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First record of the Rose Evening Primrose *Oenothera rosea* L' Hér. ex Aiton (Onagraceae) on the island of Madeira (Portugal)

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With 5 figures

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ABSTRACT: *Oenothera rosea* L' Hér. ex Aiton is reported for the first time for the island of Madeira. In Portuguese territories, nine *taxa* of the genus *Oenothera* L. (Onagraceae) are recorded. The species *Oenothera rosea* is present in mainland Portugal and in the Azores, as well as in the Canary Islands (Spain) and in the archipelago of Cape Verde (Republic of Cabo Verde). Similar to what is happening in other parts of the world, the presence of *O. rosea* on the island of Madeira, as well as other species introduced and properly reported over the last 10 years as naturalized, may pose a new potential threat to endemic flora and vegetation.

Key words: *Oenothera*, Onagraceae, new record, Madeira.

RESUMO: É assinalada pela primeira vez na ilha da Madeira, a ocorrência da espécie *Oenothera rosea* L' Hér. ex Aiton. Em território português, estão assinalados nove *taxa* do género *Oenothera* L. (Onagraceae). A espécie *Oenothera rosea* está presente em Portugal Continental e no arquipélago dos Açores, assim como nos arquipélagos das Canárias e de Cabo Verde. À semelhança do que está a acontecer noutras partes do mundo, a presença de *O. rosea* na ilha da Madeira, tal como de outras espécies introduzidas e devidamente assinaladas nos últimos 10 anos como naturalizadas, pode implicar uma potencial nova ameaça para a flora e vegetação endémicas.

Palavras-chave: *Oenothera*, Onagraceae, novo registo, Madeira.

INTRODUCTION

The archipelago of Madeira is located in the North Atlantic, approximately 630 km northwest from the West African coast (Casablanca, Morocco) and 900 km southwest from Europe (Lisbon, Portugal). It comprises the islands of Madeira, Porto Santo and the Desertas and together with the Selvagens, Canary Islands, Azores and Cape Verde archipelagos, makes up the biogeographical zone of Macaronesia. The Madeira climate is Mediterranean and deeply influenced by the northeast trade wind system, with weather conditions varying considerably between the south and north coasts and according to altitude. This climate, along with the high volume of traffic in people and goods that the island experiences, means the island is very vulnerable to new introductions of alien species.

The flora of the archipelagos of Madeira and Selvagens, according to MENEZES DE SEQUEIRA update (*pers. comm.*, 2018), comprises 1,268 *taxa* of vascular plants (species and subspecies). Of these, 29 *taxa* are 'possible introduced' and 402 to 441 *taxa* are 'introduced'.

The willowherb or evening primrose family (Onagraceae) totals ten *taxa*, native and introduced, in the archipelago of Madeira (TURLAND, 1994; JARDIM & SEQUEIRA, 2008). Besides these, *Oenothera fruticosa* L. is also present on the island of Madeira, as ornamental, according to QUINTAL (2007).

One hundred and twenty-one species of the genus *Oenothera* occurs in open, often disturbed habitats in temperate to subtropical areas of North, Central, and South America, with the centre of diversity in southwest North America (RAVEN, 1981; EFLORAS, 2019).

In Portugal, MENEZES DE SEQUEIRA *et al.* (2012) recognise nine *taxa* belonging to the genus *Oenothera*, including the species *O. rosea* L' Hér. ex Aiton occurring, as introduced and naturalized, in mainland Portugal (FRANCO, 1971; DOMINGUES DE ALMEIDA & FREITAS, 2006) and in the Azores (islands of Flores, Faial, Pico, Terceira, São Miguel and Santa Maria) (PALHINHA, 1966; ROSTANSKI, 1992; HANSEN & SUNDING, 1993; SCHÄFER, 2005; SILVA *et al.*, 2010). Until the present, this species hasn't been recorded for the island of Madeira (LOWE, 1831, 1856, 1864; MENEZES, 1894, 1899, 1905, 1914, 1922a, 1922b, 1926a, 1926b, 1927; ERIKSSON *et al.*, 1979; HANSEN & SUNDING, 1993; SHORT, 1994; VIEIRA, 2002 and JARDIM & SEQUEIRA, 2008).

Concerning the other Macaronesian Archipelagos, the species *O. rosea* L' Hér. ex Aiton has been introduced in the Canary Islands and is present on the islands of La Palma, Tenerife, Gran Canaria, Fuerteventura and Lanzarote (HANSEN & SUNDING, 1993; ACEBES GINOVÉS *et al.*,

2010). In the archipelago of Cape Verde, it was introduced and occurs on the island of Santo Antão (HANSEN & SUNDING, 1993; SÁNCHEZ-PINTO *et al.*, 2005).

MATERIAL AND METHODS

The specimens of *Oenothera rosea* L' Hér. ex Aiton reported herein were identified according to RAVEN (1981); DIETRICH (1997), SCHÄFER (2005) and GARCÍA (2016), and are deposited in the herbarium of the Natural History Museum of Funchal (MADM). Coordinates were obtained using Garmin GPSMAP 78 series GPS and plotted in Google Earth (Fig. 1).

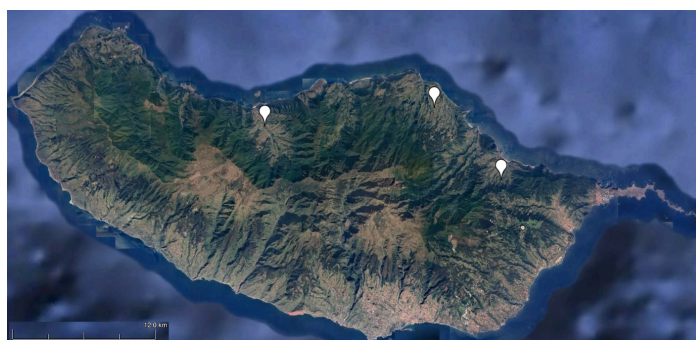


Fig. 1 – Geographical locations where *Oenothera rosea* L' Hér. ex Aiton was collected on the island of Madeira.

Studied material

Oenothera rosea L' Hér. ex Aiton, Hort. Kew. 2: 3. 1789.
Sect. Hartmannia (Spach) Endl.

Portugal, Madeira:

On road to chapel of São Francisco de Borja, Cruz da Guarda, Porto da Cruz, Machico, 26.VII.2019, João Ferreira *leg.*, 32° 45' 15.5" N 16° 49' 38.3 W (MADM 7108);

On a garden area along João Abel de Freitas Road, São Vicente, 31.VII.2019, Juan Silva & João Ferreira *leg.*, 32° 47' 42.7" N 17° 02' 22.4" W, 92 m *a.s.l.* (MADM 7117);

On road to Queimadas, at roadside, Santana, 26.VIII.2019, Juan Silva *leg.*, 32° 48' 33.0" N 16° 53' 14.4" W, 339 m *a.s.l.* (MADM 7118).

General description

The following description is based on the one given by EFLORAS (2019):

Herbs ascending to decumbent, perennial, rhizomatous and sometimes suffrutescent from woody caudex, rarely with basal rosette. STEMS 7-65 cm, simple or branched, strigillose, sometimes with longer spreading hairs. LEAVES green, with inconspicuous veins, glabrous to sparsely strigillose; petioles 3-20 mm; basal blade 2-5 x 0.5-2 cm; cauline blade elliptic to oblanceolate or oblong-ovate, 1-6 x 0.4-2.5 cm, base attenuate, margin subentire to coarsely dentate, sometimes sinuate-pinnatifid at leaf base, apex acute to obtuse. INFLORESCENCE a lax open simple

raceme. FLOWERS open near sunrise; floral tube 4-10 mm. Sepals 5-10 mm, with free tips 0.4-1 mm. Petals pink to rose-purple, 5-12 mm. Anthers 2-3.5 mm; pollen ca. 50% fertile. Ovary usually densely strigillose; stigma surrounded by anthers. CAPSULES clavate or narrowly obovoid, 4-12mm, valves angled or weakly winged, attenuate to slender sterile stipe (pedicel) 5-20 mm. SEEDS in several indistinct rows per locule, brown with dark spot at each end, obovoid, 0.5-1.2 mm, finely papillose.

Flowering: V-XI. (Fig. 2A, B, C, D).



Fig. 2 – *Oenothera rosea* L' Hér. ex Aiton: A) general aspect; B) flower; C) leaves; D) flower and capsules.

Key for the Madeiran species of the genus *Oenothera* (adapted from SHORT, 1994 and EFLORAS, 2019):

- 1. Petals white, pink or purple; capsules clavate or obovoid, valves sharply angled, winged or ridged, pedicelled ----- 2
 Petals yellow, at least before fading; capsules cylindrical, unwinged, sessile ----- 3
- 2. Petals 16-38 mm, white, fading to rose-purple; sepals 16-32 mm; leaf margin weakly serrate to sinuate-pinnatifid, often with large terminal lobe ----- **tetraptera**
 Petals 5-12 mm, pink to rose purple; sepals 5-10 mm; leaf margin subentire to coarsely dentate, sometimes sinuate-pinnatifid at leaf base ----- **rosea**
- 3. Hypanthial tube 6-8(-10) cm; leaves densely pubescent ----- **longiflora**
 Hypanthial tube c.1 cm; leaves with ciliate margins, otherwise subglabrous ----- **stricta**

CONCLUSIONS

Several new introductions and consequent naturalizations were reported by HANSEN (e.g. 1968, 1969, 1970, 1971, 1973, 1974, 1978, 1987 and 1992) and compiled by VIEIRA (2002) during the second half of the last century. This new discovery adds to many others introduced *taxa* on the island of Madeira, that have been noticed in recent years, such as, *Solidago chilensis* Meyen, *Viburnum tinus* L., *Andryala integrifolia* L., *Billardiera heterophylla* (Lindl.) L. Cayzer & Crisp, *Cobaea scandens* Cav. and *Silene latifolia* Poir. subsp. *latifolia* (GONÇALVES SILVA *et al.*, 2008, 2009; FERREIRA *et al.*, 2011; BENEDITO & MENEZES DE SEQUEIRA, 2014; PUPO-CORREIA & MENEZES DE SEQUEIRA, 2014 and GONÇALVES SILVA & PAZ RÜBEN, 2016).

As indicated previously, the centre of diversity of the genus *Oenothera* is in southwest North America, from where its representatives have spread over time to several continents and islands either naturally (such as by the wind), or for the most part, introduced by man (such as being cultivated in gardens as ornamental plants, or by accident in ballast earth, corn seed, hay, fodder or other cargo) (ROSTANSKI, 1991). Nowadays, this genus represents one of a few genera alien to Central Europe whose representatives largely differ in their invasive success, from widespread to rare (MIHULKA *et al.*, 2003). According to DAISIE [Delivering Alien Invasive Species Inventories for Europe (<http://www.europe-aliens.org/>)], *Oenothera rosea* is a South American neophyte considered an alien species in Austria, Belgium, Italy, Sardinia and Sicilia (not established) and in the Azores, Balears, France, Portugal and Spain (established), while in Israel its alien status (established or not established) is unknown. *O. rosea* is first mentioned in northern Africa (Algeria) by HAMEL (2016). In South Africa, the rose evening primrose, has invaded grassland, mountain and coastal vegetation habitats (FREAN *et al.*, 1997).

The biology of *O. rosea* suggests a high potential for invasiveness; MEIYU *et al.* (2009) note its high reproductive and adaptive abilities, with it readily producing seed banks (the seed quantity of an individual plant reaches 2.6×10^5) and having small, light, round seeds that disperse up to 100 cm, with a germination rate reaching 85%. These qualities of *O. rosea* give it the possibility of invasiveness and installation in surrounding areas (as observed during our field work) to quickly become the single dominant species.

Despite being an invasive plant in some parts of the world, *O. rosea* has also been shown to have pharmacological potential. A large number of phytoconstituents have been

isolated and identified from different parts of this plant, showing its medicinal properties (KAUR *et al.*, 2017; MUNIR *et al.*, 2017 and CALVA-CANDELARIA *et al.*, 2018).

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