

A new species of *Cirsium* (Compositae) from Deserta Grande (Madeira Archipelago, Portugal)

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Abstract

A NEW SPECIES OF *CIRSIIUM* (COMPOSITAE) FROM DESERTA GRANDE (MADEIRA ARCHIPELAGO, PORTUGAL).— A new species of *Cirsium* (Cardueae, Compositae), *C. isambertoii* from Deserta Grande (Madeira Archipelago, Portugal) is described and illustrated. This new species is morphologically similar to *C. latifolium*, an endemic species from Madeira Island. The new proposed species differs from *C. latifolium* by the size of the plant (30 cm vs. 100 cm) and the shape of the leaves (deeply pinnatifid vs. broadly dentate). Due to the narrow distribution of *C. isambertoii* and the existing threats to its habitat such as the presence of feral goats, the species is assessed as Critically Endangered according to IUCN criteria and categories.

Key words: Asteraceae; Cardueae; *Cirsium*; Compositae; Desertas Islands; Madeira Archipelago; vascular plants.

Resumen

UNA NUEVA ESPECIE DE *CIRSIIUM* (COMPOSITAE) DE DESERTA GRANDE (ARCHIPIÉLAGO DE MADEIRA, PORTUGAL).— Una nueva especie de *Cirsium* (Cardueae, Compositae), *C. isambertoii* de la isla Deserta Grande (Madeira Archipiélago, Portugal) es descrita y fotografiada. Esta nueva especie es morfológicamente similar a *C. latifolium*, un endemismo de la Isla de Madeira. La nueva especie difiere de *C. latifolium* por el tamaño de la planta (30 cm vs. 100 cm) y la forma de las hojas (profundamente pinnatifidas vs. ampliamente dentadas). Debido a la escasa distribución de *C. isambertoii* y a las amenazas existentes para su hábitat, como la presencia de cabras asilvestradas, la especie se considera en peligro crítico según los criterios y categorías de la UICN.

Palabras clave: Archipiélago de Madeira; Asteraceae; Cardueae; *Cirsium*; Compositae; Islas Desertas; plantas vasculares.

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INTRODUCTION

The genus *Cirsium* Mill. (Cardueae Cass.) is one of the largest of the Compositae Giseke, comprising ca. 450 species distributed by Eurasia, North Africa and Northern and Eastern Africa (Moreyra *et al.*, 2023). Generic delimitation of *Cirsium* has been very controversial, and up to 16 genera have been segregated from the main core of the genus (see e.g. Ackerfield *et al.*, 2020; Del Guacchio *et al.*, 2022; Moreyra *et al.*, 2023). The lack of diagnostic morphological characters, the low resolution of the phylogenetic sequences used until recently and the large number of species have made it difficult to clarify the correct boundaries of the genus (Moreyra *et al.*, 2025). However, recent phylogenomic studies using NGS-phylogenies with the help of morphological data made possible an updated generic delimitation of the complex *Carduus-Cirsium* (Moreyra *et al.*, 2023).

The Desertas Islands (Ilhéu Chão, Deserta Grande and Bugio) are included within the Madeira Archipelago together with Madeira and Porto Santo islands. The entire archipelago is made up of islands of volcanic origin, included in the floristic region of Macaronesia and positioned in the Atlantic Ocean at approximately 520 km far northwest from Morocco in Africa and 400 km far north of Canary Islands (Fig. 1). Minimum distance between Madeira (Ponta de São Lourenço) and the Desertas Islands (Ilhéu Chão) is nearly 20 km (Fig. 1). This proto-archipelago originated about 65 Ma; of the present islands, Porto Santo is the oldest one at 18.8–10.2 Ma; Madeira is 7.0–5.6 Ma; and the Desertas are more recent, between 5.07 to 1.93 Ma (Mata *et al.*, 2013).

The Desertas Islands have a NNW-SSE orientation and are very elongated and steep. Altogether they cover an area of ca. 14 km² and the largest island (Deserta Grande) is 10.3 km², with a length of 11.7 km and maximum width of 1.9 km. It has the highest altitude of all the Desertas Islands, Rocha do Barbusano (479 m a.s.l.). The islands are composed mainly by basaltic rocks, with a relative arid climate, mean annual precipitation being < 400 mm (Caldeira & Sangrà, 2012) and an annual rainfall greatly variable (Costa Neves *et al.*, 1992). The areas of the islands and the distance between them have been modified over time by eustatic movements of the sea level during some geological periods, especially during the glaciations (García-Talavera, 1999; Fernández-Palacios *et al.*, 2011).

Desertas Islands have been uninhabited and have been declared Natural Reserve since the 1995. Several non-native herbivores had been introduced in Desertas Islands before 15th century (Menezes de Sequeira *et al.*, 2021 and references therein). While the rabbits, *Oryctolagus cuniculus* (Linnaeus, 1758) had been removed since 1996 (Bell, 2001), there is still an important number of goats [*Capra hircus* (Linnaeus, 1758)], which cause serious threats on both biodiversity and habitat. The grazing pressure caused a decline of indigenous communities, both on structure and composition of plant communities (Coblentz, 1978; Campbell & Donlan, 2005; Pisanu *et al.*, 2012; Gizicki *et al.*, 2018), and have become one of most important causes of species extinction (Campbell & Donlan, 2005; Bellard *et al.*, 2016). However, its effects can be detected throughout the whole ecosystem because besides predation of plant species they have a negative impact by increasing erosion, nitrification and alteration of the soil composition (Coblentz, 1978; Spear & Chown, 2009; Gizicki *et al.*, 2018). Many studies have shown that island endemic plant species are highly vulnerable to herbivory by invasive species given the lack of defenses, lack of tolerance to herbivory or high palatability (Capó *et al.*, 2022 and references therein).

The flora of the Desertas Islands includes, at the current state of knowledge, 205 species, of which about 18% are endemic to the Madeira Archipelago (Costa Neves *et al.*, 1992; Jardim & Menezes de Sequeira, 2008). This flora comprises two endemic species from Deserta Grande, *Musschia isambertoii* M. Seq., R. Jardim, Magda Silva & L. Carvalho (Campanulaceae) and *Sinapidendron sempervivifolium* Menezes (Brassicaceae); both the genera *Musschia* and *Sinapidendron* are also endemics of this Archipelago with three and six taxa respectively (Costa Neves *et al.*, 1992; Jardim & Menezes de Sequeira, 2008). The vegetation of Desertas Islands is predominantly rupicolous and halophytic with a high rate of herbaceous component. However, there are some arboreal and shrubby elements that have taken refuge in slopes and



cliffs protected from the intrusion of feral goats. In these pockets of vegetation, favorable soil and water conditions are formed where it is possible to detect some elements of the vegetation existing in the past (Costa Neves *et al.*, 1992; Menezes de Sequeira *et al.*, 2021).

Concerning the genus *Cirsium*, only two species are currently recorded in the Madeira Archipelago, i.e. *C. latifolium* Lowe, endemic to Madeira, closely linked to the laurel forest and other forest areas, and *C. vulgare* (Savi) Ten. considered to have been introduced to Madeira and Porto Santo (Costa Neves *et al.*, 1992; Jardim & Menezes de Sequeira, 2008).

As part of the ongoing studies on the conservation of rare plants occurring on the island of Deserta Grande, a population of *Cirsium*, which cannot be identified to any known species and never found during Silva's 20 years of field work, was found and here proposed to be described as a new species for science.

MATERIALS AND METHODS

Botanical survey was conducted in 2013 on the island of Deserta Grande. Voucher specimens of flowering plants were collected and deposited at the Herbarium of the Madeira Botanical Garden (MADJ); code according to Thiers (2024 and continuously updated) under registration MADJ013218 (barcode). Morphological observations were carried out using a stereomicroscope Olympus SZ51. Flowering specimens were photographed.

Silva collected seeds from the wild that were subsequently sown in the nurseries of the Madeira Botanical Garden. Phenology and distribution data were generated solely from Silva's fieldwork as no other previous observations or records of such a species on any Madeira islands was found to exist. These data were also used to assess the extinction risk following the IUCN Red List Categories and Criteria v.3.1 (IUCN, 2012).

RESULTS AND DISCUSSION

Taxonomic treatment

Cirsium isambertoi* J. A. Carvalho, Vilatersana & Susanna, *sp. nov.

Type: Portugal, Madeira Archipelago, Desertas Island: Topo Deserta Grande. Alt. 280 m, 13.VI.2013, *I. Silva* (holotype: MADJ013218!) (Fig. 2A).

Diagnosis: *Cirsium isambertoi* can be distinguished from its closest relative, Madeiran endemic *Cirsium latifolium*, by the smaller size (30–40 cm high vs. ca. 1 m in *C. latifolium*); by the stemless habit (vs. cauline leaves present in *C. latifolium*), deeply pinnatifid leaves (vs. leaves broadly dentate in *C. latifolium*), and its involucre bracts minutely glandular-punctate (vs. non-glandular bracts in *C. latifolium*) (Figs. 2A and 2B).

Description: Spiny perennial herb, rosulate, scapose, 30–40 cm high. Stems not winged, striate, sparsely branched. Leaves lanceolate ca. 15 cm long and 7.5 mm maximum width, deeply pinnatifid with broad, digitate lobes to two cm wide, the terminal one larger, green, shiny, cartilaginous, spiny specially on lobes and teeth, subglabrous above, somewhat arachnoid-tomentose below especially along nerves, minutely glandular-punctate. Capitula globose to campanulate, terminal, solitary at the apex of stems, 2–3 cm wide. Involucre bracts glabrous, green, faintly striate with a brown medial line, minutely glandular-punctate; margin minutely denticulate; apical spine always present, one to three mm long. Florets pink 2.5–3 mm (Figs. 2A, 3A, 3B and 3D).



Figure 2. (A), *Cirsium isambertoii* holotype (MADJ013218). (B1–B2), specimen of *Cirsium latifolium* from Madeira (MADJ003658).

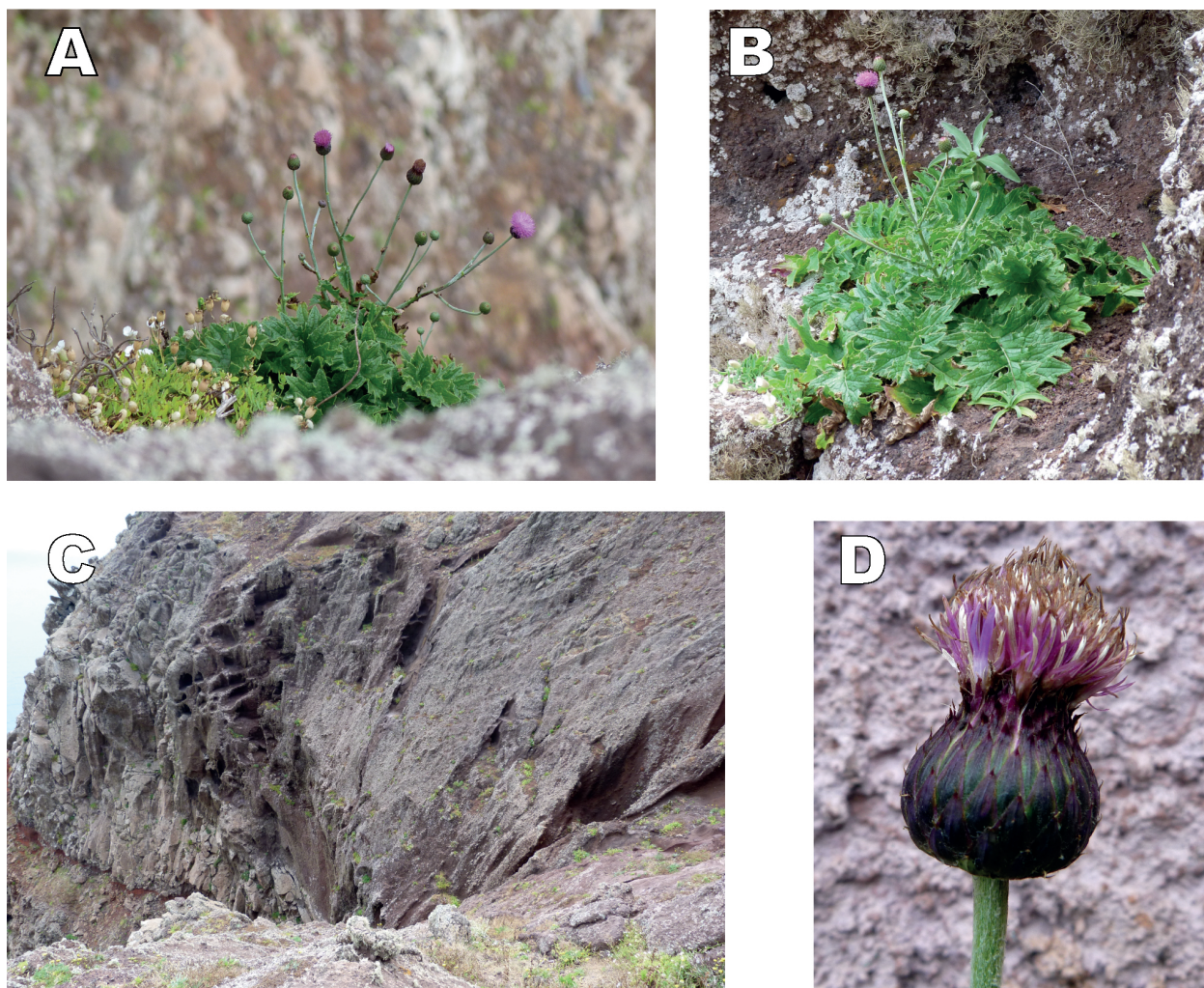


Figure 3. *Cirsium isambertoi*. (A–B), plants; (C), habitat in Deserta Grande; (D), detail of capitulum (photograph: I. Silva).

Etymology: The species is dedicated and named for its first collector, Isamberto Silva, great connoisseur of the Madeira and the Selvages Archipelagos, and collector of a large number of specimens, both animals (mainly arthropods) and plants, and co-author and collaborator in a large number of articles on this subject.

Habitat and ecology: Lava fragment rocks (hill rocks or silt-clay material or pyroclastic rocks) and basalt crevices. East slope, facing north, in a valley with high humidity (Fig. 3C). Pollinators observed *in-situ*: *Amegilla maderae* (Sichel, 1868), *Bombus terrestris* (Linnaeus, 1758).

Accompanying observed species: *Andryala glandulosa* Lam. subsp. *glandulosa*, *Lotus argyroides* R. P. Murray, *Orobanche minor* Sm., *Plantago leiopetala* Lowe, *Sideritis candicans* Aiton subsp. *crassifolia* Lowe, *Silene gallica* L., *Silene uniflora* Roth, *Sonchus ustulatus* Lowe, *Tolpis fruticosa* Schrank, and one liquen, *Roccella tinctoria* DC.

Distribution and preliminary conservation assessment: *Cirsium isambertoi* is currently known from a single population in the Deserta Grande (Madeira Archipelago, Portugal). During 2013, the number of mature individuals was estimated at 16, of which eight were flowering. However, in May and August of 2025, only a single non-flowering specimen of *C. isambertoi* was reported; perhaps the cold weather in the Madeira Archipelago was very intense during this year, which could have affected the population. Although

we cannot rule out the presence of some other subpopulation on the island, the presence of feral goats and their grazing effects on the vegetation plus the small size of the island (10.3 km²) means that there are few habitats/spaces likely to be occupied on the island. For these reasons and also the environmental stochasticity, this new species should be assessed as Critically Endangered (CR) according to the IUCN criteria B1ab(iii,v)+2ab(iii,v) and C1+2a(i,ii)b; D (IUCN, 2012).

In the case of extremely small population as *C. isambertoi*, ex-situ conservation and the subsequent reintroduction of individuals are highly recommended.

Taxonomic comments: As could be expected, the new species was found closely related to the endemic *Cirsium latifolium* from Madeira in a recent genomic analysis of the genus *Cirsium* (Moreyra *et al.*, 2025). Most of the characters that separate *C. isambertoi* from *C. latifolium* are probably adaptations to the extreme conditions of the Desertas, very different from the climatic conditions in Madeira: *C. latifolium* is a rupicolous species from the wet laurisilva. According to Moreyra *et al.* (2025), dispersal from the Mediterranean region that originated *C. latifolium* was dated at 0.5 Ma.

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AUTHORSHIP CONTRIBUTION STATEMENT

José Augusto Carvalho: Conceptualization, Data curation, Investigation, Writing – original draft, Writing – review & editing. **Isamberto Silva:** Conceptualization, Data curation, Resources, Methodology, Writing – original draft. **Alfonso Susanna:** Investigation, Validation, Writing – original draft, Writing – review & editing. **Roser Vilatersana:** Conceptualization, Investigation, Validation, Writing – original draft, Writing – review & editing.

DECLARATION OF COMPETING INTEREST

The authors of this article declare that they have no financial, professional or personal conflicts of interest that could have inappropriately influenced this work.

REFERENCES

- Ackerfield, J. R., Susanna, A., Funk, V. A., Kelch, D., Park, D. S., Thornhill, A. H., Yıldız, B., Arabacı, T. & Dirmenci, T. 2020. A prickly puzzle: Generic delimitations in the *Carduus-Cirsium* group (Compositae: Cardueae: Carduinae). *Taxon* 69: 715–738. <https://doi.org/10.1002/tax.12288>
- Bell, B. D. 2001. Removal of rabbits from Deserta Grande Island, Madeira Archipelago. *Arquipelago - Life and Marine Sciences* Supplement 2 (Part B): 117–119.
- Ballard, C., Cassey, P. & Blackburn, T. M. 2016. Alien species as a driver of recent extinctions. *Biology Letters* 12: 20150623. <https://doi.org/10.1098/rsbl.2015.0623>
- Caldeira, R. M. A. & Sangrà, P. 2012. Complex geophysical wake flows: Madeira Archipelago case study. *Ocean Dynamics* 62: 683–700. <https://doi.org/10.1007/s10236-012-0528-6>

- Campbell, K. & Donlan, C. J. 2005. Feral goat eradications on islands. *Conservation Biology* 19: 1362–1374. <https://doi.org/10.1111/j.1523-1739.2005.00228.x>
- Capó, M., Cursach, J., Picorelli, V., Baraza, E. & Rita, J. 2022. Eradication of feral goats, not population control, as a strategy to conserve plant communities on Mediterranean islets. *Journal for Nature Conservation* 65: 126108. <https://doi.org/10.1016/j.jnc.2021.126108>
- Coblentz, B. E. 1978. The effects of feral goats (*Capra hircus*) on island ecosystems. *Biological Conservation* 13(4): 279–286. [https://doi.org/10.1016/0006-3207\(78\)90038-1](https://doi.org/10.1016/0006-3207(78)90038-1)
- Costa Neves, H., Silva, I. & Palmeira, C. 1992. Contributions to the knowledge of the flora of Desertas Islands. *Bocagiana* 163: 1–21.
- Del Guacchio, E., Bureš, P., Iamónico, D., Carucci, F., De Luca, D., Zedek, F. & Caputo, P. 2022. Towards a monophyletic classification of Cardueae: restoration of the genus *Lophiolepis* (= *Cirsium* p.p.) and new circumscription of *Epitrachys*. *Plant Biosystems* 156: 1269–1290. <https://doi.org/10.1080/11263504.2022.2131924>
- Fernández-Palacios, J. M., De Nascimento, L., Otto, R., Delgado, J. D., García-del-Rey, E., Arévalo, J. R. & Whittaker, R. J. 2011. A reconstruction of Palaeo-Macaronesia, with particular reference to the long-term biogeography of the Atlantic island laurel forests. *Journal of Biogeography* 38: 226–246. <https://doi.org/10.1111/j.1365-2699.2010.02427.x>
- García-Talavera, F. 1999. La Macaronesia. Consideraciones geológicas, biogeográficas y paleoecológicas. In: Fernández-Palacios, J. M., Bacallado, J. J. & Belmonte, J. A. (Eds.), *Ecología y cultura en Canarias*. OACIMC (Organismo Autónomo de Museos y Centros), Cabildo Insular de Tenerife, Santa Cruz de Tenerife: 39–63.
- Gizicki, Z. S., Tamez, V., Galanopoulou, A. P., Avramidis, P. & Foufopoulos, J. 2018. Long-term effects of feral goats (*Capra hircus*) on Mediterranean island communities: results from whole island manipulations. *Biological Invasions* 20: 1537–1552. <https://doi.org/10.1007/s10530-017-1645-4>
- IUCN [International Union for Conservation of Nature] 2012. *IUCN Red List Categories and Criteria*. Version 3.1. Gland, Switzerland & Cambridge, UK. IUCN. Retrieved 20 January, 2025, from <https://www.iucnredlist.org/resources/categories-and-criteria>
- Jardim, R. & Menezes de Sequeira, M. 2008. As plantas vasculares (Pteridophyta e Spermatophyta) dos arquipélagos da Madeira e das Selvagens. In: Borges, P. A. V., Abreu, C., Aguiar, A. M. F., Carvalho, P., Jardim, R., Melo, I., Oliveira, P., Sérgio, C., Serrano, A. R. M. & Vieira, P. (Coord.), *A list of the terrestrial fungi, flora and fauna of Madeira and Selvagens archipelagos*. Direcção Regional do Ambiente da Madeira and Universidade dos Açores, Funchal and Angra do Heroísmo: 157–207.
- Mata, J., Fonseca, P. E., Prada, S., Rodrigues, D., Martins, S., Ramalho, R., Madeira, J., Cachão, M., Silva, C. M. & Matias, M. J. 2013. O arquipélago da Madeira. In: Dias, R., Araújo, A., Terrinha, P. & Kullberg, J. C. (Eds.) *Geologia de Portugal* 2. Escolar Editora, Lisboa: 691–746.
- Menezes de Sequeira, M., Jardim, R., Gouveia, M., Góis-Marques, C. A. & Eddie, W. M. M. 2021. Population decline in the Critically Endangered *Musschia isambertoi* (Campanulaceae) endemic to Desertas Islands (Madeira Archipelago) calls for urgent conservation management. *Journal for Nature Conservation* 60: 125955. <https://doi.org/10.1016/j.jnc.2021.125955>
- Moreyra, L. D., García-Jacas, N., Roquet, C., Ackerfield, J. R., Arabacı, T., Blanco-Gavaldà, C., Brochmann, C., Calleja, J. A., Dirmenci, T., Fujikawa, K., Galbany-Casals, M., Gao, T., Gizaw, A., López-Alvarado, J., Mehregan, I., Vilatersana, R., Yıldız, B., Leliaert, F., Seregin, A. P. & Susanna, A. 2023. African mountain thistles: Three new genera in the *Carduus-Cirsium* group. *Plants* 12(17): 3083. <https://doi.org/10.3390/plants12173083>
- Moreyra, L. D., Susanna, A., Calleja, J. A., Ackerfield, J. R., Arabacı, T., Blanco-Gavaldà, C., Brochmann, C., Dirmenci, T., Fujikawa, K., Galbany-Casals, M., Gao, T., Gizaw, A., Mehregan, I., Vilatersana, R., Viruel, J., Yıldız, B., Leliaert, F., Seregin, A. P. & Roquet, C. 2025. A thorny tale: The origin and diversification of *Cirsium*. *Molecular Phylogenetics and Evolution* 204: 108285. <https://doi.org/10.1016/j.ympev.2025.108285>
- Pisanu, S., Farris, E., Filigheddu, R. & García, M. B. 2012. Demographic effects of large, introduced herbivores on a long-lived endemic plant. *Plant Ecology* 213: 1543–1553. <https://doi.org/10.1007/s11258-012-0110-9>
- Spear, D. & Chown, S. L. 2009. Non-indigenous ungulates as a threat to biodiversity. *Journal of Zoology* 279(1): 1–17. <https://doi.org/10.1111/j.1469-7998.2009.00604.x>
- Thiers, B. 2024 [continuously updated]. *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Retrieved 20 September, 2024 from <http://sweetgum.nybg.org/science/ih/>