

Ferulago brachyloba (Apiaceae), a new species to the Portuguese flora

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Abstract

Ferulago brachyloba is here reported as a new species to the flora of Portugal, where it is preliminarily red-listed as Endangered, highlighting the urgent need of conservation measures. A very small population was found in the Xarrama river valley (Alto Alentejo), which now constitutes the westernmost limit of its distribution.

Keywords: Iberian flora, Alentejo, river dam, umbellifer.

Resumen

Ferulago brachyloba (Apiaceae), una nueva especie para la flora portuguesa

Ferulago brachyloba se reporta aquí como una nueva cita para la flora de Portugal, donde se evalúa preliminarmente como En Peligro utilizando los criterios de la lista roja, destacando la urgente necesidad de medidas de conservación. Una población muy pequeña se encontró en el valle del río Xarrama (Alto Alentejo), que constituye actualmente el límite más occidental de su distribución.

Palabras clave: Flora ibérica, Alentejo, presa, umbelífera.

Ferulago W.D.J.Koch (Apiaceae, Apioideae), one of the two most species-rich genera of the *Cachrys* L. clade, comprises between 48 and 55 accepted species distributed in Europe, North Africa and Western Asia (Bernardi, 1979; Lyskov, 2020; POWO 2024). However, its delimitation is bound to change based on unpublished phylogenetic evidence (Lyskov, 2020). *Ferulago* s. str. is proposed to encompass only what is currently named *F.* subg. *Galbanifera* Pimenov & Tomk., which includes all species recorded in the Iberian Peninsula, namely *F. brachyloba* Boiss. & Reut., *F. capillaris* (Link ex Spreng.) Cout., *F. granatensis* Boiss. and *F. ternatifolia* Solanas, M.B.Crespo & García-Martín (García Martín, 2003). In Portugal, only *F. capillaris* has been recorded, where it is confined to the provinces of Minho, Trás-os-Montes, Beira Alta and Alto Alentejo (Arenas & García Martín, 1993; García Martín, 2003; Domingues de Almeida, 2006; Domingues de Almeida et al., 2023).

Recent fieldwork in southern Portugal (Alto Alentejo), by the first and second authors, resulted in the first in-country detection of *F. brachyloba*. Subsequent herbarium work revealed two additional gatherings collected in the late 19th century in the Tagus International Valley (Beira Baixa), which were identified as *F. granatensis* by Pereira Coutinho (1913, 1939) at LISU, and one of them as *F. galbanifera* by Pinto da Silva (determinavit slip) at LISE, and since then neglected. *Ferulago brachyloba* is endemic to the central and southern areas of the Iberian Peninsula (García Martín, 2003; López-Tirado, 2023; POWO, 2024), occurring in scattered and isolated populations (Anthos, 2023).

Together with the addition of *F. brachyloba* to the Portuguese flora, we present here a regional evaluation of its conservation status, following Carapeto et al. (2020) and using the IUCN (2022) red list categories and criteria.

The only recent record of *Ferulago brachyloba* in Portugal, reported here (Figure 1), is isolated about 130 km from the nearest population in Spain. Plants were found in a 200-meter long stretch of the Xarrama River (Alcáçovas), in three sites, with no more than 20 individuals (mostly adults) at each site. It occurs in bush clearings in the upper margin of a rocky river bed. A 1.1 km long stretch, both down and upstream, with similar habitat was surveyed in detail without success. However, about 2 km of favourable habitat, in the same river sector, remain to be explored. At present, only this 3-km long stretch of the river remains free from the influence of dams, and is, thus, suitable for this species. Although the habitat quality is stable, there has been a continuing decline in its area and extent, with the past construction of nine consecutive dams both upstream and downstream. These dams (mostly small and old) have submerged the margins, destroying its potential habitat. It is noteworthy to mention that the very same river section where the species was found, includes also the location of the largest Portuguese population of the globally threatened *Allium schmitzii* Cout. (Amado & Aguiar, in press), comprising a rough estimate of thousands of individuals (M. Porto & S. Lobo Dias, pers. obs.).

Directed fieldwork is required to confirm whether *F. brachyloba* is still present in the Tagus International Valley area, where the construction of Cedillo and Fratel Dams in 1918 and 1973, respectively, may have severely affected or even extirpated these subpopulations, along with submerging its habitat (rocky river margins) in large extensions. The nearest occurrences of *F. brachyloba* to these historical Portuguese localities are located in Comarca de la Vera (Amor et al., 1993) and the Villuercas-Guadalupe Massif (Sánchez Mata et al., 1983) in Cáceres.

No additional specimens of *F. brachyloba* were located at ALGU, BRESA (Escola Superior Agrária de Bragança), COI, ELVE, LISI or PO, and no other specimens or observations of *Ferulago* were identified in southern Portugal on iNaturalist (2023), GBIF (2023) or in the virtual herbaria of B, MA or P. Two specimens from northeastern Portugal determined as *F. brachyloba* by Aguiar (2001) were examined (BRESA 3868 and BRESA 4006), but they are ascribable to *F. capillaris*. An additional citation of *F. brachyloba* in Portugal (Solanas et al., 2000), lacks any verifiable evidence.

***Ferulago brachyloba* Boiss. & Reut.**

PORTUGAL, Beira Baixa (BB), Vila Velha [do Ródão], Azenha do Pereira, VI-1881, *António Ricardo da Cunha s.n.* (LISU27882); Malpica [do Tejo], margem do Tejo, VI-1882, *António Ricardo da Cunha s.n.* (LISU27881, LISE14298). Alto Alentejo (AAI), Alcáçovas, rio Xarrama, 38.32066 Latitude, -8.16700

Longitude, 122 m Altitude, nos depósitos compactos elevados da margem do rio, nas clareiras do mato e entre as rochas, em substrato silicioso, 9-VI-2023, Sara Lobo Dias & Miguel Porto s.n. (LISI055544).

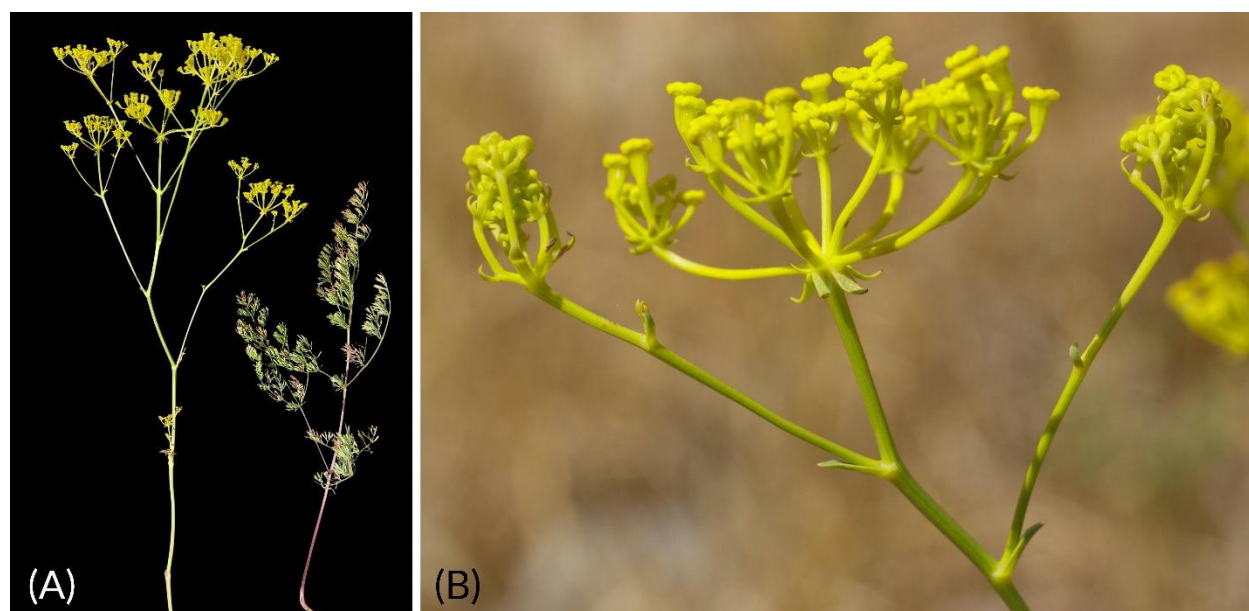


Figure 1. *Ferulago brachyloba*, Xarrama River, Alto Alentejo, Portugal. (A) Habit and leaf; (B) Detail of inflorescence. Note the upper leaves reduced to the sheaths. Photos: Miguel Porto.

Figura 1. *Ferulago brachyloba*, río Xarrama, Alto Alentejo, Portugal. (A) Hábito y hoja; (B) Detalle de inflorescencia. Note las hojas superiores reducidas a vainas. Fotografías: Miguel Porto.

Preliminary Regional Red List assessment. Assuming that the species may still occur in the historical locations, *Ferulago brachyloba* is preliminarily assessed as Endangered because it only occurs in three locations, its known Area of Occupancy (AOO) and Extent of Occurrence (EOO) are 12 and ca. 2000 km² respectively, and there has been an observed continuing decline in the area and extent of its habitat following the construction of river dams along the Xarrama and the Tagus, from which a decline in AOO and number of mature individuals can be inferred, fulfilling criteria B12ab(ii,iii,v) for EN. This continuing decline is unlikely to have ceased, as the same threat still applies at present in one of the locations. Even though some uncertainty may exist around AOO and EOO, their values are unlikely to exceed the thresholds for the EN category with future surveys, in particular the AOO, since the scarce historical records testify its rarity in Portugal. For the same reason, the number of locations is unlikely to exceed the threshold for this category. To ensure its conservation, it is fundamental to keep the aforementioned Xarrama river stretch free from dams, as the construction of a single dam can eliminate the entire population. Furthermore, since the region has been subject to infrastructure construction projects, it would be important to implement a specific conservation area, including a buffer zone on each side of the river, along the 3 km river sector with favourable habitat, to take into account possible future threats.

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References

- Aguiar, C. (2001). *Flora e vegetação da Serra de Nogueira e do Parque Natural de Montesinho*. Tese de Doutoramento, Instituto Superior de Agronomia, Universidade Técnica de Lisboa.
- Amado, A. & Aguiar, C. (in press). *Allium schmitzii*: Ficha de avaliação do risco de extinção. Lista Vermelha da Flora Vasculare de Portugal Continental. Lisboa: Sociedade Portuguesa de Botânica, Associação Portuguesa de Ciência da Vegetação – PHYTOS e Instituto de Conservação da Natureza e das Florestas.
- Amor, A., Ladero, M. & Valle, C.J. (1993): Flora y vegetación vascular de la comarca de la Vera y laderas meridionales de la Sierra de Tormantos (Cáceres, España), *Studia Botanica*, 11, 11–207.
- Anthos (2023). *Sistema de información de las plantas de España*. Real Jardín Botánico, CSIC – Fundación Biodiversidad. Recurso electrónico en <http://www.anthos.es>. Accessed on 2023-08-21.
- Arenas, J.A. & F. García Martín (1993). Atlas carpológico y corológico de la subfamilia Apioideae Drude (Umbelliferae) en España peninsular y Baleares. *Ruizia*, 12, 1–245.
- Bernardi, L. (1979). Tentamen Revisionis Generis *Ferulago*. *Boissiera*, 30, 1–82. <https://www.e-periodica.ch/digbib/view?pid=boi-001%3A1979%3A30#117>
- Carapeto, A., Francisco, A., Pereira, P. & Porto, M. (Eds) (2020). *Lista Vermelha da Flora Vasculare de Portugal Continental*. Sociedade Portuguesa de Botânica, Associação Portuguesa de Ciência da Vegetação – PHYTOS e Instituto da Conservação da Natureza e das Florestas (coord.) Coleção «Botânica em Português», Volume 7. Lisboa: Imprensa Nacional.
- Coutinho, A.X.P. (1913). *A Flora de Portugal (Plantas vasculares) disposta em chaves dicotómicas*. Lisboa: Aillaud, Alves & C.^a.
- Coutinho, A.X.P. (1939). *Flora de Portugal (plantas vasculares) disposta em chaves dicotómicas*. 2ª edição dirigida por Ruy Telles Palhinha. Lisboa: Bertrand (Irmãos).
- Domingues de Almeida, J. (2006). Adiciones corológicas a Flora iberica X: Umbelliferae. *Botanica Complutensis*, 30, 147–151.
- Domingues de Almeida, J., Carapeto, A., Araújo, P.V., Venade, C., Clamote F., Porto, M., Alves P., Portela-Pereira, E. et al. (2023). *Ferulago capillaris* (Link ex Spreng.) Cout. – mapa de distribuição. Flora-On: Flora de Portugal Interactiva, Sociedade Portuguesa de Botânica. <https://flora-on.pt/#wFerulago+capillaris>. Accessed on 2023-10-22.
- García Martín, F. (2003). *Ferulago*. In W.D.J. Koch in S. Castroviejo, G. Nieto Feliner, S.L. Jury & A. Herrero (Eds), *Flora iberica* 10 (pp. 336–343). Madrid: Real Jardín Botánico, C.S.I.C.
- GBIF (2023). <https://www.gbif.org>. Accessed on 2023-08-21.
- iNaturalist (2023). https://www.inaturalist.org/observations?place_id=7122&taxon_id=359493. Accessed on 2023-08-21.
- IUCN (2022). Guidelines for using the IUCN Red List categories and criteria, version 15. Prepared by the Standards and Petitions Committee. <https://www.iucnredlist.org/resources/redlistguidelines>. Accessed on 2023-10-22.
- López-Tirado, J. (2023). *Ferulago brachylobae-Daucetum setifolii* J. López-Tirado, ass. nova from southern Spain. *Botanica Serbica*, 47 (2), 205–213.
- Lyskov, D. (2020). (2761) Proposal to conserve the name *Ferulago* (Apiaceae) with a conserved type. *Taxon*, 69(4), 832–833. doi: <https://doi.org/10.1002/tax.12308>
- POWO (2024). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. <http://www.plantsoftheworldonline.org/>. Accessed on 2024-04-29.
- Sánchez Mata, D., Gavilán, R. & Echevarría, J.E. (1983). Miscellanea chorologica occidentalia, II, *Fontqueria* 28, 43–52.
- Solanas, J. L., Crespo, M. B. & García Martín, F. (2000). A new Spanish species of *Ferulago* Koch (Apiaceae). *Anales del Jardín Botánico de Madrid*, 58(1), 101–107. <https://doi.org/10.3989/ajbm.2000.v58.i1.142>