

Verbascum hasbenlii (Scrophulariaceae), a new species from Turkey

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Received: 08.08.2011

Accepted: 19.02.2012

Abstract: *Verbascum hasbenlii* Aytaç & H.Duman **sp. nov.** (sect. *Bothrosperma* Murb.) is described and illustrated from Turkey. This new species was collected in B1 Çan (Çanakkale Province) area. *V. hasbenlii* appears to be closely allied to *V. luciliae* (Boiss.) O.Kuntze and *V. haraldi-adnani* Parolly & Eren. Its affinities with this and other related species are discussed. The characteristic features of pollen, seed, stomata structure, and hairs are studied using a scanning electron microscope and the distribution of the new species in Turkey is given.

Key words: *Verbascum*, new species, Turkey, taxonomy, pollen, seed

Türkiye’den yeni bir tür, *Verbascum hasbenlii* (Scrophulariaceae)

Özet: (B1) Çan (Çanakkale) civarından toplanan *Verbascum hasbenlii* Aytaç & H.Duman (sect. *Bothrosperma* Murb.) yeni bir tür olarak tanımlandı. Yeni türün akraba türler *V. luciliae* (Boiss.) O.Kuntze ve *V. haraldi-adnani* Parolly & Eren ile olan taksonomik durumu tartışıldı. Ayrıca elektron mikroskopuna (SEM) dayalı polen, tohum, stoma yapıları ve yaprak tüylenmesi ile Türkiye’deki dağılışı hakkında bilgi verildi.

Anahtar sözcükler: *Verbascum*, yeni tür, Türkiye, taksonomi, polen, tohum

Introduction

The genus *Verbascum* L. (Scrophulariaceae) in Turkey includes about 244 species, 129 hybrids, and 6 imperfectly known or doubtful records, which are divided into 13 partly artificial groups (Huber-Morath, 1978; Davis, 1988; Ekim, 2000; Özhatay, 2006, 2009, 2011; Parolly, 2008; Karavelioğulları, 2009a; Parolly & Tan, 2007; Bani et al., 2010). Moreover, it includes about 360 species worldwide (Heywood, 1993). It is the second largest genus

after *Astragalus* L. in Turkey. All taxa in Turkey of the genus *Verbascum* belong to sect. *Bothrosperma* Murb. (Huber-Morath, 1971). The rate of endemism of the genus in Turkey is 80% (193 taxa are endemic) and some of them are known from the type locality or 1 or 2 collections. Three new species were presented to science between 2008 and 2010: *V. haraldi-adnani* Parolly & Eren (2008), *V. eskisehirensis* Karavelioğulları et al. (2009b), and *Verbascum turcicum* Bani & Adigüzel (2010).

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After the first revision of the Turkish genus *Verbascum* by Hub.-Mor. for the *Flora of Turkey* (Huber-Morath, 1978) and the second was prepared (Group A) by Karavelioğulları and Aytaç in 2008.

Materials and methods

During a field trip to West Anatolia (B1 Çanakkale-Çan) in 2010, an unusual population of *Verbascum* was observed. At first glance, it seemed to be close to *Verbascum luciliae* (Boiss.) O.Kuntze. After closer examination and consultation with the *Flora of Turkey* and other related literature (Huber-Morath, 1978, 1971; Davis et al., 1988; Ekim, 2000; Karavelioğulları and Aytaç, 2008), *Flora Iranica* (Huber-Morath, 1981), *Flora Palaestina* (Feinbrun-Dothan, 1978), and monograph of *Verbascum* (Murbeck, 1925 and 1933), it was realised that the specimens were different from other known *Verbascum* species. The specimens were cross-checked with various *Verbascum* accounts given in relevant literature, and with those kept in various European and Turkish herbaria: E, G, GAZI, HUB, ISTE, and G photo (typus). The abbreviations of the authors of plant names were checked in Brummitt and Powell (1992) and on the Internet (<http://www.ipni.org>, 2011). Eventually, the specimens were described as a new species for science.

Moreover, the threat category assessment of the new species was made according to IUCN criteria (IUCN, 2001).

Pollen samples were provided from herbarium materials for palynological 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 for the scanning electron microscope (SEM) studies. The SEM micrographs were taken with a JEOL JSM 6060 SEM at 10 kV. The descriptive terminology of Faegri and Iversen (1992) has been followed. The general pollen description is based on the SEM investigation in Gazi University SEM unit.

For seeds, morphometric data of cleaned and mature seeds were obtained using a stereomicroscope (Leica DM1000) with a micrometer. Seed length and width were measured at the widest point. For the new species 50 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 JEOL JSM 6060 SEM at 10 kV, in Gazi University SEM unit.

Glossary of Pollen and Spore Terminology was used for pollen and seed determination (Punt et al., 2007).

The hairs and stomata of leaflets examined with the SEM were taken from the regions close to the end points of the dried plant leaf and mounted on the SEM stubs with double-sided tape in a manner in which the upper surfaces could be examined. They were coated with gold by using the Polaron SC 502 Sputter Coater and examined with the Jeol JSM 6060 SEM operated at 10 kV in Gazi University SEM unit.

Verbascum hasbenlii Aytaç & H.Duman sp. nov. (Figure 1).

Type: B1 Çanakkale: Çan, Kirazlitepe, 700 m, 08.vii.2010, Z.Aytaç 9625 & H.Duman, (Holotype: GAZI, isotype: ANK).

Diagnosis: Affinis *V. luciliae* sed pedicellis 5-7 mm longis (non 7-15 mm), filis indumentis purpurea-violaceis (non albo-luteis), corolla 12-15 mm diametro (non 13-20 mm) et two purpurea puncto praesenti intra corolla differt.

Biennial to perennial, herb, with long multicellular eglandular to glandular hairs throughout. Stem terete, erect to ascending, 15-30 (-40) cm tall, branched from base. Basal leaves with petiole 1-2 cm, lamina 8-10 × 2-3 cm, lyrate to ovate; terminal lobes 2-3 × 1.5-2 cm, 2-5 pairs of small oblong to ovate, crenate lateral lobes. Cauline leaves lyrate to simple, oblong and dentate. Upper similar, but sessile and smaller. Inflorescence lax raceme, many flowered, each bract with a single flower. Bracts lanceolate, dentate, the lower longer than pedicel. Bracteoles absent. Pedicel 5-7 mm. Calyx 3-4 mm, divided almost to base, lobes oblong, obtuse and glandular. Corolla rotate, 12-15 mm diam., yellow, glabrous outside and inside, 2 purple-spotted present inside of the corolla (like eyes). Fertile stamens 4. Two anthers reniform, 0.5-1 mm, the others longitudinally inserted ± decurrent; filament with purple-violet wool, glabrous near apex, Style 2-3 mm, greenish and capitate. Capsule broadly ovate to globose, glandular above, 5-7 × 5 mm. Seeds tetragonal, brownish-black.

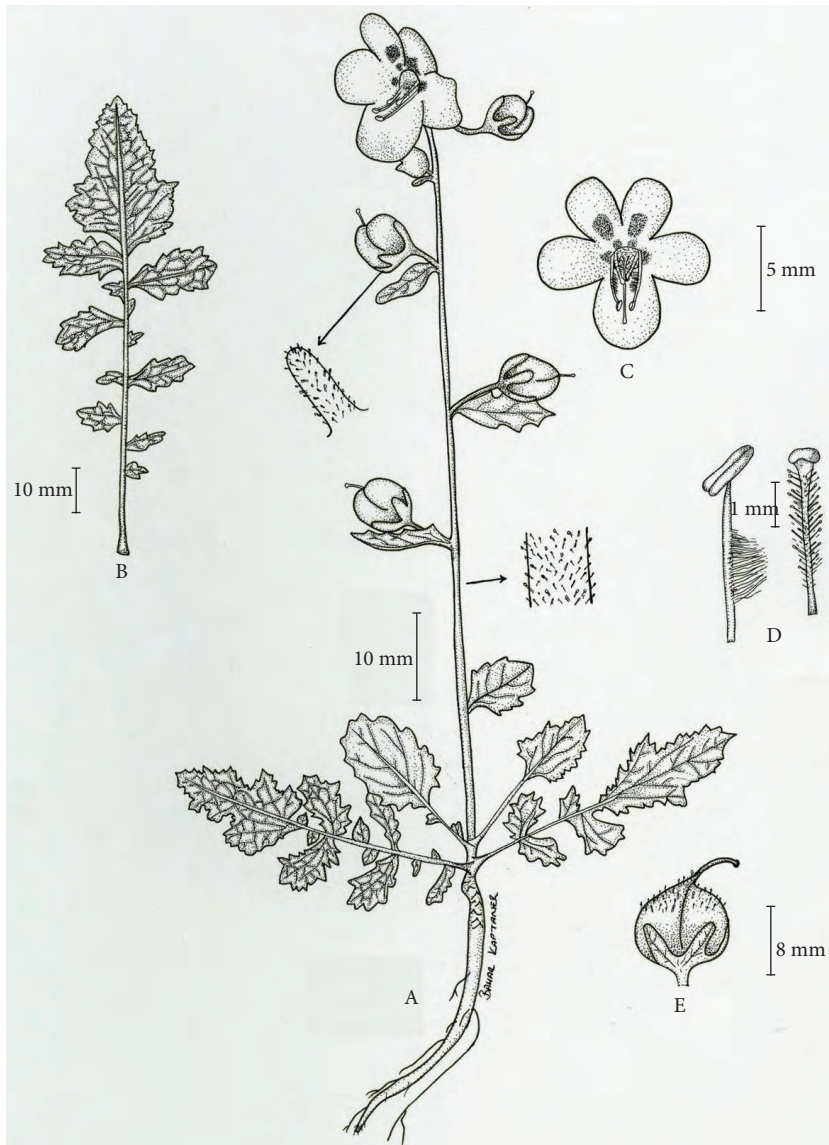


Figure 1. A. Habitus of *Verbascum hasbenlii*, B. lower leaf, C. flowers, D. stamens, E. capsule.

Fl. In June-July, mature fruits in July.

Pollen: The pollen type is tricolpate and the ornamentation is reticulate (Figure 2)

Seed: Seeds are dark brown and prismatic to prismatic-oblong and alveolate. The size of seeds is 0.8-1.1 × 0.6-0.8 mm. Hilum is short and orbicular. The seed coat ornamentation is reticulate-rugose (Figure 2).

Leaves: It has glandular and non-glandular trichomes; it has 2 types of glandular trichomes:

unicellular and multicellular stalks. Glandular trichomes are denser than the non-glandular ones (Figure 2E). It has amphistomatic leaves. The stomata are $15.33 \mu\text{m} \pm 1.88 \times 8.07 \mu\text{m} \pm 1.02 \text{mm}$. The number of stomata on the adaxial surface ($150.16 \pm 57.87 \text{ in mm}^2$) is lower than on the abaxial surface ($287.25 \pm 29.56 \text{ in mm}^2$), (Figure 2).

Distribution and Ecology: *Verbascum hasbenlii* is distributed in western Anatolia, east of Çanakkale. It is local endemic to Turkey, and is known only from the type locality. It grows on large boulders

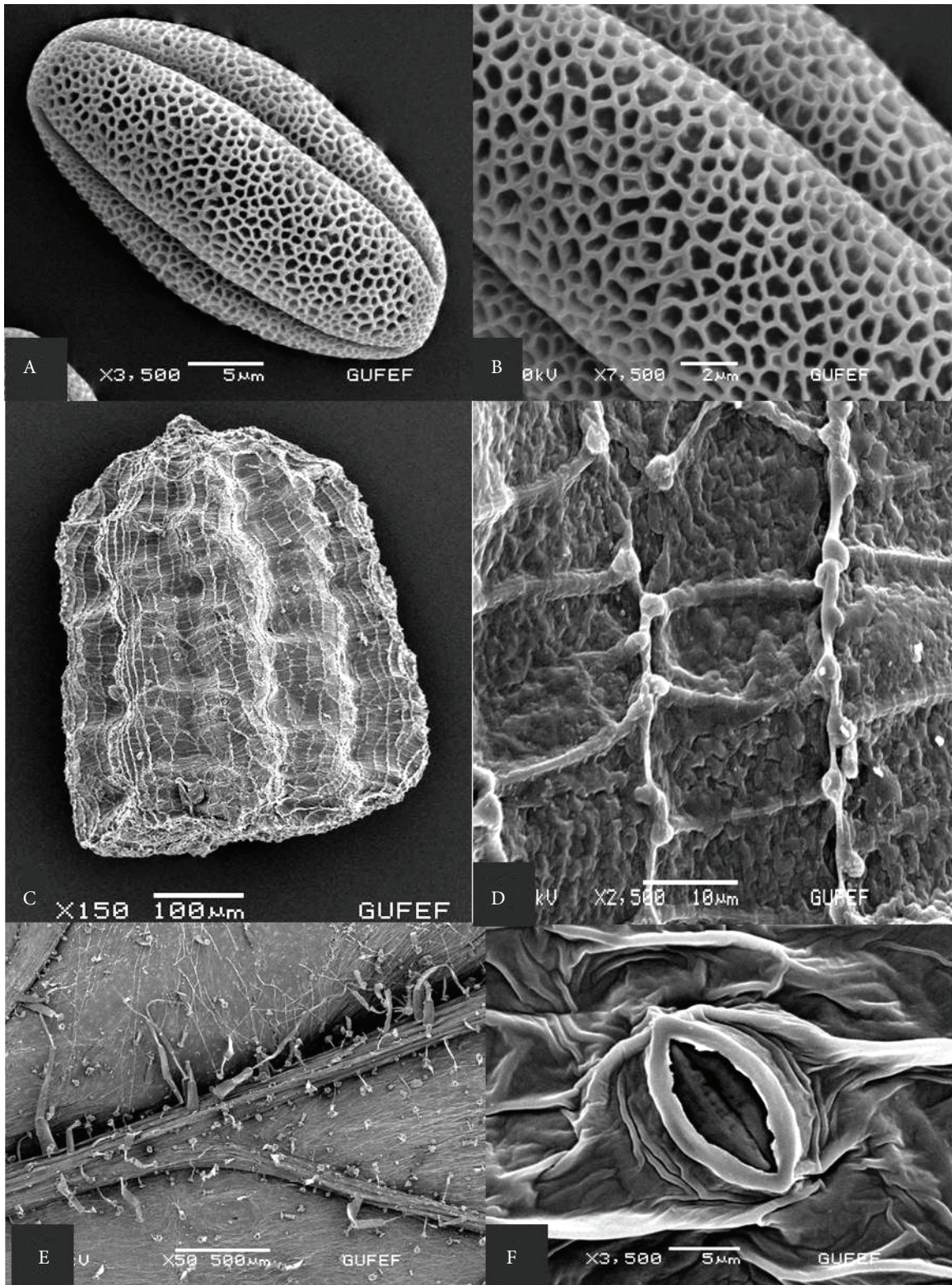


Figure 2. SEM photos of *Verbascum hasbenlii*, A- equatorial view of pollen, B- detail of pollen grain, C- general shape of seed, D- seed coat surface, E- glandular and non-glandular trichomas, F- cuticular & amphistomatic type stomata.

in metamorphic rocks, at an altitude of 600-700 m, screen of *Castanea sativa* Miller and *Pinus nigra* J.F.Arnold subsp. *nigra* var. *caramanica* (Laudon) Rehder and *Quercus* L. spp. forest (Figure 3).

Eponymy: This species is named in honour of Dr. Abdullah Hasbenli, who is one of the collectors of the new species and who works in zoo taxonomy at the Faculty of Science of Gazi University in Ankara, Turkey.

Recommended IUCN Threat Category Listing: It is known from the type locality (Criterion A1 a),

with an estimated area of occupancy less than 5 km² (Criterion B2abi,ii). The population is unhealthy with less than 50 individuals (criterion C2aii). Therefore, it should be classified as Critically Endangered (CR) (IUCN, 2001).

Examined specimens: –*Verbascum luciliae*; C2 Denizli, in fissuris rupium ad colles circa Ghyra (Geyre), Cariae, Aprodisiae veterum, vi. 1842, Boissier (G. Photo); Muğla: Kavaklıdere, Çamliyurt village, 715 m, 10.10.2000, screen on *Pinus nigra* forest, Varol 3543 GAZI. B2 Uşak: Eşme, south of

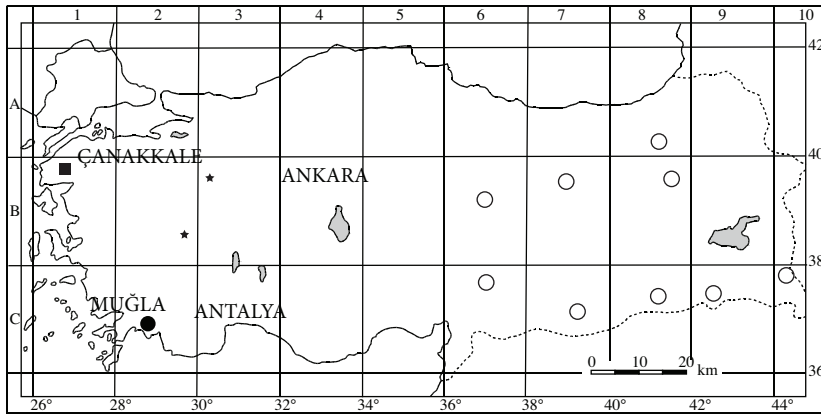


Figure 3. Distribution map of the *Verbascum hasbenlii* (■), *V. luciliae* (★), *V. haraldi-adnani* (●) and *V. agrimoniifolium* (○) in Turkey.

Table. Comparison of *Verbascum hasbenlii* with allied and similar species.

Characters	<i>V. hasbenlii</i>	<i>V. luciliae</i>	<i>V. haraldi-adnani</i>
Indumentum of lateral lobes	glandular and longer eglandular hairs throughout	glandular and longer eglandular hairs throughout	glandular and eglandular hairs below, glandular above
Pairs and lobes of basal leaves	2-5 pairs, oblong to ovate, crenate	2-5 pairs, oblong, crenate serrate-dentate	1-2 (-3) pairs, dentate
Lower bracts	boardly lanceolate, dentate	boardly lanceolate, dentate	lanceolate, acuminate entire, rarely dentate almost entire
Pedicels	5-7 mm long	7-15 mm long	(10-)12-15 mm long
Corolla diam. & indumentum	12-15 mm, glabrous outside	13-18 (20) mm, glabrous or sparsely glandular hairs outside	10-12 mm, sparse glandular and pubescent outside
Filament wool	purple-violet	whitish-yellow	whitish-yellow
Capsule	glandular and simple hairy	glandular hairy	glandular hairy

Karapınar village, Küçükçömlek Tepesi, 950-1130 m, volcanic rocks, 25.7.2001, *H.Duman* 7208 & *Z.Aytaç* (GAZI); *ibid.* Kışla mountain, west of Gümüşkol village, 920-1000 m, in rocks, 2.7.2002, *H.Duman* 8717 & *Z.Aytaç*, GAZI. – *Verbascum haraldi-adnani*: Turkey. C2 Muğla: Yılanlı dağı E of Muğla along the way to Akyer-Göktepe, 1250 m, siliceous rocks in *Pinus nigra* forest, 19.5.2007, *Kurschner* 07-269, *Erdağ & Eren*, isotype: AYDN, Photo.

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Acknowledgements

The authors thank the curators of the herbaria ANK, AYDN, E, G, GAZI, HUB, and ISTE; Funda Özbek for the SEM photographs and comments on pollen and seeds structure; and Bahar Kaptaner for drawing the illustration. This new species was collected during the Flora of Kazdağı Project, which is funded by the Golder Company.