

Cataloguing the alien flora of Portugal: New findings and updates

Filip Verloove, Paulo Alves

<https://doi.org/10.55457/pibs.01101>

Cataloguing the alien flora of Portugal: New findings and updates by Filip Verloove and Paulo Alves is licensed under a Creative Commons Attribution-NonCommercial 4.0 International Licence.

This publication may be cited as: Verloove, F., Alves, P. (2026). Cataloguing the alien flora of Portugal: New findings and updates. *Perspectives in Biosecurity*, 11: 1–31.

Contact:

epress@unitec.ac.nz

www.unitec.ac.nz/epress

Manukau Institute of Technology and Unitec

Private Bag 92025, Victoria Street West

Tāmaki Makaurau / Auckland 1142

Aotearoa / New Zealand

Cataloguing the alien flora of Portugal: New findings and updates

Filip Verloove^{1*} , Paulo Alves² 

Affiliations:

1. Meise Botanic Garden, Nieuwelaan 38, B-1860 Meise, Belgium
2. Floradata, Campo 24 de Agosto, 129 – Escritório 704, 4300-504 Bonfim, Porto, Portugal

* Corresponding author: filip.verloove@botanicgardenmeise.be

Senior Editor: Peter J. de Lange

Article type: Research paper

Abstract

During recent fieldwork in Portugal – mainly in the regions of Estremadura and Ribatejo in the autumn of 2024, but also earlier and elsewhere in the country – many interesting non-indigenous taxa were recorded. The following 25 taxa were not yet known from Portugal: *Amaranthus blitum* subsp. *pseudogracilis*, *Amaranthus palmeri*, *Bassia indica*, *Cardiospermum grandiflorum*, *Casuarina cunninghamiana*, *Chloris gayana*, *Crepis bursifolia*, *Cyperus papyrus*, *Elatine ambigua*, *Eleocharis obtusa*, *Eragrostis mexicana*, *E. pectinacea*, *Guizotia abyssinica*, *G. schimperii*, *Hedera algeriensis*, *Hydrocotyle bowlesioides*, *H. sibthorpioides*, *Ipomoea hederacea*, *Megathyrsus maximus*, *Nassella tenuissima*, *Physalis angulata*, *Sida spinosa*, *Solanum bonariense*, *Vitis riparia* and *V. × ruggerii*. Among these, *Hydrocotyle bowlesioides* is especially noteworthy as this record represents the first confirmed occurrence on the European mainland, extending the known non-native range of the species. In addition, several other taxa were recorded for the first time in particular regions, especially Estremadura and Ribatejo. Most newly recorded species belong to Poaceae and Asteraceae, families that dominate alien floras in Mediterranean regions. Biogeographically, they originate mainly from tropical and subtropical America and Africa, reflecting both climatic affinity and strong anthropogenic dispersal. Regional analyses highlight contrasting patterns: Estremadura, with its urban and coastal environments, acts as a primary entry zone linked to horticultural and transport activities, whereas Ribatejo – especially along the Tagus River (Rio Tejo) valley – functions as a linear dispersal corridor for riparian and agricultural invaders. Several taxa are clearly naturalised, and some show local dominance, underlining an accelerating transition from casual to established status. These findings illustrate the ongoing dynamism of Portugal's alien vascular flora under the combined influence of globalisation, urbanisation and climate change, and emphasise the need for continued monitoring and documentation through co-ordinated fieldwork and digital biodiversity platforms, particularly in light of the high invasive potential demonstrated by many of the species involved.

Keywords

Non-native species, floristic novelty, establishment dynamics, invasion pathways, urban floras, riparian weeds, climate change

Introduction

The study of alien plant species has gained increasing relevance in recent decades as globalisation, trade and climate change intensify biological exchanges between continents (e.g., Seebens et al. 2015, 2021). The Iberian Peninsula, located at the crossroads of Mediterranean and Atlantic biogeographical regions, is particularly susceptible to plant introductions, both deliberate and accidental (Soto et al. 2025). Portugal's flora, though relatively well documented, continues to evolve rapidly under anthropogenic pressures, with new alien taxa being detected almost annually.

Previous inventories (e.g., Domingues de Almeida & Freitas 2006, 2012; Verloove & Alves 2016; Domingues de Almeida 1999, 2018, 2024) have substantially improved knowledge of the Portuguese alien flora. Nevertheless, large gaps remain, particularly in dynamic and human-modified landscapes such as Estremadura and Ribatejo, where continuous urbanisation, agricultural intensification and riverine transport create ideal conditions for the establishment and spread of non-native species.

This study contributes to the ongoing documentation of Portugal's alien vascular flora by presenting new national and regional records collected mainly during

fieldwork in 2024. For each taxon, the presumed degree of naturalisation and invasion potential is evaluated, and the results are analysed in relation to taxonomic composition and geographical origin. Special attention is given to the contrasting invasion dynamics in Estremadura and Ribatejo, which together represent two key gateways for plant introductions in central Portugal.

Materials and Methods

The data presented in this article are primarily the result of fieldwork conducted by the first author between 1 and 15 September 2024. During this period, numerous localities were surveyed across the wide Tagus River valley, in the former Portuguese provinces of Estremadura and Ribatejo, with particular attention to coastal and lowland areas. The main focus was on riparian and other damp habitats, including rice fields, but anthropogenic environments (e.g., roadsides, parks) and agricultural fields were also explored. In addition, field observations by the second author in various Portuguese regions over recent years provided further relevant data, which are also discussed here. The spatial extent of the surveyed regions is presented in Figure 1, distinguishing between areas investigated by the first and second authors.

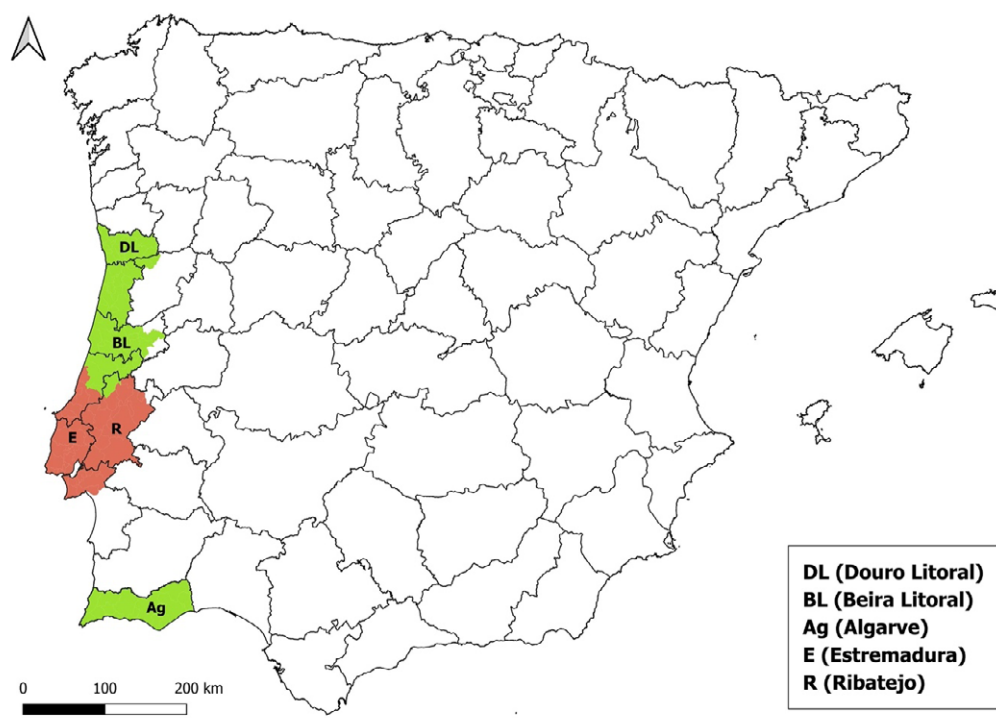


Figure 1. Surveyed regions in Portugal within the Iberian Peninsula. Brown: main survey area of the first author (September 2024). Green: additional regions surveyed by the second author.

Voucher specimens were collected for all taxa included in this study and deposited in the herbarium of Meise Botanic Garden, Belgium (BR), with selected duplicates placed in the herbaria of the University of Valencia, Spain (VAL) and the University of Porto, Portugal (PO). Specimens deposited in BR will eventually be made available online via <https://www.botanicalcollections.be>. In addition, extensive photographic documentation was obtained at several of the surveyed sites. Most records, including photographs, were registered on the observation.org platform (<https://observation.org/>) and were subsequently integrated into GBIF (Global Biodiversity Information Facility; <https://www.gbif.org/>). For each taxon, reference is made to the corresponding herbarium material, and one or more links are provided to photographic observations. Not every record is accompanied by photographs; a complete overview of all observations, including those without images, is available as an Excel file (Table S1) on request.

To assess whether a species was previously known from Portugal or from the surveyed regions, a wide range of relevant sources was consulted, including Domingues de Almeida (1999, 2018, 2024), Domingues de Almeida & Freitas (2006, 2012), the complete Flora Iberica (numerous authors, volumes published between 1986 and 2021), as well as online platforms such as iNaturalist (<https://www.inaturalist.org/>), GBIF, observation.org and Flora-On (<https://flora-on.pt/>).

To provide an indication of the degree of naturalisation for the taxa reported here, we assign each species a provisional status based solely on field observations made during the present survey and on recent incidental records available from online biodiversity platforms. Because long-term monitoring of population dynamics was beyond the scope of this study, these assessments should be regarded as informed, yet inevitably tentative, interpretations of the current situation at each site. For this reason, we deliberately refrain from applying the formal invasion-status frameworks proposed by, for instance, Pyšek et al. (2004) or Blackburn et al. (2011), whose terminology requires evidence that can only be obtained through repeated observations over extended periods. Instead, the following provisional status categories were used:

Casual: species observed occasionally, without clear signs of reproduction or persistence.

Naturalising: species showing evidence of reproduction, but with populations probably not yet fully established.

Naturalised: species that appear to have formed

self-sustaining populations.

Where appropriate, provisional recommendations (e.g., further surveys, monitoring or control measures) were also recorded alongside the status category. These recommendations are intended as pragmatic suggestions rather than formal management prescriptions.

Nomenclature follows Plants of the World Online (Royal Botanic Gardens, Kew 2025).

Results

The results are presented in two sections. The first section discusses taxa not previously recorded from Portugal, arranged alphabetically (see Table 1, p. 16). The second section focuses on taxa already known from Portugal but newly recorded in Estremadura and/or Ribatejo, mostly naturalised or invasive species that are currently expanding their range.

A total of 25 taxa were recorded for the first time in Portugal. Twelve species are regarded as (probably) naturalised, five as naturalising, and eight as (probably) casual. In addition, ten taxa are new records for Estremadura and eight for Ribatejo.

Species new to Portugal

***Amaranthus blitum* L. subsp. *pseudogracilis* (Thell.) N.Bayón** (Amaranthaceae: Amaranthoideae)

Herbarium: Douro Litoral: Maia (Cidade da Maia), 41.232800, -8.620800, area with ruderal vegetation, scattered individuals, 04.08.2025, P. Alves (PO-V73321).

Further data: <https://observation.org/observation/377689514/>; <https://observation.org/observation/377689678/>.

Degree of naturalisation: naturalised.

This pantropical taxon has been introduced into warm-temperate regions of North America and Europe, where it occurs as a casual alien in irrigated gardens, vegetable plots and moist ruderal habitats (Bayón 2015; Raus 2022). In Portugal, it has recently been observed in fertile urban soils, suggesting a wider distribution than previously recognised. The subspecies is distinguished by its ascending, vigorous stems; leaves measuring 2–4 (–6) cm; and long, slender, flexuous terminal inflorescences that closely resemble those of *Amaranthus viridis* L. The taxonomic circumscription of *A. blitum* subsp.

pseudogracilis has long been debated. While some authors have treated it as a variety under *A. blitum* subsp. *emarginatus* (Salzm. ex Uline & Bray) Carretero, Muñoz Garm. & Pedrol (Costea et al. 2001; Walter & Dobeš 2003), more recent studies advocate its recognition as a distinct entity. These treatments consider *A. blitum* and *A. emarginatus* Salzm. ex Uline & Bray to represent separate species, differing markedly in their biogeographical origins – Mediterranean Europe and North Africa versus tropical America, respectively (Iamónico et al. 2024).

***Amaranthus palmeri* S.Watson** (Amaranthaceae: Amaranthoideae) (Figure 2)

Herbarium: Ribatejo: Vila Franca de Xira (Sobralinho), Estrada da Macol near EN-10 road, roadside near grain mills, male individual, 01.09.2024, F. Verloove 15205 (BR0000027059043V); Ribatejo: Vila Franca de Xira (Sobralinho), EN-10 road, roadside, scattered individuals along the road (in the vicinity of grain mills), female individual, 10.09.2024, F. Verloove 15263 (BR0000027058718V, dupl. VAL).

Further data: <https://observation.org/observation/326627738/>; <https://observation.org/observation/327708994/>.

Degree of naturalisation: naturalising (?).

This North American dioecious weed has emerged as one of the most problematic agricultural species in recent decades, both within its native range and in introduced areas (Borgato et al. 2025). In the Iberian Peninsula, it is a relatively recent arrival, with naturalised populations first recorded in Spain around Lleida since 2007 (Verloove & Sánchez-Gullón 2008; Recasens & Conesa 2011). It has rapidly become a significant agronomic concern (Torra et al. 2020). In Europe, the species is primarily introduced as a contaminant in animal feed, including soybean meal (Verloove 2026a).

During fieldwork in September 2024, both male and female individuals were recorded near the Cargill grain transshipment facility in Sobralinho. The co-occurrence of both sexes suggests a high likelihood of permanent establishment in the Tagus River valley, where extensive agricultural fields provide suitable habitat. Concurrently, *Amaranthus tuberculatus* (Moq.) J.D.Sauer, another dioecious North American amaranth, has also established unnoticed along exposed banks of the Tagus River (Verloove 2026b). Both species are listed on the European and Mediterranean Plant Protection



Figure 2. *Amaranthus palmeri* S.Watson (Amaranthaceae: Amaranthoideae).

Organization (EPPO) Alert List and recommended for quarantine regulation within the European Union (EPPO 2024).

***Bassia indica* (Wight) A.J.Scott** (Amaranthaceae: Camphorosmoideae) (Figure 3)

Herbarium: Estremadura: Setúbal (Sado), port area, EN-10-4 road, dry roadside, a single individual, 08.09.2024, F. Verloove 15244 (BR0000027058831V).

Further data: <https://observation.org/observation/327498904/>.

Degree of naturalisation: casual.

Native to southern India, *Bassia indica* occurs across tropical and subtropical Asia and is closely related to, yet genetically distinct from, the widespread *B. scoparia* (L.) Voss. The species is distinguished by its more rounded, tumbleweed-like habit, densely hairy stems and leaves, and pubescent perianth segments, in contrast to the mostly glabrous perianth of *B. scoparia*.

The species spreads rapidly in North Africa and was recently recorded for the first time on the European



Figure 3. *Bassia indica* (Wight) A.J.Scott (Amaranthaceae: Camphorosmoideae).

continent in Spain (Sukhorukov et al. 2025). Considering its current distribution in Spain, the species has either been overlooked for some time (due to confusion with *B. scoparia*) or is a recently introduced xenophyte that is spreading very rapidly.

In September 2024 a single individual was observed on a dry sandy roadside in the Setúbal port area. Despite suitable conditions, no additional specimens were found nearby, suggesting that the species is presently an ephemeral alien in Portugal.

***Cardiospermum grandiflorum* Sw.** (Sapindaceae)
(Figure 4)

Herbarium: Ribatejo: Vila Franca de Xira (Alverca do Ribatejo), near EN-10 road, fence and dried-out stream in industrial area (container terminal), linear population of c. 100 m, both in the fence and in the dried-out stream (dominant), 10.09.2024, F. Verloove 15252 (BR0000027058787V).

Further data: <https://observation.org/observation/327708925/>.

Degree of naturalisation: naturalising (?).



Figure 4. *Cardiospermum grandiflorum* Sw. (Sapindaceae).

Cardiospermum grandiflorum is likely native to tropical and subtropical regions of Africa and America. Historically cultivated for ornamental or medicinal purposes, it has become a highly invasive species, often classified as a ‘transformer weed’ due to its capacity to overgrow native vegetation (Gildenhuys et al. 2013).

In Portugal the species was previously unrecorded on the mainland but has recently become invasive in Madeira (Pupo-Correia et al. 2020). In the European Union it is included in the EPPO Alert List for quarantine regulation. In the Mediterranean there are so far only a few records, namely from southern France, Italy (including Sicily) and Malta (EPPO 2017). More recently, the species was also recorded for the first time from Mallorca and Menorca in the Balearic Islands (Spain) (Cerrato et al. 2023; Fraga Arguinbau et al. 2025), and from Barcelona and Cádiz in mainland Spain (Gómez-Bellver et al. 2016; Fernández de Bobadilla & Sánchez-García 2025).

Morphologically, *Cardiospermum grandiflorum* closely resembles *C. halicacabum* L., but can be distinguished by larger flowers (> 6 mm), two nectariferous lobes (vs. four), and seeds with a triangular aril (Panizza et al. 2024). In general, it is also a larger, more hairy plant than *C. halicacabum*. However, identification requires care, as *C. corindum* L. – another widespread invader – also closely resembles *C. halicacabum* (Gildenhuys et al., 2013, Chalise et al., 2024). Because of this similarity, *C. grandiflorum* may also be confused with *C. corindum*, and the latter species may have been overlooked in Europe.

In September 2024 a linear population c. 100 m long was observed near the container terminal in Alverca do Ribatejo, occurring both along the fence and in a dried stream, likely facilitated by port activities.

***Casuarina cunninghamiana* Miq.** (Casuarinaceae)

Herbarium: Estremadura: Setúbal, port area, Avenida Baía de Setúbal, alongside railway tracks, roadside, a few self-sown individuals (planted nearby), 08.09.2024, F. Verloove 15249 (BR0000027058800V).

Further data: <https://observation.org/observation/327499028/>.

Degree of naturalisation: casual.

Native to New Guinea and northern/eastern Australia, *Casuarina cunninghamiana* is widely planted in warm-temperate and subtropical regions for ornamental purposes, windbreaks, erosion control and fuelwood (Brewbaker 2004). The species produces numerous samaras that are easily dispersed by wind, facilitating escape from cultivation. Casuarinas are increasingly naturalising in coastal areas of Mediterranean/subtropical climates (Wheeler et al. 2011). Experiences in Florida and the Mascarene Islands highlight that casuarinas have the potential to transform ecosystems, with significant control costs (Potgieter et al. 2014).

Although casuarina trees have been widely planted across the Iberian Peninsula, their occurrence in the wild remains poorly documented, particularly regarding which species are escaping cultivation, the habitats they occupy and their degree of naturalisation. The genus was treated in detail for the Iberian Peninsula in *Flora Iberica* by Rocha Afonso (1990), but all species were listed solely as cultivated, with no reference to escaped individuals, suggesting that naturalisation of casuarinas is a relatively recent phenomenon. Since then, several species have been recorded as escapees, primarily in coastal areas, showing a clear tendency toward naturalisation, especially in the Levante region (Boix Pozuelo 2017; Gómez-Bellver 2023). In Portugal, only the recent escape of the related species *C. equisetifolia* L. had been documented previously (Domingues de Almeida & Freitas 2012).

In September 2024 scattered self-sown saplings were observed along a railway verge in the Setúbal port area. Similar observations were made in Vila Franca de Xira (Alverca do Ribatejo), representing the first records for Ribatejo and suggesting an emerging pattern of naturalisation. *C. cunninghamiana* is currently the most widespread casuarina in southern Spanish regions adjacent to Portugal, highlighting the potential for further expansion (Sánchez-Gullón & Peña-Ramos 2022). It seems that casuarinas will increasingly escape in the Iberian Peninsula in the near future, a trend that will need to be monitored.

***Chloris gayana* Kunth** (Poaceae: Chloridoideae)

Herbarium: Algarve: Faro (S. Pedro), 37.023455, -7.944856, near riverside park road, scattered individuals, 21.08.2018, P. Alves (PO-V69122).

Degree of naturalisation: naturalised.

This perennial, tall grass forms compact clumps of erect culms and also produces stoloniferous shoots (Clayton et al. 2013). It typically inhabits disturbed environments such as roadsides, railway margins, parks, gardens, cultivated lands, grasslands, open woodlands, and riparian zones across tropical, subtropical, semi-arid and warm-temperate regions (Mahklouf 2020). Although native to sub-Saharan Africa, its precise area of origin remains uncertain (Maybery-Reupert et al. 2023).

Beyond Africa, the species has become naturalised in many regions worldwide, including the United States of America (U.S.A.), Australia, Aotearoa / New Zealand, Hawai'i and several Pacific islands (Mahklouf 2020). In Spain it was initially introduced for slope stabilisation along highways, from where it subsequently spread into disturbed habitats, becoming locally abundant in parts of the Mediterranean coast (Sanz-Elorza et al. 2006). It is likewise naturalised in the Madeira Islands (Verloove et al. 2024) and has recently been reported as escaped from cultivation in the Algarve, although no herbarium voucher has yet been cited (Domingues de Almeida 2024).

***Crepis bursifolia* L.** (Asteraceae)

Herbarium: Estremadura: Lisboa (S. Pedro), Almeida Brandão Street, urban setting, 38.711692, -9.156469, P. Alves (PO-V72113).

Degree of naturalisation: naturalised.

Crepis bursifolia originally had a restricted native distribution, confined to Sicily and parts of continental Italy (Pignatti 1982). Since the 20th century, however, it has expanded northward and is now established in many areas of France (Duvigneaud & Lambinon 1976; Tison & de Foucault 2014).

Crepis bursifolia is a morphologically distinctive species: the combination of runcinate rosette leaves, the absence of cauline leaves, and achenes with very long beaks (up to twice the length of the achene body) are characteristic (Pignatti 1982). The species is perennial and often exhibits weedy behaviour, particularly outside Europe, for instance in California, U.S.A. (Bogler 2020). From Portugal, it was recently reported as an escape

from cultivation in Almada, although no herbarium voucher was cited (Domingues de Almeida 2024).

***Cyperus papyrus* L.** (Cyperaceae) (Figure 5)

Herbarium: Ribatejo: Salvaterra de Magos (Muge), small stream in the valley of Ribeira de Muge, edge of shallow depression, a massive stand, probably a relic of former cultivation (no sexual reproduction observed, but clonally expanding), 14.09.2024, F. Verloove 15259 (BR0000027058756V).

Further data: <https://observation.org/observation/328031101/>.

Degree of naturalisation: naturalised.

This African species is widely cultivated as an ornamental in tropical and subtropical regions. Outside its native range, it can pose a serious threat to native biodiversity and impede water flow due to its vigorous growth (Bryson & Carter 2008). Until recently, *Cyperus papyrus* was rarely or never observed outside cultivation in southern Europe, although Verloove (2014) briefly mentioned it in a European and Macaronesian conspectus of the genus. Records from Spain, e.g., near Valencia (Peña et al. 2003), were considered relics of cultivation (Castroviejo 2006). However, more recent observations document clearly established populations in Spain, predominantly in coastal areas (Carballeira & Souto 2018).

In September 2024 a large clonal stand was found in Muge, in a tributary valley of the Tagus River. Although the initial planting reason is unclear, the population appears well established and likely reproduces clonally; sexual reproduction has not been observed.



Figure 5. *Cyperus papyrus* L. (Cyperaceae).

***Elatine ambigua* Wight** (Elatinaceae)

Herbarium: Ribatejo: Coruche (Biscainho), Rio Sorraia, sandy riverbank, near rice fields, c. 10 individuals, 04.09.2024, F. Verloove 15224 (BR0000027058985V).

Further data: <https://observation.org/observation/327019522/>.

Degree of naturalisation: (probably) naturalised, overlooked.

Native to Southeast Asia, *Elatine ambigua* is widely used in aquaria and has dispersed globally, including North America, Australia and parts of Europe (Razifard et al. 2016). It is also a common weed in rice fields (Barrett & Seaman 1980).

Morphologically, *Elatine ambigua* closely resembles the European native *E. triandra* and is considered a cryptic taxon. Emerged plants can be distinguished by their distinct, recurved flower stalks, whereas *E. triandra* has sessile flowers (Rosman et al. 2016). However, genetic differentiation between the two species appears limited (Sramkó et al. 2016), although other molecular studies support their treatment as distinct species (Rosman et al. 2016).

As a consequence, some herbarium material previously attributed to *E. triandra* in Iberian rice fields may in fact represent *E. ambigua*. In this context, the presence of *E. ambigua* was detected for the first time in Portuguese rice-growing areas in September 2024.

***Eleocharis obtusa* (Willd.) Schult.** (Cyperaceae)

Herbarium: Ribatejo: Benavente (Samora Correia), Albufeira de Vale do Cabrão, exposed pond margin, only a single individual observed, but probably present elsewhere in the area, 04.09.2024, F. Verloove 15225 (BR0000027058961V).

Further data: <https://observation.org/observation/327019677/>.

Degree of naturalisation: (possibly) naturalised, probably overlooked.

This American species is in the process of naturalising in parts of Europe, typically occupying valuable habitats such as exposed fen margins and heathland ponds. It is often associated with former military sites, presumably introduced via military equipment. *E. obtusa* is documented as naturalised in Italy (Koch 1952), Belgium (Verloove 2015), France (Larregle et al. 2016) and the Netherlands (Simons et al. 2020).

In September 2024 it was observed under similar

circumstances in Samora Correia, near the UAGME military base, suggesting potential spread from inaccessible areas. Additionally, a 2019 observation near Muge confirms its presence in the region (iNaturalist: <https://www.inaturalist.org/observations/31180236>). Previous Iberian records of *E. obtusa* were misidentified as *E. flavescens* (Jiménez-Mejías & Luceño 2007).

***Eragrostis mexicana* (Hornem.) Link** (Poaceae: Chloridoideae) (Figure 6)

Herbarium: Estremadura: Torres Vedras (São Pedro da Cadeira), valley of Rio Sizandro, Eco-Caminho north of EN-9 road, agricultural fields, mainly maize, sweet potatoes and pumpkins, a very common weed in this area, with thousands of individuals, 09.09.2024, F. Verloove 15264 (BR0000027058701V, dupl. VAL).

Further data: <https://observation.org/observation/327630513/>; <https://observation.org/observation/327630500/>.

Degree of naturalisation: naturalised.

Taxa within the *Eragrostis mexicana* complex are treated variably, depending on geographic region and taxonomic concept. In the Americas, the complex is usually treated broadly as a single species with two subspecies, *E. mexicana* subsp. *mexicana* and subsp. *virescens* (J.Presl) S.D.Koch & Sánchez Vega (Koch & Sánchez Vega 1985; Peterson 2003). In Europe, however, morphological variation appears reduced and taxa are often treated more narrowly (e.g., Tison & de Foucault 2014; Sánchez-Gullón et al. 2021). In the most recent revision of *Eragrostis* for the Iberian Peninsula, only *E. virescens* J.Presl is recognised from this complex (Sánchez-Gullón et al. 2021), and this taxon is by far the most frequently encountered member in both Spain and Portugal, a pattern confirmed by our recent field observations.

Previous records of *E. mexicana* s.l. from Portugal (Verloove & Sánchez-Gullón 2012) referred to populations showing intermediate characters between *E. mexicana* sensu stricto and *E. virescens*, thereby supporting a broad species concept as adopted by Peterson (2003).

During recent fieldwork, however, a population discovered in São Pedro da Cadeira clearly deviates from these earlier Portuguese records. It corresponds morphologically to plants traditionally referred to as *E. neomexicana* Vasey ex L.H.Dewey, a taxon previously reported from the Iberian Peninsula (Portal 2002) but not accepted in *Flora Iberica*. These plants differ from



Figure 6. *Eragrostis mexicana* (Hornem.) Link (Poaceae: Chloridoideae).

E. virescens by their larger, darker spikelets and share a tall habit with conspicuously glandular nodes. The latter character distinguishes them from *E. mexicana* sensu stricto, which is typically smaller and has eglandular nodes.

Although *E. neomexicana* is here not formally recognised at species rank, the São Pedro da Cadeira population represents a morphologically distinct entity within *E. mexicana* s.l., previously unrecorded from Portugal. In addition, this finding highlights the underestimated morphological diversity of the *E. mexicana* complex in southwestern Europe.

***Eragrostis pectinacea* (Michx.) Nees** (Poaceae: Chloridoideae)

Herbarium: Ribatejo: Azambuja, Rua Dom Rolim and EN-3 road, roadside weed, border of sidewalk, a small population with a few dozen individuals, 06.09.2024, F. Verloove 15236 (BR0000027058893V).

Further data: <https://observation.org/observation/327230890/>.

Degree of naturalisation: (possibly) naturalised.

Native to the Americas, *Eragrostis pectinacea* has expanded across Europe, often on exposed riverbanks, where it co-occurs with *E. pilosa* (L.) P.Beauv., a native species it closely resembles (Koch 1974). It is distinguished by longer lower glumes (at least half the length of the adjacent lemma) and more open, divergent inflorescence axes.

Previously recorded only from Spain (Sánchez-Gullón et al. 2021), a small population was discovered

in Azambuja in September 2024 near railway infrastructure. Surveys should target suitable habitats, including dry riverbeds, sandy road verges, and railway embankments, to assess the broader distribution of *Eragrostis pectinacea* in the region.

***Guizotia abyssinica* (L.f.) Cass.**

Further data: <https://observation.org/observation/327708879/>.

Degree of naturalisation: casual.

This species is predominantly distributed in East Africa, including Eritrea, Ethiopia and Kenya. *Guizotia abyssinica* is widely cultivated for its oil-rich seeds, commonly included in commercial bird-seed mixtures under the name ‘niger’ (Hanson 2019). In urban environments, it frequently establishes where birds are fed or where bird-seed litter accumulates, and it can also be found along rivers, likely introduced through sewer discharges. While *G. abyssinica* is well dispersed throughout Spain, it had not been formally reported from Portugal (Alonso & Crespo 2019b). Nonetheless, its presence is almost certainly overlooked, as evidenced by multiple iNaturalist observations in Portugal beginning in 2020.

During September 2024 several non-flowering individuals of *G. abyssinica* were recorded in São João da Talha, Estremadura, in a lawn beneath a tree, where pigeons are fed. *G. schimperi* was observed at the same site. Their co-occurrence in anthropogenic habitats highlights the role of human activity – especially bird feeding – as a vector for the introduction and local dispersal of non-native plants.

***Guizotia schimperi* Sch.Bip.** (Asteraceae) (Figure 7)

Syn.: *Guizotia scabra* subsp. *schimperi* (Sch.Bip.)

J.Baagøe

Herbarium: Estremadura: Loures (São João da Talha), Rua Heróis da Grande Guerra, disturbed lawn, c. 10 individuals, very glandular and sticky, 10.09.2024, F. Verloove 15258 (BR0000027058763V).

Further data: <https://observation.org/observation/327708883/>.

Degree of naturalisation: casual.

Guizotia schimperi is much rarer and has only recently been observed in Europe. Confirmed occurrences include the British Isles (Hanson 2019), Belgium, Germany and the Netherlands (F. Verloove, pers. obs.; J. Müller,



Figure 7. *Guizotia schimperi* Sch.Bip. (Asteraceae).

Bremen, pers. comm.). A record from Austria in 2019 is also documented on iNaturalist. Morphologically, *G. schimperi* is very sticky due to glandular hairs, unlike what its name might suggest; this character enables it to be distinguished from *G. abyssinica*, even when flowers or fruits are absent. It is a troublesome weed also included in niger and other crops.

***Hedera algeriensis* Rantonnet ex C.Morren** (Araliaceae)

Herbarium: Douro Litoral: Maia (Parque urbano do Novo Rumo), 41.228929, -8.624428, shaded area, 04.02.2020, P. Alves (PO-V69112).

Further data: <https://observation.org/observation/377689900/>.

Degree of naturalisation: naturalised.

Hedera algeriensis, commonly known as Algerian ivy, has been introduced into Portugal, where it has become a widely cultivated ornamental species. Several cultivars, including ‘Montgomery’ and ‘Gloire de Marengo’, are particularly popular for their variegated foliage and vigorous growth (McAllister 1988). Traditionally, ivy species have been propagated vegetatively through cuttings (Metcalf 2005).

Recent observations, however, indicate that *H. algeriensis* is now producing viable seeds in Portugal, a development likely influenced by shifting climatic conditions, including changes in temperature and precipitation regimes (Dullinger et al. 2017). This phenomenon may have important implications for its dispersal dynamics and ecological impact. Evidence from regions with similar Mediterranean climates,

such as California, shows that *H. algeriensis* is among the ivy taxa prevalent in invasive populations, where it forms dense mats, climbs trees, and suppresses native vegetation (Clarke et al. 2006). These parallels underscore the need for further research on its potential for naturalisation and invasiveness in Mediterranean habitats.

Both *Hedera algeriensis* and *H. maroccana* McAll., recently reported by Talhinhos et al. (2025), have been recorded not only in cultivated settings such as gardens and parks, but also in vacant urban lots and unmanaged green spaces. These observations highlight the role of human-modified environments as reservoirs of exotic biodiversity and as potential stepping-stones facilitating species dispersal.

***Hydrocotyle bowlesioides* Mathias & Constance**
(Araliaceae) (Figure 8)

Herbarium: Douro Litoral: Porto (Jardim da Moreda, junto à Rua Santos Pousada), 41.150978, -8.600282, shaded and irrigated lawn, 23.03.2025, P. Alves (PO-V73151).

Further data: <https://observation.org/observation/377703765/>;
<https://observation.org/observation/377703654/>.

Degree of naturalisation: casual.

Specimens of *Hydrocotyle bowlesioides* were recently detected in several lawns across the city of Porto (Jardim do Campo 24 de Agosto, Jardim de São Lázaro, Jardim da Moreda), as part of an ongoing effort to catalogue the municipality's biodiversity. The species is native to the Central Cordillera and the Cordillera de Talamanca in Costa Rica, extending into western Panama (Ecroyd 2007). Herbarium records also exist from Honduras, Paraguay, Brazil and Argentina, although these populations are likely naturalised rather than part of its native range (Ecroyd 2007). Outside its native region, *H. bowlesioides* is naturalised in Georgia (U.S.A.) and on several Hawaiian islands (Starr et al. 2003; Wagner et al. 1999), where it occurs in moist lawns and disturbed wet forests. In Aotearoa / New Zealand, it was first reported as naturalised by Ecroyd (2007). Within Europe, the species is not naturalised, but it has been documented in the Canary Islands (Macaronesia), where it colonises ornamental lawns dominated by *Cenchrus clandestinus* (Hochst. ex Chiov.) Morrone and *Stenotaphrum secundatum* (Walter) Kuntze (Siverio et al. 2013).

The occurrence of *H. bowlesioides* in Porto likely



Figure 8. *Hydrocotyle bowlesioides* Mathias & Constance (Araliaceae).

results from accidental introduction via horticultural practices. The species forms creeping mats with rooting nodes and hairy stems, preferring moist soils in sunny or partially shaded lawns. Morphologically, *H. bowlesioides* differs from *H. sibthorpioides* in leaf shape and size: it has 5-lobed leaves measuring 15–30 mm wide, pubescent on both surfaces, whereas *H. sibthorpioides* bears 7-lobed leaves, 5–13 mm wide, that are glabrous.

Although here still considered casual, the species may already be in the early stages of naturalisation, as evidenced by multiple observations across Porto, including an iNaturalist record from 2024 (<https://www.inaturalist.org/observations/239415501>).

***Hydrocotyle sibthorpioides* Lam.** (Araliaceae)
(Figure 9)

Herbarium: Douro Litoral: Maia (urbanização dos Maninhos), 41.231094, -8.611578, shaded and moist lawn, 03.11.2019, P. Alves (PO-V73150).

Further data: <https://observation.org/observation/379289168/>; <https://observation.org/observation/379288795/>.

Degree of naturalisation: naturalised.

Hydrocotyle sibthorpioides has been observed in public irrigated lawns in Maia since at least 2019. Owing to its low-growing and inconspicuous habit, the species is



Figure 9. *Hydrocotyle sibthorpioides* Lam. (Araliaceae).

likely more widespread across lawns in Douro Litoral than currently documented. It may have been intentionally planted as a ground cover or introduced accidentally via the aquarium trade, as it is occasionally used in aquatic plant arrangements (Cook 1996). *H. sibthorpioides* is native to subtropical Asia and possibly parts of Africa (Hutchinson & Dalziel 1954; Cook 1996). Beyond its native range, it has now become established in multiple regions of Europe, including Belgium, the British Isles, France and Italy (Verloove & Heyneman 2021).

Interestingly, recent molecular studies suggest that the taxon may encompass cryptic diversity or that its circumscription requires further study (Tippery et al. 2026).

***Ipomoea hederacea* Jacq.** (Convolvulaceae)

Herbarium: Estremadura: Setúbal, port area, Avenida Baía de Setúbal, roadside, a single individual, 08.09.2024, F. Verloove 15247 (BR0000027058824V).

Further data: <https://observation.org/observation/327499001/>.

Degree of naturalisation: casual.

This American weed is a fairly common adventive in Europe, often introduced as a contaminant in cereals. In the Iberian Peninsula, it has previously been recorded only from Cantabria and Castellón in Spain (Silvestre 2012).

Ipomoea hederacea is here reported for the first time from Portugal. A single individual was observed in September 2024 on a roadside in the Setúbal port area, growing alongside other grain-associated alien species such as *Sida spinosa* L. (see page 14). This occurrence

is likely ephemeral. Nevertheless, the species has the potential to become a troublesome weed in crops such as soybean, cotton and maize (e.g., Sohrabi et al. 2025), warranting some vigilance.

***Megathyrsus maximus* (Jacq.) B.K.Simon & S.W.L.Jacobs** (Poaceae: Panicoideae) (Figure 10)

Syn.: *Urochloa maxima* (Jacq.) R.D.Webster, *Panicum maximum* Jacq.

Herbarium: Estremadura: Loures (São João da Talha), EN-10 road near Quinta da Maçaroca, roadside, under crash barrier, 12.09.2024, F. Verloove 15262 (BR0000027058725V, dupl. VAL).

Further data: <https://observation.org/observation/327837330/>.

Degree of naturalisation: naturalised.

This species, primarily native to Africa, has spread widely across the tropics and subtropics as a forage grass or a weed. It is consistently ranked among the most ecologically damaging invasive plants globally, while also being valued as pasture (Rhodes et al. 2021, 2022). In the Iberian Peninsula, *Megathyrsus maximus* is a recent introduction. It was sown in the 1980s along the A7 motorway verges in eastern Spain, where it subsequently naturalised (Verloove 2005a, 2006; Crespo et al. 2013). It is now recorded from five Spanish provinces on the east coast (Alicante, Barcelona, Castellón, Tarragona, Valencia) and is considered potentially invasive (Andreu & Vilà 2009; Güemes 2021). Recent reports indicate its expansion elsewhere in Southern Europe (Banfi et al. 2022).

In September 2024 a large, linear population was observed along the EN-10 road parallel to the Tagus in São João da Talha. The plants grew in dense stands over several hundred metres beneath the crash barrier and appeared well established. Due to its small spikelets in lax inflorescences, the species may be easily overlooked and should be sought elsewhere in the area.

Although originally described in *Panicum* L., *Megathyrsus maximus* is distinct in its fertile floret lemma, which is transversely wrinkled. Its separation from *Urochloa* P.Beauv. is more complex, both morphologically and genetically. Following Simon & Jacobs (2003), the genus *Megathyrsus* is recognised as separate, also encompassing *M. infestus* (Andersson) B.K.Simon & S.W.L.Jacobs and two recently added African species (Delfini et al. 2023). *M. maximus* exhibits notable variability, with both hairy (var. *pubiglumis*



Figure 10. *Megathyrsus maximus* (Jacq.) B.K.Simon & S.W.L.Jacobs (Poaceae: Panicoideae).

(K.Schum.) B.K.Simon & S.W.L.Jacobs) and glabrous spikelets, both also occurring in Spain, but likely of limited taxonomic significance (Verloove 2006; Banfi et al. 2022).

***Nassella tenuissima* (Trin.) Barkworth** (Poaceae: Pooideae)

Syn.: *Stipa tenuissima* Trin.

Herbarium: Estremadura: Lisbon (Beato), port area, Rua da Cintura do Porto de Lisboa, roadside, a single individual (not seen planted nearby), 12.09.2024, F. Verloove 15251 (BR0000027058794V).

Further data: <https://observation.org/observation/327837332/>.

Degree of naturalisation: casual.

Native to the southwestern U.S.A., northern Mexico, and, disjunctly, parts of Argentina, this species is a popular ornamental grass. It readily escapes cultivation into disturbed sites, also in parts of southern Europe (Verloove 2005b), and in some regions has become highly invasive, e.g., in high-altitude grasslands in South Africa (Mapaura et al. 2020). Climatic modelling predicts that up to 100 million hectares could be suitable for establishment in Australia (McLaren et al. 2004; Humphries & Florentine 2021). Within the EPPO region, the species was initially placed on the Alert List, later moved to the Observation List as immediate risk was deemed low (EPPO 2012). In the Iberian Peninsula, *Nassella tenuissima* has been recorded sporadically in Spain, without evidence of establishment (Aedo 2020). It is reported here for the first time from Portugal, as an ephemeral occurrence.

***Physalis angulata* L.** (Solanaceae) (Figures 11 and 12)

Herbarium: Ribatejo: Almeirim, Rio Tejo near sand extraction company, sandy bank of the river, a single individual (observed) but also present elsewhere on sandy banks of the Rio Tejo (e.g. Pombalinho, Vale de Cavalos), 03.09.2024, F. Verloove 15234 (BR0000027058916V).

Further data: <https://observation.org/observation/326911523/>; <https://observation.org/observation/327775609/>; <https://observation.org/observation/327775604/>.

Degree of naturalisation: (probably) naturalised.

Originating from tropical and subtropical America, *Physalis angulata* is widely naturalised in suitable climates globally. It is considered invasive in some agricultural systems (Ozaslan et al. 2017; Balah & Balah 2022). Previously unreported from the Iberian Peninsula by Sanz Elorza & Sobrino Vesperinas (2012), it was first documented in Spain relatively recently in maize fields of Girona (Aymerich Boixader 2020).



Figure 11. *Physalis angulata* L. (Solanaceae).



Figure 12. *Physalis angulata* L. (Solanaceae).



Figure 13. *Physalis ixocarpa* (Solanaceae).



Figure 14. *Physalis ixocarpa* (Solanaceae).

In September 2024 the species was recorded repeatedly along sandy banks of the Tagus River, across approximately 20 km. Only a few individuals were observed each time, but the species appears locally established on riverbanks, though not yet in adjacent agricultural fields. Given its weediness in crops, its presence in nearby fields is plausible, similar to *P. ixocarpa* Brot. ex Hornem. It is possible that *P. angulata* was previously overlooked due to similarity to *P. ixocarpa*, a species already known from Ribatejo (Sanz Elorza & Sobrino Vesperinas 2012). Confirmed observations of *P. ixocarpa* include maize fields in Pombalinho (<https://observation.org/observation/327775645>). *P. angulata* is distinguished by a distinctly angular fruiting calyx and corolla that is unspotted or only faintly spotted in the throat, whereas in *P. ixocarpa* the calyx is terete and the corolla is darkly spotted (Figures 13 and 14).

As with several other American species reported along the Tagus (e.g., *Amaranthus palmeri*, *A. tuberculatus*, *Persicaria pensylvanica* (L.) M.Gómez), *P. angulata* may have been introduced as a contaminant in American cereals and oilseeds.

***Sida spinosa* L. (Malvaceae)**

Herbarium: Estremadura: Setúbal (Sado), port area, Avenida Baía de Setúbal, roadside, a single individual, 08.09.2024, F. Verloove 15248 (BR0000027058817V).

Further data: <https://observation.org/observation/327499010/>; <https://observation.org/observation/327708993/>.

Degree of naturalisation: (probably) casual.

This species naturally occurs throughout the tropics and subtropics and is emerging as a weed in the Mediterranean, e.g., in cotton fields in Greece (Kati et al. 2023). In the Iberian Peninsula, *Sida spinosa* was previously known only from a few provinces in Cantabria and Catalonia, Spain (Paiva & Nogueira 2005).

During our September 2024 fieldwork, the species was recorded in Estremadura (Setúbal) and Ribatejo (Vila Franca de Xira), though only as solitary individuals. Earlier, in 2022, it was observed in Pegões, also in Estremadura, by Daniel Botelho (iNaturalist: <https://www.inaturalist.org/observations/129334883>). Although present at several locations, its true naturalisation remains uncertain; it should be looked for in maize fields in the Tagus valley.

Sida spinosa can be distinguished from the longer-established *S. rhombifolia* L. (see below for further

discussion) by several traits: *S. rhombifolia* is perennial (often shrubby), with cuneate leaf bases, long-stalked flowers and fruits, and fruits of 8–14 mericarps; *S. spinosa*, in contrast, is usually annual, has truncate-cordate leaf bases, and fruits of only 5 mericarps.

***Solanum bonariense* L.** (Solanaceae) (Figure 15)

Herbarium: Ribatejo: Vila Franca de Xira (Alhandra), EN-10 road, rough ground, about five individuals (cultivated nearby), 01.09.2024, F. Verloove 15200 (BR0000027059074V).

Further data: <https://observation.org/observation/326627805/>; <https://observation.org/observation/326746839/>; <https://observation.org/observation/327230823/>; <https://observation.org/observation/327630464/>.

Degree of naturalisation: naturalised.

Native from southern Brazil to northern Argentina, this species is often introduced as an ornamental in subtropical regions. It spreads rapidly via strong rhizomes and is frequently discarded with garden waste, where it establishes wild populations. *Solanum bonariense* is considered potentially invasive in Spain, especially in the Canary Islands (Gassó et al. 2012), and as an emerging invader in Algeria (Mansouri et al. 2025). In the Iberian Peninsula, it was previously reported only from Spain (Sobrino Vesperinas & Sanz Elorza 2012).

Our recent fieldwork in Portugal confirmed numerous well-established populations. This suggests that the species has either been overlooked or ignored until now; iNaturalist records show at least 60 observations in Portugal, often in clearly wild populations.



Figure 15. *Solanum bonariense* L. (Solanaceae).

***Vitis riparia* Michx.** (Vitaceae) (Figure 16)

Herbarium: Beira Litoral: Ois da Ribeira, river Águeda, 40.580597, –8.495579, riverbank, 30.07.2016, P. Alves (PO-V62365).

Further data: <https://observation.org/observation/377691583/>; <https://observation.org/observation/377691325/>.

Degree of naturalisation: naturalised.

This North American vine is reported here for the first time from Portugal, although it may have been overlooked previously. Artificial hybrids derived from this taxon have already been recorded in the country (Verloove & Alves 2016).

Vitis riparia can be distinguished primarily by the indumentum of its vegetative organs and the size of its leaf blades (see Ardenghi et al. 2014 for details). It is widely employed as a rootstock in viticulture due to its resistance to phylloxera and other soil-borne pests, which has facilitated its introduction and naturalisation in several regions beyond its native range (Galet 1988; This et al. 2006). In Portugal, the species is fully established



Figure 16. *Vitis riparia* Michx. (Vitaceae).

in relatively artificialised hydrographic basins, such as those of the Vouga and Leça Rivers. It has also been recorded sporadically along rivers with a high degree of ecological integrity, including the Rabaçal River within Montesinho Natural Park. This distribution likely reflects the high zoochorous dispersal potential of the genus, whereby fruiting individuals enable seeds to be transported over long distances by animals, facilitating colonisation even in remote or well-preserved habitats.

***Vitis* × *ruggerii* Ardenghi, Galasso, Banfi & Lastrucci** (Vitaceae) (Figure 17)

(= *V. berlandieri* Planch. × *rupestris* Scheele)

Herbarium: Algarve: Tavira (Luz de Tavira), near EN 125, 37.086274, -7.715305, ruderal vegetation, 25.08.2016, P. Alves (PO-V62368).

Further data: <https://observation.org/observation/377691033/>; <https://observation.org/observation/377692069/>.

Degree of naturalisation: naturalising.

This artificial hybrid is reported here for the first time from Portugal. Although it reproduces exclusively vegetatively, rootstocks of *V. × ruggerii* are among the most widely used in viticulture across southern Portugal, including Ribatejo, Alentejo and Algarve (Reisch et al. 2012; Ardenghi & Cauzzi 2015).

Vitis × *ruggerii* can be distinguished primarily by the indumentum of its leaves, as well as by the size and texture of the leaf blades (see Ardenghi & Cauzzi 2015 for details). Like other *Vitis* rootstocks, this hybrid has been extensively cultivated due to its phylloxera resistance and adaptability to diverse soil conditions, which has



Figure 17. *Vitis* × *ruggerii* Ardenghi, Galasso, Banfi & Lastrucci (Vitaceae)

facilitated its introduction into multiple viticultural regions worldwide (Galet 1988; This et al. 2006). In Portugal, it is fully established in relatively artificialised hydrographic basins but has also been recorded sporadically in rivers with high ecological integrity, such as the Rabaçal River within Montesinho Natural Park.

Table 1. Plant taxa newly recorded from Portugal, showing family, region of origin, Portuguese location(s) and a provisional establishment status.

No.	Species	Family	Region of origin	Location in Portugal	Establishment status
1	<i>Amaranthus blitum</i> subsp. <i>pseudogracilis</i>	Amaranthaceae: Amaranthoideae	Pantropical (Tropical America)	Douro Litoral	Naturalised
2	<i>Amaranthus palmeri</i>	Amaranthaceae: Amaranthoideae	North America (SW U.S.A., Mexico)	Ribatejo	Naturalising (?)
3	<i>Bassia indica</i>	Amaranthaceae: Camphorosmoideae	South Asia (India, tropical/subtropical Asia)	Estremadura	Casual

CATALOGUING THE ALIEN FLORA OF PORTUGAL: NEW FINDINGS AND UPDATES

No.	Species	Family	Region of origin	Location in Portugal	Establishment status
4	<i>Cardiospermum grandiflorum</i>	Sapindaceae	Tropical/subtropical Africa and America	Ribatejo	Naturalising (?)
5	<i>Casuarina cunninghamiana</i>	Casuarinaceae	Australia, New Guinea	Estremadura, Ribatejo	Casual
6	<i>Chloris gayana</i>	Poaceae: Chloridoideae	Sub-Saharan Africa	Algarve	Naturalised
7	<i>Crepis bursifolia</i>	Asteraceae	Southern Italy, Sicily	Estremadura	Naturalised
8	<i>Cyperus papyrus</i>	Cyperaceae	Africa (Nile region, tropical/subtropical Africa)	Ribatejo	Naturalised
9	<i>Elatine ambigua</i>	Elatinaceae	Southeast Asia	Ribatejo	(Probably) naturalised
10	<i>Eleocharis obtusa</i>	Cyperaceae	North America	Ribatejo	(Possibly) naturalised
11	<i>Eragrostis mexicana</i>	Poaceae: Chloridoideae	America (SW U.S.A. → South America)	Estremadura	Naturalised
12	<i>Eragrostis pectinacea</i>	Poaceae: Chloridoideae	America (North and South)	Ribatejo	(Possibly) naturalised
13	<i>Guizotia abyssinica</i>	Asteraceae	East Africa (Ethiopia, Kenya, Eritrea)	Estremadura	Casual
14	<i>Guizotia schimperii</i>	Asteraceae	East Africa (Ethiopia, Eritrea)	Estremadura	Casual
15	<i>Hedera algeriensis</i>	Araliaceae	North Africa	Douro Litoral	Naturalised
16	<i>Hydrocotyle bowlesioides</i>	Araliaceae	Central America (Costa Rica, Panama)	Douro Litoral	Casual
17	<i>Hydrocotyle sibthorpioides</i>	Araliaceae	Subtropical Asia	Douro Litoral	Naturalised
18	<i>Ipomoea hederacea</i>	Convolvulaceae	Tropical America	Estremadura	Casual
19	<i>Megathyrsus maximus</i>	Poaceae: Panicoideae	Tropical/subtropical Africa	Estremadura	Naturalised
20	<i>Nassella tenuissima</i>	Poaceae: Pooideae	North and South America	Estremadura	Casual
21	<i>Physalis angulata</i>	Solanaceae	Tropical America	Ribatejo	(Probably) naturalised
22	<i>Sida spinosa</i>	Malvaceae	Tropical/subtropical America	Estremadura, Ribatejo	(Probably) casual
23	<i>Solanum bonariense</i>	Solanaceae	South America (Brazil–Argentina)	Ribatejo	Naturalised
24	<i>Vitis riparia</i>	Vitaceae	North America	Beira Litoral	Naturalised
25	<i>Vitis × ruggerii</i>	Vitaceae	Artificial hybrid	Algarve	Naturalising

Taxa new to Estremadura

All taxa treated below are considered naturalised at the national level. However, this degree of naturalisation may not necessarily apply to the newly recorded populations in Estremadura.

***Digitaria ciliaris* (Retz.) Koeler** (Poaceae: Panicoideae)

Herbarium: Loures (Sacavém), Urb. Real Forte, weed in ornamental lawns, common, 10.09.2024, F. Verloove 15277 (BR0000027058688V).

Previously reported in Portugal from Algarve, Beira Litoral, Douro Litoral and Minho by Alonso & Crespo (2021), this tropical weed is undoubtedly often overlooked, due to confusion with *D. sanguinalis* (L.) Scop. It is usually easily distinguished by the smooth (not scabrous) veins of the lower lemma.

***Digitaria violascens* Link** (Poaceae: Panicoideae)

Herbarium: Loures (Sacavém), Via do Oriente, weed in ornamental lawns, common, 10.09.2024, F. Verloove 15278 (BR0000027058671V); Loures (Sacavém), Urb. Real Forte, weed in ornamental lawns, common, 10.09.2024, F. Verloove 15281 (BR0000027059760V).

Previously reported in Portugal from Beira Litoral and Douro Litoral by Alonso and Crespo (2021), this tropical weed is undoubtedly often overlooked, due to confusion with *D. ischaemum* (Schreb.) Muhl. It is usually easily distinguished by its smaller, less hairy spikelets, with straight (not crisped) hairs.

***Eclipta prostrata* (L.) L.** (Asteraceae: Heliantheae)

Herbarium: Setúbal (Sado), port area, EN-10-4 road, shallow roadside ditch (concrete), a single individual, 08.09.2024, F. Verloove 15243 (BR0000027058848V).
Further data: <https://observation.org/observation/327498918/>.

This American weed has been spreading rapidly in recent years in southern Europe, where it was previously confined to rice fields but has now spread to other moist habitats, for instance exposed riverbanks. It was known from various Portuguese regions (Alonso & Crespo 2019a), but not yet from Estremadura.

***Paspalum notatum* Flüggé** (Poaceae: Panicoideae)

Herbarium: Loures (Santa Iria de Azóia), Parque Urbano Doutor José Isidro Santos Júnior, heavily disturbed ornamental lawn, common weed, 07.09.2024, F. Verloove 15239 (BR0000027058886V, dupl. VAL).

Further data: <https://observation.org/observation/327363266/>.

This South American grass species was only known from Douro Litoral in Portugal (Verloove & Alves 2016). It has been widely used in lawns ('bahiagrass') in recent years in warm-temperate and subtropical regions, and escapes very easily in urban habitats. It is probably often overlooked.

Paspalum notatum is a perennial, warm-season grass forming dense tufts, with creeping stolons. Inflorescences are distinctive paired racemes with small, glabrous spikelets.

***Paspalum urvillei* Steud.** (Poaceae: Panicoideae)

Herbarium: Setúbal (Sado), port area, EN-10-4 road, shallow roadside ditch (concrete), about 30 individuals, 08.09.2024, F. Verloove 15242 (BR0000027058855V).
Further data: <https://observation.org/observation/327498939/>; <https://observation.org/observation/327630549/>.

This South American weed has long been known from Portugal, where the first naturalised European populations were discovered (Pinto da Silva 1971; Litzler 1979). However, its distribution remained limited to the Beira Litoral region (Morales 2021). During our fieldwork in September 2024, *Paspalum urvillei* was discovered in several locations in Estremadura, in the municipalities of Setúbal and Torres Vedras (three different locations). *Paspalum urvillei* is much reminiscent of *P. dilatatum* Poir. and both are often intermingled. *P. urvillei* is usually a taller species, with robust stems up to 2 m tall; its spikelets, however, are smaller (2–3 mm vs. 3–4 mm) and the inflorescence branches are much more numerous (10–25 vs. 2–10) (Verloove et al. 2024).

***Persicaria pensylvanica* (L.) M.Gómez** (Polygonaceae)

Herbarium: Vila Franca de Xira (Sobralinho), Estrada da Macol near EN-10 road, roadside ditch near grain mills, about 10 individuals, 01.09.2024, F. Verloove 15201 (BR0000027059067V).

Further data: <https://observation.org/observation/326627750/>.

This North American species was first reported in Portugal by Verloove & Alves (2016) from riparian habitats in Beira Litoral and Minho. The species is likely under-recorded due to confusion with the native and highly variable *P. lapathifolia* (L.) Delarbre. Compared with the latter, *P. pensylvanica* has stipitate-glandular peduncles, prominently veined tepals (non-anchor-shaped), and usually brighter pink flowers. In September 2024 it was recorded along the Tagus River in very large populations, often numbering thousands of individuals over a distance of more than 60 km, demonstrating that it had previously been overlooked. Although the species is discussed here under Estremadura, where it was also found and collected, the vast majority of populations along the Tagus – including the large, invasive stands – occur in Ribatejo. A 2020 observation in Golegã (Josué Amoroso, iNaturalist: <https://www.inaturalist.org/observations/61678713>) corroborates this. The species exhibits invasive behaviour similar to *Amaranthus tuberculatus*, another overlooked American species (Verloove 2026b).

***Rumex cristatus* DC.** (Polygonaceae)

Herbarium: Vila Franca de Xira (Sobralinho), EN-10 road, rough ground in the vicinity of grain mills, small population, 01.09.2024, F. Verloove 15204 (BR0000027059050V).

Further data: <https://observation.org/observation/326627731/>.

Native to southeastern Europe and Turkey, *Rumex cristatus* is often misidentified as *R. patientia* L., which has allowed it to establish unnoticed in much of Europe. In Portugal, it was previously recorded only from Beira Baixa (López González 1990). In recent years, it has been newly found in quite a few regions in Spain, some near the Portuguese borders (Quesada et al. 2007).

Recent fieldwork revealed populations along the Tagus River valley, spanning more than 60 km, often in large numbers. The species occurs along dirt roads bordering the river, not within the riverbed. Although *Rumex cristatus* is discussed here under Estremadura, where it also occurs, most populations along the Tagus – including the largest and densest stands – are situated in Ribatejo, with additional localities in Salvaterra de Magos (Muge), Santarém and Alpiarça.

***Senecio inaequidens* DC.** (Asteraceae)

Herbarium: Setúbal (Sado), port area, EN-10-4 road, dry roadside, a single individual, 08.09.2024, F. Verloove 15245 (BR0000027058732V).

Further data: <https://observation.org/observation/327498874/>.

This southern African weed remains rare in Portugal and is so far known only from Minho and Douro Litoral (Calvo & Aedo 2019). It is here reported for the first time from Estremadura, apparently representing its southernmost occurrence in the entire Iberian Peninsula. Although only a single individual was observed during our fieldwork, the species has subsequently been recorded at additional locations near Setúbal, suggesting it may indeed be becoming established in the region (Inês Costa, pers. comm., January 2026).

It is worth considering the morphological variation observed within this complex in Europe. The plant found in Setúbal was remarkable for its unusually small capitula (barely exceeding 10 mm across) with few and very short calyculus bracts (at most one-fifth the length of the involucre). Based on these features, the plant closely matches *S. inaequidens* as described by Hilliard (1977). The widespread European form differs in having broader capitula and calyculus bracts arranged in three or four overlapping series, the innermost approximately one-third to one-half as long as the involucre – characters that rather correspond to *S. harveianus* MacOwan. Schmidt-Lebuhn et al. (2024) recently drew attention to this as well, and the name *S. harveianus* had already been suggested for the European plants in earlier works (e.g., Antoine & Weill 1966; Cochard 2003). Nevertheless, it should be borne in mind that gene flow, polyploidy or reticulate evolution may be involved in the naturalised European populations (Schmidt-Lebuhn et al. 2025).

***Verbena brasiliensis* Vell.** (Verbenaceae)

Syn.: *V. litoralis* Kunth var. *brevibracteata* (Kuntze) N.O'Leary

Herbarium: Setúbal (Sado), port area, EN-10-4 road, roadside, a single individual, 08.09.2024, F. Verloove 15241 (BR0000027058862V, dupl. VAL).

Further data: <https://observation.org/observation/327498838/>.

This South American weed is a recent newcomer in the Iberian Peninsula that was first reported from Spain by Verloove (2003). Since then, the species has been found

in several Spanish provinces, especially in the north. In Portugal, the species is only known from the north of the country, in Minho (Pujadas Salvá & Plaza 2010). It is unclear whether the species has become naturalised in Estremadura, where we found it for the first time, but on a global scale, it is probably naturalised in Portugal.

***Verbena incompta* P.W.Michael** (Verbenaceae)

Herbarium: Palmela (Marateca), Ribeira da Marateca at bridge IC-1/EN-5 road, sandy riverbank, two individuals, 08.09.2024, F. Verloove 15240 (BR0000027058879V).

Further data: <https://observation.org/observation/327498750/>.

This poorly known South American species was previously recorded from Portugal from Beira Litoral and Douro Litoral (Verloove & Alves 2016). It is a recent newcomer to the Iberian Peninsula (Verloove 2011), as in the rest of southern Europe.

Taxa new to Ribatejo

All taxa treated below are considered naturalised at the national level. However, this degree of naturalisation may not necessarily apply to the newly recorded populations in Ribatejo.

***Cenchrus setaceus* (Forssk.) Morrone** (Poaceae: Panicoideae)

Syn.: *Pennisetum setaceum* Forssk.

Herbarium: Azambuja (Vila Nova da Rainha), EN-3 road, roadside, a single individual, 06.09.2024, F. Verloove 15233 (BR0000027058923V). Although this locality lies in Estremadura, from where the species was already known, this specimen provides a recent confirmation of its continued presence in the region.

Further data (selection): <https://observation.org/observation/327230901/>; <https://observation.org/observation/326746961/>; <https://observation.org/observation/327363384/>.

This invasive grass is listed as a species of Union Concern in the European Union. Despite regulatory attention, it continues to expand in southern Europe, including the Iberian Peninsula. In Portugal, it had previously been reported only from Estremadura (Crespo & Sáez 2021), where it was observed again during our recent fieldwork,

particularly in the Setúbal area and in several localities around Loures. Newly recorded populations were also found in Ribatejo, though only at two sites (Alverca do Ribatejo and Samora Correia), indicating that the species remains far more widespread in Estremadura. Some populations occur along the EN-10 road, where dispersal is likely facilitated by wind turbulence generated by heavy traffic.

***Cucumis myriocarpus* Naudin** (Cucurbitaceae)

Herbarium: Salvaterra de Magos (Muge), valley of Ribeira de Muge, edge of arable fields (mainly tomatoes), a rather frequent weed, 14.09.2024, F. Verloove 15261 (BR0000027058749V).

Further data: <https://observation.org/observation/328031115/>.

This African weed is locally naturalised in the Iberian Peninsula, including Alto and Baixo Alentejo, and Beira Baixa (Fernandes 1993). In Ribatejo, it is newly reported and locally abundant along the margins of tomato fields in the area indicated above.

***Digitaria violascens* Link** (Poaceae: Panicoideae)

Herbarium: Vila Franca de Xira, EN-10 road north of the city, near drive-in of A1 motorway, on the verge of irrigated lawn, about 30 individuals, 01.09.2024, F. Verloove 15202 (BR0000027059746V, dupl. VAL); Vila Franca de Xira (Alverca do Ribatejo), EN-10 road, ornamental lawn, 07.09.2024, F. Verloove 15282 (BR0000027059753V).

See comments under Estremadura records.

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

Herbarium: Almeirim, Rio Tejo, sandy bank of the river, rather numerous (also seen elsewhere on the banks of the Rio Tejo: Alpiarça, Pombalinho), 03.09.2024, F. Verloove 15217 (BR0000027059012V).

Further data: <https://observation.org/observation/326911509/>.

This predominantly New World species is sparingly naturalised in the Iberian Peninsula, typically on sandy, exposed river and pond margins. In Portugal, it was previously known from Douro Litoral and Minho (Gonçalves 1990). Since this publication, *Mollugo*

verticillata has been found in many new locations, both in Spain (e.g., Verloove & Aymerich 2020; Araújo Díaz de Terán et al. 2023) and Portugal (in Beira Litoral; Verloove & Alves 2016).

Our recent fieldwork confirms its occurrence in several new locations along the Tagus River, including Alpiarça, Pombalinho and Golegã, spanning over 10 km. The species shows clear signs of naturalisation along the riverbanks.

***Panicum dichotomiflorum* Michx.** (Poaceae)

Herbarium: Salvaterra de Magos (Foros de Salvaterra), Rua da Bica near Ribeira de Magos, maize field, 02.09.2024, F. Verloove 15206 (BR, dupl. VAL).

Further data: <https://observation.org/observation/326746865/>.

No herbarium material from Ribatejo was recorded by Crespo (2021) during the Flora Iberica revision, leaving some uncertainty regarding its occurrence in the region. During fieldwork in September 2024, *Panicum dichotomiflorum* was frequently observed in maize fields throughout the Tagus valley. It is clearly well established and common. Additional records include Almeirim, Alpiarça, Cartaxo (Valada), Chamusca, Coruche (Couço, Erra), Golegã (Pombalinho) and Salvaterra de Magos (Muge).

***Persicaria pensylvanica* (L.) M.Gómez**

(Polygonaceae)

Herbarium: Valada, Porto de Muge, Rio Tejo, upstream of Ponte Rainha Dona Amélia, sandbank of the river, about 10 individuals, 02.09.2024, F. Verloove 15218 (BR0000027059005V).

Further data: <https://observation.org/observation/326746803/>; <https://observation.org/observation/326911553/>; <https://observation.org/observation/326911503/>; <https://observation.org/observation/327775650/>.

See comments under Estremadura records.

***Rumex cristatus* DC.** (Polygonaceae)

Herbarium: As under Estremadura records.

Further data: <https://observation.org/observation/326911447/>.

See comments under Estremadura records.

***Sida rhombifolia* L.** (Malvaceae)

Herbarium: Salvaterra de Magos, Praia Doce, Rio Tejo, open woodland on the banks of the river, rather numerous (also seen elsewhere on the banks of the Rio Tejo), 03.09.2024, F. Verloove 15216 (BR0000027059029V).

Further data: <https://observation.org/observation/326911559/>; <https://observation.org/observation/327230947/>.

According to Paiva & Nogueira (2005), this tropical American shrub was previously known from Minho and Beira Litoral in Portugal. Flora-On reports a single observation from the Tagus River in 2010. Our recent fieldwork indicates that it is now naturalised along the Tagus, primarily in semi-open riparian woodland bordering the river. Recorded localities include Salvaterra de Magos, Alenquer (Carregado) and Azambuja.

Discussion

The present contribution documents a further enrichment of the alien vascular flora of Portugal, adding both taxa newly reported for the country and several others recorded for the first time in particular regions, notably Estremadura and Ribatejo. Together, these records illustrate the continuing dynamism of the Portuguese flora under the combined effects of globalisation, urbanisation and climate change.

Taxonomic and biogeographical patterns

The newly recorded species belong mainly to Poaceae and Asteraceae, confirming the overrepresentation of these families in the alien floras of Mediterranean regions. The preponderance of grasses (*Digitaria*, *Paspalum*, *Panicum*, *Cenchrus*) reflects their frequent introduction through pasture improvement, ornamental horticulture, and the contamination of imported seed or animal feed. Asteraceae such as *Eclipta prostrata*, *Guizotia abyssinica* and *Senecio inaequidens* follow similar global trends, spreading along disturbed and urbanised habitats.

Biogeographically, most taxa originate from tropical and subtropical regions, particularly South America (e.g., *Paspalum notatum*, *Verbena brasiliensis*, *Sida rhombifolia*) and Africa (e.g., *Cenchrus setaceus*, *Cucumis myriocarpus*). This reflects climatic compatibility with Portugal's warm-temperate conditions and the strong influence of anthropogenic dispersal pathways. A smaller contingent, such as *Rumex cristatus* from southeastern

Europe, and in particular *Crepis bursifolia*, represents range expansions from adjacent Mediterranean floras.

Regional trends: Estremadura and Ribatejo

An interesting outcome of this study is the documentation of several alien taxa new to Estremadura and Ribatejo, two regions that play contrasting but complementary roles in the spread of non-native plants.

In Estremadura, new records include *Digitaria ciliaris*, *D. violascens*, *Eclipta prostrata*, *Paspalum notatum*, *P. urvillei*, *Senecio inaequidens*, *Verbena brasiliensis* and *V. incompta*. Most of these are warm-climate weeds, associated with ornamental lawns, roadside habitats and port areas. Their discovery in urbanised environments such as Loures and Setúbal underscores the importance of human-modified landscapes as primary entry points. The tropical grasses *Digitaria ciliaris* and *D. violascens* are probably long overlooked because of their similarity to widespread congeners. Both species are confirmed to be naturalised in Portugal, suggesting that diagnostic confusion rather than ecological limitation has delayed their recognition.

The records of *Paspalum notatum* and *P. urvillei* mark an expansion of these South American taxa in Portugal. *P. notatum*, commonly planted as ‘bahiagrass’ in lawns and road verges, has clearly escaped from cultivation, while *P. urvillei* – previously confined to Beira Litoral – is now established in multiple Estremaduran localities. *Eclipta prostrata*, an American weed spreading rapidly across southern Europe, is likewise extending its range beyond irrigated rice fields into artificial wet microhabitats. *Verbena brasiliensis* and *V. incompta* continue their Iberian expansion, confirming the increasing representation of South American Verbenaceae in Mediterranean landscapes.

In Ribatejo, an equally rich set of new records reveals a distinct ecological profile, centred on riparian and agricultural habitats along the Tagus River valley. Noteworthy additions include *Cenchrus setaceus*, *Cucumis myriocarpus*, *Mollugo verticillata*, *Panicum dichotomiflorum*, *Persicaria pensylvanica*, *Rumex cristatus* and *Sida rhombifolia*. The Tagus valley thus emerges as a major dispersal corridor for alien plants in central Portugal.

Many of these taxa are now clearly naturalised. *Persicaria pensylvanica* is abundant and locally dominant, often spreading over dozens of kilometres. *Mollugo verticillata* and *Rumex cristatus* occupy the drier, sandy upper river margins and adjacent disturbed soils, respectively. Such concentration of newcomers

along the Tagus underscores the role of rivers as linear invasion pathways, facilitating hydrochorous dispersal and repeated propagule input.

The detection of *Cenchrus setaceus* (a species of Union Concern in the EU) in Ribatejo is of particular relevance. Previously restricted to Estremadura, it now appears well established along major transport routes, dispersed by wind turbulence from passing traffic. Its expansion northward along the N-10 corridor mirrors patterns already observed in Spain and calls for urgent management attention.

Establishment dynamics and invasion potential

Across both regions, nearly all new taxa are at least locally naturalised, and some (e.g., *Panicum dichotomiflorum*, *Persicaria pensylvanica*) appear fully established and expanding. These findings suggest that the transition from casual to naturalised status is accelerating in central Portugal, facilitated by mild winters, irrigation and recurrent soil disturbance.

The repeated presence of tropical grasses in ornamental lawns and urban green spaces points to a horticultural route of introduction, while riparian taxa rely on natural spread along waterways. Several human-mediated vectors further contribute to the establishment of alien plants: bird feed (e.g., *Guizotia abyssinica*), cereals and cattle feed introduce propagules into urban, agricultural and riparian habitats. Similarly, ornamental plants already present in the country, such as *Casuarina*, can become locally naturalised and serve as sources for further dispersal.

The co-occurrence of several aggressive or regulated species (*Cenchrus setaceus*, *Amaranthus palmeri*) highlights the incipient invasion risk. Timely monitoring of high-risk introduction pathways – including repeated surveys of ornamental plantings, urban green spaces, and areas receiving bird or livestock feed – combined with citizen-science platforms, herbarium vouchers and field observations, provides an opportunity for early detection and rapid response before casual introductions transition to fully established populations.

These patterns of establishment and spread underscore the significance of integrating pathway-based risk assessment with targeted surveillance, particularly for taxa already present in the landscape, as such taxa may expand further into natural and semi-natural habitats and become invasive.

Implications for monitoring and management

The data presented here reinforce the value of continuous

field surveys and online biodiversity platforms (e.g., Observation.org, iNaturalist) as complementary tools for tracking the expansion of alien plants. While many taxa observed are already naturalised or established, the combination of herbarium vouchers and digital records can still provide timely detection of newly arriving or potentially invasive species, supporting prioritisation of monitoring and management efforts.

In practice, this means that field surveys should focus on habitats where early-stage invasions are most likely, such as disturbed riparian zones, ruderal sites and urban edges. For taxa already showing expansion along the Tagus and in coastal Estremadura, regular monitoring can inform adaptive management strategies aimed at limiting further spread. Although early warning may not always precede establishment, integrating traditional and digital records improves the spatial and temporal resolution of observations and facilitates a rapid, evidence-based response.

Conclusion

The discovery of numerous alien taxa new to Portugal and its regions demonstrates that the national flora remains in flux, particularly in human-dominated landscapes. Estremadura and Ribatejo emerge as key gateways and secondary dispersal zones for alien plants, linked respectively to horticultural trade and riverine transport. Continued botanical exploration, supported by systematic data archiving, will be essential to document and manage this rapidly evolving component of Portugal's biodiversity.

Acknowledgements

We thank the anonymous reviewer and Campbell James for their constructive feedback and helpful suggestions, which significantly improved this manuscript.

Data Accessibility Statement

No additional database.

Author Contributions

Filip Verloove: Conceptualisation; methodology; investigation; writing – original draft.

Paulo Alves: Investigation; writing – review and editing.

References

- Aedo, C. (2020). *Nassella*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(1) (pp. 104–107). Madrid: Real Jardín Botánico, CSIC. xlv + 738 pp.
- Alonso, M. Á., Crespo, M. B. (2019a). *Eclipta*. In Benedí, C., Buira, A., Rico, E., Crespo, M. B., Quintanar, A., Aedo, C. (Eds.), *Flora Iberica*, vol. 16(3) (pp. 2169–2173). Madrid: Real Jardín Botánico, CSIC. xviii + 900 pp.
- Alonso, M. Á., Crespo, M. B. (2019b). *Guizotia*. In Benedí, C., Buira, A., Rico, E., Crespo, M. B., Quintanar, A., Aedo, C. (Eds.), *Flora Iberica*, vol. 16(3) (pp. 2194–2197). Madrid: Real Jardín Botánico, CSIC. xviii + 900 pp.
- Alonso, M. Á., Crespo, M. B. (2021). *Digitaria*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1136–1147). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.
- Andreu, J., Vilà, M. (2009). Risk analysis of potential plants in Spain. *Journal for Nature Conservation*, 18(1): 34–44. <https://doi.org/10.1016/j.jnc.2009.02.002>
- Antoine, G., Weill, J. (1966). Un *Senecio* Sud-Africain à Calais. *Bulletin de La Société Botanique de France*, 113(5–6): 342–344. <https://doi.org/10.1080/00378941.1966.10835533>
- Araújo Díaz de Terán, J., Grijalbo Cervantes, J., Laguna Lumbreras, E., Ferrer Gallego, P. P., Martínez Labarga, J. M. (2023). *Mollugo verticillata* L. (Molluginaceae), nueva especie para la flora alóctona de la Comunidad de Madrid (España). *BV News Publicaciones Científicas*, 11(124): 34–42. <https://oa.upm.es/86652/>
- Ardenghi, N. M., Cauzzi, P. (2015). Alien grapes (*Vitis*, Vitaceae) in Sicily (Italy): Novelties for the Sicilian and Mediterranean flora. *Natural History Sciences*, 2(2): 137–148. <https://doi.org/10.4081/nhs.2015.256>
- Ardenghi, N. M., Galasso, G., Banfi, E., Zoccola, A., Foggi, B., Lastrucci, L. (2014). A taxonomic survey of the genus *Vitis* L. (Vitaceae) in Italy, with special reference to Elba Island (Tuscan Archipelago). *Phytotaxa*, 166(3): 163–198. <https://doi.org/10.11646/phytotaxa.166.3.1>
- Aymerich Boixader, P. (2020). *Physalis angulata* L. (Solanaceae), naturalizada en la Península Ibérica. *Acta Botanica Malacitana*, 45: 221–224. <https://doi.org/10.24310/abm.v45i.10543>
- Balah, M. A., Balah, A. M. (2022). Growth and ecological characteristics of *Physalis angulata* invasive weed species in several invaded communities. *Biologia*, 77: 325–338. <https://doi.org/10.1007/s11756-021-00944-1>
- Banfi, E., Bajona, E., Raimondo, F. M. (2022). *Megathyrsus maximus* var. *maximus* (Poaceae), a new naturalised grass alien to Italy. *Flora Mediterranea*, 31: 453–462. <https://doi.org/10.7320/FIMedit31SI.453>
- Barrett, S. C. H., Seaman, D. E. (1980). The weed flora of Californian rice fields. *Aquatic Botany*, 9: 351–376. [https://doi.org/10.1016/0304-3770\(80\)90036-4](https://doi.org/10.1016/0304-3770(80)90036-4)
- Bayón, N. D. (2015). Revisión taxonómica de las especies monoicas de *Amaranthus* (Amaranthaceae): *Amaranthus* subg. *Amaranthus* y *Amaranthus* subg. *Albersia*. *Annals of the Missouri Botanical Garden*, 101(2): 261–383. <https://doi.org/10.3417/2010080>
- Blackburn, T. M., Pyšek, P., Bacher, S., Carlton, J. T., Duncan, R. P., Jarošík, V., Wilson, J. R. U., Richardson, D. M. (2011). A proposed unified framework for biological invasions. *Trends in Ecology and Evolution*, 26(7): 333–339. <https://doi.org/10.1016/j.tree.2011.03.023>
- Bogler, D. (2020). *Crepis bursifolia*. *Jepson eFlora*. The University and Jepson Herbaria. Available online: <https://ucjeps.berkeley.edu/eflora/> [Accessed: 24 February 2026].
- Boix Pozuelo, R. J. (2017). *Flora alóctona de la comarca de l'Alacantí – Introducció, naturalizació e invasió de especies vegetales exóticas en la provincia de Alicante*. PhD thesis, Universidad de Alicante. 835 pp. <https://hdl.handle.net/10045/82567>
- Borgato, E. A., Ohadi, S., Brunharo, C. A. C. G., Patterson, E. L., Matzrafi, M. (2025). *Amaranthus palmeri* S. Watson reproduction system: Implications for distribution and management strategies. *Weed Research*, 65(1): e12626. <https://doi.org/10.1111/wre.12626>
- Brewbaker, J. L. (2004). Tree breeding, practices. Nitrogen-fixing tree improvement and culture. In Burley, J. (Ed.), *Encyclopedia of forest sciences* (pp. 1490–1501). Oxford: Elsevier. 2,400 pp. <https://doi.org/10.1016/B0-12-145160-7/00083-1>

- Bryson, C. T., Carter, R. (2008). The significance of Cyperaceae species as weeds. In Naczi, R. F. C., Ford, B. A. (Eds.), *Sedges: Uses, diversity, and systematics of the Cyperaceae*. Monographs in Systematic Botany from the Missouri Botanical Garden 108 (pp. 15–101). St Louis: Missouri Botanical Garden Press. xi + 298 pp.
- Calvo J., Aedo, C. (2019). *Senecio*. In Benedí, C., Buira, A., Rico, E., Crespo, M. B., Quintanar, A., Aedo, C. (Eds.), *Flora Iberica*, vol. 16(3) (pp. 1506–1562). Madrid: Real Jardín Botánico, CSIC. xviii + 900 pp.
- Carballeira, R., Souto, M. (2018). Presencia de *Cyperus papyrus* L. (Cyperaceae) en la región biogeográfica atlántica de la Península Ibérica. *Acta Botanica Malacitana*, 43: 137–140. <https://doi.org/10.24310/abm.v43i0.5011>
- Castroviejo, S. (2006). Más sobre *Cyperus* y *Kylinga* (sic) en la Península ibérica. *Acta Botanica Malacitana*, 31: 232–238. <https://doi.org/10.24310/abm.v31i31.7173>
- Cerrato, M. D., Cardona Ametller, C., Mir Rosselló, P. M., Ribas Serra, A., Alberti Roig, I., Cortés Fernández, I., Lassnig, N., López Vich, L., Gil Vives, L. (2023). Notas corológicas para la flora de Mallorca, III. *Flora Montiberica*, 86: 67–73. https://www.floramontiberica.org/FM/086/Flora_Montib_086_067-073_2023.pdf
- Chalise, P., Dhakal, S., Paneru, Y. R. (2024). *Cardiospermum corindum* L. (Sapindaceae): A new record for the flora of Nepal. *Journal of Plant Resources*, 22(1): 8–10. <https://doi.org/10.3126/bdpr.v22i1.68285>
- Clarke, M. M., Reichard, S. H., Hamilton, C. W. (2006). Prevalence of different horticultural taxa of ivy (*Hedera* spp., Araliaceae) in invading populations. *Biological Invasions* 8: 149–157. <https://doi.org/10.1007/s10530-004-2424-6>
- Clayton, W. D., Vorontsova, M. S., Harman, K. T., Williamson, H. (2013). *Chloris gayana*. *GrassBase – The online world grass flora*. Royal Botanic Gardens, Kew. Available online: <https://www.kew.org/data/grassbase/index.html> [Accessed: 24 February 2026].
- Cochard, P.-O. (2003). Histoire de l'expansion en France du *Senecio inaequidens* DC.: Analyse bibliographique. *Symbioses*, nouvelle série, 9: 41–56. [http://pierrecochard.free.fr/cv_poc/Senecio_inaequidens_France\(Cochard2003\).pdf](http://pierrecochard.free.fr/cv_poc/Senecio_inaequidens_France(Cochard2003).pdf)
- Cook, C. D. K. (1996). *Aquatic and wetland plants of India*. Oxford: Oxford University Press. 385 pp.
- Costea, M., Sanders, A., Waines, G. (2001). Notes on some little known *Amaranthus* taxa (Amaranthaceae) in the United States. *SIDA, Contributions to Botany*, 19(4): 975–992. <https://www.jstor.org/stable/41967948>
- Crespo, M. B. (2021). *Panicum*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1177–1188). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.
- Crespo, M. B., Martínez Azorín, M., Camuñas, E. (2013). Novedades corológicas para la flora valenciana. *Flora Montiberica*, 55: 118–127. https://www.floramontiberica.org/FM/055/Flora_Montib_055_118-127_2013.pdf
- Crespo, M. B., Sáez, L. (2021). *Cenchrus*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1211–1226). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.
- Domingues de Almeida, J. (1999). *Flora exótica subespontânea de Portugal continental (plantas vasculares): Catálogo das plantas vasculares exóticas que ocorrem subespontâneas em Portugal continental e compilação de informações sobre estas plantas*. Dissertação de Mestrado, Faculdade de Ciências da Universidade de Coimbra, Coimbra.
- Domingues de Almeida, J. (2018). New additions to the exotic vascular flora of continental Portugal. *Flora Mediterranea*, 28: 259–278. <https://doi.org/10.7320/FIMedit28.259>
- Domingues de Almeida, J. (2024). Some new additions to the exotic vascular flora of continental Portugal. *Flora Mediterranea*, 34: 277–294. <https://doi.org/10.7320/FIMedit34.277>
- Domingues de Almeida, J., Freitas, H. (2006). Exotic naturalized flora of continental Portugal – a reassessment. *Botanica Complutensis*, 30: 117–130. https://www.researchgate.net/publication/27591302_Exotic_naturalized_flora_of_continental_Portugal_A_reassessment
- Domingues de Almeida, J., Freitas, H. (2012). Exotic flora of continental Portugal – a new assessment. *Bocconeia*, 24: 231–237. <https://herbmedit.org/papers/677dfd8e-1bda-4cf4-be0f-3695ce3787a0>

- Delfini, C., Salariato, D. L., Aliscioni, S. S., Zuloaga, F. O. (2023). Systematics and phylogenetic placement of *Panicum* L. species within the Melinidinae based on morphological, anatomical, and molecular data (Poaceae, Panicoideae, Paniceae). *Plants*, 12(2): 399. <https://doi.org/10.3390/plants12020399>
- Dullinger, I., Wessely, J., Bossdorf, O., Dawson, W., Essl, F., Gatttringer, A., Klöner, G., Kreft, H., Kuttner, M., Moser, D., Pergl, J., Pyšek, P., Thuiller, W., van Kleunen, M., Weigelt, P., Winter, M., Dullinger, S. (2017). Climate change will increase the naturalization risk from garden plants in Europe. *Global Ecology and Biogeography*, 26(1): 43–53. <https://doi.org/10.1111/geb.12512>
- Duvigneaud, J., Lambinon, J. (1976). Quelques mots sur la distribution de *Crepis bursifolia* L. (Asteraceae). *Société pour l'Échange des Plantes Vasculaires de l'Europe Occidentale et du Bassin Méditerranéen, Bulletin*, 16: 89–90.
- Ecroyd, C. E. (2007). *Hydrocotyle bowlesioides* (Araliaceae/Apiaceae), a new naturalised plant in New Zealand. *New Zealand Journal of Botany*, 45(3): 479–484. <https://doi.org/10.1080/00288250709509731>
- European and Mediterranean Plant Protection Organization (EPPO) (2012). Mini data sheet on *Stipa trichotoma*, *Stipa neesiana* and *Stipa tenuissima*. Available online: https://gd.eppo.int/download/doc/1140_minids_STDTN.pdf
- European and Mediterranean Plant Protection Organization (EPPO) (2017). *Cardiospermum grandiflorum*. *Bulletin OEPP/EPPO Bulletin*, 47(3): 526–530. <https://doi.org/10.1111/epp.12427>
- European and Mediterranean Plant Protection Organization (EPPO) (2024). EPPO A2 list of pests recommended for regulation as quarantine pests – version 2024-09. Available online: https://www.eppo.int/ACTIVITIES/plant_quarantine/A2_list [Accessed: 24 February 2026].
- Fernandes, R. B. (1993). *Cucumis*. In Castroviejo, S., Aedo, C., Cirujano, S., Laínz, M., Montserrat, P., Morales, R., Muñoz Garmendia, F., Navarro, C., Paiva, J., Soriano, C. (Eds.), *Flora Iberica*, vol. 3 (pp. 462–466). Madrid: Real Jardín Botánico, CSIC. liv + 730 pp.
- Fernández de Bobadilla, J., Sánchez-García, I. (2025). Aportaciones al conocimiento de la xenoflora gaditana. *Revista de la Sociedad Gaditana de Historia Natural*, 19: 7–34. <https://sociedadgaditanahistorianatural.com/volumen-19/>
- Fraga Arguinbau, P., Capó, M., Rita, J., Borràs J., Joana Cursach, J. (2025). New data for the alien vascular flora of Menorca (Balearic Islands, Spain). *Flora Mediterranea*, 35: 75–84. <https://doi.org/10.7320/FIMedit35.075>
- Galet, P. (1988). *Cépages et vignobles de France: Tome 1. Les vignes américaines*. Montpellier: Imprimerie Charles Déhan. 660 pp.
- Gassó, N., Thuiller, W., Pino, J., Vilà, M. (2012). Potential distribution range of invasive plant species in Spain. *NeoBiota*, 12: 25–40. <https://doi.org/10.3897/neobiota.12.2341>
- Gildenhuys, E., Ellis, A. G., Carroll, S. P., Le Roux, J. J. (2013). The ecology, biogeography, history and future of two globally important weeds: *Cardiospermum halicacabum* Linn. and *C. grandiflorum* Sw. *NeoBiota*, 19: 45–65. <https://doi.org/10.3897/neobiota.19.5279>
- Gómez-Bellver, C. (2023). *Flora al·lòctona vascular ocasional, naturalitzada i invasora al territori comprès per Catalunya, el País Valencià i les Illes Balears: El cas d'estudi del neòfit recent invasor Kalanchoe × houghtonii*. PhD thesis, Universitat de Barcelona, Barcelona, Spain. <https://hdl.handle.net/10803/688049>
- Gómez-Bellver, C., Álvarez, H., Sáez, L. (2016). New contributions to the knowledge of the alien flora of the Barcelona province (Catalonia, Spain). *Orsis*, 30: 167–189. https://www.researchgate.net/publication/311913003_New_contributions_to_the_knowledge_of_the_alien_flora_of_the_Barcelona_province_Catalonia_Spain
- Gonçalves, M. L. (1990). *Mollugo*. In Castroviejo, S., Laínz, M., López González, G., Montserrat, P., Muñoz Garmendia, F., Paiva, J., Villar, L. (Eds.), *Flora Iberica*, vol. 2 (pp 93–95). Madrid: Real Jardín Botánico, CSIC. lii + 897 pp.
- Güemes, J. (2021). *Urochloa*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1168–1172). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.
- Hanson, C. G. (2019). Birdseed aliens originating from Niger (*Guizotia abyssinica*) wild bird food. *British and Irish Botany*, 1(4): 292–308. <https://britishandirishbotany.org/index.php/bib/article/view/35>
- Hilliard, O. M. (1977). *Compositae in Natal*. Pietermaritzburg: University of Natal Press. 659 pp.

- Humphries, T., Florentine, S. K. (2021). A comparative review of six invasive *Nassella* species in Australia with implications for their management. *Plants*, 10(6): 1036. <https://doi.org/10.3390/plants10061036>
- Hutchinson, J., Dalziel, J. M. (1954). *Flora of West Tropical Africa, vol. 1, part 1*. London: Crown Agents for Overseas Governments and Administrations. vi + 295 pp.
- Iamónico, D., Hussain, A. N., Fortini, P., Galasso, G. (2024). *Amaranthus emarginatus* s.lat. (Amaranthaceae) in Italy. *Natural History Sciences*, 11(1): 37–44. <https://doi.org/10.4081/nhs.2024.728>
- Jiménez-Mejías, P., Luceño, M. (2007). *Eleocharis*. In Castroviejo, S., Luceño, M., Galán, A., Jiménez Mejías, P., Cabezas, F., Medina, L. (Eds.), *Flora Iberica*, vol. 18 (pp. 75–91). Madrid: Real Jardín Botánico, CSIC. xlvii + 420 pp.
- Kati, V., Gitsopoulos, T., Vasilakoglou, I., Vlachos, C., Mylonas, P., Menexes, G. (2023). Prickly sida (*Sida spinosa* L.) and cotton response to pre- and early post-emergence herbicides. *Agronomy*, 13(10): 2466. <https://doi.org/10.3390/agronomy13102466>
- Royal Botanic Gardens, Kew (2025). Plants of the world online. Available online: <https://powo.science.kew.org/> [Accessed 2 December 2025].
- Koch, W. (1952). Zur Flora der oberitalienischen Reisfelder. *Berichte der Schweizerischen Botanischen Gesellschaft*, 62: 628–663. <https://www.e-periodica.ch/digbib/view?pid=bhl-001%3A1952%3A62%3A%3A654>
- Koch, S. D. (1974). The *Eragrostis pectinacea* – *pilosa* complex in North and Central America (Gramineae: Eragrostoideae). *Illinois Biological Monographs*, 48. 74 pp.
- Koch, S. D., Sánchez Vega, I. (1985). *Eragrostis mexicana*, *E. neomexicana*, and *E. virescens*: The resolution of a taxonomic problem. *Phytologia*, 58(6): 377–381. <https://doi.org/10.5962/bhl.part.14761>
- Larregle, G., Bottinelli, J., Fernez, T. (2016). Une nouvelle espèce pour la France: *Eleocharis obtusa* (Willd.) Schult. découverte en Seine-et-Marne. *Le Monde des Plantes*, 513: 19–21.
- Litzler, P. (1979). *Paspalum urvillei* Steudel en Espagne. *Bulletin de la Société Botanique de France: Lettres Botaniques*, 126(1): 95–102. <https://doi.org/10.1080/01811797.1979.10824379>
- López González, G. (1990). *Rumex*. In Castroviejo, S., Laínz, M., López González, G., Montserrat, P., Muñoz Garmendia, F., Paiva, J., Villar, L. (Eds.), *Flora Iberica*, vol. 2 (pp. 595–634). Madrid: Real Jardín Botánico, CSIC. lii + 897 pp.
- Mahklouf, M. (2020). Biological and ecological review of an exotic grass *Chloris gayana* Kunth. (Poaceae) from Libya. *Journal of Advanced Botany and Zoology*, 7(4): 1–3. <https://doi.org/10.5281/zenodo.3830211>
- Mansouri, L. M., Kheloufi, A., Rihane, M. R. (2025). Emergence of *Solanum bonariense* L. (Solanaceae) as a new invasive species in Algeria. *Biologica Nyssana*, 16(2): 367–375. <https://doi.org/10.46793/BioINyss.16.2.20M>
- Mapaura, A., Canavan, K., Richardson, D. M., Clark, V. R., Steenhuisen, S-L. (2020). The invasive grass genus *Nassella* in South Africa: A synthesis. *South African Journal of Botany*, 135: 336–348. <https://doi.org/10.1016/j.sajb.2020.08.031>
- Maybery-Reupert, K., Isenegger, D., Hayden, M., Cogan, N. (2023). Development of genomic resources for Rhodes grass (*Chloris gayana*), draft genome and annotated variant discovery. *Frontiers in Plant Science*, 14: 1239290. <https://doi.org/10.3389/fpls.2023.1239290>
- McAllister, H. (1988). Canary and Algerian ivies. *The Plantsman*, 10(4): 193–199.
- McLaren, D. A., Stajsis, V., Iaconis, L. (2004). The distribution, impacts and identification of exotic stipoid grasses in Australia. *Plant Protection Quarterly*, 19(2): 59–66.
- Metcalfe, D. J. (2005). *Hedera helix* L. *Journal of Ecology*, 93: 632–648. <https://doi.org/10.1111/j.1365-2745.2005.01021.x>
- Morales, R. (2021). *Paspalum*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buira Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1226–1233). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.

- Ozaslan, C., Farooq, S., Onen, H., Ozcan, S., Bukun, B., Gunal, H. (2017). Germination biology of two invasive *Physalis* species and implications for their management in arid and semi-arid regions. *Scientific Reports*, 7: 16960. <https://doi.org/10.1038/s41598-017-17169-5>
- Paiva, J., Nogueira, I. (2005). *Sida*. In Castroviejo S., Aedo, C., Cirujano, S., Laínz, M., Montserrat, P., Morales, R., Muñoz Garmendia, F., Navarro, C., Paiva, J., Soriano, C. (Eds.), *Flora Iberica*, vol. 3 (pp. 206–208). Madrid: Real Jardín Botánico, CSIC. liv + 730 pp.
- Panizza, A. M., Ferrucci, M. S., Temponi, L. G., Caxambu, M. G., Pires Lima, L. C. (2024). Taxonomic synopsis of Sapindaceae in the Upper Paraná Atlantic Forest. *Rodriguésia*, 75: e01822023. <https://doi.org/10.1590/2175-7860202475088>
- Peña, C., Sebastián, A., Laguna, E. (2003). *Cyperus papyrus* L. en la Albufera de Valencia. *Flora Montiberica*, 23: 44–45. <https://dialnet.unirioja.es/servlet/articulo?codigo=1394795>
- Peterson, P. M. (2003). *Eragrostis*. In Flora of North America Editorial Committee, Barkworth, M. E., Capels, L. M., Long, S., Piep, M. B. (Eds.), *Flora of North America north of Mexico*, vol. 25 (pp. 65–105). New York and Oxford: Oxford University Press. xxv + 783 pp.
- Pignatti, S. (1982). *Flora d'Italia*. Bologna: Edagricole. 2,302 pp.
- Pinto da Silva, A. R. (1971). Les plantes synanthropiques au Portugal continental et aux Açores. *Boissiera*, 13: 297–303.
- Portal, R. (2002). *Eragrostis de France et de l'Europe occidentale*. Vals près Le Puy: author. 431 pp.
- Potgieter, L. J., Richardson, D. M., Wilson, J. R. U. (2014). *Casuarina*: Biogeography and ecology of an important tree genus in a changing world. *Biological Invasions*, 16: 609–633. <https://doi.org/10.1007/s10530-013-0613-x>
- Pujadas Salvá, A. J., Plaza, L. (2010). *Verbena*. In Morales, R., Quintanar, A., Cabezas, F., Pujadas, A. J., Cirujano, S. (Eds.), *Flora iberica*, vol. 12 (pp. 13–21). Madrid: Real Jardín Botánico, CSIC. liv + 650 pp.
- Pupo-Correia, A., Menezes de Sequeira, M., Tadeu Aranha, J. (2020). Fallen from grace: From cherished garden dwellers to invasive species. The story of two garden-escaped vines in Madeira Island. *Revista Scientia Insularum*, 3: 155–162. <https://doi.org/10.25145/j.SI.2020.03.10>
- Pyšek, P., Richardson, D. M., Rejmánek, M., Webster, G. L., Williamson, M., Kirschner, J. (2004). Alien plants in checklists and floras: Towards better communication between taxonomists and ecologists. *Taxon*, 53(1): 131–143. <https://doi.org/10.2307/4135498>
- Quesada, J., Salazar Mendiá, C., Pastor Díaz, J. E. (2007). 135. *Rumex cristatus* DC. (Polygonaceae) especie exótica en Andalucía (S. España). *Lagascalia*, 27(1): 416–417. <https://dialnet.unirioja.es/servlet/articulo?codigo=7422601>
- Raus, T. (2022). Taxonomic, nomenclatural and floristic review of Amaranthaceae of Greece and neighbouring countries. *Willdenowia*, 52(3): 335–357. <https://doi.org/10.3372/wi.52.52304>
- Razifard, H., Tucker, G. C., Les, D. H. (2016). *Elatine*. In Flora of North America Editorial Committee (Ed.), *Flora of North America north of Mexico*, vol. 12 (pp. 349–353). New York: Oxford University Press. xxiv + 603 pp.
- Recasens, J., Conesa, J.A. (2011). Presencia de la mala hierba *Amaranthus palmeri* en el NE de la Península Ibérica. Una amenaza como potencial invasora de cultivos extensivos de regadió. *Boletín de Sanidad Vegetal Plagas*, 37: 129–132.
- Reisch, B. I., Owens, C. L., Cousins, P. S. (2012). Grape. In Badenes, M. L., Byrne, D. H. (Eds.), *Fruit breeding* (pp. 225–262). Boston: Springer. 875 pp. https://doi.org/10.1007/978-1-4419-0763-9_7
- Rhodes, A. C., Plowes, R. M., Goolsby, J. A., Gaskin, J. F., Musyoka, B., Calatayud, P-A., Cristofaro, M., Grahmann, E. D., Martins, D. J., Gilbert, L. E. (2021). The dilemma of Guinea grass (*Megathyrsus maximus*): A valued pasture grass and a highly invasive species. *Biological Invasions*, 23: 3653–3669. <https://doi.org/10.1007/s10530-021-02607-3>
- Rhodes, A. C., Plowes, R. M., Martins, D. J., Ng'lru, I., Gilbert, L. E. (2022). The invasiveness of Guinea grass (*Megathyrsus maximus*) is characterized by habitat and differing herbivore assemblages in its native and invaded range. *NeoBiota*, 78: 25–44. <https://doi.org/10.3897/neobiota.78.87069>
- Rocha Afonso, M. L. (1990). *Casuarina*. In Castroviejo, S., Laínz, M., López González, G., Montserrat, P., Muñoz Garmendia, F., Paiva, J., Villar, L. (Eds.), *Flora Iberica*, vol. 2 (pp. 50–52). Madrid: Real Jardín Botánico, CSIC. lii + 897 pp.

- Rosman, A. J., Razifard, H., Tucker, G. C., Les, D. H. (2016). New records of *Elatine ambigua* (Elatinaceae), a nonindigenous North American species. *Rhodora*, 118(974): 235–242. <https://doi.org/10.3119/15-30>
- Sánchez-Gullón, E., Devesa, J. A., Muñoz Rodríguez, A. (2021). *Eragrostis*. In Devesa Alcaraz, J. A., Romero Zarco, C., Buiria Clua, A., Quintanar, A., Acedo, C. (Eds.), *Flora Iberica*, vol. 19(2) (pp. 1313–1329). Madrid: Real Jardín Botánico, CSIC. xx + 756 pp.
- Sánchez-Gullón, E., Peña-Ramos, J. F. (2022). Aportación al conocimiento de especies de casuarinas cultivadas, adventicias o naturalizadas en la provincia de Huelva (SW España). *Folia Botanica Extremadurensis*, 16: 47–54. <https://dialnet.unirioja.es/servlet/articulo?codigo=8964202>
- Sanz-Elorza, M., Dana, E. D., Sobrino, D. (2006). *Atlas de las plantas alóctonas invasoras de España*. Madrid: Dirección General para la Biodiversidad. 378 pp.
- Sanz Elorza, M., Sobrino Vesperinas, E. (2012). *Physalis*. In Talavera, S., Andrés, C., Arista, M., Fernández Piedra, M. P., Gallego, M. J., Ortiz, P. L., Romero Zarco, C., Salgueiro, F. J., Silvestre, S., Quintanar, A. (Eds.), *Flora Iberica*, vol. 11 (pp. 204–209). Madrid: Real Jardín Botánico, CSIC. xlviii + 672 pp.
- Schmidt-Lebuhn, A. N., Egli, D., Greal, A., Nicholls, J. A., Zwick, A., Dymock, J. J., Gooden, B. (2024). Genetic data confirm the presence of *Senecio madagascariensis* in New Zealand. *New Zealand Journal of Botany*, 62(1): 1–13. <https://doi.org/10.1080/0028825X.2022.2148544>
- Schmidt-Lebuhn, A. N., Egli, D., Greal, A., Gooden, B. (2025). Phylogenomics and genetic admixture of the invasive fireweed complex (*Senecio inaequidens* – *Senecio madagascariensis*) at a global scale. *Biological Invasions*, 27: 243. <https://doi.org/10.1007/s10530-025-03704-3>
- Seebens, H., Bacher, S., Blackburn, T. M., Capinha, C., Dawson, W., Dullinger, S., Genovesi, P., Hulme, P. E., van Kleunen, M., Kühn, I., Jeschke, J. M., Lenzner, B., Liebhold, A. M., Pattison, Z., Pergl, J., Pyšek, P., Winter, M., Essl, F. (2021). Projecting the continental accumulation of alien species through to 2050. *Global Change Biology*, 27(5): 970–982. <https://doi.org/10.1111/gcb.15333>
- Seebens, H., Essl, F., Dawson, W., Fuentes, N., Moser, D., Pergl, J., Pyšek, P., van Kleunen, M., Weber, E., Winter, M., Blasius, B. (2015). Global trade will accelerate plant invasions in emerging economies under climate change. *Global Change Biology*, 21(11): 4128–4140. <https://doi.org/10.1111/gcb.13021>
- Silvestre, S. (2012). *Ipomoea*. In Talavera, S., Andrés, C., Arista, M., Fernández Piedra, M. P., Gallego, M. J., Ortiz, P. L., Romero Zarco, C., Salgueiro, F. J., Silvestre, S., Quintanar, A. (Eds.), *Flora Iberica*, vol. 11 (pp. 279–286). Madrid: Real Jardín Botánico, CSIC. xlviii + 672 pp.
- Simon, B. K., Jacobs, S. W. L. (2003). *Megathyrsus*, a new generic name for *Panicum* subgenus *Megathyrsus*. *Austrobaileya*, 6(3): 571–574. <https://www.jstor.org/stable/41739005>
- Simons, E. L. A. N., Wieringa, J. J., Gonggrijp, S. (2020). *Eleocharis ovata* and its alien allies in the Netherlands. *Gorteria Dutch Botanical Archives*, 42(1): 28–35. <https://natuurtijdschriften.nl/pub/712520>
- Siverio Núñez, A., Sobrino Vesperinas, E., Rodríguez de la Torre, H. A., Reyes-Betancort, J. A., Santos Guerra, A. (2013). Nuevos xenófitos de elevada capacidad invasora para la flora canaria. *Botánica Macaronésica*, 28: 165–173. <https://dialnet.unirioja.es/servlet/articulo?codigo=4699731>
- Sobrino Vesperinas, E., Sanz Elorza, M. (2012). *Solanum*. In Talavera, S., Andrés, C., Arista, M., Fernández Piedra, M. P., Gallego, M. J., Ortiz, P. L., Romero Zarco, C., Salgueiro, F. J., Silvestre, S., Quintanar, A. (Eds.), *Flora Iberica*, vol. 11 (pp. 166–195). Madrid: Real Jardín Botánico, CSIC. xlviii + 672 pp.
- Sohrabi, S., Yazlık, A., Bazos, I., Gharekhloo, J., Kati, V., Kitiş, Y. E., Arianoutsou, M., Kortz, A., Pyšek, P. (2025). Alien species of *Ipomoea* in Greece, Türkiye and Iran: Distribution, impacts and management. *NeoBiota*, 97: 135–160. <https://doi.org/10.3897/neobiota.97.131827>
- Soto, I., Oficialdegui, F. J., Bedmar, S., Capinha, C., Sousa, R., García-Berthou, E., Mendes Muniz, C., Oscoz, J., Cano-Barbacil, C., Anastácio, P. M., Angulo, E., Arnanz, C., Florencio, M., Kouba, A., Miranda, R., Oliva-Paterna, F. J., Ribeiro, F., López-Pujol J., Dalmau, M., Pladevall, C., Porto, M., Haubrock, P. J., Briski, E. (2025). Over 1200 non-native species are established in the Iberian Peninsula. *Diversity and Distributions*, 31(8): e70071. <https://doi.org/10.1111/ddi.70071>

- Sramkó, G., Molnár, V. A., Tóth, J. P., Laczkó, L., Kalinka, A., Horváth, O., Skuza, L., Lukács, B. A., Popiela, A. (2016). Molecular phylogenetics, seed morphometrics, chromosome number evolution and systematics of European *Elatine* L. (Elatinaceae) species. *PeerJ*, 4: e2800. <https://doi.org/10.7717/peerj.2800>
- Starr, F., Starr, K., Loope, L. (2003). New plant records from the Hawaiian Archipelago. *Bishop Museum Occasional Papers*, 74: 23–34.
- Sukhorukov, A. P., Wen, Z., Krinitsina, A. A., Fedorova, A. V., Verloove, F., Kushunina, M., Léger, J-F., Chambouleyron, M., Tanji, A., Sennikov, A. N. (2025). A revised taxonomy of the *Bassia scoparia* complex (Camphorosmoideae, Amaranthaceae s.l.) with an updated distribution of *B. indica* in the Mediterranean region. *Plants*, 14(3): 398. <https://doi.org/10.3390/plants14030398>
- Talhinhas, P., Ferreira, J. d. C., Ramos, A. P., Soares, A. L., Espírito-Santo, D. (2025). Reservoirs of biodiversity: Gardens and parks in Portugal show high diversity of ivy species. *Plants*, 14(16): 2486. <https://doi.org/10.3390/plants14162486>
- This, P., Lacombe, T., Thomas, M. R. (2006). Historical origins and genetic diversity of wine grapes. *Trends in Genetics*, 22(9): 511–519. <https://doi.org/10.1016/j.tig.2006.07.008>
- Tippary, N. P., Abbott, K. M., Leliaert, F., Wefferling, K. M., Franck, A. R., Forbes, H. (2026). Phylogenetic relationships and molecular identification of *Hydrocotyle* species in North America (Araliaceae). *Plant Systematics and Evolution*, 312: 7. <https://doi.org/10.1007/s00606-025-01977-8>
- Tison, J-M., de Foucault, B. (coord.) (2014). *Flora Gallica: Flore de France*. Mèze: Editions Biotope. xx + 1196 pp.
- Torra, J., Royo-Esnal, A., Romano, Y., Osuna, M. D., León, R. G., Recasens, J. (2020). *Amaranthus palmeri* a new invasive weed in Spain with herbicide resistant biotypes. *Agronomy*, 10(7): 993. <https://doi.org/10.3390/agronomy10070993>
- Verloove, F. (2003). *Physalis ixocarpa* Brot. ex Hornem. and *Verbena litoralis* Kunth, new Spanish xenophytes and records of other interesting alien vascular plants in Catalonia (Spain). *Lazaroa*, 24: 7–11. https://www.researchgate.net/publication/27591176_Physalis_ixocarpa_Brot_ex_Hornem_and_Verbena_litoralis_Kunth_new_Spanish_xenophytes_and_records_of_other_interesting_alien_vascular_plants_in_Catalonia_Spain
- Verloove, F. (2005a). New records of interesting xenophytes in Spain. *Lazaroa*, 26: 141–148. https://www.researchgate.net/publication/27590381_New_records_of_interesting_xenophytes_in_Spain
- Verloove, F. (2005b). A synopsis of *Jarava* Ruiz & Pav. and *Nassella* (Trin.) E.Desv. (*Stipa* L. s.l.) (Poaceae: Stipeae) in southwestern Europe. *Candollea*, 60: 97–117. <https://doi.org/10.5169/seals-879266>
- Verloove, F. (2006). Exotic grasses running wild: *Megathyrsus maximus* var. *pubiglumis* (Poaceae, Paniceae) – new to Spain. *Bouteloua*, 1: 55–60. https://www.researchgate.net/publication/28136539_Exotic_grasses_running_wild_Megathyrsus_maximus_var_pubiglumis_Poaceae_Paniceae_new_to_Spain
- Verloove, F. (2011). *Verbena incompta* (Verbenaceae), an overlooked xenophyte in Europe. *Willdenowia*, 41: 43–49. <https://doi.org/10.3372/wi.41.41104>
- Verloove, F. (2014). A conspectus of *Cyperus* s.l. (Cyperaceae) in Europe (incl. Azores, Madeira and Canary Islands), with emphasis on non-native naturalized species. *Webbia*, 69(2): 179–223. <https://doi.org/10.1080/00837792.2014.975013>
- Verloove, F. (2015). *Eleocharis engelmannii* and *E. obtusa* (Cyperaceae), two recent acquisitions from sect. Ovatae in Belgium. *Dumortiera*, 107: 25–30. https://www.researchgate.net/publication/283086127_Eleocharis_engelmannii_and_E_obtusa_Cyperaceae_two_recent_acquisitions_from_series_Ovatae_in_Belgium
- Verloove, F. (2026a). *Amaranthus palmeri*. *Manual of the alien plants of Belgium*. Botanic Garden Meise. Available online: <https://alienplantsbelgium.myspecies.info/content/amaranthus-palmeri> [Accessed: 24 February 2026].
- Verloove, F. (2026b). The North American weed *Amaranthus tuberculatus* (Amaranthaceae) new to Portugal: Previously overlooked or rapidly spreading? *Acta Botanica Croatica*, 85(1): 48–54. <https://doi.org/10.37427/botcro-2026-010>
- 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. https://www.researchgate.net/publication/311671264_New_vascular_plant_records_for_the_western_part_of_the_Iberian_Peninsula_Portugal_and_Spain

- Verloove, F., Aymerich, P. (2020). Chorological novelties for the alien flora of northeastern Catalonia (Iberian Peninsula). *Butlletí de la Institució Catalana d'Història Natural*, 84: 137–153. <https://www.raco.cat/index.php/ButlletilCHN/article/view/384517>
- Verloove, F., Heyneman, G. (2021). A note on some alien species of *Hydrocotyle* (Araliaceae) in Belgium. *Dumortiera*, 117: 26–29. <https://doi.org/10.5281/zenodo.4541037>
- Verloove, F., Sánchez-Guillón, E. (2008). New records of interesting xenophytes in the Iberian Peninsula. *Acta Botanica Malacitana*, 33: 147–167. <https://doi.org/10.24310/abm.v33i0.6978>
- Verloove, F., Sánchez Gullón, E. (2012). New records of interesting vascular plants (mainly xenophytes) in the Iberian Peninsula. II. *Flora Mediterranea*, 22: 5–23. <https://doi.org/10.7320/FIMedit22.005>
- Verloove, F., Gonçalves Silva, J. J., Leliaert, F. (2024). Critical notes on grasses (Poaceae) of Madeira, Portugal. *Phytotaxa*, 670(1): 1–17. <https://doi.org/10.11646/phytotaxa.670.1.1>
- Wagner, W. L., Herbst, D. R., Sohmer, S. H. (1999). *Manual of the flowering plants of Hawaii* (Revised edition). Honolulu: University of Hawai'i Press and Bishop Museum Press. xviii + 1918 pp.
- Walter, J., Dobeš, C. (2003). Morphological characters, geographic distribution and ecology of neophytic *Amaranthus blitum* L. subsp. *emarginatus* in Austria. *Annalen des Naturhistorischen Museums in Wien. Serie B, Botanik und Zoologie*, 104: 645–672. https://verlag.nhm-wien.ac.at/pdfs/105B_645672_Walter.pdf
- Wheeler, G. S., Taylor, G. S., Gaskin, J. F., Purcell, M. F. (2011). Ecology and management of sheoak (*Casuarina* spp.), an invader of coastal Florida, U.S.A. *Journal of Coastal Research*, 27: 485–492. <https://doi.org/10.2112/JCOASTRES-D-09-00110.1>