

## **ONOSMA DEMIRIZII (BORAGINACEAE), A NEW SPECIES FROM CENTRAL ANATOLIA, TURKEY**

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### **Abstract**

*Onosma demirizii* Kaynak, Tarımcılar & Yılmaz sp. nova (Boraginaceae) is described as a new species from central Anatolia, Turkey. This new species is closely related to *O. subulifolium* H. Riedl but differs by its yellowish-green stems, patent-setose indumentum, linear to narrowly oblanceolate cauline leaves, shorter calyx and corolla and anthers that are longer than the filaments. The diagnostic morphological characters of this new species are discussed.

### **Introduction**

The Boraginaceae family is distributed mainly in temperate, pantropical and subtropical areas and comprises approximately 150 genera and 2700 species worldwide (Heywood *et al.* 2007). The genus *Onosma* L. is restricted to Asia and Europe and includes about 150 species (Peruzzi and Passalacqua 2008). *Onosma* is a systematically difficult genus, and most of the diagnostic characters are based mainly on the whole indumentums, leaf and flower morphology (Ball 1972, Riedl 1978, Pavlova 2009). Riedl (1978) has reported 88 species of Turkish flora. Currently, 10 new species have been recognised by different authors (Davis *et al.* 1988 Güner 2000, Yıldırım 2000, Riedl *et al.* 2005, Binzet and Orcan 2007, Kandemir and Türkmen 2010, Aytaç and Türkmen 2011, Koyuncu *et al.* 2013). Approximately half of the species are endemic to the Flora of Turkey. In this paper, a new species of the genus *Onosma* is described.

### **Materials and Methods**

Flowering specimens were collected during a botanical survey in central Anatolia around Kayseri province in the spring of 2013. These specimens were compared to *Onosma* species that were kept at ANK, BULU and digital images from E and different herbaria were studied. In addition, these specimens were checked against the literature cited above. For the scanning electron microscope studies, stem leaves were coated with gold-palladium for 4 min in a BAL-TEC SCD 005 sputter-coater (Leica Microsystems, Wetzlar, Germany). All of the observations were made on a Carl Zeiss EVO 40 (Carl Zeiss AG, Oberkochen, Germany) at a voltage of 15 kV.

### **Results and Discussion**

***Onosma demirizii* Kaynak, Tarımcılar & Yılmaz sp. nova (Figs 1, 2, 3)**

*Holotype:* Turkey. B6 Kayseri: Pınarbaşı, 38°43'N, 36°23'E, 1540 m, 24.v.2013, G. Kaynak, Ö. Yılmaz s.n. (BULU 35011).

*Diagnosis:* This new species is closely related to *Onosma subulifolium* H. Riedl. However *O. demirizii* is different by its yellowish-green stem with patent-setose indumentums; linear to narrowly oblanceolate, and 12 - 16 mm long (not 15 - 32 mm) cauline leaves; setose and 7 - 9 mm long (not hispid, 10 - 11 mm) calyx; cream coloured and 12 - 14 mm long (not 15 - 18 mm) corolla, and anthers that are longer than the filaments.

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**Table 1. Comparison of some morphological characteristics *Onosma demirizii*, *O. subulifolium* and *O. thracicum*.**

	<i>O. demirizii</i>	<i>O. subulifolium</i>	<i>O. thracicum</i>
Stem	11 - 17 cm	6 - 12 cm	12 - 25 cm
Indumentum	Yellowish-green patent-setose	Bluish black adpressed-setose	Green patent-setose
Leaves	12 - 16 × 1 - 2 mm linear to narrowly oblanceolate	15 - 32 × 1 - 1.8 mm subulate	10 - 29 × 1 - 5 mm linear-oblong
Bracts	6 - 9 mm revolute	7 - 8 mm flat	-
Calyx	7 - 9 mm setose	10 - 11 mm hispid	6-8 mm setose
Corolla	12 - 14 mm cream, glabrous	15 - 18 mm white, glabrous	11-19 mm pale yellow puberulent
Filament	Anthers are longer than the filaments	Filaments are equal to anthers	-
Inflorescence	Short cyme, subcapitate	Subcapitate cyme	Lax cyme

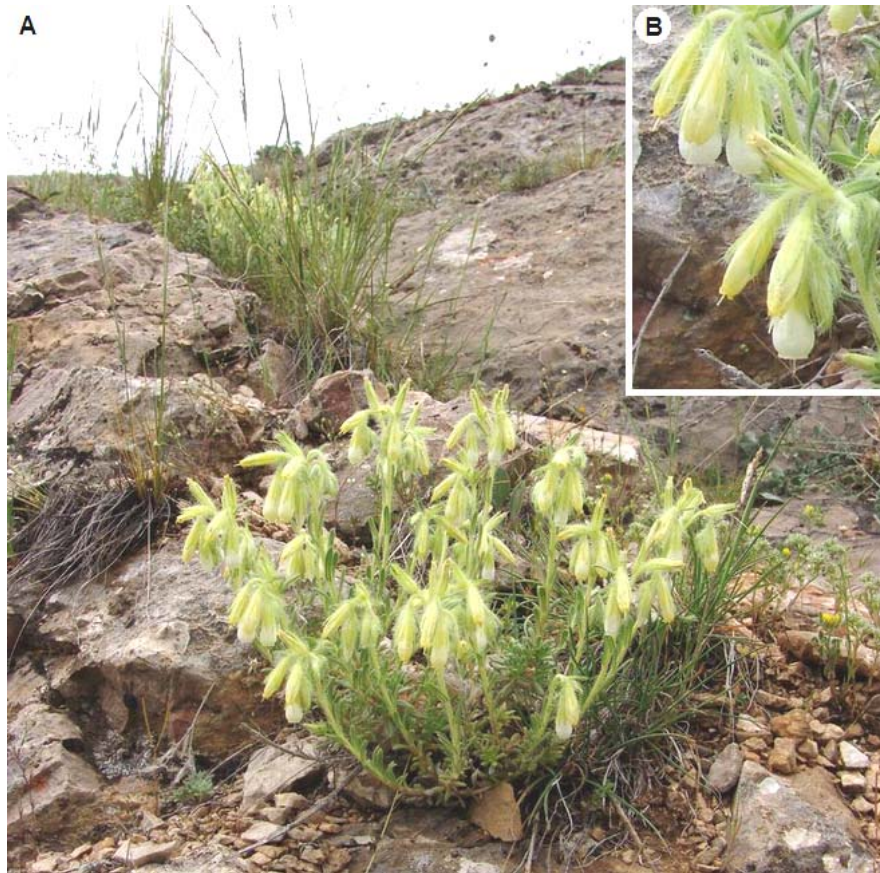
Fig. 1. *Onosma demirizii* in the wild. A- Habit. B- Flowers (photos Gönül Kaynak).



Fig. 2. A- Holotype of *O. demirzii* from the herbarium BULU (photo Özer Yılmaz). B- Type of *O. subulifolium* from the herbarium E. (available at website: <http://elmer.rbge.org.uk/bgbase/vherb/bgbasevherb.php?cfg=bgbase/vherb/zoom.cfg&filename=E00022534.zip&queryRow=1>).

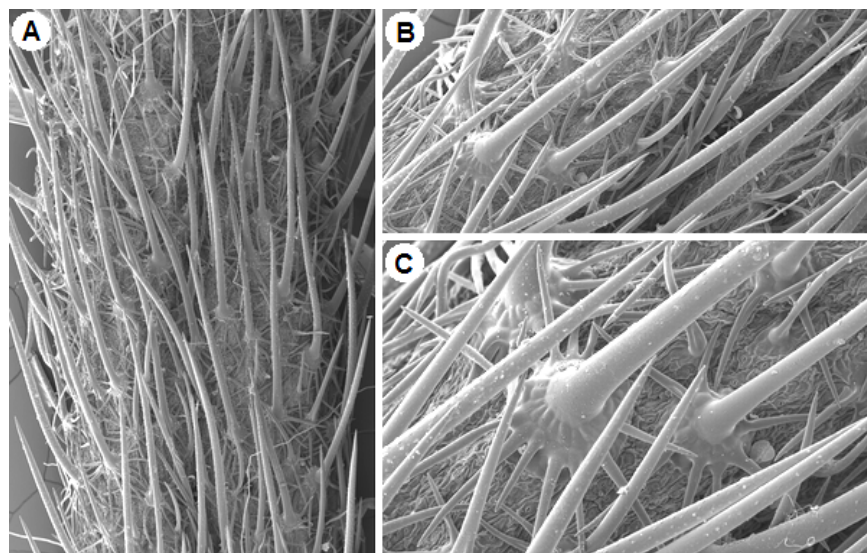


Fig. 3. A- Leaf indumentum of *Onosma demirzii* ( $\times 100$ ). B- Asterotrichous hair in general view ( $\times 150$ ). C- Asterotrichous hair in closer view ( $\times 300$ ).

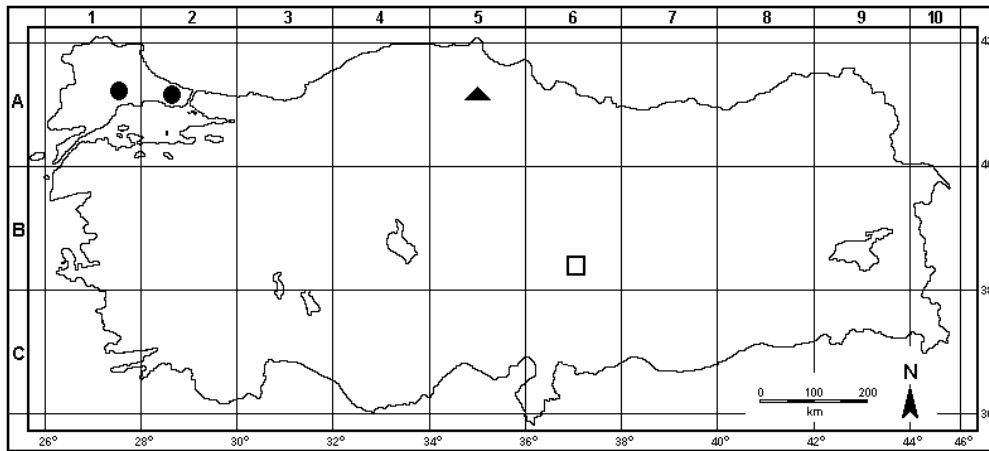


Fig. 4. Map shows the distribution of *Onosma demirizii* (□), *O. subulifolium* (▲) and *O. thracicum* (●) in Turkey.

**Description:** Perennial. Stem numerous, 11 - 17 cm, erect to ascending yellowish-green with long patent stellate tubercles and whitish setose hairs. Basal leaves crowded in to an irregular tuft or rosette, shorter than cauline leaves spatulate, margins strongly revolute, shorter than cauline leaves, 6 - 12 × 0.6 - 1.2 mm wide, upper surface dull greyish-green, densely long patent stellate tubercles robust setae, 1.5 - 2 mm long, lower surface with adpressed short setae, 2 - 3.5 mm long, indumentum ± uniform on both surface. Cauline leaves linear to narrowly oblanceolate, 12 - 16 × 1 - 2 mm, margins strongly revolute, densely clothed with yellowish-green long patent stellate tubercles, robust setae on the upper surface, 2-3.5 mm long; lower surface with adpressed short setae, 1.5 - 3 mm long. Inflorescence cyme, short subcapitate. Bracts 6 - 9 × 1-2 mm, foliaceous, linear-lanceolate, revolute, acute, setose with similar indumentum as the stem and leaves. Pedicels 1 - 1.5 mm long, setose. Calyx divided almost to base lobes, lobes narrowly linear, 7 - 9 mm long, densely covered with long adpressed setae, a few long patent setae and short thin hairs on the upper surface. Corolla 12 - 14 mm long, clavate-campanulate, lobes short acute, glabrous, cream-coloured, pale yellow when dry. Anthers included, linear, 5 - 5.5 × 1 mm wide; apex acuminate membranous, base sagittate; free part of filament 5 - 5.5 mm long, coherent only near apex, flattened, glabrous. Ovary glabrous, approximately 1 mm diam. Style filiform, exserted, approximately 16 mm, longer than corolla. Stigma distinctly 2-lobed. Nutlets unknown.

**Distribution and habitat:** This new species is endemic to central Anatolia. *Onosma demirizii* is only known from the type locality and is geographically well isolated from the related species (Fig. 4). This new species grows on calcareous rocky slopes with *Onosma albo-roseum* Fisch., *Scrophularia libanotica* Boiss., *Aubrieta canescens* (Boiss.) Bornm subsp. *canescens*, *Asphodeline taurica* (Pallas) Kunt and *Ebenus laguroides* Boiss.var. *laguroides* at an altitude of greater than 1500 m.

**Phenology:** Flowering in May.

**Etymology:** This species is named in honour of the eminent Turkish Botanist, Professor Dr. Hüsnü Demiriz (1920 - 1999) (Department of Biology, Istanbul University).

**Conservation status:** *Onosma demirizii* is endemic to Turkey. It is known from the type locality only. It is known from one locality (criterion B2 a), with an estimated area of less than 10 km<sup>2</sup> (criterion B2). The population is unhealthy with less than 100 individuals (criterion C).

Therefore it should be classified as “Critically Endangered (CR)” based on the criteria of the IUCN Red List Categories (IUCN, 2001).

*Onosma demirizii* is closely related to *O. subulifolium*; however, this new species is considerably different. *O. demirizii* has yellowish-green patent-setose indumentum, linear to narrowly oblanceolate cauline leaves, shorter calyx and corolla, anthers that are longer than the filaments.

Additionally, this new species has similarities with *O. thracicum* Velen., but differs by its shorter stem, revolute leaves, glabrous and cream corolla, and subcapitate inflorescence (Table 1). *Onosma demirizii* and the remaining two have asterotrichous indumentum (Fig. 3). According to the Flora of Turkey (Riedl 1978) they belong to the subsect. *Asterotricha* (Boiss.) Gürke.

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