

Orobanche Rumseiana A. Pujadas & P. Fraga (Orobanchaceae), a New Species from the Balearic Islands

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Orobanche rumseiana A. Pujadas & P. Fraga (Orobanchaceae), a new species from the Balearic Islands

Antonio J. Pujadas-Salvà & Pere Fraga I Arguimbau

Abstract

PUJADAS-SALVÀ, A. J. & P. FRAGA I ARGUIMBAU (2012). *Orobanche rumseiana* A. Pujadas & P. Fraga (Orobanchaceae), a new species from the Balearic Islands. *Candollea* 67: 65-74. In English, English and French abstracts.

A new species, *Orobanche rumseiana* A. Pujadas & P. Fraga (subgen. *Trionychon* (Wallr.) Spach, *Orobanchaceae*) is described from Majorca and Minorca, Balearic Islands. The new species inhabits coastal rocky areas with shrubby vegetation, is parasitic on *Rosmarinus officinalis* L. It is characterised by an inflorescence with erect-patent to patent flowers, a calyx with long acuminate triangular teeth, a corolla tube uniformly curved, corolla lobes obtuse with a distinctive mucro, some staminal filaments pubescent in the lower half and hairy anthers. Its morphological traits, and the fact that it is a parasite of *Rosmarinus officinalis* L., relate it to *Orobanche rosmarina* Beck with which it has been misidentified. It is also related to *Orobanche mariana* A. Pujadas and *Orobanche pseudorosmarina* A. Pujadas & Muñoz Garm. A detailed description and diagnosis are provided. Morphological characters that allow it to be discriminated from these related taxa are discussed and summarized.

Key-words

OROBANCHACEAE – *Orobanche* – Balearic Islands – Taxonomy

Résumé

PUJADAS-SALVÀ, A. J. & P. FRAGA I ARGUIMBAU (2012). *Orobanche rumseiana* A. Pujadas & P. Fraga (Orobanchaceae), une nouvelle espèce des Iles Baléares. *Candollea* 67: 65-74. En anglais, résumés anglais et français.

Une nouvelle espèce, *Orobanche rumseiana* A. Pujadas & P. Fraga (subgen. *Trionychon* (Wallr.) Spach, *Orobanchaceae*) est décrite de Majorque et Minorque des Iles Baléares. La nouvelle espèce habite les zones côtières rocheuses et est un parasite de *Rosmarinus officinalis* L. Elle est caractérisée par une inflorescence à fleurs dressées à étalées, un calice pourvu de dents triangulaires longuement acuminées, un tube de la corolle uniformément courbé, une corolle à lobes obtus et mucronés, des filaments staminaux pubescents dans leur moitié inférieure et des anthères velues. Ses caractéristiques morphologiques et son parasitisme de *Rosmarinus officinalis* L. la rapprochent d'*Orobanche rosmarina* Beck avec laquelle elle a d'ailleurs été confondue. Elle est aussi proche d'*Orobanche mariana* A. Pujadas et d'*Orobanche pseudorosmarina* A. Pujadas & Muñoz Garm. Une description détaillée et une diagnose sont proposées. Les caractères morphologiques qui permettent de la séparer des taxons proches sont discutés et résumés.

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Typification

Orobanche L. (*Orobanchaceae*) is a complex genus highly diversified in the Iberian Peninsula and Balearic Islands, but several authors have reported different numbers of recognized taxa. FOLEY (2001b) recognizes up to 32 taxa, while PUJADAS-SALVÀ (2002) reports 39 taxa. Recent studies have helped improve knowledge of the taxonomy of the subgenus *Trionychon* (Wallr.) Spach (PUJADAS-SALVÀ & CRESPO, 2004; CARLÓN & al., 2005; PUJADAS-SALVÀ, 2006; PUJADAS-SALVÀ, 2007; CARLÓN & al., 2008; PUJADAS-SALVÀ & MUÑOZ-GARMENDIA, 2010).

Previously, individuals of *Orobanche* from the Eastern Balearic Islands (Majorca and Minorca) collected by Fred Rumsey on Majorca (growing on *Rosmarinus officinalis* L.) and by Pons y Guerau in Minorca (with no indication of the host) were determined as *O. rosmarina* Beck by BECKETT (1993: 148), FOLEY (2001b: 40, 42) and CARLÓN & al. (2008: 73). There are no other references in literature to the presence of this taxon in the Balearic Islands (BARCELÓ I COMBIS, 1879-1881; MARÈS & VIGINEIX, 1880; RODRÍGUEZ-FEMENÍAS, 1904; KNOCH, 1922; GREUTER & al., 1989; BOLÒS & VIGO, 1996; GIL & LLORENS, 1999; ROSSELLÓ & SÁEZ, 2000; PUJADAS-SALVÀ, 2001; FRAGA I ARGUIMBAU & al., 2004).

Recent studies have shown that not all *Orobanche* growing on *Rosmarinus officinalis* belong to *Orobanche rosmarina*. Thus, *O. mariana* A. Pujadas and *O. pseudorosmarina* A. Pujadas & Muñoz Garm., despite sharing certain similarities with *O. rosmarina*, can be easily distinguished from the latter due to their morphological traits and have subsequently been described as different taxa (cf. PUJADAS-SALVÀ, 2007; PUJADAS-SALVÀ & MUÑOZ-GARMENDIA, 2010). Consequently, the plants from the Balearic Islands may have also been included in *O. rosmarina* due to the lack of a detailed analysis of their morphology and other differences with respect to better known and accepted species.

In fact, *O. rosmarina* was recently lectotypified by FOLEY (2001a: 231) using specimens collected by Welwitsch in Estremadura (Portugal) labelled as *Trionychium rosmarinum* Welw. in its distributed exsiccatae. Furthermore, available herbarium material of *O. rosmarina* is relatively scarce for comparison with known populations of *Orobanche* growing on *Rosmarinus* L. This may be one of the main reasons why any plant of the *Orobanche* subgen. *Trionychon* found as a parasite on *Rosmarinus* is commonly identified as *O. rosmarina*. However, as stated by FOLEY (2001a, 2001b) and PUJADAS-SALVÀ & al. (2005), some records of *O. rosmarina* may be erroneous determinations.

A detailed analysis of the lectotype established by FOLEY (2001a: 231) for *O. rosmarina* Beck compared with the plants collected on Majorca and Minorca has revealed significant and

consistent morphological differences between them, enough to consider the latter at a different taxonomic level; hence, in this study populations from the Balearic Islands are proposed as a new species.

Material and Methods

Studies were made of both fresh material collected from native populations and dried specimens from the COA and “H. Fraguense” herbaria. Detailed determinations of the plants were made through morphological characterisation of the Balearic plants compared with *O. rosmarina* as described by FOLEY (2001a: 231), and also after a careful study of both the single specimen of Foley’s lectotype (BM [574992]) and plants from its traditional location (Serra da Arrábida, Estremadura, Portugal), parasitic on *Rosmarinus officinalis*, collected by Welwitsch and Guimarães and kept at the LISU herbarium, and also those collected later by Rothmaler and kept at JE. The description and figures published by FOLEY (2001b: 40-41) were also considered.

The morphological traits of the plants from the Balearic Islands were compared with the other two species of subgen. *Trionychon* that parasitize *Rosmarinus*, namely *Orobanche mariana* and *O. pseudorosmarina*, using specimens deposited at COA, W and WU herbaria.

A critical review was also made of specimens kept at various herbaria (ABH, BC, BCN, BM, COA, COFC, COI, HJBS, JACA, JE, LISI, LISU, MA, MAF, MGC, MPU, MUB, SEV, UIB, VAB and VAL), as well as a number of private herbaria on the Balearic Islands (“H. Col.legi Oficial de Farmacèutics de les Illes Balears”, “H. Fraguense”, “H. Orell-Casasnovas”) in order to compare and determine the area of distribution.

The biogeographic and bioclimatic aspects are based on RIVAS-MARTÍNEZ & al. (2001). The authors of syntaxon names follow the standardisation by RIVAS-MARTÍNEZ & al. (2002).

According to CRESPO & PUJADAS-SALVÀ (2006), DOMINA & RAAB-STRAUBE (2010) and DOMINA (2010), taxa of the subgenus *Trionychon* are included under the genus *Orobanche*.

Results

Orobanche rumseiana A. Pujadas & P. Fraga, **spec. nova** (Fig. 1, 2).

Typus: SPAIN. Balearic Islands, Majorca: Pollença, Cala Sant Vicenç, c. Punta de Ses Coves Blanques, 31SEE0419, 103 m, parasitic on *Rosmarinus officinalis*, 2.V.2003, A. Pujadas s.n. (holo-: COA [49186]; iso-: BM, G, MA). *Planta humilis*, (7-)10-26(-35) cm alta. *Caulis gracilis*, ad medium 2-4,5 mm latus. *Inflorescentia* 5,5-15(-19) × 2,3-3 cm, *cylindracea*, *rotundata in apice*, *obtusata*, *rare subobtusata*; *rhachis dense pubescente-glandulosa*, *cum pilis* 0,2-

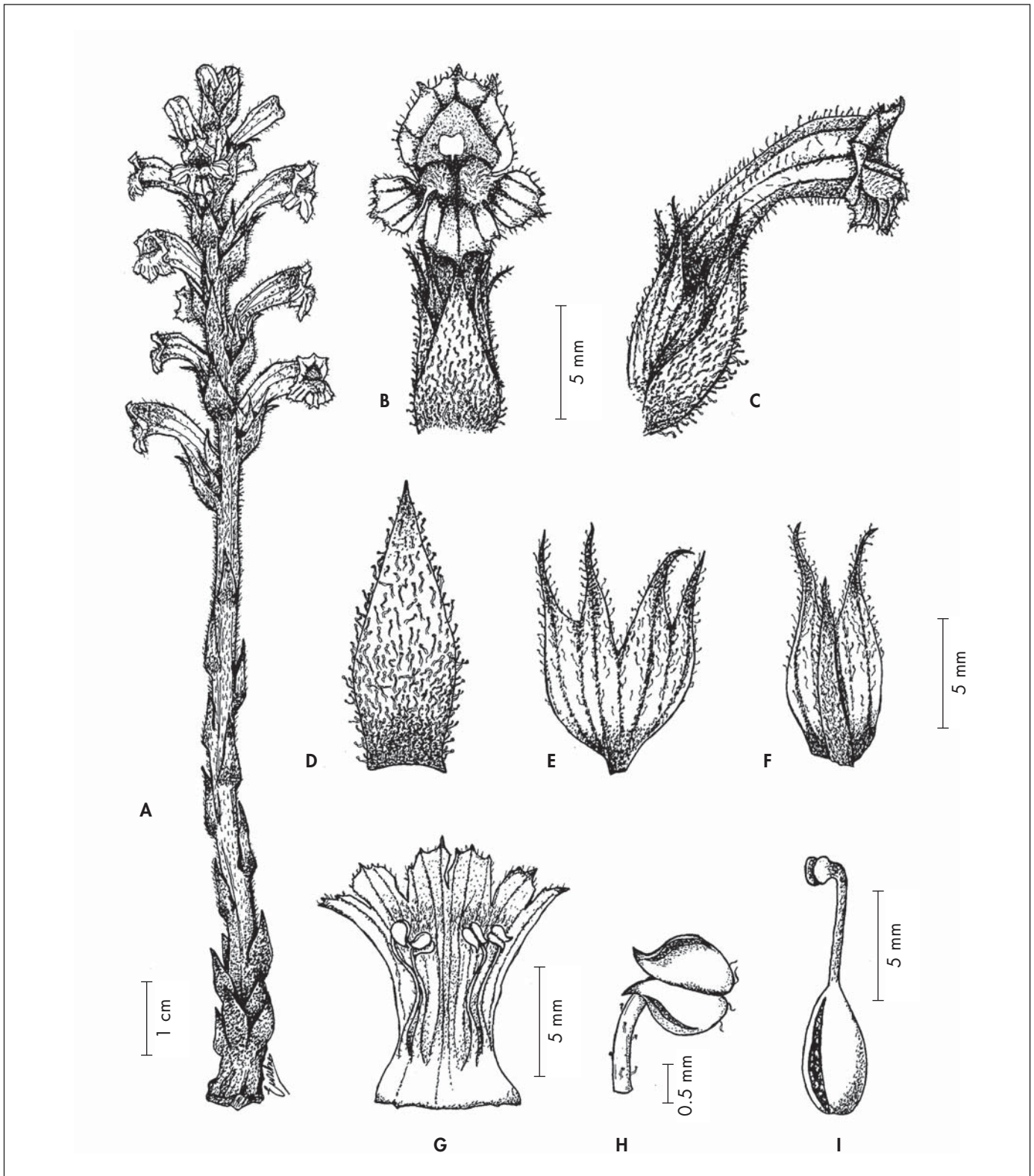


Fig. 1. – *Orobanche rumseiana* A. Pujadas & P. Fraga. **A.** Appearance; **B.** Flower, front view; **C.** Flower, side view; **D.** Bract; **E.** Open calyx; **F.** Calyx, side view and bracteole; **G.** Open corolla and androecium; **H.** Anther; **I.** Gynoecium.

[A. Pujadas s.n., COA]



Fig. 2. – *Orobanche rumseiana* A. Pujadas & P. Fraga.

[Photo by the authors]

0,6 mm longis. Bracteae 7-12 mm longae, cum pilis glandulosis 0,1-0,5 mm longis. Bracteolae 4-7,5 × 0,7-1,5 mm, linear-lanceolatae. Calyx (6,5-)-8-11,5 mm longus, dentibus triangularibus longiacuminatibus; dense piloso-glandulosus, cum pilis 0,1-0,5 mm. Corolla (14-)-15-18 mm longa, lobis obovatis, obtusis; apex loborum mucronatus (mucro usque ad 0,5 mm); corollae labiorum marginibus breviglanduloso-pilosis (ciliatis), pilis usque ad 0,3 mm. Filamenta staminales pubescentes, cum pilis 0,1-0,4 mm infra dimidium, et supra pilis glandulosis (ca. 0,1 mm) subsessilibus, sparsis infra antheras. Antherae 1,1-1,3 mm longae, pilosae ad basim, sparsis pilis ≤ 0,6 mm, interdum cadentibus. Ovarium, sicut stylus, glabrum. Parasita supra *Rosmarini officinalis* radices.

Small plant, (7-)-10-26(-35) cm high; stem 2-4.5 mm in diameter at medium height, only slightly thickened or clavate at the base with a diameter of (5-)-7-15 mm, simple, rarely branched below ground, sometimes with sterile buds at the base, densely pubescent, indumentum of glandular hairs 0.2-0.6 mm long, hyaline, gland yellow or ferruginous when dry, glabrous in the lower part, stem colour whitish, usually tinged purple, becoming brown tinged dark blue when dry; basal leaves 3-13 × (2-)-3-5 mm, sparse, deltoid to lanceolate, glabrous, upper leaves 5-12 × 2-4 mm, lanceolate to widely lanceolate, minutely pubescent with glandular hairs 0.1-0.3 mm long, indumentum dense at the base, lax towards the apex; inflorescence 5.5-15(-19) × 2.3-3 cm, dense to subdense, cylindrical, rounded apex, obtuse or rarely subobtuse; rachis with a dense indumentum of hyaline glandular hairs 0.2-0.6 mm long, hair glands yellow or ferruginous when dry, rachis colour whitish tinged purple, becoming brown tinged deep blue when dry; flowers sessile, only sometimes the lower ones with a short peduncle up to 3 mm long; bracts (6-)-7-12 × 2.5-3.5 mm, shorter than calyx, ovate to ovate-lanceolate, pubescent with hyaline glandular hairs 0.1-0.5 mm long, glands yellow or ferruginous when dry, indumentum dense, laxer towards the apex, deep purple when dry; bracteoles 4-7.5 × 0.7-1.5 mm, linear-lanceolate, purple or whitish tinged purple, deep purple or somewhat purplish blue when dry, rarely brown; calyx (6.5-)-8-11.5 mm long, with 4 triangular teeth, long acuminate, equalling the tube, lacking a fifth adaxial tooth, veins somewhat marked, calyx segments connate, abaxially up to 3.5 mm high, adaxially up to 1.5 mm high, not overlapping, indumentum of glandular hairs dense and uniform in the upper half, laxer towards the base, hairs 0.1-0.6 mm long, calyx segments purplish blue, deeper purple blue when dry; corolla (14-)-15-18 mm long, bilabiate, erect-patent to patent, dorsal line uniformly curved, tubulose, base slightly inflated becoming narrow above stamen insertion, 1.7-2.4 mm wide, slightly infundibuliform towards the apex, 3.5-5 mm wide at the mouth, shortly pubescent with glandular and eglandular hairs (up to 0.2 mm) at the base, with eglandular and some glandular hairs

(up to 0.3 mm) in the lower half, and predominantly with glandular hairs and some eglandular hairs (0.1-0.5 mm) in the upper half (glandular hairs hyaline, with glands hyaline or ferruginous when dry in all cases), corolla glabrous inside except at the throat folds with papillate hairs up to 0.3 mm, corolla colour whitish towards the base, often slightly tinged purple, purplish blue with deep purple veins above the filaments insertion, lobes blue to bluish-purple, becoming purplish blue when dry, upper lip bilobed, slightly emarginated, lobes with rounded apex, obtuse, with a central mucro up to 0.7 mm long, lower lip with subequal lobes or central one slightly bigger than laterals, obovate, obtuse, with a central mucro up to 0.5 mm long, margins erose, shortly ciliate with glandular hairs 0.1-0.4 mm long; stamen filaments inserted sub-horizontally, the adaxial ones to 4-5 mm from corolla base, the abaxial ones to 3.5-4.5 mm, both with hairs 0.1-0.4 mm long in the lower half and with sparse subsessile glandular hairs (ca. 0.1 mm) below the anthers, filaments white; anthers 1.1-1.3 mm long (including apiculus ca. 0.2 mm), ovate, apiculate, with sparse long hairs ≤ 0.6 mm at the base, hairs sometimes deciduous, anthers white, even when dry; ovary glabrous, purplish blue or whitish tinged purple; style glabrous, pale purplish; stigma scarcely bilobed, yellowish white; parasite on roots of *Rosmarinus officinalis*.

Ecology and phytosociology. – On Majorca, *Orobanche rumseiana* grows on a karstic, slightly sloped, rocky plateau close to the coast with a moderate influence of sea spray. It can be found in *Smilaco balearicae-Ampelodesmetum mauritanicae* Rivas-Martínez 1992 (alliance *Oleo-Ceratonion siliquae* Guinochet & Drouineau 1944; order *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975; class *Quercetalia Ilicis* Molinier 1934) (sensu RIVAS-MARTÍNEZ & al., 2001), a Mediterranean shrubby vegetation that grows in sunny, poor soils. In Minorca, the species is more widely distributed (Fig. 3) and although it can only be found near to the coast, it has also been observed mainly in two plant communities: in *Loto tetraphylli-Ericetum multiflorae* O. Bolòs & Moliner 1958 (alliance *Rosmarinion officinalis* Molinier 1934; order *Rosmarinetalia officinalis* Molinier 1934; class *Rosmarinetea officinalis* Rivas-Martínez & al. 1991) (sensu RIVAS-MARTÍNEZ & al., 2001) in limestone soils mostly originating from Quaternary fossil dunes; and in *Ampelodesmo mauritanicae-Ericetum scopariae* O. Bolòs & al. 1970 (alliance *Ericenion arboreae* Rivas-Martínez & al. 1986; order *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975; class *Quercetalia Ilicis* Molinier 1934) (sensu RIVAS-MARTÍNEZ & al., 2001) in siliceous sandy soils. Both plant associations are linked to vegetation in relatively low shrub-lands and open spaces. In all cases, it parasitizes on *Rosmarinus officinalis*.

Distribution, bioclimatology and biogeography. – *Orobanche rumseiana* is only known to grow in the Eastern Balearic Islands. It should be currently regarded as a stenochorous endemism of the coastal ecosystems where it grows in a reduced and

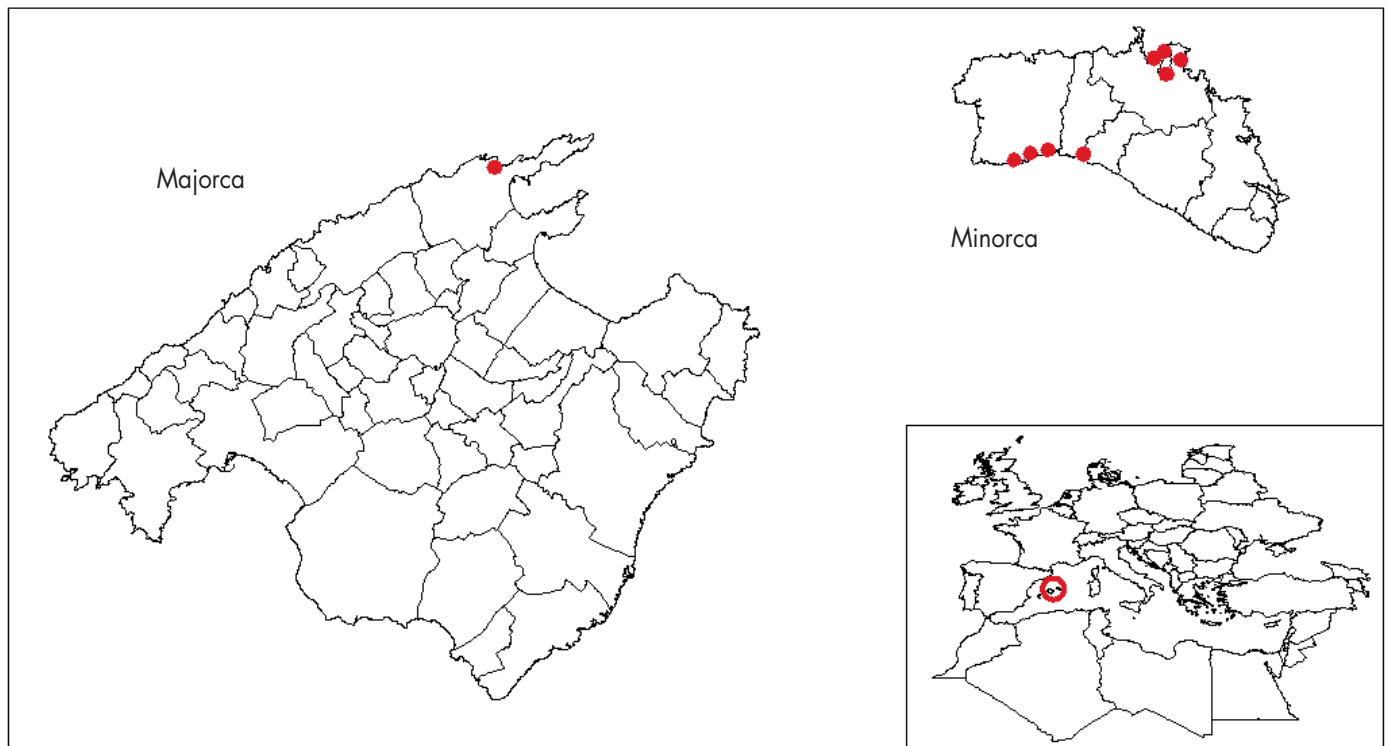


Fig. 3. – Distribution of *Orobanche rumseiana* A. Pujadas & P. Fraga in Balearic Islands.

discontinuous area, on Majorca in the north, in Serra de Tramuntana, near Cala Sant Vicenç, Pollença, but it was also reported by F. Rumsey in Alcudia; and in Minorca it is always found near to the coast (normally less than 500 m from the sea) but is more widely distributed in the north and south of the island, with at least six recorded populations (Fig. 3). On this island, all attempts to locate this species in apparently favourable inland habitats have failed.

It grows in Mediterranean pluviseasonal-oceanic bioclimates, in territories in the Thermo-Mediterranean stage. From a biogeographic standpoint, it is included in the Balearic-Catalan-Provençal Province, Balearic Subprovince, Minorcan and Majorcan Sectors (*sensu* RIVAS-MARTÍNEZ & al., 2002), with a typically Mediterranean maritime climate characterised by mild and rather rainy winters and very hot and dry summers. The drought period normally lasts six or more months. It grows from 2 to 105 m above sea level. The flowering period is quite long, lasting from April to early June.

Etymology. – The epithet “*rumseiana*” named after Fred Rumsey (BM) who showed the authors the place on Majorca where the new species grows.

Conservation status and proposals. – In the last ten years, the known population of *O. rumseiana* on Majorca has undergone important variations in plant number. Census figures vary,

with as many as 30 individuals having been recorded in the most favourable years, compared with no plants or only a few isolated individuals in other years. Even if other populations exist, e.g. in Alcudia, as indicated by Rumsey, it is highly likely that these would also display similar variations in plant number from one year to another. Populations on Minorca seem to be more constant in terms of plant number, at least in the last five years.

It is likely that some populations on both islands have been destroyed by urban development, particularly in coastal areas.

Moreover, a large population of feral goats has been detected on Majorca in the area of Coves Blanques, exerting strong herbivorous pressure on vegetation. It seems that goats look for *Orobanche* due to its juicy stem and grazed plants have been observed in this area.

For this reason, and due to the increasing pressure of negative human activities in recent decades, we propose that this new species be classified as Vulnerable (VU) according to IUCN (2001) criteria.

Although all the known populations are found in areas with some type of legal protection against urban development, at regional level as is the case of the Natural Areas of Special Interest (ANEI) in the Balearic Islands, or even at European

Table 1. – Main differences between *Orobanche rumseiana* A. Pujadas & P. Fraga, *O. rosmarina* Beck, *O. mariana* A. Pujadas and *O. pseudorosmarina* A. Pujadas & Muñoz Garm.

	<i>O. rumseiana</i>	<i>O. rosmarina</i>	<i>O. mariana</i>	<i>O. pseudorosmarina</i>
Plant height [cm]	(7-)10-26(35)	(4-)6-25	(7-)10-17	9-14
Main stem width	Slim	Quite thick	Slim	Slim
Main stem diameter at halfway [mm]	2-4.5	(3-)5-7	2-5(6)	2-5-3.3
Inflorescence height [cm]	5.5-15(-19) × 2.3-3	5-12 × (1.5-)2-2.3	5.5-12 × 1.8-2.1	3.5-5.5 × 2.2-2.7
Inflorescence apex	Rounded, obtuse, rarely subobtus	Rounded, obtuse	Conical, acute	Rounded, obtuse
Inflorescence rachis indumentum	Pubescent with dense glandular hairs	Thinly glandular pubescent, sparse hairs 0.1-0.4 mm long	Pubescent with dense glandular hairs 0.3-0.9 mm long	Pubescent with dense glandular hairs 0.1-0.4 mm long
Bract length [mm]	(6-)7-12	6-8	7-10	4.5-5.5
Bract, glandular hairs length [mm]	≤ 0.5	≤ 0.2	≤ 0.5	≤ 0.4
Bracteole length [mm]	4.7 × 0.7-1.5	4.7 × 1-2	5.5-7 × 0.9-1.4	3.5-6 × 0.3-0.8
Bracteole shape	Linear lanceolate	Lanceolate	Linear to linear lanceolate	Linear lanceolate
Calyx teeth shape	Triangular, long acuminate	Triangular	Narrowly triangular, long acuminate	Triangular, long acuminate
Calyx indumentum	Regularly and dense glandular pubescent, hairs ≤ 0.6 mm	Sparse glandular hairs < 0.3 mm, mainly on teeth, lower part glabrous or subglabrous	Sparse glandular hairs < 0.4 mm, mainly on teeth, lower part glabrous or subglabrous	Regularly and dense glandular pubescent, hairs ≤ 0.4 mm to 0.6 mm, at the lower part
Corolla length [mm]	(14-)15-18	14-16	12-16	13-16
Corolla margin indumentum	Ciliate, glandular hairs ≤ 0.4 mm	Glabrous to subglabrous, glandular hairs ≤ 0.2 mm	Glabrous to subglabrous with a few short glandular hairs ≤ 0.04 mm	Ciliate, glandular hairs ≤ 0.4 mm
Lower corolla lobes	Rounded, obtuse, with a mucro up to 0.5 mm long	Rounded, obtuse	Ovate to triangular, acute	Rounded, obtuse
Stamen filament indumentum	Hairy in the lower half, hairs ≤ 0.4 mm. Subsessile glandular hairs below anthers	Hairy in the lower half, hairs ≤ 0.1 mm. Glabrous or subsessile glandular hairs below anthers	Glabrous in the lower half. Glabrous or subglabrous with a few inconspicuous sessile glandular hairs below anthers	Glabrous at the base. Sparse glandular hairs in the upper 2/3, hairs c. 0.1 mm. Inconspicuous subsessile glandular hairs below anthers
Anther length [mm]	1.1-1.3	1.2-1.4	1.2-1.5	0.9-1.1
Anther indumentum	Sparse hairs deciduous	0.6 mm, sometimes deciduous	Glabrous o subglabrous with 1 or 2 hairs < 0.2 mm	Hairs up to 0.3-0.4 mm
Ovary	Glabrous	Glabrous	Glabrous	Glabrous hairs up to 0.2 mm. Sometimes subglabrous
Style	Glabrous	Glabrous	Glabrous	Sparse glandular hairs 0.1 mm long. Sometimes subglabrous

level as Sites of Community Interest (SCI) within the Natura 2000 Network, none of these legal instruments provides integral protection against threats such as invasive species or changes in land use. For these reasons, urgent conservation measures should be implemented to protect the populations and natural habitats of *O. rumseiana*.

Iconography. – BECKETT (1993: tab. 61, 4, sub *Orobanche rosmarina*).

Taxonomy. – Within the subgen. *Trionychon*, *O. rumseiana* presents a number of features, described in the diagnosis, that are not normally found in any other taxon in this group. Although it has certain similarities with *O. rosmarina*, *O. mariana* and *O. pseudorosmarina* (see Appendix 1 for the studied specimens), important morphological differences between these taxa warrant its recognition at species level (Table 1). Thus, it can be discriminated from these allied taxa mainly by the obtuse corolla lobes with a mucro up to 0.7 mm long and also by the stamen filaments, which are hairy in the lower half, with hairs up to 0.4 mm long.

Furthermore, certain characteristics distinguish it from *O. rosmarina*: its thinner stem, 2-4.5 mm diameter at medium height; densely glandular pubescent rachis (hairs 0.2-0.6 mm long); bracts with longer glandular hairs (≤ 0.5 mm); lanceolate linear bracteoles, usually narrower (0.7-1.5 mm); calyx teeth more acuminate and with denser glandular indumentum; glandular ciliate corolla margins (hairs ≤ 0.4 mm).

The differences with *O. mariana* are as follows: wider inflorescence (2.3-3 cm) with a more rounded and obtuse apex, rarely subobtuse; uniform and densely glandular pubescent calyx in the upper half; glandular ciliate corolla margins (hairs ≤ 0.4 mm); anthers usually shorter (1.1-1.3 mm) and ciliate at the base with a few long hairs (≤ 0.6 mm), sometimes deciduous.

The differences with *O. pseudorosmarina* are as follows: a taller habit (≤ 26 -(35) cm); rachis with longer glandular hairs (≤ 0.6 mm); longer bracts [(6)7-12 mm]; bracteoles usually wider (0.7-1.5 mm); longer corolla (≤ 18 mm); anthers usually longer (1.1-1.3 mm); ovary and style glabrous.

In addition to the morphological differences, these group species also display a distinct geographic distribution pattern. Thus, *O. rumseiana* is restricted to the eastern Balearic Islands, *O. rosmarina* is distributed in the southwest of continental Europe, *O. mariana* has only been reported in Sierra Morena (southwest of the Iberian Peninsula), and *O. pseudorosmarina* is distributed throughout coastal areas of the Eastern Mediterranean region.

Paratypes. – **SPAIN. Balearic Islands, Majorca:** Pollença, Cala Sant Vicenç, camí cap a la Punta de Ses Coves Blanques, 39° 55'36.17"N 3°03'01.60"E, 72 m, sobre *Rosmarinus officinalis*, 24.VII.2002, *A. Pujadas s.n.* (COA [49187]); Pollença, Cala Sant Vicenç, c. Punta de Ses Coves Blanques, 39°55' 51.56"N

3°03'18.46"E, 103 m, sobre *Rosmarinus officinalis*, 2.IV.2003, *A. Pujadas s.n.* (COA [49185]); Mallorca, sobre *Rosmarinus officinalis*, VI.1979, *J. Orell 1345* (Herb. Orell-Casasnovas); Flora majoricensis 612, supra *Rosmarinum* legita, 6.X.1946, *Palau Ferrer s.n.* (MA [114767]). **Minorca:** Ciutadella, Macarella, 31SEEE80 3215, 50 m, sobre *Rosmarinus officinalis*, 2.V.2010, *P. Fraga s.n.* (COA [49324]); Es Mercadal, Tirant, 31TEE948340, 40 m, sobre *Rosmarinus officinalis*, 14.V.2010, *P. Fraga s.n.* (COA [49325]); Es Mercadal, Cala Blanca, 31TEE968319, 2 m, sobre *Rosmarinus officinalis*, 15.V.2010, *P. Fraga s.n.* (COA [49326]); Ciutadella, Es Banyuls, 31SEE761202, 5 m, sobre *Rosmarinus officinalis*, 17.V. 2010, *P. Fraga s.n.* (COA [49327]); Es Mercadal, Sa Mola de Fornells, Cala Pudent, 31TEE988338, 10 m, sobre *Rosmarinus officinalis*, 25.V. 2010, *P. Fraga s.n.* (COA [49328]); Son Olivari, Trebalúger, 31SEE8823, 100 m, 22.IV.1957, *P. Montserrat s.n.* (JACA [155857]); [probably *O. rumseiana*] Alayor, Son Sancho, 20.V.1898, *A. Pons y Guerau s.n.* (MA [435481]).

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Appendix 1. – Studied material of *Orobanche rosmarina* Beck, *O. mariana* A. Pujada and *O. pseudorosmarina* A. Pujadas & Muñoz Garm.

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Sevilla: El Real de la Jara, Sierra del Pimpollar, Cortijo de las Águilas, 30SQC5605, 740 m, 19.VI.1997, *J. M. Delgado & M. López s.n.* (COA [23756]); El Real de la Jara, Sierra del Pimpollar, Cortijo de las Águilas, 30SQC5605, 740 m, sobre *Rosmarinus?*, 9.VII.1997, *M. López & A. Pujadas s.n.* (COA [23755]).

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