

Reseda minoica (Resedaceae), a new species from the eastern Mediterranean region

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Reseda minoica Martín-Bravo & Jim. Mejías (Resedaceae), a new species from the eastern Mediterranean region, is described and illustrated. It is distributed in Crete (Gavdos Island), Cyprus and S Anatolia (Mersin), where it grows mostly on basic, occasionally schistose, substrates near the coast. It is included in *Reseda* sect. *Phyteuma*, a taxonomically complex group mostly containing narrow endemics from the western or eastern Mediterranean region. *Reseda minoica* has been confused with *R. odorata*, *R. orientalis* and *R. balansae* in Crete, Cyprus and Turkey. It can be distinguished from those by the lower number of stamens, seed size, colour of petals and indumentum. An identification key to the eastern Mediterranean taxa of *Reseda* sect. *Phyteuma* is provided.

Introduction

Reseda is the largest of the six genera of Resedaceae (ca. 85 species), and has about 65 species mainly distributed in temperate areas of the Palearctic, with a centre of diversity in the Mediterranean region. The taxonomy of the genus is relatively well established as a result of the detailed accounts of Resedaceae based on morphology by Müller Argoviensis (1857, 1868) and Abdallah and de Wit (1978). In addition, a molecular study of the phylogenetic relationships and biogeography of the family was published by Martín-Bravo *et al.* (2007).

Reseda sect. *Phyteuma* comprises 14 species, 12 of which are narrow endemics from the western or eastern Mediterranean region. It is a monophyletic group based on nrITS and plastid *trnL-F* sequences, and its taxonomy is character-

ized by problems regarding species circumscription, mainly due to limited morphological differentiation and hybridization (Martín-Bravo *et al.* 2007, Martín-Bravo & Jiménez-Mejías 2009). Recent taxonomic rearrangements within the section include the molecular and morphological re-evaluation of *R. collina* (Martín-Bravo & Jiménez-Mejías 2009), as well as the combinations *R. anatolica* (Snogerup & Snogerup 2002) and *R. phyteuma* subsp. *rupestris* (Aránega & Pajarón 1990). However, the problematic taxonomy of the group warrants an updated, comprehensive revision.

Taxa of *Reseda* sect. *Phyteuma* from the eastern Mediterranean region illustrate the taxonomic complexity of the group. Some species have apparently similar morphology which hinders their correct identification. A revision of herbarium materials of *R.* sect. *Phyteuma* has

revealed the existence of several specimens from the eastern Mediterranean region that had been variously identified as three different species depending on their geographic origin: *R. odorata* and *R. orientalis* if collected from Gavdos Island near Crete (Rechinger 1943, Abdallah & de Wit 1978, Snogerup & Snogerup 2002, Fielding & Turland 2005, Bergmeier *et al.* 2007), *R. orientalis* if collected from Cyprus (Meikle 1977, Abdallah & de Wit 1978, Viney 1994), and *R. balansae* for Turkey (Coode 1965). However, those specimens share a set of anomalous morphological characters (e.g. indumentum, number of stamens, petal colour, seed size) which are different from those characterising any of the three species, and suggest they may deserve taxonomic recognition at the species level. Therefore, the aim of this study is to investigate the taxonomic status of these populations, as part of the effort to clarify the taxonomic complexity of *R. sect. Phyteuma*, particularly in the eastern Mediterranean region.

Material and methods

We performed an extensive revision of *R. sect. Phyteuma* including materials from 68 herbaria worldwide (ALME, AMD, ARAN, B, BC, BEO, BEOU, BM, BG, BREM, BRNM, BRNU, BUNS, C, CAS, DBN, DS, E, F, FI, G, GB, GDA, GH, GOET, HAL, HBG, HEID, HGI, HUAL, HUJ, IBF, JAEN, JE, K, L, LD, LINN, LOU, M, MA, MANCH, MGC, MO, MOR, MPU, MSB, NY, O, OXF, P, PH, PR, PRE, RNG, SALAF, SO, SOM, S, SD, SEV, UPOS, UPS, US, VAL, WAG, WRSL, WU). The most important morphological characters for the taxonomy of *R. sect. Phyteuma* were carefully examined (e.g. calyx accrescence, capsule and seed size, number of stamens; Müller Argoviensis 1868, Abdallah & de Wit 1978, Valdés Bermejo 1993, Martín-Bravo & Jiménez-Mejías 2009). We detected 20 vouchers from the eastern Mediterranean region that had previously been identified mainly as *R. balansae*, *R. odorata* and *R. orientalis* (see references in Introduction). Nonetheless, these specimens display a congruent and distinct set of morphological characters (Table 1) that in our opinion justifies formal

Table 1. Main diagnostic morphological characters of *Reseda minoica*, *R. balansae*, *R. odorata* and *R. orientalis*.

Taxon	<i>R. minoica</i>	<i>R. balansae</i>	<i>R. odorata</i>	<i>R. orientalis</i>
Leaves	entire to 3(–5)-lobed	basal ones entire, stem ones entire to 3-lobed	entire, upper stem ones rarely 3-lobed	entire to 3(–5)-lobed
Indumentum	more or less sparsely papillose-hispidulous	glabrous	glabrous, sometimes slightly and sparsely hispidulous	hispidulous or papillose-hispidulous
Sepal margin	glabrous	glabrous	glabrous	papillose-scabrid
Petal colour	whitish	light yellow	pastel yellow	white
Stamen number	12–16(–18)	15–20	18–22(–24)	12–18
Capsules	7–12(–14) × 4.5–7 mm, obovoid-oblong to elliptic, sometimes slightly papillose in the ribs	8–12(–13) × 6.5–9 mm, obovoid-subglobose, glabrous	6–10(–12) × (4–)4.5–7(–7.5) mm, obovoid-oblong to subglobose, generally glabrous	7–14(–18) × 4–8 mm, obovoid-cylindrical, rarely subglobose, glabrous, papillose in the ribs
Seeds	(1.5–)1.6–1.8 mm	2.4–2.6 mm	1.6–1.8(–2) mm	2–2.5 mm

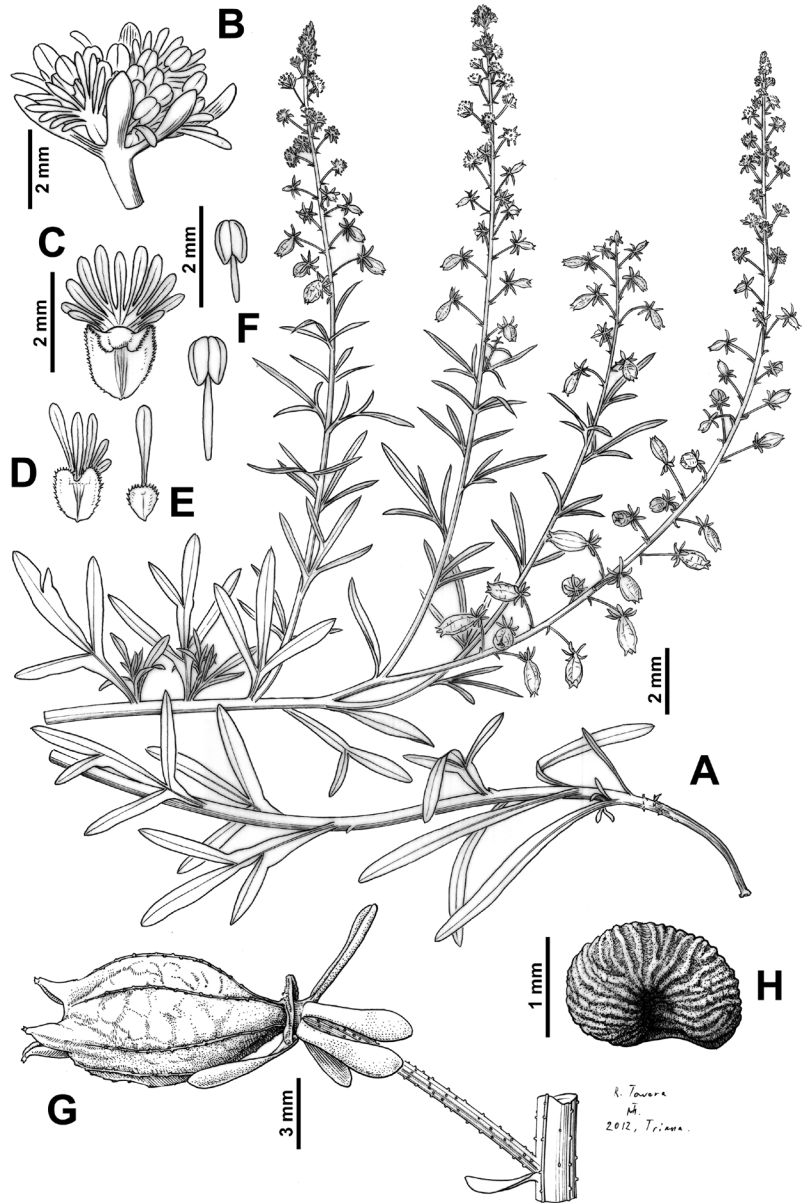


Fig. 1. *Reseda minoica* (from the holotype). — **A:** Habit. — **B:** Flower. — **C:** Superior petal. — **D:** Lateral petal. — **E:** Anterior petal. — **F:** Stamens. — **G:** Capsule. — **H:** Seed. Drawn by Rodrigo Tavera.

taxonomic recognition. Consequently, here we describe them as a new species.

Results and discussion

Reseda minoica Martín-Bravo & Jim. Mejías, *sp. nova* (Fig. 1)

Similar to *R. odorata*, from which it differs mainly by having fewer stamens, the more or

less papillose-hispidulous indumentum, the frequent presence of lobed leaves and the usually whitish petals.

TYPE: Turkey, Mersin: ca. 5 km from Mersin (Kaleköy) to Findikpinari, limestone cliffs beside the road, slopes and rocky ground on marl. 330 m, 36°46'98"N, 34°28'00"E, 28 April 2010 *S. Martín-Bravo 102SMB10, P. Jiménez-Mejías & E. Ortiz* (holotype UPOS; isotypes ANK, E, ISTE, LD, MA, MO, K, UPOS, UPS).

ETYMOLOGY. The species is named after the Minoan civilization, which flourished during the Bronze Age (27th–15th

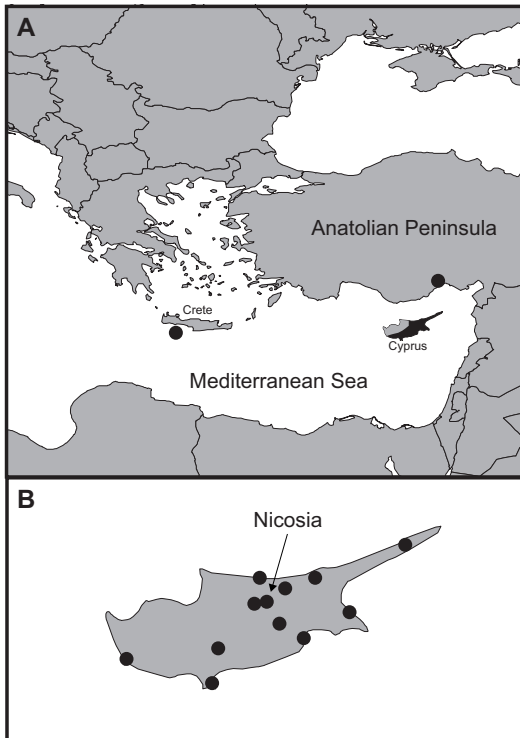


Fig. 2. — **A:** Distribution, based on studied populations, of *Reseda minoica* in the eastern Mediterranean region. — **B:** Studied populations in Cyprus.

century BC) in Crete, and expanded its cultural influence to Anatolia and Cyprus, as well as to Levantine coasts (cf. Dickinson 1994, McLerran 2011).

Annual to perennial herb. Stems 10–70 cm, decumbent to erect-ascending, branching from base and sometimes also above, more or less sparsely papillose-hispidulous. Leaves entire to 3(–5)-lobed, basal ones sometimes rosette-like, stem ones alternate, usually slightly papillose or hispidulous on veins and margin. Inflorescence racemose, up to 15–25(–30) cm long with ripe fruits, pedicels 3–7(–10) mm in flower, in fruit, up to 12(–15) mm. Flowers bisexual, (5–)6 merous. Calyx dialysepalous, sepals persistent, 2–4.5(–5) × 0.5–0.9 mm in flower, not or slightly accrescent, usually reflexed in fruit, up to 3–6(–7.5) × 0.7–1.3(–1.5) mm, linear-lanceolate to oblong-spathulate, with glabrous margins. Corolla dialypetalous, heteromorphic, white, sometimes pale yellow when dry. Superior petals two, 2–3(–3.5) mm, unguiculate, limb trisect, with lateral lobes wider than central one,

palmatisect, each with 4–6 linear-spathulate or spatulate laciniae, central lobe linear or linear-spathulate, longer or shorter than lateral lobes. Lateral and anterior petals smaller and reduced; lateral petals usually two, lacking one of lateral lobes; anterior petals usually two, generally reduced to central lobe. Stamens 12–16(–18), filaments deciduous, not widened in upper part. Ovary with 3 carpels. Capsules 7–12(–14) × 4.5–7 mm, estipitate, pendulous when ripe, obovoid-oblong to elliptic, glabrous, sometimes slightly papillose in ribs, capsule teeth 0.5–2 mm. Seeds (1.5–)1.6–1.8 mm long, reniform, undulate-rugose, dark brown or blackish when ripe, dull. Flowering in March–June.

DISTRIBUTION (Fig. 2). Eastern Mediterranean region (KRI, CYP, TUR): Crete (Gavdos Island), Cyprus, southern Turkey (Mersin area).

HABITAT. Slopes, ravines and cliff ledges on limestone, marl, and occasionally schist, in Mediterranean thermophilous shrubland (garrigue), usually near the coast. Alt. 0–350 m a.s.l.

Reseda minoica is apparently endemic to the eastern Mediterranean coastal areas: Crete (Gavdos Island), Cyprus and S Turkey (Mersin). It is mostly a calcicole that usually grows at low altitudes within thermophilous scrub, not far from the coast. Due to the taxonomic complexity of *R.* sect. *Phyteuma* and frequent misidentifications of its populations (*see above*), the finding of new populations in nearby regions is possible. In particular, populations from the Kikladean island of Anafi reported as apparently wild *R. odorata* (Snogerup & Snogerup 2002, Fielding & Turland 2005), as well as a single population from Montenegro (Katunska nahija, 2 August 1991, V. Stevanović *s.n.* (BEOU); P. Jiménez-Mejías pers. obs.) should be carefully revised.

This taxon is morphologically close to *R. odorata*, a species widely cultivated for its fragrant flowers in gardens of many temperate regions of the world. Morphological and molecular data suggest a hybrid origin for *R. odorata* (Abdallah & de Wit 1978, Martín-Bravo *et al.* 2007), and *R. minoica* seems to be closely related to the putative maternal ancestor of *R. odorata*, as inferred from the phylogenetic analysis of plastid *trnL-F* sequences (*see R. minoica* samples mislabelled as “*R. orientalis*” in Martín-Bravo *et al.* 2007, Martín-Bravo & Jiménez-Mejías 2009). Appar-

ently wild populations of *R. odorata* occur in N Libya, S Crete and probably N Egypt (Abdallah & de Wit 1978, Fielding & Turland 2005, Martín-Bravo 2011). The taxonomic identity of these materials has been confirmed as *R. odorata* by morphological and/or molecular data (S. Martín-Bravo & P. Jiménez-Mejías unpubl.). Distinction between *R. minoica* and *R. odorata* is mainly based on the reduced stamen number [12–16(–18) vs. 18–22(–24)], leaves (at least some usually 3(–5)-lobed vs. all generally entire) colour of petals (usually white vs. pastel yellow) and indument (papillose-hispidulous vs. usually glabrous). Other characters, especially seed size, readily allow the distinction of *R. minoica* from the two other species with which it has been confused (*R. balansae* and *R. orientalis*). A compilation of diagnostic characters (Table 1) and an identification key that helps to identify the species of *R. sect. Phyteuma* present in the eastern Mediterranean basin are provided.

ADDITIONAL SPECIMENS EXAMINED (paratypes): — **Cyprus**. In montis circa Kythraea, *P. Sintenis* & *G. Rigo* 39 (GH, WU); Mutsefla, Khalosta forest, *R.D. Meikle* 2455 (C); Paphos, hamnen (“harbour”), 28 March 1972, *E. Julin* s.n. (UPS); Louroujina near Dahli, 30 April 1984, *E. Julin* s.n. (UPS); Ktima, *M. Haradjian* 658 (S); ca. 5 km W of Nicosia on road to Troodos, *A. Anderberg* & *al.* 149 (S); 6 miles E of Kyrenia, *E.L. Larsen* 696 (S); Carpäss, prope Arthēna, *P. Sintenis* & *G. Rigo* 39 (DS, FI, IBF, LD, WU); inter Fama-gusta et Dherinia, *E. Wängsjö* & *G. Wängsjö* 5084 (LD); Kalohorio, *G. Claridge Druce* 92 (OXF); Paphos, April 1930, *G. Claridge Druce* s.n. (OXF); prope Larnaka, *J. Ball* 2389 (GH); Limassol, Akrotiri Bay, *J. Lambinon* 92/Cy/296 & *G. van den Sanden* (MA); Amanthus (Larnaka), *OPTIMA IV Iter Mediterraneum* 330 (MA, FI); Nicosia, partie W de la ville, *J. Lambinon* 92/Cy/406 & *J. Rousselle* (MA). — **Greece**. Crete, island of Gavdos, *H. Runemark* & *B. Snogerup* 47774 (LD); Oberhalb der Bucht Korfos im östlichen Teil der Insel, *Bergmeier* & *Jagel* 94-48 (C); Karave, *N.J. Turland* 1815 & *al.* (MO). — **Turkey**. İçel, Mersin, *A. Huber-Morath* 10518 (G).

Key to the eastern Mediterranean species of *Reseda* sect. *Phyteuma*

1. Stems hirsute, densely covered by long hairs *R. alopecuros*
1. Stems glabrous, papillose-scabrid, papillose-hispidulous or hispidulous 2
2. Staminal filaments persistent in fruit; ripe capsule sessile *R. arabica*
2. Staminal filaments mostly deciduous in fruit; ripe capsule generally estipitate 3

3. Seeds 3–3.5 mm; all leaves usually entire, bright light green; perennial herbs *R. armena*
3. Seeds up to 2.7 mm; at least upper stem leaves frequently lobed, rarely entire (in *R. odorata*), not bright light green; annual or perennial herbs 4
4. Seeds up to 1.8(–2) mm; sepal margins glabrous 5
4. Seeds 2–2.7 mm; sepal margins glabrous or papillose-scabrid 6
5. Stamens 18–22(–24); stems generally glabrous; petals pastel yellow *R. odorata*
5. Stamens 12–16(–18); stems more or less papillose-hispidulous; petals usually whitish *R. minoica*
6. Sepals usually markedly accrescent in fruit, as long as or longer than half the ripe capsule, (0.5–)1–4 mm wide; staminal filaments generally distinctly widened in the distal part *R. phyteuma*
6. Sepals not or slightly accrescent in fruit, as long as or shorter than half the ripe capsule, 0.4–1.5(–2.5) mm wide; staminal filaments not or scarcely widened in the distal part 7
7. Stems hispidulous or papillose-hispidulous *R. orientalis*
7. Stems glabrous or papillose-scabrid 8
8. Ripe capsule teeth 1.5–3(–3.5) mm long; seeds up to 2.3(–2.4) mm; generally annual herbs *R. inodora*
8. Ripe capsule teeth 0.5–1.5(–2) mm long; seeds up to 2.7 mm; biennial or perennial herbs 9
9. Inflorescence up to 40 cm long, lax; stems erect, up to 100 cm; margin of sepals smooth *R. balansae*
9. Inflorescence up to 25 cm long, at least dense in the distal part; stems ascending or erect, up to 60(–80) cm; margin of sepals usually papillose-scabrid 10
10. Pedicels up to 14(–16) mm in fruit; sepals 0.4–0.7 mm wide in fruit; capsules up to 12(–14) mm long *R. anatolica*
10. Pedicels up to 8(–10) mm in fruit; sepals (0.5–)0.7–1.2(–1.5) mm wide in fruit; capsules up to 15(–17) mm long *R. tymphaea*

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