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Marrubium vulcanicum (Lamiaceae), a topotype from northeastern Anatolia, Turkey

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Abstract: *Marrubium vulcanicum* is an endemic plant to northeast Anatolia and known by two locations around Ağrı Province. It was collected again by the author from its type locality. This species has little branched and stems dark green, stem leaves ovate to orbicular, rounded at apex, cordate at base and coarsely doubly serrate at margines. Lower and upper lobes of corolla are nearly equal. After recollecting, it has decided as VU in IUCN (2001) because of intensive grazing and cultivation. Collected plant materials were deposited in the Herbarium of Ankara University Faculty of Science. The comparison of the type and photo of the habitus, drawing of the flower parts and distribution map of the species are given. And also, its pollen characteristics were examined by SEM and seed morphology by LM. In addition, the absence of some characters of the species descriptions in the Flora of Turkey was corrected and extended with this study.

Keywords: *Marrubium*, Lamiaceae, Topotype, Turkey.

Introduction

The genus *Marrubium* L. (Lamiaceae) has more than 40 species in the world. Most of them i.e. 12 species are endemic to Turkey and more than half of them (i.e. 22 species) are found in Turkey. However, 15 species are found in Iran (Seybold, 1974), 14 species in former USSR countries (Komarov, 1964), 12 species in Europe (Tutin et al., 1964-1980), and less than ten species in the other countries located around the Mediterranean Sea (Akgül, 2008; Aytaç et al., 2012; Akgül and Selvi, 2014). Irano-Turanian especially in the areas of Turkey and Mediterranean phytogeographic regions are main centers of the distribution of this genus (Akgül and Ketenoğlu, 2014). Except few species, most of them are perennial herbs. There are a few species in this genus that is known to be used for medical purposes (i.e. *M. vulgare*). The genus *Marrubium* is characterized by erect or ascending stems and densely hairy, usually having many lateral branches, leave with toothed margins, flowers usually arranged densely on the stems known as verticillaster, having broad bracts and small bracteoles, and having tubular calyx and corolla. This species was first collected from Ağrı in 1979 by Arthur Huber Morath (Huber-Morath, 1979). After than it has not been collected again. In the flowering and fruiting time of the vegetation, the author was carried out many times field researches in east Anatolia especially in Ağrı Province. During this field works, the species was collected for the second time from the region. It is found on field margins and rocky hillsides. The population seems too pure and scattered. Therefore, it was decided to be VU category in the IUCN (IUCN, 2001). The authorities are confirmed in accordance with authors of Plant Names (Brummit and Powell, 1992). The specimens of the plants were deposited in the Herbarium of Ankara University Faculty of Science (Hb. ANK.).

Materials and Methods

During the field study, *Marrubium vulcanicum* was collected again by the author from the type locality in the flowering and fruiting time in the region. The specimens were pressed and dried according to herbarium techniques (Davis and Heywood, 1973). They were deposited at the Hb. ANK. It was cross-checked with *Marrubium* accounts given in the relevant floras, e.g. Flora Orientalis (Boissier, 1876) and Flora of Turkey (Cullen, 1982), and were compared with duplets obtained from E, W, BM, G.

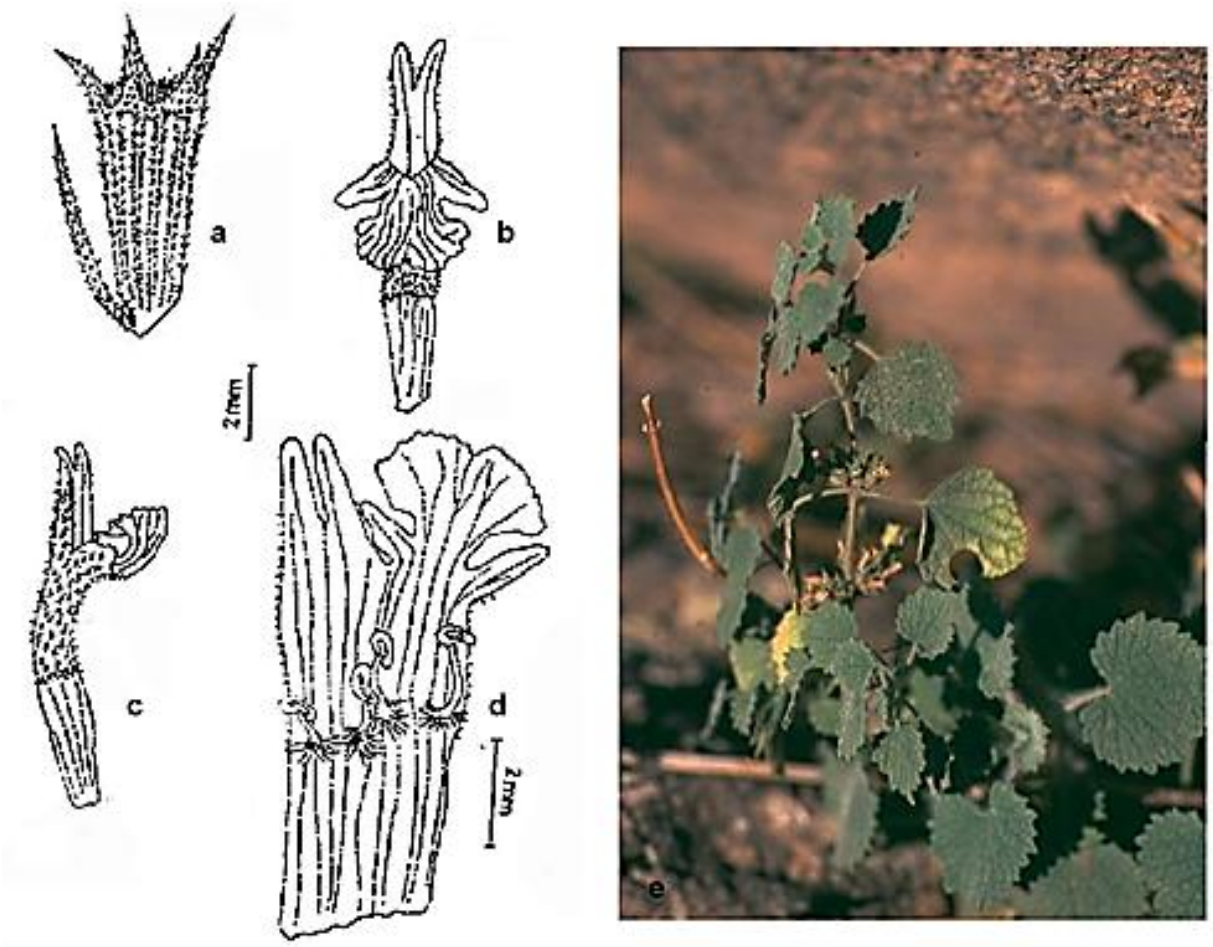

Figure 1. Flower of *Marrubium vulcanicum*. (a) Calyx, (b-d) Corolla, and (e) habitus of *Marrubium vulcanicum.*

Pollen slides were prepared by using the technique of Wodehouse (1935). Morphological observations were made using a Leica 58APO Light microscope. Measurements were based on 20 or more pollen grains. The photographs of seeds were taken by Leica DFC280 digital camera connected to a stereomicroscope. For SEM studies, the pollen grains and seeds were coated with gold for 4 minute in a sputter-coater. The pollen terminology followed Faegri-Iversen (1975) and Brochmann (1992), and for seed terminology Murley (1951) and Koul (2000) are followed.

Results

Marrubium vulcanicum Hub.-Mor., in Bauhinia 6 (2): 288, Figure 1.

Holotype: [Turkey: B9 Ağrı] Patnos, between Erciş and Patnos, 1740 m, 12.07.1951, steppe, Huber-Morath 11712 (holo. Hb. Hub.-Mor.).

Description: Perennials, stems little branched, dark green, 20-40 cm, stellate above thinly lunate below. Stem leaves broadly ovate to orbicular, 15-25×25-30 mm, apex rounded, cordate at base, coarsely doubly serrate, dark green, stellate pilose beneath. Petioles 1.5-2.5 cm. Floral leaves right angels, two times as long as verticillasters, ovate to rounded, 12-18×12-15 mm, dark green and stellate pilose upper and lower surfaces. Verticillasters hemispherical, 2-5, 15-30 flowers. Bracteoles subulate, usually equal to calyx tube, rarely longer than calyx tube. Calyx tube tubular, purplish above, 4.5-5.5 mm, scarcely stellate pilose hairs. Calyx teeth 5, usually equal, spreading or sometimes erect, 1.5-2 mm, 1/3 acicular and glabrous at apex, densely stellate hairs. Corolla whitish, tubular to concave, 5-6 mm. Upper lip 3.5 mm, main lobes of lower lip 3x4.5 mm, emarginated, lateral lobes long, 2.5 mm, acute. Stamens didinam, anthers elliptic, filaments 1.5 mm. Stilus lobes, 4.5 mm. Ovary smooth. Nutlets 4, dark brown, elliptic, 0.9-1×1.3 mm, triangular, verrucate. Localities (Topotype); B9 Ağrı: Patnos, above Burnubulak village, 1800 m, 23.06.1996, rocky slopes in steppe, Akgül 2506 (Hb. ANK). B9 Ağrı: Patnos, between

Figure 2. Distribution area of *Marrubium vulcanicum* (●), and *Marrubium vanense* (▲).

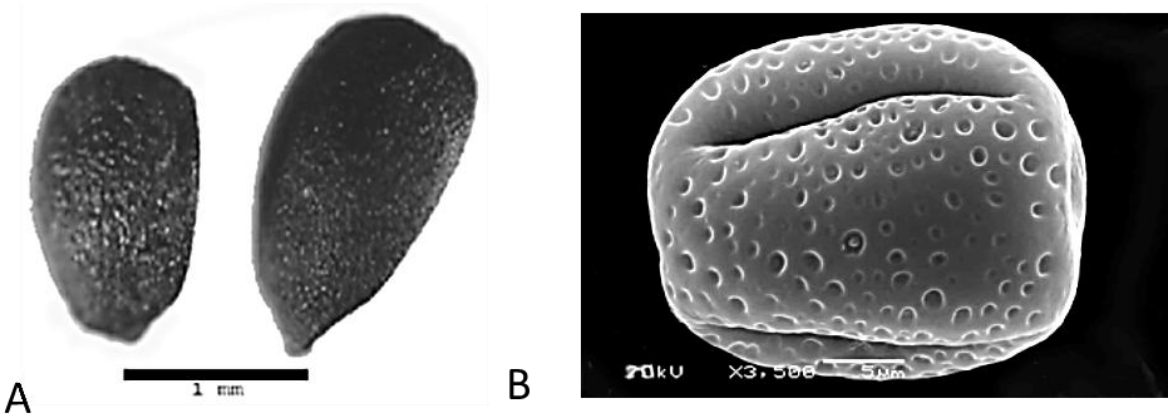

Figure 3. Photos of LM nutlets of *Marrubium vulcanicum*; B. Photos of SEM pollen grains of *Marrubium vulcanicum*.

Patnos and Erciş, 1700 m, 19.09.2001, rocky places and serpentine rocky hillsides, Akgül 2506 (Hb. ANK.). ***Topotype***

Flowering time is from June to September; fruiting time in August.

Ecology and habitat preferences: *Marrubium vulcanicum* grows on field margins and serpentine rocky hillside near Patnos in Ağrı provinces (B9) at 1740 m, with *Marrubium vulgare* L., *M. parviflorum* Fisch. Et Mey. ssp. *oligodon* (Boiss.) Seybold, *Salvia nemorosa* L., *Wiedemannia multifida* (L.) Benth. *Ziziphora tenuior* L., *Sisymbrium loeselii* L., *Carduus nutans* L., *Onopordum acanthium* L., *Verbascum georgicum* Benth., *Adonis flammea* Jacq., *Poa bulbosa* L., *P. trivialis* L. ve *Bromus tectorum* L. ssp. *tectorum.*

IUCN category of M. vulcanicum: This local endemic species is known by two localities around Ağrı Province (Fig. 2). It was collected from two localities near the Patnos where it grows on single location surrounded by fields and rocky hillsides. The additional fields' surveys carried out by the author in June, July, August and September, showed that the distribution of the species restricted with a small area. The population seems to be pure and scattered on the field margins and rocky hillsides where grazing throughout the flowering and fruiting time, and the cultivation is threatening the species. Therefore, it

Table 1. The comparison of morphological characters in the type specimens and the topotype of *Marrubium vulcanicum* and *Marrubium vanense*.

Morphological characters	*Marrubium vulcanicum* (in the type)	*Marrubium vulcanicum* (in the new study)	*Marrubium vanense* (in the type)
Stems	branched, 20-30 cm long, pilose with longer and shorter simple hairs	little branched, dark green, 20-40 cm long, stellate above, thinly lanate below	erect, 50 cm or more
Cauline leaves	orbicular to flabellate, coarsely doubly serrate, grayish green, pilose with dense stellate hairs above and beneath	broadly ovate to orbicular, lamina 15-25×25-30 mm, apex rounded, cordate at base, coarsely doubly serrate, dark green, stellate pilose beneath	orbicular or flabellate, irregularly and coarsely crenate, thiinly pilose with simple hairs above and rather more densely so with large stellate hairs beneath
Petiole	Unknown	1.5-2.5 cm long	unknown
Floral leaves	Unknown	two times as long as verticillasters, ovate to rounded, 12-18 × 12-15 mm, dark green, stellate pilose upper and lower surfaces	unknown
Verticillasters	several flowered	hemispherical, 2-5, 15-30 flowers	crowded, several flowered
Bracteoles	somewhat shorter than calyx tube	subulate, usually equal to calyx tube, rarely longer	about as long as calyx tube
Calyx tube	purplish with green ribs, 5-6 mm, with stellate hairs	purplish above, 4.5-6 mm, scarcely stellate pilose hairs	4.5-5 mm, with stellate hairs
Calyx teeth	5, somewhat unequal, strait, or subspreading, 1.5-2 mm stellate-pubescent for c.1/2 their length	usually 5, usually equal, spreading or sometimes erect, 1.5-2 mm, acicular and glabrous at apex, densely stellate hairs	5 or rarely 6, somewhat unequal, 2-2.5 mm, strait, erect or slightly spreading, covered with stellate hairs for 1/2-2/3 of their length
Corolla	white, densely stellate-pilose outside	whitish, tubular to concave, 5-6 mm	yellowish-white, densely lanate with stellate hairs outside
Upper lip	glabrous within	bifid, strait, 3.5 mm, glabrous inside, densely stellate hairs outside	glabrous inside
Main lobes of lower lip	Unknown	3×4.5 mm, emarginated	unknown
Lateral lobes	Unknown	2.5 mm long, acute	unknown
Stamens	Unknown	didinam, anthers elliptic, filaments 1.5 mm	unknown
Stilus lobes	Unknown	4.5 mm	unknown
Nutlets	brown, c. 1.5 mm	dark brown, elliptic, 0.9-1×1.3 mm, triangular, verrucate	unknown

was decided to be Vulnerable (VU) category because of its local distribution and small population size instead of category in the IUCN 2001.

Characteristics of nutlets and pollen grains of *M. vulcanicum* (Fig. 3. A-B); radially symmetrical and isopolar; tricolpate and prolate-spheroidal; polar axes 29.1 μm, equatorial axes 25.5 μm. Ornamentation is psilate-foveolate. Exine tectate, 1.8 μm. Ectexine thick than endexine and intine 1.3 μm. Nutlets 4, dark, oblong, 0.9×1.3 mm, triangular, verrucate.

Discussion

Marrubium vulcanicum Hub.-Mor. a local endemic in northeast Anatolia was first collected from Ağrı Province by Arthur Huber Morath (1979) (near Patnos) and later given by James Cullen in the Flora of Turkey. It has not been collected again since 1979. During the flowering and fruiting time, the area have been observed by some collectors but the species could not have been recorded because of its limiting area and its narrow distribution.

Marrubium vulcanicum is related to *M. vanense* which is also distributed only in northeast Anatolia. It is known only from two localities in Ağrı Province. It differs from *M. vanense* due to having little branched stems, leaves blade ovate to orbicular, and coarsely serrate to crenate, verticilasters spaced along stem and dichotomal branches (terminating the main branched of stem). In addition, it was quite different from *M. vanense* on morphological characteristics having calyx tube purplish with green ribs and upper lip of corolla equal to lower lip and flowering time is long (from June to September) than the allied taxa (Table 1).

Marrubium vulcanicum has an endangered habitat in

the east and South of the Patnos in Ağrı Province. The plant species grows on field margins and serpentine rocky hillsides that are surrounded by the cultivation areas and villages. A small population is found only one location in rocky hillsides and field margins. The growing area of this species has been getting smaller because of cultivation by people in the region until now. In addition, the plants are eaten by cattle and sheep because of having thin stems, leaves and have no acicular calyx teeth. According to field surveys, it was decided to be VU (Vulnerable) category (IUCN 2001). And also, cultivation is one of the leading causes of getting smaller plants habitat, it is necessary to take steps to conserve the habitat quickly.

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