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A new species of *Echinops* (Asteraceae) from Turkey

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Abstract: *Echinops dumanii* C.Vural is described and illustrated from Adana province, South Anatolia, Turkey. It is considered to be endemic to Turkey. The morphological differences from the closely related species *Echinops phaeocephalus* Hand.-Mazz. are discussed. The International Union for Conservation of Nature (IUCN) threat category and observations on the ecology of the populations are noted. The geographical distribution of the new species is mapped.

Key words: Compositae, *Echinops*, pollen, taxonomy

Türkiye'den *Echinops*'un (Asteraceae) yeni bir türü

Özet: *Echinops dumanii* C.Vural Adana ilinden yeni bir tür olarak tanımlandı. Türkiye'ye endemic olarak değerlendirilen türün, yakın akrabası olan *Echinops phaeocephalus* Hand.-Mazz. türünden morfolojik farklılıkları tartışıldı. Yeni tür için, Uluslararası Doğa Koruma Birliği (IUCN) tehdit kategorisi belirlendi ve ekolojik gözlemler not edilerek, coğrafik dağılımı harita üzerinde gösterildi.

Anahtar sözcükler: Compositae *Echinops*, polen, taksonomi

Introduction

The genus *Echinops* L. (Asteraceae) comprises about 18 species, 2 subspecies and 3 varieties in Turkey (Hedge, 1975; Gemici & Leblebici, 1992; Greuter, 2006-2009; Özhatay et al., 2009). According to Hedge (1975), there are 9 endemic species in the *Flora of Turkey* area. The present study raises this number to 10. *Echinops* species in Turkey been classified into 3 sections: *Echinops* (12 species), *Ritrodes* Bunge (2 species), and *Oligolepis* Bunge (2 species). Usually, species of *Echinops* are anthropophilous or ruderal plants. They are found in fields, on the margins of roads in waste places, or less frequently in conserved habitats, usually in mountainous areas (Mozaffarian & Ghahreman, 2002). These authors have pointed out that *Echinops* specimens are scarce in herbaria. Due to their prickliness and to the difficulties of conservation of collected specimens (mature inflorescences break into pieces on drying), botanists avoid collecting them.

In 2008, the authors found an unusual isolated population of *Echinops* in the coastal area of

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Yumurtalık, Adana, during an excursion (Figure 1). Morphological studies on the new population revealed that this plant population differed sufficiently from other related species (*E. phaeocephalus*) and deserves recognition as a new species belonging to sect. *Oligolepis*.

The pollen morphology of the new population and related species was studied. Material for light microscopy was prepared according to Wodehouse (1935). Material for scanning electron microscopy was prepared by mounting untreated dry pollen and seed onto clean stubs. The terminology used here follows that of Punt et al. (1994) and Stearn (1996). In this study, all the authors' names of the plants mentioned were checked and compared with the work of Brummitt and Powell (1992).

Description

Echinops dumanii C.Vural sp. nova (Figures 2-4)

Sect. *Oligolepis* Bunge

Diagnosis: Affinis *E. phaeocephalus* Hand.-Mazz., sed caulibus floriferis 50-100 cm elatis, albidis (non 30-60 cm elatis, stramineis), foliis 1-2 pinnatisectis, marginibus revolutis (non pinnatifidus, marginibus integris), phyllariis externis 9-12 mm longis (non 6-8 mm longis), phyllariis intermediis 15-25 mm longis (non 5-6 mm longis), acheniis 9-11mm longis (non 14-16 mm longis) differt.

Typus: Turkey. C5 Adana: Yumurtalık, 36°46.371′N, 035°45.420′E, 1-3 m, sandy seashore, 09.09.2008, *C.Vural* 4744 (holot. Herbarium of Erciyes University; ISO, ANK, HUB, GAZI).

Perennial herbs. Whitish-grey. Stem single, erect, branched, several headed, sturdy, ridged, up to 1 m, densely lanate with scattered purplish glandular hairs. Leaves lanceolate to oblong-lanceolate in outline, 1-2 pinnatisect with oblong to oblong-lanceolate segments with revolute margins and sturdy spines up to 1 cm; grey with aracnoid-lanate and rarely with some glandular hairs above, almost white with dense lanate beneath with scattered purplish glandular hairs. Basal leaves petiolate up to 42 × 18 cm; cauline leaves subamplexicaule, simple. Heads 3.5-7 cm in diameter, borne at the ends of stems and branches, greyish to bluish. Capitula up to 30 mm long, brush equal to longer than outer phyllaries, 11-14 mm long. Phyllaries 15-18; outer 9-12 mm, glabrous spathulate-deltoid, margins serrate; median 15-25 mm with spines, ovate to lanceolate, margins serrate; innermost connate to about more than ½ their length. Corolla white or pale blue; tube 10-11 mm long, glandular, lobes 8-9.5 mm. Anther bases tailed and fimbriate. Achenes 9-11 mm, covered with yellow hairs. Pappus bristles connate at basal half.

Distribution: The species is known only from Yumurtalık (Adana province in Turkey).

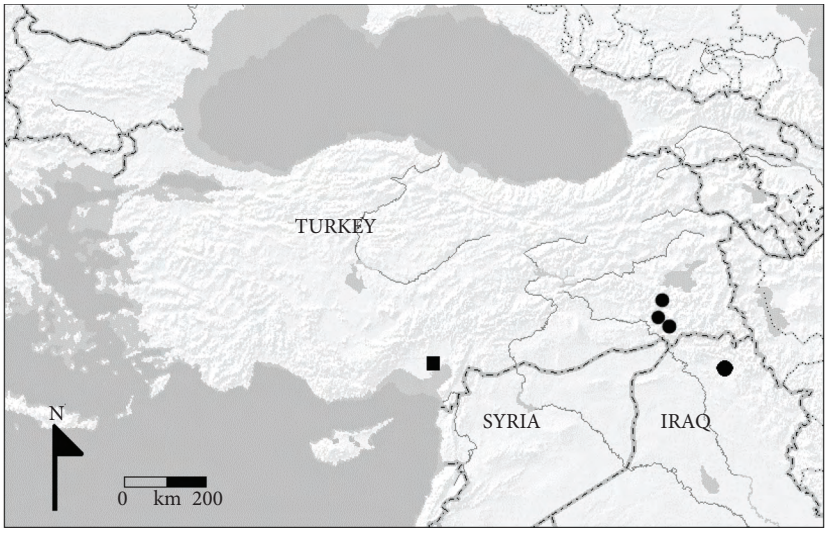

Figure 1. Geographical distribution of *Echinops dumanii* (▪) and *E. phaeocephalus* (•).

Figure 2. *Echinops dumanii*; A-habit of plant, B-flowering branch. Scale bars: A: 15 cm; B: 5 cm.

Habitat: *Echinops dumanii* grows on more or less salty sandy seashores with poor nutrients among mostly herbaceous plant species between 1 and 3 m and shares its habitat with *Anthemis halophila* Boiss. & Balansa, *Bolboschoenus maritimus* (L.) Palla var. *maritimus*, *Cakile maritima* Scop., *Echium angustifolium* Mill., *Euphorbia paralias* L. *Ipomoea stolonifera* (Cyr.) J.F.Gmel. *Juncus maritimus* Lam., *J. acutus* L., *Plantago scabra* Moench, *Sarcopoterium spinosum* Spach., and *Xanthium strumarium* L.

Phenology: Flowers and fruits between August and October.

Figure 3. Holotype photograph of *Echinops dumanii*.

Etymology: This species is named in honour of Prof. Dr. Hayri Duman (Gazi University, Ankara), who is one of the most senior Turkish botanists.

Conservational Status: It is known only from the type locality on a sandy seashore. The population is under threat from recreational activities and the building of summer-houses; therefore the population size is decreasing. Its occupancy is less than 10 km^2. The data gained from field studies were evaluated according to the IUCN categorisation and the

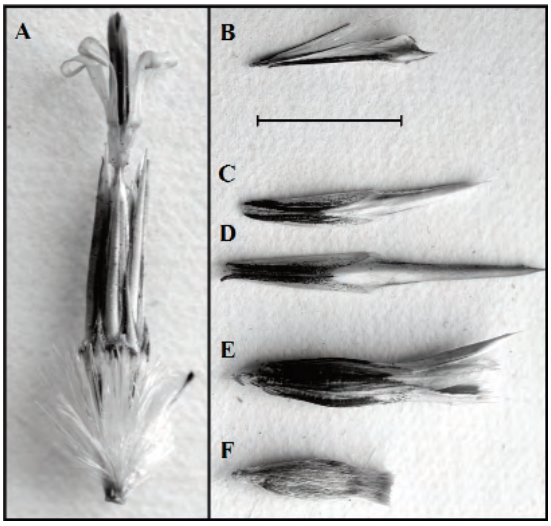

Figure 4. *Echinops dumanii;* **A**- capitulum with flower, **B**- outer phyllary, **C** - **D**- median phyllaries, **E**- inner phyllaries, **F**- achene. Scale bar: 8 mm.

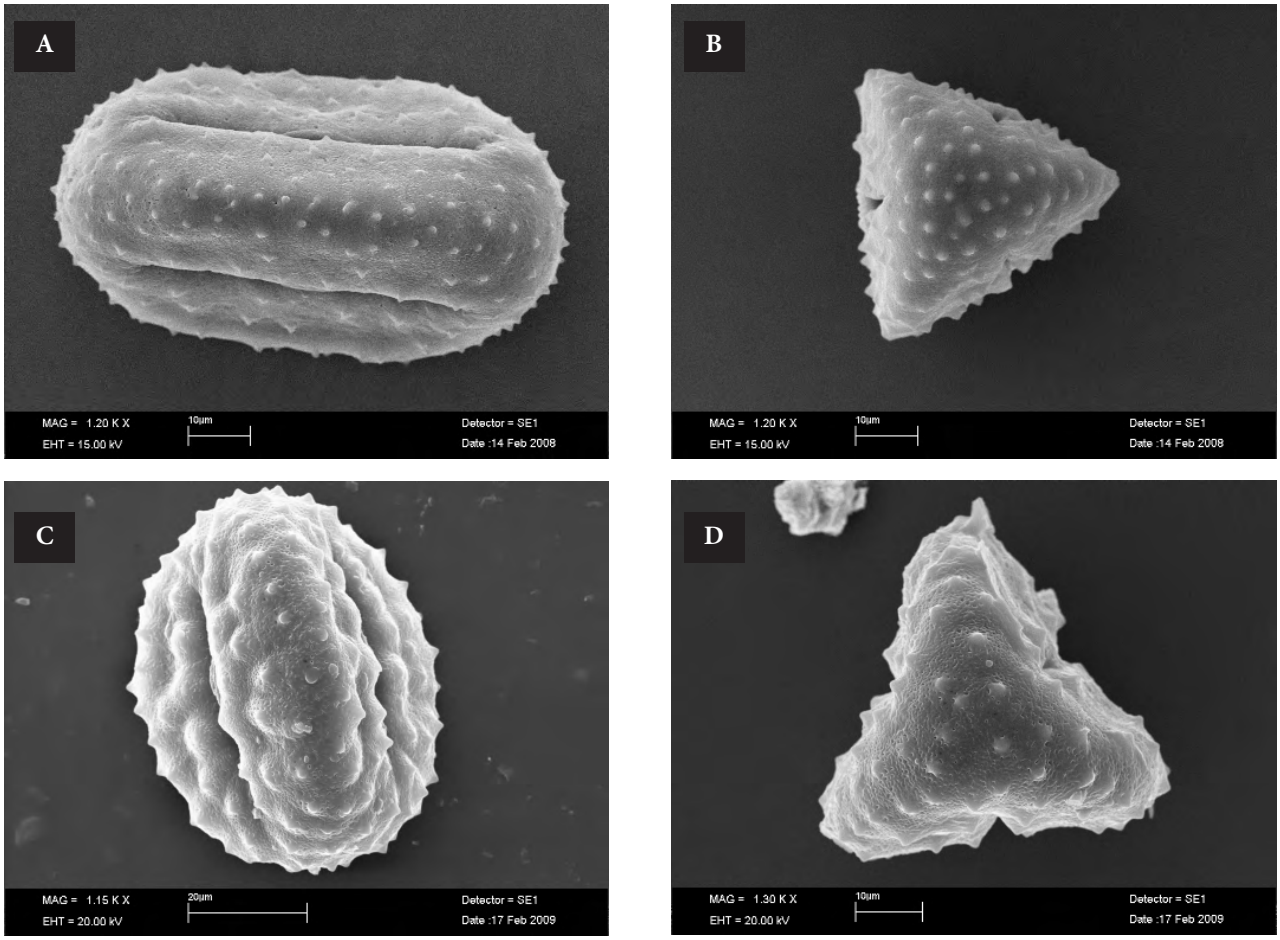

Figure 5. Scanning electron micrographs of pollens. **A** - **B**- *Echinops dumanii*, **C** - **D**- *Echinops phaeocephalus*. **A** - **C**- equatorial view, **B** - **D**- polar view.

"Critically Endangered" [CR: A1a (estimated population size reduction of 90% over the last 10 years), B2a, b(iii) (area of occupancy estimated to be less than 10 km^2, known to exist at only a single location and continuing decline quality of habitat)] status has been proposed for the species (IUCN, 2001).

Pollen morphology: Pollen grains 3-zonocolporate, equatorial view elliptic, obtuse at the poles. Polar view sinu-aperturate. Pollen shape, *P/E*: 1.59, prolate. Polar diameter P(78-) 84.81 ± 3.48 (-90) µm, and equatorial diameter E(50-) 53.25 ± 2.76 (-57) µm. Colpi 45-57 µm long; very narrow, slightly sunken; margins distinct, irregular, with a broad margo; ends acute; no colpus membrane. Pore circular or transversely elliptic, slightly lalongate. Mesocolpium 25-37 µm. Apocolpium 24-25.5 µm. Exine distinctly stratified 2-18 µm thick, sexine thinner at the polar region than at the equator. Ornamentation is echinate; tectum between the echinae is perforated. Echinae 4-9 µm. (Figure 5).

Discussion

The key characters that distinguish *Echinops dumanii* sp. nov. from *Echinops phaeocephalus* are summarised in the Table. Morphologically, *Echinops dumanii* is distinguished by being taller than the related species, reaching 1 m in height with a whitish-grey stem. Leaf margins are 1-2 pinnatisect with oblong to oblong lanceolate segments and revolute. Brush is c. 12 mm long in flower. Outer phyllaries are 9-12 mm (not 6-8 mm). Achenes are 9-11 mm. Plants live along the sandy seashore.

Echinops dumanii is a hemicryptophyte belonging to Mediterranean elements (Raunkier, 1934). It is an endemic species, occupying a very restricted area on the sandy seashore of Yumurtalık (Adana province) (Figure 1). The plant population is threatened as the result of human disturbances such as recreational activities and the building of summer-houses. Therefore, "Critically Endangered" status has been proposed for this species.

Table. Summary of the key differences between *Echinops dumanii* and *E. phaeocephalus.*

Characters	*Echinops dumanii*	*Echinops phaeocephalus*
Plant	50-100 cm tall	30-60 cm tall
Stem colour	whitish-grey	straw colour
Stem indumentum	densely lanate with scattered purplish glandular hairs	Eglandular or glandular lanate
Leaf shape	lanceolate to oblong-lanceolate in outline	triangular-lanceolate
Leaf margin	1-2 pinnatisect with oblong to oblong lanceolate segments and revolute	pinnatifid with c. 5 pairs of ovate lobes and not revolute
Leaf indumentum (above)	grey with aracnoid-lanate and rarely with some glandular hairs	green with densely glandular hairs
Leaf indumentum (beneath)	dense lanate with scattered purplish glandular hairs	lanate with long glandular hairs on veins
Capitulum length with flower	up to 30 mm	c. 17 expending to 35 mm in fruit
Brush length in flower	11-14 mm shorter than ½ of capitullum in fruit	6-8 mm
Outer phyllary length	9-12 mm	6-8 mm
Median phyllary length	15-25 mm	5-6 mm
Achene length	9-11 mm	14-16 mm
P/E	1.59 (1.46-1.74)	1.48 (1.44-1.50)
Altitude	1-3 m	390 - 1100 m

Key to the species of Echinops **sect.** Oligolepis **in Turkey**

1. Brush as long as capitulum, copious, in fruit 23-26 mm…….....…….....*E. melitenensis*
1. Brush less than half length of capitulum, 7-12 mm
2. Stem straw colour, outer phyllaries 6-8 mm, brush c. 7 mm ….....…*E. phaeocephalus*
2. Stem whitish-grey, outer phyllaries 9-12 mm, brush 11-14 mm…….....…...*E. dumanii*

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Appendix

Examined specimens: – *Echinops phaeocephalus*; Iraq: Rawanduz, 680 m, 03.viii.1947, limestone, *Gillet* 0441 (K). Bitlis: Hizan, Şağınlı Nahiyesi, Cemihasan Köyü, dere kenarı, 1500 m, 01.viii.1989, *Altan* & *Behçet* 2814 (VANF); Şırnak: Cizre-Şırnak, road to Güçlükonak, stony slopes, 42°10.857′N, 37°23.404’E, 404 m, 06.viii.2008, *M.Y.Dadandı* & *C.Vural* 4482 (Herb. of Erciyes Univ.); Şırnak: road to Fındık, near Kızılsu river, slopes, 390 m, 06.viii.2008, *M.Y.Dadandı* & *C.Vural* 4483 (Herb. of Erciyes Univ.); Şırnak: Cizre-Şırnak, Kasrik, slopes, 400 m, 06.viii.2008, *M.Y.Dadandı* & *C.Vural* 4484 (Herb. of Erciyes Univ.)

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