



## *Verbascum duzgunbabadagensis* (Scrophulariaceae), a new species from eastern Anatolia, Turkey

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### Abstract

*Verbascum duzgunbabadagensis* (Scrophulariaceae) is described and illustrated as a new species endemic to eastern Anatolia, Turkey. In this study, diagnostic morphological characters of this and closely related species (*V. luciliae* and *V. rupicola*) are discussed. Pollen and seed morphology of the new species and of similar taxa are documented. The seeds of this group are brown in color and oblong in *V. luciliae* and *V. rupicola*, whereas they are dark brown in color and ovate in shape in *V. duzgunbabadagensis*. Furthermore, distribution maps for the three taxa are provided.

**Key words:** Scrophulariaceae, Turkey, *Verbascum*, new species, taxonomy

### Introduction

*Verbascum* Linnaeus (1753: 177) (Scrophulariaceae) includes about 360 species distributed throughout the world (Heywood 1993). This genus in Turkey includes about 244 species, 129 hybrids and 6 imperfectly known or doubtful records. Its endemism ratio is very high with 192 (80%) species restricted to Turkey (Huber-Morath 1978, Davis *et al.* 1988, Vural & Aydoğdu 1993, Karavelioğulları *et al.* 2004, 2006, 2008a, 2009a, 2009b, 2011, Karavelioğulları 2012, Sutorý 2001, 2004, Özhatay 2006, Kaynak *et al.* 2006, Yılmaz & Dane 2008, Bani *et al.* 2010). *Verbascum* is divided into two sections (Murbeck 1933): *Aulacospermae* Murbeck (1933: 593) and *Bothrospermae* (Murbeck 1933: 82) Kamelin (1981: 218). The seed morphology is the most important character to differentiate between sections. Seeds are transversal corrugated and alveolate in sect. *Bothrospermae*, whereas the seeds are longitudinal corrugated in sect. *Aulacospermae*. Section *Bothrospermae* includes all Turkish *Verbascum* species.

The first revision of Turkish *Verbascum* for *Flora of Turkey* was carried out by Huber-Morath (1978). Thirteen species and six hybrids were later described (Vural & Aydoğdu 1993, Karavelioğulları *et al.* 2004, 2006, 2008a, 2008b, 2009a, 2010, 2011, Karavelioğulları 2012, Sutorý 2001, 2004, Özhatay 2006, Kaynak *et al.* 2006, Dane & Yılmaz 2009, Dane & Yılmaz 2005, Yılmaz & Dane 2008, Karavelioğulları 2009b).

### Material & Methods

During field exploration in Tunceli province, Turkey, during 2012, an unusual population of *Verbascum* was discovered. At first glance, it seemed to be similar to *V. luciliae* Kuntze (1891: 469) and *V. rupicola* Hayek & Siehe (1914: 175) Huber-Morath (1973: 14). The specimens were cross-checked with the keys provided by Huber-Morath (1978, 1981) and the *Verbascum* accounts given in various relevant publications such as Fedchenko (1955), Feinbrun-Dothan (1978a, 1978b), Meikle (1985), Boulos (2009) and Ekim (2000). Herbarium specimens from GAZI, ISTE, EGE, VANF, ANK, G and GB herbaria were also examined and compared. The threat category assessment of the new species was defined according to IUCN criteria (IUCN 2001).

Pollen grains and seed samples were taken from the specimens at GAZI herbarium. Pollen grains were acetolized

**Phenology:**—Flowering from June to July, fruiting from July to September.

**Habitat:**—Rocky place, rock crevices, 1800–2050 m.

**Etymology:**—This new species is called after Düzgün Baba Mountain, the unique area where this species has been recorded.

**Red list assessment:**—The extent of occurrence for the *Verbascum duzgunbabadagensis* was almost 20 km<sup>2</sup>. This species was found in a single location. It grows in limestone slopes, associated to *Quercus* sp. shrub. Its habitat continues to decline because of agricultural activities and other local uses. Hence, the threat category of *V. duzgunbabadagensis* is suggested as CR [B1ab(iii)] (IUCN 2001).

**Additional specimens seen (paratypes):**—TURKEY. B7 Tunceli: Nazimiye, Düzgün Baba Mountain, 1800–2050 m, 20 June 2012, *M. Fırat 27902* (VANF!); *ibidem*, 20 August 2012, *M. Fırat 30082* (VANF!).

**Taxonomic relationships:**—*Verbascum duzgunbabadagensis* belongs to the so called “A group” in Flora of Turkey (Huber-Morath 1978, Davis *et al.* 1988). This group has reached 30 species with the addition of *Verbascum duzgunbabadagensis* (Güner *et al.*, 2012). The new species is morphologically similar to *V. luciliae* and *V. rupicola*.

**Vernacular names:** In Tunceli Province, indigenous people use the name “Masîjark” for *Verbascum* (Fırat, 2013).

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## References

- Bani, B., Adıgüzel, N & Karavelioğulları, F.A. (2010) A new species (*Verbascum turcicum* sp. nov., Scrophulariaceae) from South Anatolia, Turkey. *Annales Botanici Fennici* 47: 489–492.  
<http://dx.doi.org/10.5735/085.047.0608>
- Boulos, L. (2009) *Flora of Egypt Checklist, Revised Annotated Edition*. Al-Hadara Publishing, Cairo, Egypt, 410 pp.
- Cabi, E., Baser, B., Yavru, A., Polat, F., Toprak, U. & Karavelioğulları, F.A. (2011) Scanning electron microscope (SEM) and light microscope (LM) studies on the seed morphology of *Verbascum* taxa (Scrophulariaceae) and their systematic implications. *Australian Journal of Crop Science* 5: 660–667.
- Dane, F. & Yılmaz, G. (2005) New records for the flora of European Turkey: *Verbascum roripifolium* and *V. ovalifolium* subsp. *thracicum* (Scrophulariaceae). *Botanica Chronica* 18: 11–16.
- Dane, F. & Yılmaz, G. (2009) A new natural hybrid of *Verbascum* (Scrophulariaceae) from European Turkey. *Phytologia Balcanica* 15: 159–162.
- Davis, P.H., Mill, R.R. & Tan, K. (1988) *Flora of Turkey and the East Aegean Islands* 10. Edinburgh University Press, Edinburgh, 591 pp.
- Ekim, T. (2000) *Verbascum* L. In: Güner, A., Özhatay, N., Ekim, T. & Başer, K.H.C. (Eds.) *Flora of Turkey and the East Aegean Islands* 11. Edinburgh University Press, Edinburgh, pp. 193.
- Erdtman, G. (1952) *Pollen Morphology and Plant Taxonomy. Angiosperms*. Chronica Botany Company Waltham, Massachusetts, 539 pp.
- Erdtman, G. (1960) The Acetolysis Method, A Revised Description. *Svensk Botanisk Tidskrift* 54: 561–564.
- Fægri, K. & Iversen, J. (1964) *Textbook of Pollen Analysis*. Munksgaard, Copenhagen, 237 pp.
- Fedchenko, B.A. (1955) *Verbascum* L. In: Schischkin, B.K. & Bobrow, E.G. (Eds.) *Flora of U.S.S.R.* 22. Izdatel'stvo Akademii Nauk S.S.S.R., Leningrad, pp. 132–197.
- Feinbrun-Dothan, N. (1978a) *Verbascum* L. In: Zohary, M. & Feinbrun-Dothan, N. (Eds.) *Flora Palaestina (Text)* 3. Academic Press, Jerusalem, pp. 282–302.
- Feinbrun-Dothan, N. (1978b) *Verbascum* L. In: Zohary, M. & Feinbrun-Dothan, N. (Eds.) *Flora Palaestina (Plates)* 3. Academic Press, Jerusalem, pp. 170–182.
- Fırat, M. (2013) *Ferhenga Navên Rîwekên Bî Kurdi/Kürtçe Bitki Adları Sözlüğü / Dictionary of Plant Names in Kurdish*. Kalkan Ofset, Ankara, pp. 460–470.
- Güner, A., Aslan, S., Ekim, T., Vural, M. & Babaç, M.T., (Eds.) (2012) *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*. Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul, 1290 pp.
- Hayek, A & Siehe, W. (1914) *Plantae Sieheanae. Annalen des Naturhistorischen Hofmuseums Wien* 28: 150–188.
- Heywood, V.H. (1993) *Flowering Plants of the World*. Oxford University Press, New York, 335 pp.
- Huber-Morath, A. (1973) *Verbascum* L. s.l. (Incl. *Celsia* L. et *Staurophragma* Fish. & Mey.). *Bauhinia* 5: 14.

- Huber-Morath, A. (1978) *Verbascum* L. In: Davis, P.H. (Ed.) *Flora of Turkey and the East Aegean Islands* 6. Edinburgh Univ Press, Edinburgh, pp. 461–603.
- Huber-Morath, A. (1981) *Verbascum* L. In: Rechinger, K.H. (Ed.) *Flora Iranica* 147. Graz, Akademische Druck-Verlagsanstalt, pp. 1–51.
- IUCN (2001) *The IUCN Red List Categories and Criteria*, version 3.1. IUCN Species Survival Commission. Gland, UK: Switzerland and Cambridge.
- Juan, R., Fernandez, I. & Pastor, J. (1997) Systematic consideration of microcharacters of fruits and seeds in the genus *Verbascum* (Scrophulariaceae). *Annals of Botany* 80: 591–598.
- Juan, R., Pastor, J. & Fernandez, I. (1999) Morphological and anatomical studies of *Linaria* species from South-West Spain: seeds. *Annals of Botany* 84: 11–19.
- Juan, R., Pastor, J. & Fernandez, I. (2000) SEM and light microscope observations on fruit and seeds in Scrophulariaceae from southwest Spain and their systematic significance. *Annals of Botany* 86: 323–338.
- Karavelioğulları, F.A., Duran, A. & Hamzaoğlu, E. (2004) *Verbascum tuna-ekimii* (Scrophulariaceae) a new species from Turkey. *Annales Botanici Fennici* 41: 227–231.
- Karavelioğulları, F.A., Vural, M. & Polat, H. (2006) Two new taxa from Central Anatolia Turkey. *Israel Journal of Plant Sciences* 54: 105–111.
- Karavelioğulları, F.A., Uzunhisarcıklı, M.E. & Celik, S. (2008a) *Verbascum ozturkii* (Scrophulariaceae), a new species from East Anatolia, Turkey. *Pakistan Journal of Botany* 40: 1595–1599.
- Karavelioğulları, F.A. & Aytac, Z. (2008b) Revision of the genus *Verbascum* L. (Group A) in Turkey. *Botany Research Journal* 1: 9–32.
- Karavelioğulları, F.A., Ocak, A., Ekici, M. & Cabi, E. (2009a) *Verbascum eskisehircensis* sp. nov. (Scrophulariaceae) from central Anatolia, Turkey. *Nordic Journal Botany* 27: 222–227.  
<http://dx.doi.org/10.1111/j.1756-1051.2008.00250.x>
- Karavelioğulları, F.A. (2009b) A new record *Verbascum szovitsianum* Boiss. var. *szovitsianum* (Scrophulariaceae) from Turkey. *Biodicon* 2: 68–70.
- Karavelioğulları, F.A., Çelik, S., Baser, B. & Yavru, A. (2010) *Verbascum ergin-hamzolui* (Scrophulariaceae), a new species from South Anatolia, Turkey. *Turkish Journal of Botany* 35: 275–283.
- Karavelioğulları, F.A. (2012) *Verbascum* L. In: Güner, A., Aslan, S., Ekim, T., Vural, M. & Babaç, M.T. (Eds.) *Türkiye Bitkileri Listesi (Damarlı Bitkiler)*. Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul, pp. 850–870.
- Kaynak, G., Daşkın, R., Yılmaz, O. & Erdoğan, E. (2006) *Verbascum yurtkurianum* (Scrophulariaceae) a new species from northwest Anatolia, Turkey. *Annales Botanici Fennici* 43: 456–459.
- Kremp, G.O.W. (1965) *Encyclopaedia of Pollen Morphology*. Tucson, Arizona University Press. Tucson, 263 pp.
- Kuntze, O. (1891) *Revisio Generum Plantarum* 2. Leipzig, 469 pp.
- Linnaeus, C. (1753) *Species Plantarum* 1. Switzerland, Geneva, 177 pp.
- Meikle, R.D. (1985) *Verbascum* L. In: Meikle, R.D. (Ed.) *Flora of Cyprus* 2, Royal Botanic Gardens, Kew, pp. 1196–1200.
- Murbeck, S. (1933) *Monographie Der Gattung Verbascum* 29. Acta Universitatis Lundensis, 630 pp.
- Ozhatay, N. (2006) Check-list of additional taxa to the Supplement Flora of Turkey III. *Turkish Journal of Botany* 30: 281–316.
- Pınar, N.M., Ekici, M., Aytac, Z., Akan, H., Ceter, T. & Alan, Ş. (2009a) Pollen morphology of *Astragalus* L. sect. *Onobrychoidei* DC. (Fabaceae) in Turkey. *Turkish Journal of Botany* 33: 291–303.
- Pınar, N.M., Duran, A., Ceter, T. & Tuğ, G.N. (2009b) Pollen and seed morphology of the genus *Hesperis* L. (Brassicaceae) in Turkey. *Turkish Journal of Botany* 33: 83–96.
- Sutory, K. (2001) Two new hybrids of *Verbascum* from Turkey and Spain. *Bocconea* 13: 457–460.
- Sutory, K. (2004) New hybrids of *Verbascum* (Scrophulariaceae) from Turkey. *Turkish Journal of Botany* 28: 261–262.
- Vujicic, R., Grubusic, D. & Konjevic, R. (1993) Scanning electron microscopy of the seed coat in the genus *Paulownia* (Scrophulariaceae). *Botanical Journal of the Linnean Society* 111: 505–511.  
<http://dx.doi.org/10.1111/j.1095-8339.1993.tb01917.x>
- Vural, M. & Aydoğdu, M. (1993) A new species from central Anatolia *Verbascum gypsicola* (Scrophulariaceae). *The Karaca Arboretum Magazine* 2: 75–78.
- Yılmaz, G. & Dane, F. (2008) *Verbascum samniticum* Ten. (Scrophulariaceae): a new record for the Flora of Turkey. *Turkish Journal of Botany* 32: 411.
- Walker, J.W. & Doyle, J.A. (1976) The basis of Angiosperm phylogeny: Palynology. *Annals of the Missouri Botanical Garden* 62: 666–723.  
<http://dx.doi.org/10.2307/2395271>