhere in the world, mostly for its decorative foliage and fruits. In the U.S.A. it started escaping a long time ago already and is now considered to be an invasive tree in the southeastern states, especially in thickets and mixed deciduous woods (Dorr, 2015).

To our knowledge, *Firmiana simplex* had not been recorded so far in the wild in Europe (Valdés, 2011). The recent record from Salt relates to a single individual that was moreover found close to the parent tree, and thus points to an ephemeral occurrence. However, it underscores the ability of this potentially invasive species to reproduce from seed in Europe.

***Hypericum canariense* L.**
(Hypericaceae)

SELVA: Blanes, Boscos de Sant Francesc, DG8414, 45 m, margin of a forest track in a *Quercus suber* woodland, 4 fruiting individuals, 12 April 2019, P. Aymerich s.c.

Not previously reported from Catalonia and continental Europe.

This is a shrub native to the western Canary Islands and Madeira but sometimes grown as an ornamental in Mediterranean gardens. It is known as a locally naturalized or invasive plant in Mediterranean-like or subtropical habitats from California (Dlugosch & Parker, 2008; Frey *et al.*, 2015), South Africa (Cowan & Anderson, 2014), Australia (Randall, 2007) and Hawaii Islands (Dlugosch & Parker, 2008), and as casual in New Zealand (Howell & Sawyer, 2006). In Blanes, it is currently a casual plant, but a further expansion in open Mediterranean forests is possible.

***Mollugo verticillata* L.**
(Molluginaceae)

SELVA: Blanes, Tordera river close to the sea, DG8111, 2 m, sandy margin of dried out river bed, a single individual, 2 September 2019, F. Verloove 13617 (BR).

First record for the flora of Catalonia.

This South American weed is widely naturalized in warm-temperate parts of Europe. In the Iberian Peninsula it has been known from Ávila, Cáceres and Toledo provinces in Spain and from Douro Litoral and Minho in Portugal (Gonçalves, 1990). More recently it was also reported from Huelva (Sánchez Gullón & Verloove, 2013) and Beira Litoral (Verloove & Alves, 2016). All records are from exposed river or pond margins.

In exactly the same type of habitat *Mollugo verticillata* was recently seen in Blanes, on the sandy margin of the Tordera river. Although only a single individual was observed, it is not unlikely that *Mollugo verticillata* also occurs elsewhere in the Tordera river basin, as a naturalized weed.

Ruscus ×microglossus Bertol. [*R. hypophyllum* L. × *R. hypoglossum* L.] (Fig. 8)
(Asparagaceae)

SELVA: Blanes, Boscos de Sant Francesc close to Pinya de Rosa Botanical Garden, DG8414, 30 m, in disturbed *Quercus ilex* woodland in a ravine, at least 15 individuals, 12 April 2019, P. Aymerich s.c.



Figure 8. *Ruscus ×microglossus*. Blanes, April 2019, P. Aymerich.

Not previously reported from Catalonia and the Iberian Peninsula.

This is an artificial hybrid of garden origin, obtained from a crossing of *Ruscus hypophyllum* (a southern Mediterranean species) and *R. hypoglossum* (of eastern European origin). It has intermediate characters between the two parental species, and it is often confused with both. *R. ×microglossus* looks like *R. hypoglossum* for its fairly light green cladodes and oblique stems, but has smaller bracts that are more reminiscent of *R. hypophyllum*, a species with erect stems and dark green cladodes (Yeo, 2011). In Blanes we found a small population in the process of naturalization that coexists with native *R. aculeatus* L. *R. ×microglossus* was reported as a casual allochthonous nothospecies in Italy (Galasso *et al.*, 2018), while in the Provence in France it is known as a cultivation relict (Tison *et al.*, 2014). Yeo (2011) also comments that it is sometimes naturalized.

Other interesting alien plants records

Albizia julibrissin Durazz. (Fig. 9)
(Fabaceae)

MARESME: Arenys de Munt, Riera d'Arenys south of the village, DG6105, 80-105 m, dried out river bed, a few dozen of self-sown individuals, several flowering and fruiting, 3 September 2019, F. Verloove 13630 (BR).



Figure 9. *Albizia julibrissin*. Arenys de Munt, September 2019, F. Verloove.

First incipient naturalization event in Catalonia.

This ornamental tree relatively easily escapes, also in Catalonia. However, it is mostly considered to be ephemeral. It was reported as doubtfully naturalized in Garrotxa county (around Olot) by Oliver (2009) and records from the Barcelona metropolitan area are probably casual (Basnou *et al.*, 2015). In Arenys de Munt rather numerous individuals of *Albizia julibrissin* were observed in the sandy, dried-out river bed over a distance of ca. 500 m; several of them were flowering and fruiting which would enable the species to naturalize in a near future. It was accompanied by other thermophilous ornamentals that escaped from cultivation, e.g. *Melia azedarach*, *Plumbago auriculata*, *Washingtonia robusta*, etc.

Ambrosia tenuifolia Spreng. (Fig. 10)
(Asteraceae)

GIRONÈS: Sarrià de Ter, C-255, DG8652, 62 m, roadside and adjacent agricultural field, locally very common, 15 September 2019, F. Verloove 13643 (BR).

Range extension in Catalonia.

This South American weed is known since quite a long time from Catalonia (Casasayas, 1989). However, it was considered to be ephemeral at first and its naturalization is probably a recent phenomenon (Verloove, 2005a). It is probably best represented in the Barcelona metropolitan area where it has invaded gravelly river banks and other disturbed habitats. It also has some nuclei further south (<http://biodiver>).



Figure 10. *Ambrosia tenuifolia*. Sarrià de Ter, September 2019, F. Verloove.

bio.ub.es). In 2019 it was observed in Sarrià de Ter where it colonizes the side of the road C-255 and also invades an adjacent agricultural field. This now constitutes the northernmost population in the Iberian Peninsula.

***Bothriochloa barbinodis* (Lag.) Herter (Fig. 11)**
(Poaceae)

ALT EMPORDÀ: Roses, GI-614 between km 1-2, EG1380, 20-30 m, roadside, 9 September 2019, F. Verloove s.c.; GIRONÈS: Sant Julià de Ramis, N-II S of riera de la Farga, DG8955, 47 m, roadside, 9 September 2019, F. Verloove s.c.; SELVA: Caldes de



Figure 11. *Bothriochloa barbinodis*. La Roca del Vallès, September 2019, F. Verloove.

Malavella to Fornells de la Selva, A2 motorway between exit 700 and 708, DG8241, 8240, 8239, 8238, 8237, 8137, 8136, 8135, 8134, 8133, 8033, 120-130 m, very common on both directions, 8 September 2019, F. Verloove 13633.

Range extension in Catalonia.

This grass is native to South and Central America, Mexico, and the southernmost continental United States from California to Florida. It is weedy and has been known since the 1970's from southern France (Auriault, 1975) where it has much expanded subsequently (Tison *et al.*, 2014). In 2009 it was also recorded for the first time in the Iberian Peninsula: Pyke (2010) reported about its presence in La Roca del Vallès in the Barcelona area. In 2019 its naturalization in this same area could be confirmed. Moreover, this species was also seen along high- and motorways further north. *Bothriochloa barbinodis* has clearly established itself definitively and will further expand in a near future in Catalonia.

***Catharanthus roseus* (L.) G. Don (Fig. 12)**
(Apocynaceae)

MARESME: Argentona, riera d'Argentona, S of C1415c-road, DF5099, 48 m, dried-out sandy riverbed, a single individual, 7 September 2019, F. Verloove s.c.

New record of a rare species in Catalonia, the first for the northern half of the region.

Catharanthus roseus is endemic to Madagascar (where it is an endangered species) but frequently grown as a garden ornamental elsewhere in the world. The species produces



Figure 12. *Catharanthus roseus*. Argentona, September 2019, F. Verloove

numerous small seeds that are dispersed by ants, wind and water. It is listed as an invasive species in numerous countries in Asia, Africa, the Americas and Oceania.

There are, however, surprisingly few records of it from the Iberian Peninsula, for instance from León and Valencia (Guillot, 2001; Egido *et al.*, 2007). From Catalonia *C. roseus* was only reported from urban and suburban habitats in Montsià (Royo, 2006). In 2019 it was observed in the sandy dried-out riverbed of the Argentona river, doubtlessly as an ephemeral garden escape.

Cenchrus setaceus (Forssk.) Morrone [*Pennisetum setaceum* (Forssk.) Chiov.]
(Poaceae)

SELVA: Blanes, Carrer Mirador de la Cala near Plaça Horitzó, a single individual, *F. Verloove* s.c.

Further expansion of this species in Catalonia.

This invasive grass species was known so far from very few Catalanian localities, see Verloove *et al.* (2019) for an overview. However, like elsewhere in the invaded range, the number of populations dramatically increases once the species has established itself. In September 2019 several new populations were observed, some of them also reported by Guardiola & Petit (2020).

Chloris truncata R. Br.
(Poaceae)

MARESME: Tordera, Tordera river (illa de Tordera), DG7517, 26 m, alongside gravelly track, locally very numerous, 2 September 2019, *F. Verloove* 13622 (BR).

Further expansion of this species in Catalonia.

Chloris truncata, a grass native to Australia, is naturalized in the Cambrils area since several years (Verloove 2005a; Verloove *et al.*, 2019) and in the Vallès area (Sánchez Gullón & Verloove, 2015). In the Iberian Peninsula it was also reported from Extremadura (Vázquez, 2008). In 2019 it was discovered in abundance along tracks on an island in the Tordera river in Tordera. This actually constitutes the northernmost population in the Iberian Peninsula.

Chlorophytum comosum (Thunb.) Jacques
(Asparagaceae)

SELVA: Blanes, Camí de Santa Cristina, DG8314, 100 m, disturbed Mediterranean woodland on a north-facing slope, clonal group of 20 rosettes, 3 October 2019, *P. Aymerich* s.c.

New record of a rare species in Catalonia, the first for the northern half of the region.

This is a very common indoor ornamental, native to Africa, that is also cultivated outdoors in mild climates. Currently, *Chlorophytum comosum* is naturalized in many tropical and subtropical areas and invasive in some oceanic islands (e.g. <http://hear.org>). In the Mediterranean region, it is a rare alien plant, which was reported as naturalized in Italy (Galasso *et al.*, 2018) and as casual in the eastern Iberian Peninsula, in Valencia and Catalonia (Sanz *et al.*, 2011; Aymerich & Sáez,

2019). Only two previous records are known in Catalonia, both in the southernmost coastal areas: from a riparian forest of the lower Ebre river (Royo, 2006) and from a disturbed ravine in L'Ametlla de Mar (Aymerich & Gustamante, 2015). The Blanes plants belong to the cultivar «Vittatum», which has leaves with a medial yellowish stripe.

Commelina communis L. (Fig. 13)
(Commelinaceae)

SELVA: Fogars de la Selva, Tordera river, DG7420, 38 m, gravelly river margin, a single individual, 5 September 2019, *F. Verloove* 13660 (BR).



Figure 13. *Commelina communis*. Fogars de la Selva, September 2019, *F. Verloove*.

First incipient naturalization event in Catalonia.

Commelina communis has rarely been reported so far from Catalonia, perhaps only twice and always as an ephemeral alien. It has been known from Cantallops (Alt Empordà) (Font, 2000; Font & Vilar, 2000) and Pobla de Segur (Pallars Jussà) (Aymerich, 2019). However, in the lower Tordera-Selva plain the species was observed in at least four localities between 2004 and 2019, all of them within a distance of less than 20 km. In addition to the newly discovered locality in Fogars de la Selva (where only a single individual was found), *C. communis* was also seen in similar habitats in Gualba (Vallès Oriental) and in Hostalric (Selva) (obs. Jordi Puyuelo in <https://biodiversidadvirtual.org>), as well as in Sils (Selva) (Narcís Munsó, pers. comm.). It is possible that all these records in fact relate to a local, naturalized meta-population.

Commelina erecta L. (Fig. 14)
(Commelinaceae)

SELVA: Blanes, near Pinya de Rosa Botanical Garden, DG8414, 65 m, along track near entrance, ca. 10 m², 12 September 2019, *F. Verloove* 13656 (BR).

New record of a potentially invasive species.



Figure 14. *Commelina erecta*. Blanes, September 2019, F. Verloove.

Commelina erecta is a well-known weed that originates in temperate regions of North and Central America. It has naturalized throughout tropical regions and was recently reported for the first time from Europe. It was probably first observed in Gran Canaria in 2015 (Verloove, 2017) although it may be considered ephemeral there, at least for the time being. It was subsequently reported from the Iberian Peninsula: two localities in Catalonia, in Baix Llobregat and Maresme (Gómez Bellver *et al.*, 2019a) and one in Huelva (Sánchez Gullón *et al.* (2020). Recently, it was also recorded for the first time in Italy (Rosati *et al.*, 2020). Several of these records clearly refer to escaped garden plants, although the species usually is a weed rather than a garden ornamental (but see Huxley, 1999). In 2019 another population was discovered in Catalonia, this time in Blanes (Selva). Numerous flowering and fruiting individuals were seen along a track close to the Pinya de Rosa botanical garden.

Unlike *Commelina communis*, *C. erecta* is a perennial species with stout fleshy roots. It is a glyphosate-tolerant weed (Panigo *et al.* 2012). A further naturalization in the Iberian Peninsula seems very likely.

***Crassula multicava* Lem.**
(Crassulaceae)

SELVA: Blanes, Camí de Santa Cristina, DG8314, 105 m, vacant lot in a residential area, established population of 20-30 individuals, 3 October 2019, *P. Aymerich s.c.*

Second record for the northern half of Catalonia.

This South-African species is a garden escape that was first reported from Catalonia in L'Ametlla de Mar (Aymerich & Gustamante, 2015) and later in other coastal places. The new location in Blanes is interesting because only one previous record comes from the coast north of the Llobregat river (Port de la Selva, Empordà: Gómez-Bellver *et al.*, 2019b) and very few data refer to naturalized populations (Aymerich, 2016a; Verloove *et al.*, 2019).

***Cyrtomium falcatum* (L.) C. Presl**
(Dryopteridaceae)

SELVA: Blanes, Passeig Bitàcora, DG8314, 36 m, roadside ditch, shady, 13 September 2019, *F. Verloove* 13615 (BR); VALLÈS OCCIDENTAL: Montcada i Reixac, Mas Rampinyo area, near Besòs and Ripoll rivers confluence, DF3293-3193, 40-45 m, at least two populations in viaducts of C-33 and C-13 highways (*P. Aymerich*, 2007-2009; *D. Vilasís*, November 2019).

New records of a rare alien in Catalonia.

In Catalonia *C. falcatum* is only known in two sectors: the metropolitan area of Barcelona and the Costa Brava. The first known report is from the Barcelona port area where it was found in the 1980's (Casasayas & Farràs, 1986); it is still present there. Online databases and websites provide further records from the Barcelona area, for instance (as an escape) in urban gardens (Park Güell: Lluís Torrente, 2012 in <https://biodiversidadvirtual.org>), on a wall of a building in the center of Barcelona (Rosa Moreno, 2015 in <https://biodiversidadvirtual.org>) and near a stream in Cervelló (Baix Llobregat); it is also indicated in Baix Llobregat, near Sant Boi de Llobregat (http://exocatdb.creaf.cat/base_dades/).

In the Costa Brava area it has been observed in fewer places. It is probably best known from the Mar i Murtra Botanic Garden in Blanes where it is naturalized (Casasayas & Farràs, 1986). Mallol & Maynés (2008) reported its presence in Calonge, Baix Empordà. From the same area it is also known from Santa Cristina d'Aro (http://exocatdb.creaf.cat/base_dades/). A claim from an inland locality, in Sant Gregori (Gironès), in the ruins of an old mill, refers to *C. fortunei* J. Sm. (Aymerich & Sáez, 2019).

***Digitaria violascens* Link**
(Poaceae)

BAIX EMPORDÀ: Platja d'Aro, riera de Fenals at Carrer Isaac Albéniz, EG0530, 24 m, on the verge of riverlet, 6 September 2019, *F. Verloove* 13626 (BR).

Further expansion of this species in Catalonia.

This weed is naturalized and fast spreading in many parts of the Iberian Peninsula, often in irrigated lawns but also on exposed river banks and similar, temporarily damp habitats. In Catalonia it has been reported from various regions (e.g. Pyke, 2008; Verloove *et al.*, 2019). All reports, however, are from the Barcelona metropolitan area and further south (Tarragona). It is here listed for the first time in the northern part of Catalonia, in Platja d'Aro. There are further unpublished records from the same area (Palafrugell and L'Estartit) in the HGI herbarium.

***Heliotropium amplexicaule* Vahl (Fig. 15)**
(Boraginaceae)

SELVA: Blanes, s'Agüia (below Pinya de Rosa Botanic Garden), DG8414, 45 m, on half-shady stony ground, few plants, 12 September 2019, *F. Verloove* 13616 (BR); idem, Punta s'Agüia, DG8414, 11 m, on top of sea cliffs, near abandoned ruin, 12 September 2019, *F. Verloove s.c.*



Figure 15. *Heliotropium amplexicaule*. Blanes, September 2019, F. Verloove.

First Catalan records outside Barcelona.

This ornamental easily reproduces from seed and shows tendencies towards naturalization in neighboring territories, for instance in France (Tison & de Foucault 2014). In Catalonia it is only known apparently from the Barcelona area where it is found, as an ephemeral alien, in urban habitats (Casasayas, 1989); its current persistence in Barcelona is confirmed from photographs (e.g. P. Sainz, November 2019 in biodiversidadvirtual.org).

It is here reported from two localities close to the Pinya de Rosa Botanic Garden from where it may have escaped.

Jacaranda mimosifolia D. Don (Fig. 16)
(Bignoniaceae)

SELVA: Blanes, s'Agüia (below Pinya de Rosa Botanic Garden), DG8414, 30 m, on half-shady stony ground, few plants, 12 September 2019, F. Verloove s.c.

First record for the northern half of the region.



Figure 16. *Jacaranda mimosifolia*. Blanes, September 2019, F. Verloove. Self-sown individuals.

This is a subtropical tree native to south-central South America but widely planted elsewhere because of its attractive and long-lasting pale indigo flowers. In the Mediterranean and the Canary Islands its escape from cultivation was recently recorded. It is reported as invasive for instance in South Africa, Australia and Hawaii (Pasiecznik, 2014). It is naturalizing in dry mesic areas, in savanna and other grasslands but also in riparian woodland and other riverside habitats, in forests and in sheltered situations such as in wooded ravines. Scattered plants were observed in 2019 in the latter type of habitat below the Pinya de Rosa Botanic Garden in Blanes from where it may have escaped. It was found along with other rare escaped ornamentals such as *Solanum mauritianum*, *Tipuana tipu*, *Paulownia tomentosa* and *Senna corymbosa*.

In Catalonia it was only once reported before, a single young plant at the Ebre river near Tortosa (Royo, 2006).

Maclura pomifera (Raf.) C.K. Schneid. (Fig. 17)
(Moraceae)

SELVA: Blanes, Camí de Santa Cristina, DG8314, 105 m, vacant lot in a residential area, one individual, 3 October 2019, P. Aymerich s.c.



Figure 17. *Maclura pomifera*. Blanes, October 2019, P. Aymerich.

New record of a rare alien in Catalonia.

This low tree, native to the southern United States, is rarely cultivated in Catalonia. As an alien plant it was formerly reported from the Rosselló (Roussillon) plain (Bolòs & Vigo, 1990) and recently from the middle Llobregat basin area (Aymerich, 2013). At least the latter occurrence relates to a vegetative spreading of unisexual individuals, as was reported for *M. pomifera* in the Languedoc and Provence in southern France (Tison *et al.*, 2014). The new Catalan record from Blanes is apparently the result of vegetative multiplication of individuals cultivated in nearby gardens. However, in Italy this species is reported as naturalized (Galasso *et al.*, 2018) as it may reproduce from seeds (Viegi *et al.*, 2003).

Malephora uitenhagensis (L. Bolus) H. Jacobsen & Schwantes (Fig. 18)
(Aizoaceae)



Figure 18. *Malephora uitenhagensis*. Blanes, September 2019, F. Verloove.

SELVA: Blanes, Camí de Santa Cristina below Santa Bàrbara hill, DG8314, 110-115 m, acidic rocks and sandy soil in a disturbed area, growing with *Delosperma ecklonis*, population of 50 individuals, 12 September 2019, F. Verloove 13709 (BR) and 3 October 2019, P. Aymerich s.c.

New record of a rare species in Catalonia, the first for the central coast.

This constitutes the second record of a naturalized population of this species in Catalonia. It was first observed on a rocky coastal slope in Roses, Alt Empordà (Aymerich, 2015a). It is also known from the southern Catalan coast, but only as isolated individuals (Aymerich, 2017; Aymerich, 2020). Elsewhere in Europe, this species is reported from the islands of Sardinia (Bacchetta *et al.*, 2009), as casual, and Mallorca (Sáez *et al.*, 2016), where it is naturalized. It is also possible that some European records of *M. lutea* Schwantes –e.g. from Cadaqués in northern Catalonia (Gómez *et al.*, 2010) or the Valencia region in the eastern Iberian Peninsula (Guillot *et al.*, 2008)– belong to *M. uitenhagensis*. According to Manning & Goldblatt (2012) *M. lutea* is an insufficiently known species that might be conspecific with some of the other yellow-flowered *Malephora* species, including *M. uitenhagensis*. In the newly detected population in Blanes *M. uitenhagensis* grows together with another South-African Aizoaceae, *Delosperma ecklonis* (Salm-Dyck) Schwantes. In Europe, the latter is exclusively known from this area, mainly on the maritime slopes between Punta de s'Agüia i Sa Llapissada, less than 1 km further east (Aymerich, 2015b).

Nassella tenuissima (Trin.) Barkworth
(Poaceae)

GIRONES: Salt, Carrer d'Alfons Moré, DG8346, 80 m, foot of fence on the verge of rough ground, ca. 30 individuals, 11 September 2019, F. Verloove 13621 (BR).

Further expansion of this species in Catalonia.

This ornamental grass species from South America is commonly cultivated in Europe. It is known to easily

self-seed and has locally naturalized already, for instance in the Hérault department in southern France (Verloove, 2005b; Tison & de Foucault, 2014). In the Iberian Peninsula it is still rare with only two previous records from Catalonia (see Verloove *et al.*, 2019 for an overview).

In Salt it was observed along a fence that surrounds a fallow land. It obviously had escaped from a nearby ornamental plantation.

Plumbago auriculata Lam.
(Plumbaginaceae)

SELVA: Blanes, Camí de Santa Cristina, DG8314, 105 m, vacant lot in a residential area, 20 individuals, 12 September 2019, F. Verloove s.c. and 3 October 2019, P. Aymerich s.c.

New data about the local naturalization of this species in Catalonia.

This is a South African species that is often cultivated in Mediterranean gardens, first reported in Catalonia as a casual alien by Casasayas (1989). Later it has been observed in scattered places along the coast (Aymerich, 2019; Verloove *et al.*, 2019), also as casual or in the process of naturalization. The new record in Blanes refers to a small naturalized population.

Paulownia tomentosa Steud.
(Paulowniaceae)

SELVA: Blanes, s'Agüia (below Pinya de Rosa Botanic Garden), DG8414, 30 m, coastal woodland, two young trees, self-sown, 12 September 2019, F. Verloove s.c.

Second report for Catalonia, the first from the maritime area.

An ornamental tree native to central and western China, *Paulownia tomentosa* is increasingly naturalizing in areas where it was introduced in the past, to such an extent that it is often considered to be detrimental instead of ornamental (Essl, 2007). In the Iberian Peninsula it is still rare and confined to a few regions in Spain (Guipúzcoa and Huesca; Aizpuru *et al.*, 2003; Sanz Elorza, 2006). More recently, it was also reported for the first time from Catalonia in the Pyrenees (Berguedà), as casual (Aymerich, 2015c).

In 2019 two young, self-sown trees were observed in a shallow ravine below the Pinya de Rosa Botanic Garden from where it most likely escaped.

Podranea ricasoliana (Tanfani) Sprague (Fig. 19)
(Bignoniaceae)

SELVA: Blanes, Camí de Santa Cristina, DG8314, 105 m, disturbed Mediterranean woodland in a north-facing slope, clonal group 6 m², 12 September 2019, F. Verloove s.c. and 3 October 2019, P. Aymerich s.c.

New record of a rare species in Catalonia.

This ornamental vine has been reported from very few localities in Catalonia (Baix Ebre, Barcelonès and Empordà; see Verloove *et al.*, 2019 for an overview). A small

established clone was observed in a new locality in Blanes (Selva) in 2019.



Figure 19. *Podranea ricasoliana*. Blanes, September 2019, F. Verloove.

***Polygala myrtifolia* L.**
(Polygalaceae)

SELVA: Blanes, Torrent de la Cala Sant Francesc, DG8314, 45 m, growing in a stand of *Arundo donax*, a single individual, 3 October 2019, P. Aymerich s.c.

New record of a rare species in Catalonia, the first in the northern half.

This South African shrub is commonly cultivated in Mediterranean gardens, but rarely reported as escaped. Only one previous record is known in Catalonia, of a single individual, in the southern coast at L'Ampolla (Aymerich, 2017). In the Mediterranean area this species was doubtfully reported as naturalized in Corsica (Paradis, 2004) and the southern Italian Peninsula (Celesti-Grapow *et al.*, 2010). It is more often considered to be a mere casual alien, for instance in the Provence in France (Tison *et al.*, 2014), Sardinia (Podda *et al.*, 2012) and peninsular Italy (Galasso *et al.*, 2018).

***Quercus rubra* L.**
(Fagaceae)

ALT EMPORDÀ: Maçanet de Cabrenys, Salines massif, below Rocacinta, DG7895, 930-950 m, ancient plantation of *Quercus rubra*, seven young spontaneous individuals (ranging from 2-6 m in height) and a minimum of 20 seedlings, 15 June 2020, P. Aymerich s.c.

New record of a rare species in Catalonia.

This North American oak is rarely planted in Catalonia, either as an ornamental or as a forestry tree. Only four published observations are known, always as a casual alien and confined to the northeastern part of the territory: Garrotxa county (Oliver, 2009), Guillerics massif (Pérez-Haase *et al.*, 2013; Gesti, 2020) and Cerdanya plain in the Pyrenees (Aymerich, 2016b). In this location of the Salines massif there

is a small plantation of *Quercus rubra* with tall trees and a completely naturalized undergrowth. All the spontaneous individuals were observed inside this stand or in the periphery, but it is also possible that some individuals exist in the surrounding woods (not prospected) that are dominated by *Castanea sativa* and *Fraxinus excelsior*.

***Salvia hispanica* L.**
(Lamiaceae)

RIPOLLÈS: Camprodon, river Ter south of Camprodon, DG4783, 925 m, mud in riverbed, a single individual, 8 October 2019, P. Aymerich; VALLÈS ORIENTAL: Sant Celoni, Riera de Pertegàs at confluence with river Tordera, DG5915, 120 m, margin of riverlet, a single individual, 5 September 2019, F. Verloove s.c.

New record of a rare species in Catalonia.

The seeds of this Mexican species ('chia') are a pseudocereal and much-consumed as a so-called superfood these days. With sewage water undigested seeds end up in rivers. As a result, at the end of summer spontaneously arisen plants are increasingly observed along rivers and streams. Aymerich (2019) provides an overview of recent Catalan records.

In 2019 *Salvia hispanica* was recorded in two additional localities in Catalonia. Although the number of records is increasing, there are signs of an incipient naturalization only in the Segre river south of Seu d'Urgell, where it has been observed yearly between 2016 and 2020.

***Senecio pseudolongifolius* Sch. Bip. ex J. Calvo** (Fig. 20)
(Asteraceae)

SELVA: Blanes, Boscos de Sant Francesc area, DG8414, 65 m, margin of a forest track in a *Quercus suber* woodland, three reproductive individuals, 12 April 2019, P. Aymerich s.c.



Figure 20. *Senecio pseudolongifolius*. Blanes (Boscos de Sant Francesc), April 2019, P. Aymerich.

New record of a rare species in Catalonia and Europe.

This shrubby *Senecio* of South African origin is sometimes cultivated as ornamental in the Mediterranean region. It is rarely observed as a garden escape and, until now, it has

only been reported from the northern coast of Catalonia. There are two previous records: as a casual in Roses, Punta Falconera (Casasayas, 1989; as *S. lineatus* (L. f.) DC.) and a small naturalized population in Tossa de Mar, Punta de Giverola (Aymerich, 2015b). We know this species also as a cultivation relic in another location in Roses, east of Cala Jóncols (EG2177, 30 m, 2015-2019), but genuinely escaped plants were not yet observed there.

Senna corymbosa (Lam.) H.S.Irwin & Barneby
(Fabaceae)

SELVA: Blanes, s'Agüia (below Pinya de Rosa Botanic Garden), DG8414, 30 m, coastal woodland, two shrubs, probably self-sown, 12 September 2019, *F. Verloove* 13614 (BR).

First record for northern Catalonia.

A native of South America, this species is commonly grown as an ornamental in climatologically suitable areas, for instance in the Mediterranean. It sometimes reproduces from seed and naturalizes in areas where it was formerly introduced. It is known for instance from most of the southern states in the U.S.A.

In the Iberian Peninsula escaped individuals have only been reported twice. Royo (2006) mentioned the species from Barranc de la Galera in Montsià and from Barranc del Triador in Vinaròs (Baix Maestrat). A naturalized population was recently reported in this same area, Rambla de Cervera in Càlig, Castelló province (Senar & Cardero, 2019).

In Blanes two apparently self-sown shrubs were observed in 2019 in a shallow ravine below the Pinya de Rosa Botanic Garden from where it most likely escaped.

Solidago altissima L. (Fig. 21)
(Asteraceae)

GIRONÈS: Bescanó, river Ter at Illa de la Pilastra, DG7946, 95 m, riparian woodland, a highly invasive species, very tall (+200 cm) and late flowering, 8 September 2019, *F. Verloove* 13637 (BR).

Confirmation of the presence of this cryptic species in the Iberian Peninsula.

This North American species strongly resembles *S. canadensis* L. and has often been reported from Central and western Europe. However, the species that is widely naturalized is the latter and this was already pointed out by McNeill (1976). However, the genuine presence of *S. altissima* in western Europe –although thought to be of a much lesser importance– was recently confirmed from Belgium (Verloove *et al.*, 2017), based on nuclear genome size as measured by flow cytometry. In southwestern Europe, *S. altissima* is known as a naturalized alien in Catalonia since Casasayas (1989) mentioned this species from the northeastern lowlands. It is correctly accepted in the regional flora (Bolòs & Vigo, 1996) and –as a result of a revision of herbarium specimens (BC and BCN) conducted by L. Sáez– also in the recent catalogue of Catalonian alien plants (Aymerich & Sáez, 2019). However, all Spanish populations were erroneously thought to



Figure 21. *Solidago altissima*. Bescanó, September 2019, *F. Verloove*. This species resembles *S. canadensis* a lot but it is a taller species with subtentire leaves, entirely hairy stems and it starts flowering later.

belong to *S. canadensis* in the recent account of the genus in *Flora iberica* (Aedo, 2019). We confirm that exactly the same type of plants found in Belgium (Verloove *et al.*, 2017) was observed along river Ter in 2019, at first in Bescanó (Illa de la Pilastra), subsequently also further downstream up to Sant Julià de Ramis. In the valley of Ter river *S. altissima* occurs in massive stands in riparian woodland. It is an invasive weed and was undoubtedly introduced a long time ago already. From the very same area it was already reported by Casasayas (1989).

Solidago altissima is an unusually tall and vigorous species with stems up to 200 cm long and short-hairy throughout. Leaves are nearly entire, more or less leathery and stiff in texture, and rough and large up into the inflorescence (typical for *S. altissima* var. *altissima*). Flowering commences very late in the season (in the northeastern Iberian Peninsula from the end of September onwards, several weeks later than *S. canadensis*). Finally, involucre are markedly longer than in *S. canadensis*.

Tipuana tipu (Benth.) Kuntze (Fig. 22)
(Fabaceae)

SELVA: Blanes, s'Agüia (below Pinya de Rosa Botanic Garden), DG8414, 30 m, coastal woodland, scattered young trees, self-sown, 12 September 2019, *F. Verloove* s.c. (BR).



Figure 22. *Tipuana tipu*. Blanes, September 2019, F. Verloove. Self-sown individuals

New record of a rare species in Catalonia.

Tipuana tipu, a native of South America, is commonly planted as an ornamental street tree in Mediterranean climates. It produces numerous samara-like fruits that are easily wind-dispersed. As a result, it reproduces from seed wherever germination conditions are suitable. Although the escape of this tree in the Iberian Peninsula seems to be recent, it was reported already from several localities in Barcelona and Tarragona (Gómez-Bellver *et al.*, 2019c; Verloove *et al.*, 2019).

In Blanes several obviously self-sown young trees were observed in 2019 in a shallow ravine below the Pinya de Rosa Botanic Garden from where it most likely escaped. This apparently is the northernmost locality for this species in the Iberian Peninsula.

***Trachycarpus fortunei* (Hook.) H. Wendl. (Fig. 23)**
(Arecaceae)

GIRONÈS: Girona, N side of river Ter between Passera de Fontajau and Pont de Fontajau, DG8448, 64 m, river bank, a single self-sown individual, 15 September 2019, *F. Verloove* s.c.; SELVA: Blanes, Santa Cristina near Ermita, DG8415, 40 m, shallow ravine close to the sea, shady, small population of at least 26 self-sown individuals ca. 20-200 cm tall, 12 September 2019, *F. Verloove* 13661 (BR).

New record of a rare species in Catalonia.

Trachycarpus fortunei is one of the hardiest palm species in the world and it is increasingly planted in western Europe, in Catalonia at least since the beginning of the 20th century. It is known as an escape from the milder parts of the British Isles (Clement & Foster, 1994) and recently started escaping in, for instance, Switzerland as well (e.g. Walther, 2000). It is considered a significant bio-indicator across continents for present-day climate change and reflects a global signal towards warmer conditions (Walther *et al.*, 2007). In some areas in its secondary range incipient invasive behavior has been observed, for instance in Japan (Koike, 2006), but also in Switzerland.



Figure 23. *Trachycarpus fortunei*. Blanes, October 2019, P Aymerich.

In Catalonia, like elsewhere in Europe (e.g. Switzerland, Italy), it is mostly known from inland localities, for instance from the middle Llobregat basin (Aymerich, 2013, 2016b, 2017), the Collserola mountain in Barcelona (Pérez-Haase, 2012), the Garrotxa area (Oliver, 2009) and Santa Coloma de Farners (Gesti, 2020). The EXOCAT database also includes unspecified records from coastal areas in Tossa de Mar and the Maresme area.

In 2019 a small population exclusively consisting of non-reproductive individuals was discovered near to the coast in Blanes and a single individual was also observed in Girona, probably for the first time from Gironès.

***Wisteria sinensis* (Sims) DC.**
(Fabaceae)

SELVA: Blanes, above Cala Sant Francesc ravine, DG8314, 55-60 m, vacant lot in a residential area (*Pinus* woodland and Mediterranean scrub), covering an area of 500-600 m², 3 October 2019, *P. Aymerich* s.c.

New record of a rare species in Catalonia.

Although this Chinese vine has been known as an alien plant in Catalonia for quite a long time (Casasayas, 1989), it is rare and there are only few published records. The new Blanes location is in the maritime fringe north of Barcelona, like most Catalan records (Casasayas, 1989; Guardiola *et al.*, 2009; Gesti, 2020). The Blanes population is the result of vegetative expansion of cultivated individuals in nearby gardens.

References

- AEDO, C. 2019. *Solidago* L. P. 2044-2048. In: Benedí, C., Buirra, A.; Rico, E.; Villalba, M. B. C., Quintanar, A., Aedo, C. (eds.). *Flora iberica* 16(3). Real Jardín Botánico, CSIC. Madrid. 918 p.
- AIZPURU, I., APERRIBAY, J. A., BALDA, A., GARIN, F., LORDA, M., OLARIAGA, I., TERÉS, J. & VIVANT, J. 2003. *Contribuciones al conocimiento de la flora del País Vasco (V). Munibe*, 54: 39-74.
- AURIAULT, R. 1975. *Bothriochloa imperatoides* (Hack.) Herter adventice dans l'Hérault. *Le Monde des Plantes*, 383: 2-3.

- AYMERICH, P. 2013. Plantas alóctonas de origen ornamental en la cuenca alta del río Llobregat (Cataluña, noreste de la Península Ibérica). *Bouteloua*, 16: 52-79.
- AYMERICH, P. 2015a. Nuevos datos sobre plantas suculentas alóctonas en Cataluña. *Bouteloua*, 22: 99-116.
- AYMERICH, P. 2015b. Notes sobre plantes al·lòctones d'origen ornamental a la Costa Brava (nord-est de la península Ibèrica). *Bulletí de la Institució Catalana d'Història Natural*, 79: 65-68.
- AYMERICH, P. 2015c. Notes florístiques de les conques altes dels rius Segre i Llobregat. III. *Orsis*, 29: 1-28.
- AYMERICH, P. 2016a. Algunas citas de plantas alóctonas de origen ornamental en la zona del Penedès (Cataluña). *Bouteloua*, 24: 78-92.
- AYMERICH, P. 2016b. Contribució al coneixement de la flora al·lòctona del nord i el centre de Catalunya. *Orsis*, 30: 11-40.
- AYMERICH, P. 2017. Notes sobre flora al·lòctona a Catalunya. *Bulletí de la Institució Catalana d'Història Natural*, 81: 97-116.
- AYMERICH, P. 2019. Notes sobre flora al·lòctona a Catalunya. II. *Bulletí de la Institució Catalana d'Història Natural*, 83: 3-21.
- AYMERICH, P. 2020. Notes sobre flora al·lòctona a Catalunya. III. *Bulletí de la Institució Catalana d'Història Natural*, 84: 101-124.
- AYMERICH, P. & GUSTAMANTE, L. 2015. Nuevas citas de plantas alóctonas de origen ornamental en el litoral meridional de Cataluña. *Bouteloua*, 20: 22-41.
- AYMERICH, P. & SÁEZ, L. 2019. Checklist of the vascular alien flora of Catalonia (northeastern Iberian Peninsula, Spain). *Mediterranean Botany*, 40: 215-242.
- BACCHETTA, G., MAYORAL, O & PODDA, L. 2009. Catálogo de la flora exótica de la isla de Cerdeña (Italia). *Flora Montiberica*, 41: 35-61.
- BASNOU, C., IGUZQUIZA & PINO, J. 2015. Examining the role of landscape structure and dynamics in alien plant invasions from urban Mediterranean coastal habitats. *Landscape and urban planning*, 136 : 156-164.
- BOLÒS, O. & VIGO, J. 1990. *Flora dels Països Catalans*. Vol. 2. Ed. Barcino. Barcelona. 921 p.
- BOLÒS, O. & VIGO, J. 1996. *Flora dels Països Catalans*. Vol. 3. Ed. Barcino. Barcelona. 1230 p.
- CAMPOS, J.A & HERRERA, M. 2009. *Diagnosis de la flora alóctona invasora de la CAPV*. Departamento de Medio Ambiente y Ordenación del Territorio. Bilbao. 296 p.
- CASASAYAS, T. 1989. *La flora al·lòctona de Catalunya*. Ph.D. Thesis. Universitat de Barcelona. 880 p. Online accessible at: <http://diposit.ub.edu/dspace/handle/2445/36121>
- CASASAYAS, T. & A. FARRÀS 1986. *Polystichum falcatum* (L. fil.) Diels, adventícia a Catalunya. *Collectanea Botanica (Barcelona)*, 16: 425-426.
- CASTROVIEJO, S. 1990. *Amaranthaceae*. P. 554-569. In: Castroviejo, S., Lainz, M., López-González, G., Montserrat, P., Muñoz-Garmendia, F., Paiva, J., Villar, L. (eds.). *Flora iberica*, vol. 2. Real Jardín Botánico, CSIC. Madrid. 897 p.
- CELESTI-GRAPPOW, L., PRETTO, F., CARLI, E. & BLASI, C. (eds.) 2010. *Flora vascolare alloctona e invasiva delle regione d'Italia*. Casa Editrice Università La Sapienza. Roma. 207 p.
- CLEMENT, E. J. & FOSTER, M. C. 1994. *Alien plants of the British Isles*. BSBI, London. XVIII + 590 p.
- COWAN, O. S. & ANDERSON, P. M. L. 2014. The Peninsula Shale Renosterveld of Devil's Peak, Western Cape: A study into the vegetation and seedbank with a view toward potential restoration. *South African Journal of Botany*, 95: 135-145.
- DEBRAY, M. 1968. Les espèces du genre *Bidens* introduites en France. Rectifications et nouvelles données. *Cahiers des Naturalistes* (Bulletin des Naturalistes Parisiens), 24: 53-58.
- DE CASTRO, O., GARGIULO, R., DEL GUACCHIO, E., CAPUTO, P. & DE LUCA, P. 2015. A molecular survey concerning the origin of *Cyperus esculentus* (Cyperaceae, Poales): two sides of the same coin (weed vs. crop). *Annals of Botany*, 115: 733-745.
- DLUGOSCH, K. M. & PARKER, I. M. 2008. Invading populations of an ornamental shrub show rapid life history evolution despite genetic bottleneck. *Ecology Letters*, 11: 701-709.
- DOMINGUES DE ALMEIDA, J. & FREITAS, H. 2012. Exotic flora of continental Portugal – a new assessment. *Bocconea*, 24: 231-237.
- DORR, L. J. 2015. *Firmiana*. P. 190-245. In: Flora of North America Editorial Committee (eds.). *Flora of North America* 6. Oxford University Press, New York-Oxford. 496 p.
- EGIDO, F. DEL, PUENTE, E. & LÓPEZ, M.J. 2007. Fragmentos taxonómicos, corológicos, nomenclaturales y fitocenológicos (164-170). 165. Notas sobre flora alóctona leonesa. *Acta Botanica Malacitana*, 32: 215-220.
- ESSL, F. 2007. From ornamental to detrimental? The incipient invasion of Central Europe by *Paulownia tomentosa*. *Preslia*, 9: 377-389.
- FONT, J. 2000. *Estudis botànics de la serra de l'Albera: catalog florístic general i poblament vegetal de les basses de l'Albera*. Ph.D. Thesis (unpublished). Universitat de Girona. 692 p.
- FONT, J. & VILAR, L. 2000. *Plantes vasculares del quadrat UTM 31T DG09. Sant Climent Sescebes*. ORCA: Catàlegs florístics locals: 10. Institut d'Estudis Catalans. Barcelona.
- FREY, M., PERLMUTTER, M., WILLIAMS, A. & GLUESENKAMP, D. 2015. The San Francisco Bay Area Early Detection Network. *Management of Biological Invasions*, 6: 231-241.
- GALANOS, C. J. 2015. The alien flora of terrestrial and maritime ecosystems of Rodos island (SE Aegean), Greece. *Willdenowia*, 45: 261-278.
- GALASSO, G., CONTI, F., PERUZZI, L., ARDENGHI, N. M. G., BANFI, E., CELESTI-GRAPPOW, L., ALBANO, A., ALESSANDRINI, A., BACCHETTA, G., BALLELLI, S., BANDINI MAZZANTI, M., BARBERIS, G., BLASI, C., BERNARDO, L., BLASI, C., BOUVET, D., BOVIO, M., CECCHI, L., DEL GUACCHIO, E., DOMINA, G., FASCETTI, S., GALLO, L., GUBELLINI, L., GUIGGI, A., IAMONICO, D., IBERITE, M., JIMÉNEZ-MEJÍAS, P., LATTANZI, E., MARCHETTI, D., MARTINETTO, E., MASIN, R. R., MEDAGLI, P., PASSALACQUA, N. G., PECCENINI, S., PENNESI, R., PIERINI, B., PODDA, L., POLDINI, L., PROSSER, F., RAIMONDO, F. M., ROMA-MARZIO, F., ROSATI, L., SANTANGELO, A., SCOPPOLA, A., SCORTEGAGNA, S., SELVAGGI, A., SELVI, F., SOLDANO, A., STINCA, A., WAGENSOMMER, R. P., WILHALM, T. & BARTOLUCCI, F. 2018. An updated checklist of the vascular flora alien to Italy. *Plant Biosystems*, 152: 179-303.
- GESTI, J. 2020. Catàleg de la flora vascular de Santa Coloma de Farners (la Selva, nord-est de Catalunya). *Miconia*, 4: 69-105.
- GIORGIS, M. A. & TECCO, P. A. 2014. Árboles y arbustos invasores de la provincia de Córdoba (Argentina): una contribución a la sistematización de bases de datos globales. *Boletín Sociedad Argentina Botánica*, 49: 581-603.
- GÓMEZ, F., PRUNELL, S., SABATÉ, P., & SALVADÓ, S. 2010. *Pla de gestió de l'illa de Portlligat i diagnosi de flora a la badia*. Universitat de Girona. Unpublished report. 145 p.
- GÓMEZ-BELLVER, C., ÁLVAREZ, H., NUALART, N., IBÁÑEZ, N., SÁEZ, L. & LÓPEZ-PUJOL, J. 2019a. New records of alien vascular plants in Catalonia (NE Iberian Peninsula). *Collectanea Botanica (Barcelona)*, 38: e004.

- GÓMEZ-BELLVER, C., LÓPEZ-PUJOL, J., NUALART, N., ÁLVAREZ, H., IBÁÑEZ, N. & GUILLOT, D. 2019b. Nuevos datos de plantas alóctonas de origen ornamental en Cataluña. *Bouteloua*, 28: 51-65.
- GÓMEZ-BELLVER, C., NUALART, N., IBÁÑEZ, N., BURGUEIRA, C., ÁLVAREZ, H. & LÓPEZ-PUJOL, J. 2019c. Noves dades per a la flora al·lòctona de Catalunya i del País Valencià. *Butlletí de la Institució Catalana d'Història Natural*, 83: 23-40.
- GONÇALVES, M. L. 1990. *Mollugo*. P. 93-95. In: Castroviejo, S., Lainz, M., López-González, G., Montserrat, P., Muñoz-Garmendia, F., Paiva, J., Villar, L. (eds.). *Flora iberica*, vol. 2. Real Jardín Botánico, CSIC. Madrid. 897 p.
- GUARDIOLA, M., GUITÉRREZ, C., PÉREZ-HAASE, A., JOVER, M. & CORBERA, J. 2009. Les plantes al·lòctones del sector central de la Serralada Litoral Catalana (territori comprès entre el riu Besòs i la Tordera). *L'Atzavara*, 18: 89-100.
- GUARDIOLA, M. & PETIT, A. 2020. Aportacions a la flora al·lòctona de la serralada Litoral central catalana i territoris propers. *Butlletí de la Institució Catalana d'Història Natural*, 84: 35-49.
- GUILLOT, D. 2001. Apuntes sobre algunos neófitos de la flora valenciana. *Flora Montiberica*, 18: 19-21.
- GUILLOT, D., LAGUNA, E. & ROSSELLÓ, J. A. 2008. *Flora alóctona suculenta valenciana: Aizoaceae y Portulacaceae*. *Monografías de la revista Bouteloua*, 7: 66 p.
- HAYASHI, A. H. & APPEZZATO-DA-GLÓRIA, B. 2009. Resprouting from roots in four Brazilian tree species. *Revista de Biología Tropical*, 57: 789-800.
- HEYWOOD, V. H. & SHARROCK, S. 2013. *European Code of Conduct for Botanic Gardens on Invasive Alien Species*. Council of Europe, Strasbourg, Botanic Gardens Conservation International, Richmond.
- HOWELL, C. & SAWYER, J. W. D. 2006. *New Zealand naturalised vascular plant checklist*. New Zealand Plant Conservation Network. Wellington. 60 p.
- HUXLEY, A.J. 1999. *The new Royal Horticultural Society dictionary of gardening*. London, Macmillan. 3000 p.
- IAMONICO, D. 2013. About the circumscription of *Celosia argentea* (Amaranthaceae) and the related Linnaean taxa. *Phytotaxa*, 90: 61-64.
- KOIKE, F. 2006. *Invasion of an alien palm (Trachycarpus fortunei) into a large forest*. P. 200-203. In: Koike, F., Clout, M.N., Kawamichi, M., De Poorter, M., Iwatsuki, K. (eds.). *Assessment and control of biological invasion risks*. Shoukadoh book sellers, Kyoto, Japan, the World Conservation Union (IUCN), Gland, Switzerland.
- LANDREIN, S., BUERKI, S., WANG, H.-F. & CLARKSON, J. J. 2017. Untangling the reticulate history of species complexes and horticultural breeds in *Abelia* (Caprifoliaceae). *Annals of Botany*, 120: 257-269.
- MALLOL, A. & MAYNÉS, J. 2008. Nous xenòfits al Baix Empordà (Catalunya). *Acta Botanica Barcinonensia*, 51: 59-78.
- MANNING, J. & GOLDBLATT, P. 2012. *Plants of the Greater Cape Floristic Region. I: The core Cape flora*. Strelitzia, 29. South African National Biodiversity Institute. Pretoria. 853 p.
- MCNEILL, J. 1976. *Solidago*. P. 110-111. In: Tutin, T.G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M., Webb, D. A. (eds.). *Flora europaea* 4. Cambridge: Cambridge University Press. 534 p.
- OLIVER, X. 2009. *Catàleg de la flora vascular al·lòctona de la Garrotxa*. Institució Catalana d'Història Natural. Delegació de la Garrotxa. Olot. 65 p.
- OTTO, R. & VERLOOVE, F. 2018. New xenophytes from La Palma (Canary Islands, Spain), with emphasis on naturalized and (potentially) invasive species – Part 2. – *Collectanea Botanica (Barcelona)*, 37: e005.
- PANIGO, E. S., DELLAFERRERA, I. M., ACOSTA, J. M., BENDER, A. G., GARETTO, J. I. & PERRETA, M. G. 2012. Glyphosate-induced structural variations in *Commelina erecta* L. (Commelinaceae). *Ecotoxicology and Environmental Safety*, 76: 135-142.
- PARADIS, G. 2004. Observations sur les stations de l'espèce subspontanée *Polygala myrtifolia* L. à l'ouest d'Ajaccio (Corse). *Bulletin de la Société Botanique du Centre-Ouest*, 35: 91-102.
- PASIECZNIK, N. 2014. Datasheet *Jacaranda mimosifolia*. Invasive Species Compendium. Accessed online at: <https://www.cabi.org/isc/datasheet/29212> (25 March 2020).
- PÉREZ-HAASE, A. 2012. *Creació d'una geobase de dades dels hàbitats CORINE del Parc de Collserola a escala 1:10.000*. Universitat de Barcelona - Ajuntament de Barcelona – Diputació de Barcelona. Technical report. 98 p. Online accessible at: http://www.parcnaturalcollserola.cat/pdfs/HabitatsCORINE_PNCollserola_2012_Memoria.pdf
- PÉREZ-HAASE, A., BATRIU, E. & BLANCO-MORENO, J. M. 2013. *Aportació al coneixement florístic de l'Espai Natural de les Guilleries-Savassona*. Diputació de Barcelona. Technical report. 238 p. Online accessible at: http://diposit.ub.edu/dspace/bitstream/2445/110309/1/Aportacio_Coneixement_Floristic_ENGS2013.pdf
- PETROVA, A. S. & VLADIMIROV, V. 2009. Two alien species of *Bidens* (Asteraceae) new to the Bulgarian flora. *Phytologia Balcanica*, 15: 367-371.
- PODDA, L., LAZZERI, V., MASCIA, F., MAYORAL, O. & BACCHETTA, G. 2012. The Checklist of the Sardinian Alien Flora: an update. *Notulae Botanicae Horti Agrobotanici*, 40: 14-21.
- PYKE, S. 2008. Contribució al conocimiento de la flora alóctona catalana. *Collectanea Botanica (Barcelona)*, 27: 95-104.
- PYKE, S. 2010. Three recently-introduced alien grasses in the Iberian Peninsula. *Collectanea Botanica (Barcelona)*, 29: 91-93.
- RANDALL, R.P. 2007. *The introduced flora of Australia and its weed status*. CRC for Australian Weed Management. Department of Agriculture and Food, Western Australia. University of Adelaide. 524 p.
- RICHARDON, D. M. & REJMÁNEK, M. 2004. Conifers as invasive aliens: a global survey and predictive framework. *Diversity and Distributions*, 10: 321-331.
- ROSATI, L., FASCETTI, S., ROMANO, V. A., POTENZA, G., LAPENNA, M. R., CAPANO, A., NICOLETTI, P., FARRIS, E., DE LANGE, P. J., DEL VICO, E., FACIONI, L., FANFARILLO, E., LATTANZI, E., CANO-ORTIZ, A., MARIGNANI, M., FOGU, M. C., BAZZATO, E., LALLAI, E., LAFACE, V. L. A., MUSARELLA, C. M., SPAMPINATO, G., MEI, G., MISANO, G., SALERNO, G., ESPOSITO, A. & STINCA, A. 2020. New Chorological Data for the Italian Vascular Flora. *Diversity*, 2020, 12, 22; doi:10.3390/d12010022
- ROYO, F. 2006. *Flora i vegetació de les planes i serres litorals compreses entre el riu Ebro i la serra d'Irta*. Ph.D. Thesis. Universitat de Barcelona. 717 p.
- SÁEZ, L., SERAPIO, J., GÓMEZ-BELLVER, C., ARDENGHI, N. M. G., GUILLOT, D. & RITA, J. 2016. New records in vascular plants alien to the Balearic Islands. *Orsis*, 30: 101-131.
- SÁNCHEZ GULLÓN, E., MUÑOZ RODRÍGUEZ A.F. & VERLOOVE, F. 2020. Flora ornamental naturalizada en el SW de la península ibérica. *Bouteloua*, 29: 3-11.
- SÁNCHEZ GULLÓN, E. & VERLOOVE, F. 2013. New records of interesting vascular plants (mainly xenophytes) in the Iberian Peninsula. IV. *Folia Botanica Extremadurensis*, 7: 29-34.

- SÁNCHEZ GULLÓN, E. & VERLOOVE, F. 2015. New records of interesting xenophytes in the Iberian Peninsula. V. *Lazaroa*, 36: 43-50.
- SANZ, M., GUILLOT, D. & DELTORO, V. 2011. La flora aloctona de la Comunidad Valenciana (España). *Botanica Complutensis*, 35: 97-130.
- SANZ ELORZA, M. 2006. *La flora aloctona del Alto Aragón. Flora analítica de xenofitas de la provincia de Huesca*. Ed. Gihemar S. A., Madrid. 311 p.
- SCHIPPERS, P., TER BORG, S. J. & BOS, J. J. 1995. A revision of the infraspecific taxonomy of *Cyperus esculentus* (Yellow Nutsedge) with an experimentally evaluated character set. *Systematic Botany*, 20: 461-481.
- SENAR, R. & CARDERO, S. 2019. Dades de plantes al·loctones per a l'est de la península Ibèrica. *Collectanea Botanica*, 38: e009.
- SERVISS, B. E. & PECK, J. H. 2019. *Abelia* (Caprifoliaceae) in the flora of Arkansas. *Phytoneuron*, 2019-7: 1-7.
- STACE, C. 2010. New flora of the British Isles, 3th ed. Cambridge University Press. XXXII + 1232 p.
- TATIC, B. & ŽUKOWSKI, W. 1973. *Bidens vulgata* Greene in Yugoslavia. *Bulletin de l'Institut et du Jardin Botaniques de l'Université de Beograd*, 8: 125-128.
- TISON, J.-M. & DE FOUCAULT, B. 2014. *Flora Gallica. Flore de France*. Editions Biotope, Mèze. 1196 p.
- TISON, J. M., JAUZEIN, P. & MICHAUD, H. 2014. *Flore de la France méditerranéenne continentale*. Naturalia Publications. 2078 p.
- TUCKER, G. C., MARCKS, B. G. & CARTER, J. R. 2002. *Cyperus*. P. 141-191. In: Flora of North America Editorial Committee (eds.). Flora of North America 23. Oxford University Press, New York-Oxford. 544 p.
- ULUDAG, A., AKSOY, N., YAZHK, A., ARSLAN, Z. F., YAZMIS, E., ÜREMIS, I., COSSU, T. A., GROOM, Q., PERGL, J., PYSEK, P. & BRUNDU, G. 2017. Alien flora of Turkey: checklist, taxonomic composition and ecological attributes. *Neobiota*, 35: 61-85.
- VALDÉS, B. 2011. *Malvaceae*. In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. Accessed online at: <http://www.emplantbase.org/home.html> (20 February 2020).
- VAZ, A. M. & TOZZI, A. M. 2005. Sinopse de *Bauhinia* sect. *Pauletia* (Cav.) DC. (Leguminosae: Caesalpinioideae: Cercidae) no Brasil. *Revista Brasileira de Botanica*, 28: 477-491.
- VÁZQUEZ, F. M. 2008. Anotaciones Corológicas a la Flora en Extremadura: 011, *Chloris truncata* R.Br. *Folia Botanica Extremadurensis*, 2: 59-62.
- VENTOSO, A. & MONGIARDINO, G. (eds.) 2014. *Guía de identificación de especies arbóreas nativas Uruguay*. Dirección Nacional de Medio Ambiente. Montevideo. 166 p.
- VERLOOVE, F. 2005a. New records of interesting xenophytes in Spain. *Lazaroa*, 26: 141-148.
- VERLOOVE, F. 2005b. A synopsis of *Jarava* Ruiz & Pav. and *Nassella* E. Desv. (*Stipa* L. s.l.) (Poaceae: Stipeae) in southwestern Europe. *Candollea*, 60: 97-117.
- VERLOOVE, F. 2017. New xenophytes from the Canary Islands (Gran Canaria and Tenerife; Spain). *Acta Botanica Croatica*, 76: 120-131.
- VERLOOVE, F. & ALVES, P. 2016. New vascular plant records for the western part of the Iberian Peninsula (Portugal and Spain). *Folia Botanica Extremadurensis*, 10: 5-23.
- VERLOOVE, F. & ARDENGHI, N. M. G. 2015. New distributional records of non-native vascular plants in northern Italy. *Natural History Sciences*, 2: 5-14.
- VERLOOVE, F., AYMERICH, P., GÓMEZ-BELLVER, C. & LÓPEZ-PUJOL, J. 2019. Chorological notes on the non-native flora of the province of Tarragona (Catalonia, Spain). *Butlletí de la Institució Catalana d'Història Natural*, 83: 133-146.
- VERLOOVE, F., SALAS-PASCUAL, M. & MARRERO RODRÍGUEZ, Á. 2018. New records of alien plants for the flora of Gran Canaria (Canary Islands, Spain). *Flora Mediterranea*, 28: 119-135.
- VERLOOVE, F., ZONNEVELD, B. J. M. & SEMPLE, J. C. 2017. First evidence for the presence of invasive *Solidago altissima* (Asteraceae) in Europe. *Willdenowia*, 47: 69-75.
- VIEGI, L., VANGELISTI, R., D'EUGENIO, M. L., RIZZO, A. M. & BRILLI-CATARINI, A. 2003. Contributo alla conoscenza della flora esotica d'Italia: le specie presenti nelle Marche. *Atti della Società Toscana di Scienze Naturali*, Mem. Serie B, 110: 97-162.
- WALTHER, G. R. 2000. *Laurophyllisation in Switzerland*. Dissertation, Swiss Federal Institute of Technology (ETH) Zurich. 150 p.
- WALTHER, G. R., GRITTI, E. S., BERGER, S., HICKLER, T., TANG, Z. & SYKES, M. T. 2007. Palms tracking climate change. *Global Ecology and Biogeography*, 16: 801-809.
- WUNDERLIN, R. P. 1983. Revision of the arborescent Bauhinias (Fabaceae, Caesalpinioideae, Cercidae) native to Middle America. *Annals of the Missouri Botanical Garden*, 70: 95-127.
- YEO, P. F. 2011. *Ruscus*. P. 168-170. In: Cullen, J., Knees, S.G., Cubey, H. S. (eds.). The European Garden Flora 1 (Angiospermae-Monocotyledons). Second Edition. Cambridge University Press. 688 p.