

Short note

Orobanche ballotae (Orobanchaceae) in Tunisia, a confirmation for the African parasitic flora

Ridha EL MOKNI

<https://orcid.org/0000-0003-3849-1039>

Monastir University, Laboratory of Botany, Cryptogamy and Plant Biology, Faculty of Pharmacy of Monastir, Avenue Avicenna, 5000-Monastir, Tunisia. E-mail: riridah@yahoo.fr

Carthage University, IRESA, Laboratory of Forest Ecology, National Research Institute of Rural Engineering, Water and Forests, 2080-Ariana, Tunisia

Gianniantonio DOMINA

<https://orcid.org/0000-0003-4184-398X>

University of Palermo, Department of Agricultural, food and Forest Sciences, Viale delle Scienze, bldg. 4, 90128 Palermo, Italy

Correspondence: gianniantonio.domina@unipa.it

Abstract. This paper reports the first discovery in Tunisia of *Orobanche ballotae* (Orobanchaceae) parasiting on *Pseudodictamnus hirsutus*, its specific plant-host, within the mountains of Le Kef region in the northwestern part of the country. The species was considered to be endemic to Spain but reported later also from Greece and doubtfully from Morocco. The population reported confirms it as a floristic record to the African holoparasitic flora. Moreover, its geographical distribution together with its phenology, habitat and ecology in Tunisia are presented.

Keywords. *Ballota hirsuta*, chorology, Lamiaceae, Mediterranean, parasitism.

Resumen. En este artículo se informa del primer descubrimiento oficial en Túnez de *Orobanche ballotae* (Orobanchaceae) parasitando a *Pseudodictamnus hirsutus*, su planta hospedante específica, en las montañas de la región de Le Kef, en la parte noroeste del país. La especie se consideraba endémica de España, pero más tarde se informó también de su presencia en Grecia y, dudosamente, en Marruecos. La población descrita confirma el registro florístico de la flora holoparásita africana. Además, se presenta su distribución geográfica junto con su fenología, hábitat y ecología en Túnez.

Palabras clave. *Ballota hirsuta*, corología, Lamiaceae, Mediterráneo, parasitismo.

How to cite this article: El Mokni R. & G. Domina. 2025. *Orobanche ballotae* (Orobanchaceae) in Tunisia, a confirmation for the African parasitic flora. *Anales del Jardín Botánico de Madrid* 82: e159. <https://doi.org/10.3989/ajbm.636>

Title in Spanish: *Orobanche voteae* (Orobanchaceae) en Túnez, una confirmación de la flora parásita africana.

Associate editor: Rodrigo Cámara-Leret. Received: 10 September 2024; accepted: 17 February 2025; published online: 20 October 2025

Orobanche ballotae A.Pujadas (Orobanchaceae, *Orobanche* sect. *Orobanche* subsect. *Speciosae* (Lojac.) Novopokr. [incl. subsect. *Minores* (Beck) Teryokhin]) is a relatively rare parasitic species described from the southern regions along the Mediterranean coast of Spain (including Almería, Córdoba, Granada, Jaen, and Málaga), parasiting only *Pseudodictamnus hirsutus* (Willd.) Salmaki & Siadati [*Ballota hirsuta* Benth.] (Lamiaceae) (Pujadas Salvà 1997; Sánchez Pedraja & al. 2016+). Pujadas Salvà (1997) deemed it probable that this species also inhabits North Africa. Rätzel & al. (2019) reported the presence of this taxon outside the Iberian Peninsula, in Greece (from Peloponnisos, SE of Evrostina, Mt Mavro Oros, Achladokambos) parasiting on *Lamium garganicum* L. (Lamiaceae). Beyond the European area, no report was known until now (Domina & Raab-Straube 2010; APD 2024). Within the African continent, Rätzel & al. (2019) doubtfully reported a specimen from the Oukaïmeden area within the Moroccan High Atlas (Jury, Rejdali & Watson no. 8867). In Tunisia, extensive floristic field surveys across various regions since 2010 have resulted in the discovery of numerous taxa within the *Orobanchaceae* family (e.g., Domina 2011; Pavon & Vela 2011; El Mokni & al. 2015; El Mokni & Domina 2019, 2020; El Mokni 2023; El Mokni & al. 2023). More recently, while prospecting within Le Kef mountains and its surroundings a small population of *Orobanche* parasitizing on *Pseudodictamnus hirsutus* was discovered and identified later, based on its morphological characters and host-plant, as *Orobanche ballotae*. The taxon is here reported as the first official record for

the African vascular flora and outside the European area. Description, phenology together with its ecology in Tunisia are presented. Moreover, original photographs are presented for the first time from the African continent (Tunisia).

Intensive floristic field surveys were carried out by both authors (mainly during the spring and the early summer, March–May) from 2019 to 2023, in carbonate mountains and their surroundings of the northwestern and central-western of Tunisia (regions of Le Kef, Kasserine, Siliana). These surveys resulted in the discovery of a small population of a species of *Orobanche* gr. *minor* parasiting on *Pseudodictamnus hirsutus* not previously recorded at national and North African levels. Plants collected in the field were examined in comparison with relevant Floras and monographs of the surrounding areas (Beck-Mannagetta 1930; Quézel & Santa 1963; Pottier-Alapetite 1981; Kreutz 1995; Domina & Arri-goni 2007; Domina & al. 2011) and the specimens of *Orobanche* preserved in the main herbaria housing North African and Iberian collections: COA, G, MPU, P, RNG etc. (acronyms according to Thiers 2024). New specimens collected were housed in the personal herbarium of R. El Mokni and in the Herbarium of the Faculty of Pharmacy of Monastir (here indicated as Herb. Univ. Monastir), and duplicates were preserved at SAL. The morphological description reported here follows Pujadas Salvà (1997) and Rätzel & al. (2019), with measurements made on fresh Tunisian material. Nomenclature follows the Euro+Med PlantBase (2006 continuously updated) and APD (2024).

Taxonomic treatment

Orobanche ballotae A.Pujadas, Acta Bot. Malacitana 22: 29, t. 1. 1997. Type: Spain, Córdoba, Almodóvar, base del Castillo, 30SUG2186, 200 m, sobre *Ballota hirsuta*, 2 May 1991, A. Pujadas, P. Poyato, A. Seguí & A. Ramírez s.n. (holotype: COA17617; isotypes: G00383291, MA610116, MGC46000).

Morphology.—Achlorophyllous plant, (16)22–34(46) cm tall, simple sometimes forming aggregates. Stem (3)4–6(7) mm in diameter in its middle, 5–8(12) mm barely thickened at the base, subtetragonous and slightly fluted, pubescent glandular, sometimes yellowish slightly tinged with purple. Basal scales 10–15 × 4–5 mm, ovate, lanceolate, subimbricate, subglabrous. Upper scales 15–19(21) × 2–3(4) mm, gradually longer, narrowly lanceolate, spacing in height, erecto-patent, white, sometimes slightly tinged violet that quickly turns color brown, glandular pubescent abaxially. Spike (10)13–19(28) × 2–2.8 cm, cylindrical, more or less rounded at the apex, sparsely comose, with numerous flowers, lax at least in its lower half. Flower bracts (11)14–17 mm larger or matching the corolla, often deflexed. Flowers erect to erect-patent. Calyx 5–9 mm long, smaller than the corolla tube, pubescent glandular, sometimes white with its apex slightly violet, without conspicuous venation; segments free, contiguous or briefly imbricated rarely fused at the base, broadly ovate at their base (1.5)2.5–3.5 mm wide and long acuminate subulate teeth. Corolla 10–14(15) mm in length, 4–5 mm in diameter in the middle, somewhat swollen at the base and slightly inflated at the tip, uniform and markedly curved, erect to patently erect, in the fruiting recurved, kneeled-flexed and constricted above the ovary, externally pubescent glandular with denser pubescence towards the limbus and glabrous or glabrescent on its belly, internally hairy at its base, milky white, rarely the nerves of the lobes slightly amethyst; upper lip bilobed, sparsely emarginated, straight; lower lip almost equal 3-lobed or with central lobe slightly larger than lateral lobes, rounded, with crenate to irregularly dentate and glandular margin. Stamens 4, the adaxial filaments of 6–7 mm length inserted obliquely at 2–3.5 mm from the base of the corolla, the abaxial ones 7–8 mm inserted horizontally at (1)1.5–2 mm, inferiorly dilated to (0.5)0.7–0.8(1.1) mm wide, all with long hairs up to 0.5(–1) mm at their base (up to the lower 2/3 of their length) and glabrescent apex with few short, scattered, inconspicuous glandular hairs, white filaments with a yellow base; anthers 1.5–1.8 mm, ellipsoid, with rounded bases with a short apex of 0.1–0.2(0.3) mm whitish, puberulous at the base of the suture, amethystine (gray-amethyst dry). Ovary 7.5–8(9) mm, glabrescent with few glandular hairs on the abaxial side of its apex, white, yellow at its base; style 6–7 mm, with scattered glandular hairs sometimes glabrescent, white or slightly tinged with amethyst at its apex; stigma bilobate, milky white. Seeds 0.3–0.5 × 0.2–0.25 mm, pyriform, subcylindrical to subspherical, blackish gray.

General distribution.—*Orobanche ballotae* is a very rare Mediterranean species native to the Iberian Peninsula (southern Spain) and Greece (Domina & Raab-Straube 2010+; GBIF 2024; POWO 2024). In the African continent, its presence in Morocco was questionable. We confirm the identification of the specimen COA 33955-1 collected on *Pseudodictamnus hirsutus* the 1/5/2004 from Carretera Meknes-Rabat by B. Román, D. Rubiales & A. Moral and identified by A. Pujadas. On the contrary, we cannot confirm the identification of the specimen collected by S.L. Jury & al. in Oukaïmeden, revised by A. Pujadas in 2006 as *O. ballotae*, and included in Jury & al. (2008). This is because the individuals are dark in color (while all the other examined specimens are straw yellow in color), the shape of the corolla is different (widened at the tip instead of slightly inflated) and the host seems to be different (*Mantisalca* sp. [= *Centaurea* sp.] vs. *Pseudodictamnus* sp.). In light of the above, *Orobanche ballotae* is here confirmed from Morocco and reported for the first time, from northwestern Tunisia. Figs. 1, 2.

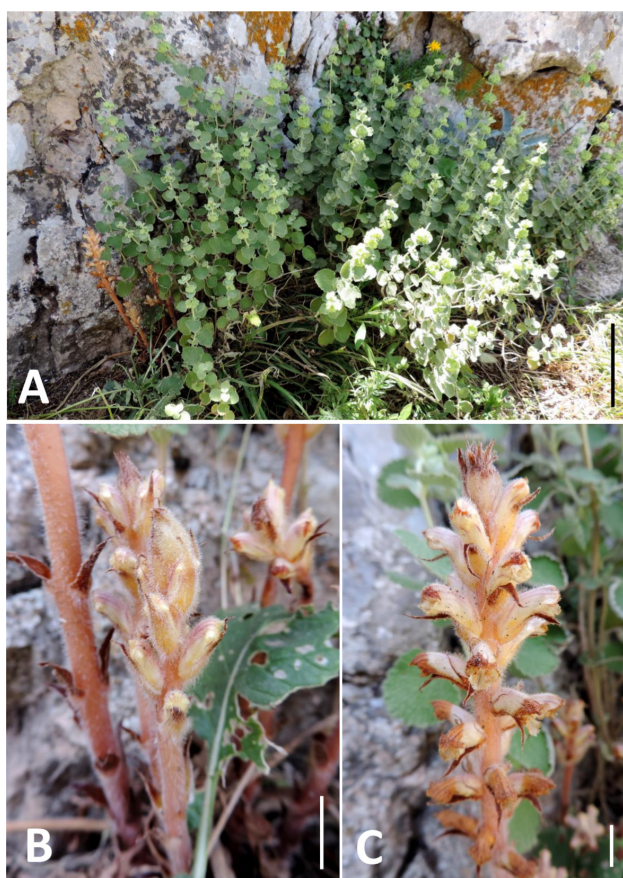


Fig. 1. *Orobanche ballotae*, Kalâat Snène 2022 (Le Kef, NW Tunisia): **a**, habit and habitat; **b**, plant before blooming period with details of scales; **c**, plant in blooming period with long bracts [photographs by R. El Mokni, scales: **a** = 10 cm; **b**, **c** = 1 cm].



Fig. 2. *Orobanche ballotae*, Kalâat Snène 2022 (Le Kef, NW Tunisia), an aggregate of specimens parasitizing on *Pseudodictamnus hirsutus* [photograph by R. El Mokni, scale bar = 2 cm].

Distribution in Tunisia.—Only one locality within the northwestern area of Le Kef, Kalâat Snène (NW Tunisia).

Hosts in Tunisia.—*Orobanche ballotae* was collected parasitizing on *Pseudodictamnus hirsutus* (Lamiaceae).

Phenology.—Flowering from May to June (Figs. 1, 2).

Habitat and ecology in Tunisia.—Calcareous slopes with fertile soils, on sunny places. The area where *Orobanche ballotae* thrives harbor other species as *Allium* sp., *Asphodeline lutea* (L.) Rchb., *Brassica gravinae* Ten., *Dactylis glomerata* L., *Dianthus virgineus* L., *Hyoseris radiata* L., *Jacobaea maritima* (L.) Pelter & Meijden, *Sedum* sp. pl., *Silene latifolia* Poir., *Valeriana rubra* L., and several taxa with restricted distribution area, *Linaria multicaulis* subsp. *aurasiaca* (Pomel) D.A. Sutton (Tunisian endemic), *Erodium trifolium* (Cav.) Cav. (Morocco-Algerian-Tunisian endemic), *Galium cossonianum* Jafri (Tunisian-Algerian endemic), *Oreobliton thesioides* Durieu & Moq. (Tunisian-Algerian endemic), *Chaenorhinum flexuosum* (Desf.) Lange subsp. *flexuosum* (Morocco-Algerian-Tunisian endemic), *Stachys circinata* L'Hér. (endemic to Spain, Morocco, Algeria and Tunisia), etc.

Specimina visa.—TUNISIA. **Le Kef:** Kalâat Snène, 35°44'43.62"N, 008°23'00.65"E, 1235 m, 29 May 2022, R. El Mokni & Domina s.n. (Herb. Univ. Monastir, SAL).

Regional conservation status.—*Orobanche ballotae* is known in Tunisia from one collection and one locality with a small number (< 50) of sporadic flowering/fruitlet mature individuals. The locality is not in a protected area and a continuing decline of the habitat is inferred due mainly to threats of livestock overgrazing. In accordance with the IUCN Red List Categories and Criteria (IUCN 2012), we propose the regional assessment for this species as Critically Endangered (CE), following criterion D, with only about 1 km² area of occupancy.

AUTHORSHIP CONTRIBUTION STATEMENT

Ridha EL MOKNI: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. Gianniantonio DOMINA: Investigation, Methodology, Writing – review & editing.

REFERENCES

- APD [African Plant Database] 2024. *Orobanche* L. – Genève: Conservatoire et Jardin botaniques de la Ville de Genève; Pretoria: South African National Biodiversity Institute. Website: <https://africanplantdatabase.ch/en/nomen/genus/193250/orobanche-1> [accessed 1 Jul. 2024].
- Beck-Mannagetta G. 1930. Orobanchaceae L. In Engler, A. (ed.) *Das Pflanzenreich* IV. 261 (Heft 96). Wilhelm Engelmann, Leipzig, pp: 1–348.
- Domina G. 2011. *Orobanche rosamarina* Beck, In Greuter W. & Raus T. (eds.), Med-checklist Notulae 30. *Willdenowia*. 41: 311–328.
- Domina G. & Arrigoni P.V. 2007. The genus *Orobanche* (Orobanchaceae) in Sardinia. *Flora Mediterranea* 17: 115–136. <https://hdl.handle.net/10447/4430>
- Domina G. & Raab-Straube E. von 2010+ [continuously updated]. *Orobanche ballotae* A. Pujadas. In *Euro+Med PlantBase*. Website: https://europlus-med.org/cdm_dataportal/taxon/cbe894ad-bbff-46a9-9cfa-7d3b2f067cc7 [accessed 1 Jul. 2024].
- Domina G., Marino P. & Castellano G. 2011. The genus *Orobanche* (Orobanchaceae) in Sicily. *Flora Mediterranea* 21: 205–242.
- El Mokni R. 2023. *Orobanche dominae* (Orobanchaceae), a new species described from Tunisia, North Africa. *Mediterranean Botany* 44: e80515.
- El Mokni R. & Domina G. 2019. New records of *Orobanche canescens* C. Presl and *O. litorea* Guss. (Orobanchaceae) in North Africa with notes on their distribution in Tunisia. *Revue de la Faculté des Sciences de Bizerte* 7: 62–67.
- El Mokni R. & Domina G. 2020. Additions to terrestrial flora of Tunisia: occurrence and taxonomic notes. *Check List* 16: 553–561.
- El Mokni R., Domina G. & Barone G. 2023. New records of the genus *Orobanche* L. (Orobanchaceae) to the Tunisian flora with lectotypification of the name *O. rapum-genistae* Thuill. *Adansonia*, sér. 3, 45(5): 73–81.
- El Mokni R., Domina G., Sebei H. & El Aouni M.H. 2015. Taxonomic notes and distribution of taxa of *Orobanche* gr. *minor* (Orobanchaceae) from Tunisia. *Acta Botanica Gallica: Botany Letters* 162: 5–10.
- Euro+Med 2006+ [continuously updated]. *Euro+Med PlantBase - the information resource for Euro-Mediterranean plant diversity*. Website: <http://www.europlusmed.org> [accessed 1 Jul. 2024].
- GBIF [Global Biodiversity Information Facility] 2024. *Orobanche ballotae* A. Pujadas. Website: <https://www.gbif.org/species/9038688> [accessed 1 Jul. 2024].
- IUCN 2012. *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN, Gland, Switzerland and Cambridge, UK, iv + 32 pp.
- Jury S.L., Rutherford R.W., Rejdali M., Rankou H., El Atechi T. 2008. The vascular flora of Oukaïmeden, in the Moroccan High Atlas. Second edition 2008. Website: https://www.researchgate.net/publication/237672452_The_vascular_flora_of_Oukaïmeden_in_the_Moroccan_High_Atlas [accessed 1 Jul. 2024].
- Kreutz C.A.J. 1995. *Orobanche: the European boomrape species, a field guide, 1: central and northern Europe*. Stichting Natuurpublicaties Limburg Eds., Maastricht.
- Pavon D. & Vela E. 2011. Espèces nouvelles pour la Tunisie observées sur les petites îles de la côte septentrionale (archipels de la Galite et de Zembra, îlots de Bizerte). *Flora Mediterranea* 21: 273–286.
- Pottier-Alapetite G. 1981. *Orobanche* L., in *Flore de la Tunisie*, Vol. 2. Imprimerie officielle de la République tunisienne, Tunis: 867–874.
- POWO [Plants of the World Online] 2024. *Orobanche ballotae* A. Pujadas. Website: <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:1001710-1> [accessed 1 Jul. 2024].
- Pujadas Salvà A.J. 1997. *Orobanche ballotae* A. Pujadas (Orobanchaceae), especie nueva. *Acta Botanica Malacitana* 22: 29–34.
- Quézel P. & Santa S. 1963. The genus *Orobanche* L. In *Nouvelle Flore d'Algérie et des Régions Désertiques Méridionales*, 2. Editions CNRS, Paris: 854–859.
- Rätzel S., Ristow M. & Uhlich H. 2019. *Orobanche ballotae* A. Pujadas (Orobanchaceae). In Raab-Straube E. von & Raus Th. (ed.), 435–436, Euro+Med-Checklist Notulae, 11 [Notulae ad floram euro-mediterraneam pertinentes No. 40]. *Willdenowia* 49: 421–445.
- Sánchez Pedraja Ó., Moreno Moral G., Carlón L., Piwowarczyk R., Laínz M. & Schneeweiss G.M. 2016+ [Continuously updated]. *Index of Orobanchaceae*. Website: <http://www.farmalierganes.com/Otrospdf/publica/Orobanchaceae%20Index.htm>. Liérganes, Cantabria, Spain. ISSN: 2386-9666 [accessed 1 Jul. 2024].
- Thiers B. 2024. *Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff*. New York Botanical Garden's Virtual Herbarium. Website: <http://sweetgum.nybg.org/science/ih/> [accessed 1 Jul. 2024].