

A new species of *Marrubium* (Lamiaceae) from Central Anatolia, Turkey

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Abstract: *Marrubium sivasense* Aytaç, Akgül & Ekici sp. nova (Lamiaceae) is described and illustrated from Central Anatolia, Turkey. The new species most resembles *Marrubium depauperatum*, but it differs by 3-10 flowered verticillasters, crenate to crenulated leaf margins, and unequal calyx teeth. The ecology and phenology of the new species as well as its etymology, conservation status, and diagnostic features are discussed.

Key words: New species, endemic, *Marrubium*, Labiatae, Turkey

Introduction

The members of the genus *Marrubium* L. show a herbaceous habit. They are distributed in Irano-Turanian and the Mediterranean phytogeographic regions and rarely in America and Australia. The total number of taxa is about 40 all over the world (Akgül et al., 2008). It is represented by 20 species and 11 of them are endemic in Turkey (Cullen, 1982; Davis et al., 1988; Ekim et al., 2000). The specimens of the new species were collected from Kangal (Sivas, Central Anatolia) district. It is very similar to *M. depauperatum* Boiss., but differs from it in several characters such as 3-10 flowered and lax verticillasters, crenate to crenulate leaf margins, and unequal calyx teeth.

The locality of new species is close to the type locality of *M. depauperatum* known from 2 collections around the Kayseri region, where it has been recollected since 1855. Only *M. depauperatum* is 1-flowered in its verticillasters in the genus and therefore this is the most important unique character. It was collected again by the second author from the type locality during the revision of the Turkish *Marrubium* in 2003. These collections are compared with the type photo of *M. depauperatum*, which was obtained from G herbarium. The new species were also compared with the relevant literature like Cullen (1982), Boissier (1859), Huber-Morath (1978), Seybold (1978), Özhatay et al. (2009), and Özhatay and Kültür (2011) and the second collection of *M. depauperatum* in ANK herbarium. The

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morphological and micro-morphological studies support the introduction of this species as new to science.

For palynological investigations, material was obtained from the type collection. The pollen slides were prepared according to Wodehouse's technique (Wodehouse, 1935) for light microscope.

For the scanning electron microscopy studies, pollen grains were first hydrated with 10% KOH for ca. 10 min, then rinsed with distilled water, and dried before mounting and coating with gold. The SEM micrographs were taken with a JEOL CXII microscope in Gazi University. The descriptive terminology of Faegri and Iversen was followed (Faegri & Iversen, 1992).

For seeds, morphometrical data of cleaned and mature seeds were obtained using a stereomicroscope with a micrometer. Seed length and width were measured at the widest point. Twenty seeds were measured. Mature seeds were mounted using double-sided tape on the SEM stubs and coated with gold in a Polaron SC502 sputter coater. They were examined with a JEOL JSM 840A SEM at 5 kV at Gazi University.

The authors of plant names were checked in Brummitt and Powell (1992) and the specimens were checked in GAZI, G, and ANK herbaria.

Results

***Marrubium sivasense* Aytaç, Akgül & Ekici sp. nova** (Figures 1-2).

Type: Turkey, B6 Sivas: Between Kangal and Sivas, 2 km, 1550-1600 m, 09.07.2002, steppe, *M.Ekici* 3035, *Aytaç* & *H.Akan*. (holotype: GAZI; isotypes ANK, HUB).

Paratype: B6 Sivas: Between Kangal and Gürün, east of Mancılık village, 1640 m, 10.07.2007, steppe, *Aytaç* 9074 (GAZI).

Diagnosis: *Affinis M. depauperato, sed folio margine crenato vel crenulato (non folio integro vel serrato), verticillastris 3-10 floribus (non floribus 1), calycibus longidentatis differt.*

Perennial herb. Stem erect, simple and woody at base. Sterile shoots 1-2 cm long and thin. Fertile stems 30-40 cm long, quadrangular, greenish-

white lanate below, adpressed and greyish stellate-pubescent above. Leaves of sterile shoots obovate to spatulate, 3-6 × 1.5-2 mm, densely white-lanate, obtuse to acute, crenulate. Leaves of fertile stems 4-6 pairs, petiole 5-15 (-18) mm long; usually involute; elliptic to oblong, 20 × 6 mm, acute to obtuse at apex, cuneate at base, crenate to crenulate at margin; densely adpressed greyish stellata-lanate on both sides. Central branch of the stellata hairs longer than laterals; ± sessile glands. Lower floral leaves elliptic to oblong, 4-8 (-11) × 0.5-3 mm, upper surface stellata-lanate, yellowish green, 2 times longer than verticillasters; upper ones as long as verticillaster or slightly longer. Each branch terminated by a 'spike' of 3-10 flowered verticillasters. Bracteoles 3 pairs, linear, 1.6-2.1 mm long, as long as 3/4 to 1/2 length of calyx, densely adpressed stellata-lanate. Calyx obconical, 4-5 mm, greyish, whitish-grey and stellate-pubescent, forked above; tube densely hairy outside, with tufts of long hairs inside at mouth; calyx teeth subequal, longer ones 1.8-2.3 mm, shorter ones 1-1.4 mm long, densely stellate-pubescent. Corolla white to cream, 5-7 mm long, exerted from calyx tube, stellata-pubescent outside, glabrous inside; upper lip slightly concave and deeply lobed. Nutlets dark brown, ovate and 2.05 × 1.02 mm.

Fl: 7, *Fr:* 7-8.

The pollens grains are isopolar with radial symmetry, tricolpate (97%) and sincolpate (3%). The polar axis is 34.82 ± 1.46 µm, equatorial axis is 24.57 ± 0.76 µm, P/E ratio is 1.41 ± 0.07 and subprolate. They show foveolate-perforate ornamentation (Figure 3).

The seeds are dark brown, ovate, 1.02 ± 0.06 width and 2.05 ± 0.03 length. The ornamentation is verrucate-reticulate (Figure 4).

Ecology and phenology: It shares its habitat with some herbaceous plants such as *Linum mucronatum* Bertol subsp. *orientale* (Boiss.) P.H.Davis, *Hypericum lydium* Boiss., *Astragalus hirsutus* Vahl, *A. xylobasis* Freyn & Bornm., and *Phlomis linearis* Boiss. & Balansa, between 1550 and 1640 m altitude. Flowering occurs in July. The new species also grows on gypseous steppe.

Etymology: The specific epithet is derived from the locality of the type specimen, Sivas Province.

Distribution: Central Anatolia near Sivas (B6), (Figure 5). Endemic. Ir.-Tur. element.

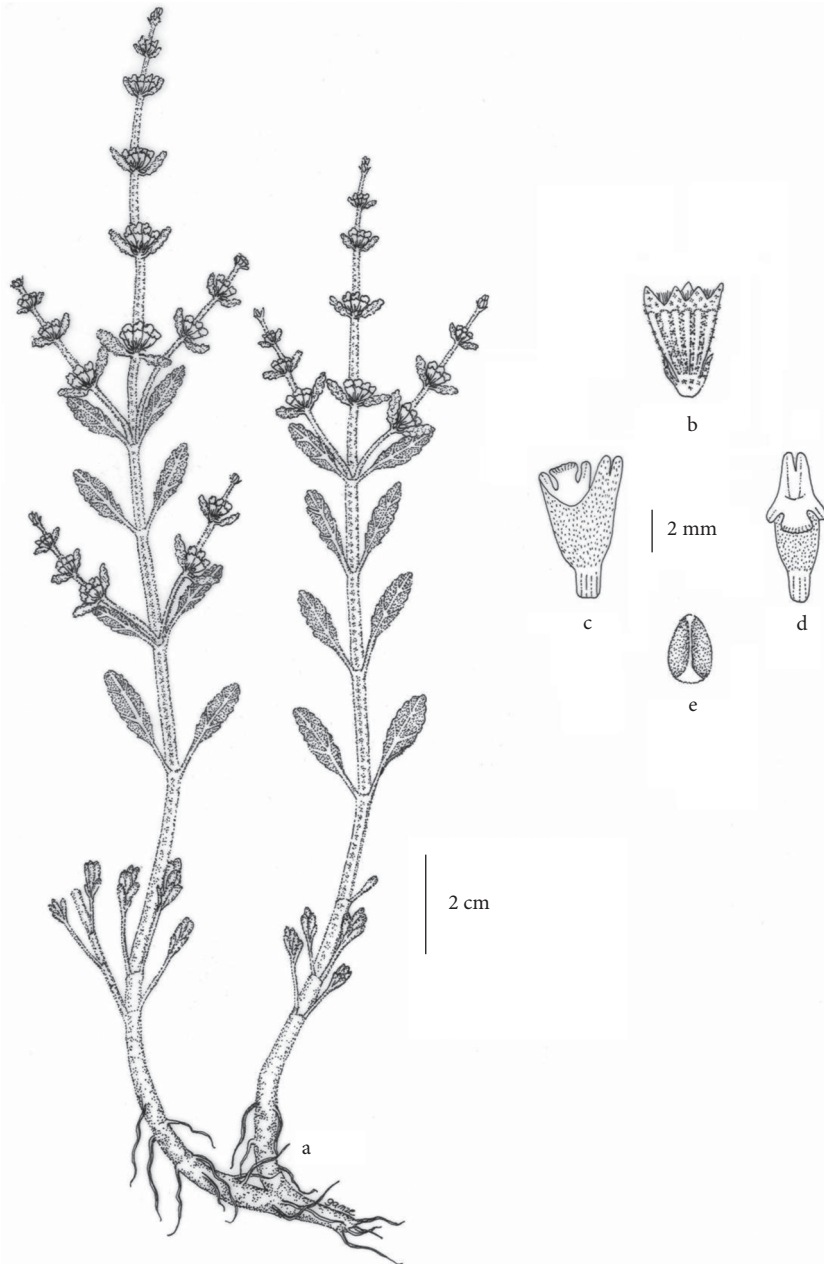


Figure 1. *Marrubium sivasense*. a- habitus of plant; b- calyx; c & d- corolla; e- seed.



Figure 2. *Marrubium sivasense* (Photo, in field). A- general form, B- verticillaster.

Conservation status: The steppe locality of the new species will be used for agricultural purposes in the future. The known area for the type locality of *M. sivasense* is less than 5 km² and the number of individuals is less than 250 (Criterion B21a). Therefore, of the IUCN categories (IUCN, 2001), Critically Endangered (CR) status is proposed.

Specimen examined: *Marrubium depauperatum*: B5 Kayseri: In collibus saxosis Cappadociae ad pagum Ekrek inter Caesareum urbem et fluvium Zamante sou (nr. Elbaşı), 1500 m, 08.1855, *Balansa s.n.* (holo. G photo!); Kayseri: 36 km E-SE of Kayseri, 1450 m, *Balansa* 1077 (G photo!); Kayseri: Pınarbaşı, near Elbaşı, 1450 m, 15.09.2003, stony places, *Akgül* 2683 (ANK, topotype).

Discussion

Marrubium sivasense is very similar to *M. depauperatum*, which is distributed in Central Anatolia near Elbasi (B5 Kayseri) and only known from the type locality. It differs from *M. depauperatum* by its long petiole, 5-15 mm (not 2-3 mm); 3/4 crenate to crenulate in marginal of cauline leaves (not entire at base and serrate at apex); each verticillasters 3-10 flowered (not 1 or usually 2 flowered), sessile or with short peduncle 5-15 mm (not 2-3 mm); verticillasters 3-6 and not disposed in spikes (more than 6 and disposed in spikes); bracteoles linear and not enclosing base of calyx (enclosing base of calyx in *M. depauperatum*); longer calyx teeth 1.8-2.3 mm (not 1-1.4 mm); corolla exerted from the calyx (not as long as or shorter than calyx), (Table).

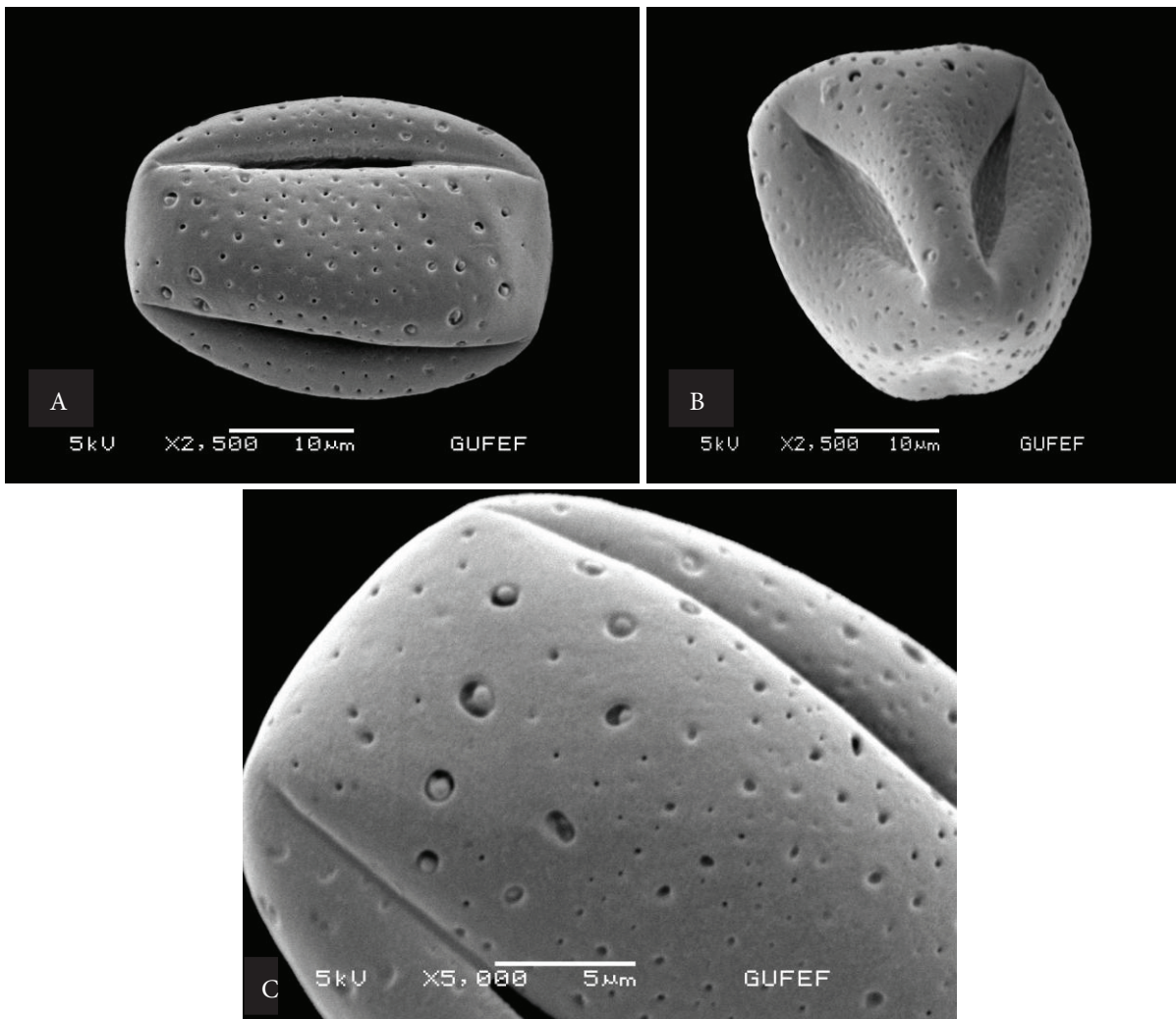


Figure 3. *Marrubium sivasense*, scanning electron micrographs of pollen grains. A- general view (tricolpate), B- general view (sincolpate), C- ornamentation.

Table. Comparison of *Marrubium sivasense* and *M. depauperatum*.

Characters	<i>M. sivasense</i>	<i>M. depauperatum</i>
Stem	simple or branched	branched
Indumentums of stems	adpressed stellate	adpressed dendroid
Cauline leaves	elliptic to oblong	oblong-cuneate
Petiole	5-15 mm long	2-3 mm long
Margin of cauline leaves	crenate to crenulate	entire below and serrate above
Verticillasters	3-10 flowered	1- (-2) flowered
Bracteoles	1.6-2.1 mm; not enclosing base of calyx	<1 mm; enclosing base of calyx
Calyx teeth	longer teeth 1.8-2.3 mm, shorter teeth 1-1.4 mm	longer teeth 1-1.4 mm, shorter teeth 1 mm
Corolla	5-7 mm long	3-4 mm long
Pollen ornamentation	foveolate-perforate	granulate-perforate
Seed ornamentation	verrucate-reticulate	tuberculate and carunculate

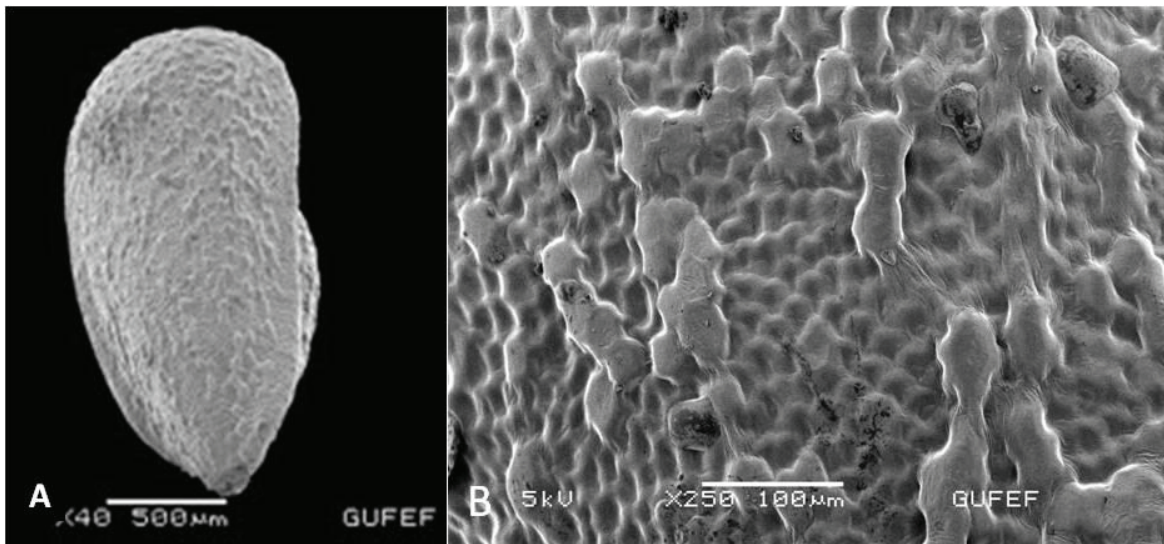


Figure 4. *Marrubium sivasense*, SEM micrographs of seed. A- general view, B- ornamentation (reticulate verrucate).

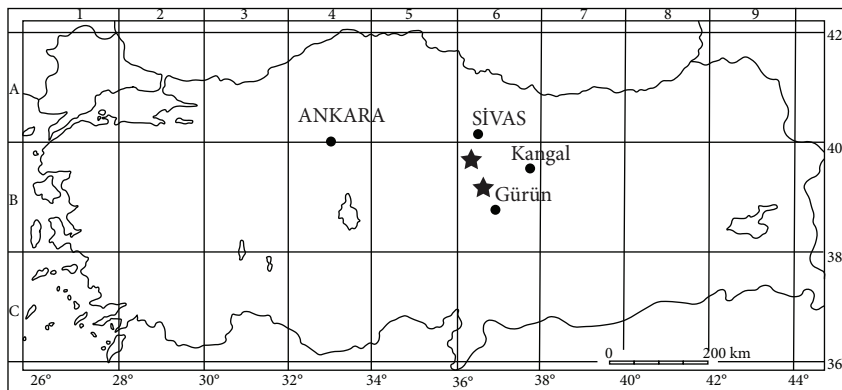


Figure 5. Distribution map of *Marrubium sivasense* (★).

The pollen polar axis is maximum $34.82 \mu\text{m}$ (not $30.2 \mu\text{m}$) and equatorial axis is $24.57 \mu\text{m}$ (not $27.1 \mu\text{m}$), the ornamentation is foveolate-perforate in the species, while granulate-perforate in *M. depauperatum* (Akgül et al., 2008).

The seeds are dark brown, ovate, $1.02 \times 2.05 \text{ mm}$ (not $1.5-2 \times 1-1.5 \text{ mm}$). The ornamentation is verrucate-reticulate (not tuberculate and carunculate) (Akgül et al., 2007) (Figure 4).

Flowering time of this new taxon is earlier than that of *M. depauperatum* (in July not August) and it grows on gypseous steppe, whereas *M. depauperatum* grows on calcareous steppe.

Marrubium depauperatum was not collected after 1855, and so it is evaluated in the DD category in the Turkish Red Data Book (Ekim et al., 2000), but it was recollected by the second author in 2003 and its threat category has been changed from DD to CR, because of its small and under threat population (Akgül et al., 2007).

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