

244. NEW RECORDS OF ALIEN VASCULAR PLANT SPECIES IN MAINLAND PORTUGAL

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Novos registos de plantas vasculares exóticas em Portugal continental

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The expansion of invasive alien plants is a main threat to the Portuguese native flora and is also becoming a severe environmental problem (Almeida & Freitas (2001). Over the last decade, several checklist reviews of the alien flora in mainland Portugal have been produced and new alien species have been regularly reported (Almeida & Freitas 2001, 2006, 2012, Alves & Aguiar 2009, Sánchez Gullón *et al.* 2010, Silva *et al.* 2012, Verloove & Sánchez Gullón 2012, Smith *et al.* 2015,).

Preventing introduction of potentially invasive alien species is by far the preferred strategy to deal with this problem, and so, every alien species should be treated as potentially invasive unless and until convincing evidence indicates that this is not so. An important first step in prevention is to identify those alien species that may become invasive and therefore require special attention (McNeely *et al.* 2001).

This work aims to contribute to the early detection and report of new alien plants in mainland Portugal and to evaluate their potential invasive behaviour. It compiles data from several field observations made between 2010 and 2015. The locations were marked in the field with a hand-held GPS receiver (Garmin Oregon 450) and samples were collected for identification. Herbarium specimens were stored in the Herbariums of Universidade de Lisboa (LISU), Universidade do Algarve

(ALGU) and Universidade de Coimbra (COI). The works of Almeida & Freitas (2001, 2006, 2012), the Checklist of Portuguese Flora (Sequeira *et al.*, 2011) and the website of DAISIE Project (2015) were used as references to assess previous species reporting in mainland Portugal. Two new alien plants are reported as naturalized or sub spontaneous in mainland Portugal:

Cirsium scabrum (Poirlet) Bonnet & Barratte
Portugal, Beira Litoral (BL), Coimbra, Alto de São João. UTM 29TNE54: in a wasteland. André Carapeto, 19-06-2014, LISU 262290.

Portugal, Beira Litoral (BL), Coimbra, Antanho, Ladeira da Paula. UTM 29TNE44: in a wasteland. André Carapeto, 24-06-2014, ALGU 14425.

This plant is a tall biennial thistle, forming a rosette of basal leaves and a flowering stem up to 250 cm long. Endemic to the Mediterranean basin, it occurs from southern Spain to southern Italy, including the islands of Sardinia and Sicily and is also present in Northern Africa. Reported as introduced in California (USDA, 2016), the species is found in ruderal plant communities, colonizing roadsides and other disturbed places and, over temporary humid grounds and acidic soils (Blanca & Quesada, 2009).

This species was firstly observed by the author in 2011, a small subpopulation with

30-40 individuals in a disturbed wasteland inside the city of Coimbra. In 2016, only 15 flowering individuals were counted in this subpopulation. In 2012 another population of 10-20 individuals was found in an abandoned grove, in Antanol, near Coimbra. The number of individuals remained stable in 2016. A third subpopulation, with only three individuals, was observed on a road slope near Antanol in 2014, but has not been seen since then. All three records were within a 7 km range and, in all locations, the species was found in plant communities dominated by synantropic vegetation, along with several other alien species, such as *Ailanthus altissima* (Miller) Swingle, *Ipomoea indica* (Burm.) Merr. and *Arundo donax* L.

Although this species is native from the Mediterranean basin, the Portuguese populations are unlikely to be native, since there is a very large geographical distance from the nearest records, found in the Cádiz province (southern Spain), circa 400km to Southeast (Anthos 2014, Talavera, 1987, Blanca & Quesada, 2009). Since it is a very conspicuous species, it is unlikely to have been previously unrecorded by Portuguese botanists in such an explored territory as the Coimbra surroundings, making it plausible that an accidental introduction may have occurred in the recent years. The occurrence of three small naturalized subpopulations suggests that this plant is probably expanding in the region, along the IC2 road corridor, and should be eradicated to avoid its spreading.

Jacobaea erucifolia* subsp. *praealta (Bertol.) Greuter & B. Nord.

Syn: *Senecio erucifolius* subsp. *praealtus* (Bertol.) Fiori = *Senecio praealtus* Bertol.

Portugal, Beira Litoral (BL), Coimbra, Casal dos Vagares. UTM 29TNE54: In herbaceous formations along a road margin. André Carapeto, 28-01-2015. COI00075070

Jacobaea erucifolia (L.) G. Gaertn., B. Mey. & Scherb. is a perennial herbaceous plant

up to 120 cm tall, with a vast distribution in Europe and Asia (from Asia Minor to Siberia), and reportedly introduced in North America (Konechnaya, 2002). *Jacobaea erucifolia* subsp. *praealta* is a subspecies endemic to Southwestern Europe, present in Spain and Italy, but previously unrecorded in Portugal¹. It differs from the other subspecies in having 2-pinnatisect lower leaves (Iamónico & Managlia, 2015).

This plant was collected by the author in herbaceous formations along a road margin, inside the city of Coimbra. Although it is unclear if this species is truly an alien since it is found at several locations in Spain near the northern Portuguese border, this occurrence at least is very likely not to be native. Only two individuals were observed, and this appears to be an occasional naturalization resulting from the use of seed mixtures for gardening purposes. However, since there are non-confirmed reports that this species was also detected at other locations in Beira Litoral region (Miguel Porto, pers. comm. 2014), monitoring is advisable to understand if these records represent the early stages of a colonization process.

New locations are reported for five other alien species, representing chorological news:

Cestrum parqui (Lam.) L'Hér.

Portugal, Baixo Alentejo (BAI), Grândola, Carvalhal, Tróia. UTM 29SNC06: In anthropic sandy soils with *Retama monosperma* thickets. André Carapeto, 29-04-2013, ALGU 14426.

This plant is an erect, perennial shrub up to 3 m high, widely used in gardening due to its conspicuous yellow flowers and evergreen foliage. It is native to South America, but reported to have been introduced in Western Europe - Italy, France, Spain and Portugal (DAISIE, 2015) - Africa, United States of America and Australia. It is mainly found along riparian vegetation, roadsides and other disturbed or abandoned sites (Global Invasive Species Database 2015).

The species was already reported as present in mainland Portugal, in the surroundings of the botanical garden of Coimbra (Almeida & Freitas 2006). It was also found in Tróia peninsula, colonizing a clearing of *Retama monosperma* (L.) Boiss thickets, over anthropic sandy soils. In this location the plant forms a mat, about a 1 m tall, which covers *c.a.* 9 m². Since 2009, when the author first observed it, this mat seems to be stable or just slightly spreading. No seedlings have been found in the surroundings, suggesting that this may be a casual naturalization and the plant although able to survive and grow, is unable to propagate. Due to its potential for invasive behaviour, as reported in Australia (Global Invasive Species Database 2015), it is advisable to eradicate the species as soon as possible.

Elaeagnus angustifolia L.

Portugal, Baixo Alentejo (BAL), Grândola, Carvalhal, Tróia. UTM 29SNC05: In secondary dunes, near humanized areas. André Carapeto, 28-04-2014. COI 00075065, COI 00075069.

The russian olive (*Elaeagnus angustifolia*) is a deciduous shrub or small tree, native to central and western Asia and reaching south-eastern Europe. Within its native range it occurs primarily on coastal dunes, riparian areas and other relatively moist habitats (Global Invasive Species Database 2015). It is widely used as a garden plant, especially in coastal areas since it can tolerate maritime exposure. The species is naturalized in Europe and North America and reported as invasive in several countries (*e.g.* United States of America, Belgium) (Global Invasive Species Database 2015).

In Portugal, the species was previously reported in the archipelagos of Madeira and Azores, but not in mainland Portugal (Sequeira *et al.* 2011). It is now reported as sub spontaneous in Tróia peninsula, where it occurs in shrub formations colonizing disturbed dune ridges, with *Retama monosperma* (L.)

Boiss, *Rhamus alaternus* L. and *Ononis ramosissima* Desf.. Only 6-7 individuals were found in 2009, and that number apparently remained stable until 2015. The presence of these individuals is likely to result from intentional introduction, since a beach resort once existed near this area and the species is frequently used for landscaping in coastal areas. Flower and fruit production were observed, as well as sprouting from the root, showing that several reproductive mechanisms are functional in this population. Since this species presents invasive behaviour in other countries and once established is difficult to control and nearly impossible to eradicate (Global Invasive Species Database 2015), it is advisable to eradicate this population while it is still feasible due to the small number of individuals.

Eragrostis curvula (Schrader) Nees

Portugal, Ribatejo (R), Benavente, Samora Correia, Herdade da Vargem Fresca. UTM 29SNC29: Along the margins of the road N119, on sandy soils. André Carapeto, 24-04-2014, ALGU 14418.

The weeping lovegrass (*Eragrostis curvula*) is a large perennial caespitose grass, native to South and East Africa (Romero Zarco & Charpin, 1986), but reported as introduced in several world regions, including Australia, North America, East Asia and the Iberian Peninsula (DAISIE 2015, Gucker 2009).

In mainland Portugal this species reported to occur in Estremadura (Romero Zarco & Charpin, 1986), Alto Alentejo (Verloove & Sánchez Gullon 2012, Romero Zarco 2015) and in the northern half of the Southwestern coast (Franco & Rocha Afonso, 1998). This plant was found and collected in Vargem Fresca – Benavente (Ribatejo), in a roadside, on sandy soil slightly humid and disturbed. In an additional note, during 2014, several populations of this grass were observed by the author along several roadsides between Setúbal (Estremadura) and Santarém (Ribatejo), and

near São Miguel de Machede (Alto Alentejo). Also, additional observations throughout the country have been recently reported (Miguel Porto, Carlos Aguiar, pers. comm. 2014). All these observations suggest that this species is rapidly expanding in mainland Portugal, probably enhanced by regular vegetation cuts along roadsides. This hypothesis should be assessed through regular monitoring and prospection of the species at national level. If confirmed, measures to control its expansion should be taken.

***Lagarosiphon major* (Ridl.) Moss**

Portugal, Baixo Alentejo (BAI), Odemira, São Teotónio, Delfeira. UTM 29SNB24: In an artificial pond. André Carapeto, 03-05-2015, COI 00075067.

Lagarosiphon major is a rhizomatous, perennial, submerged aquatic plant which inhabits freshwater lakes, dams and slow-current streams and forms dense submerged mats (Global Invasive Species Database, 2015). This plant is native to Southern Africa, but presents an invasive behaviour in several parts of the world, replacing native vegetation and propagating through vegetative fragments (MacGregor & Gourelay, 2002). It is reported as naturalized in several European countries, namely in Germany, Belgium, France, Switzerland, Austria, Italy, Ireland and United Kingdom and also in Australia, New Zealand and United States of America (DAISIE 2015, Global Invasive Species Database 2015).

In mainland Portugal this species was first detected in 2010, in Odeleite, Eastern Algarve (Sánchez Gullon *et al.* 2010). In 2013 this species was detected near São Teotónio (Baixo Alentejo), colonizing two artificial ponds, distant *c.a.* 1300 m. In both locations the plant was dominant in the central area of the pond, forming dense mats just below the water surface. In 2015 some samples were collected and several other artificial ponds were surveyed in the proximity, but the species was not found elsewhere. Although flowering was observed,

neither fruits nor seeds have been recorded, as already reported for other countries outside its native range (Global Invasive Species Database 2015). It is unclear whether this species was introduced intentionally due to its value as an ornamental plant in aquascaping, or as an accidental introduction by migratory birds from Africa. Due to its invasive behaviour reported in other countries (DAISIE 2015, Global Invasive Species Database 2015), eradication of these two subpopulations (Odeleite and São Teotónio) is advisable since they are still confined to a small area.

***Lilium candidum* L.**

Portugal, Algarve (AG), Albufeira, Paderne, Castelo de Paderne. UTM 29SNB71: in carob tree orchards. André Carapeto, 24-04-2014. COI00075062

The Madonna lily (*Lilium candidum*) is a bulbous geophyte, with large white flowers, native from eastern Mediterranean basin, ranging from the Balkans to Palestine but naturalized all around the Mediterranean (Güemes, 2013). This species was already known in Portugal since 1804 (Almeida & Freitas, 2012), from Estremadura and Trás-os-Montes regions (Güemes, 2013).

The species was found in central Algarve, near Castelo de Paderne, in two different locations, distant *c.a.* 1 km. Its presence in Algarve expands the species distribution range in Portugal much further south. In both locations the species was found naturalized in orchards of carob tree, over *terra rossa* rocky soils. The two subpopulations occupy a very small area (<100m²), and have an estimated total of 100-300 individuals (100-250 individuals in one subpopulation and less than 50 in the other). The larger population was firstly recorded by the author in 2006 and seems to be stable since then. The smaller population was only found in 2014 and there is no information regarding population trends. These two subpopulations should be regularly

monitored and the surrounding areas should be surveyed in order to evaluate a possible expansion of the species.

The detection of an alien species in its early stages of naturalization is crucial to evaluate the potential for invasive behaviour and to promote an immediate response, which will be more cost-effective and more likely to succeed than after the species has become well established (McNeely *et al.* 2001).

This paper identifies eight alien species in mainland Portugal that are believed to be in the process of naturalization or in early stages of invasion. For the species with invasive behaviour reported in other countries and that were found in small populations or very restricted occurrence areas, such as *Lagarosiphon major*, *Cirsium scaber*, *Elaeagnus angustifolia* and *Cestrum parqui*, it is advisable to proceed to eradication as soon as possible, while the actions are still likely to be well succeeded and to have small costs. For *Eragrostis curvula*, a more widely distributed species that is believed to be rapidly expanding along roadsides, a national survey is needed before deployment of effective control measures, since eradication is no longer viable. For species not reported as invasive in other countries such as *Jacobaea erucifolia* subsp. *praealta* and *Lilium candidum* it is advisable to proceed to regular monitoring of populations demographics and to surveying the surroundings of their occurrence areas, in order to gather the necessary data to evaluate whether each one is in fact naturalized and if so, expanding or not.

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