



Crepis setosa subsp. *topaliana* (Asteraceae): a new record for the flora of Turkey

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ABSTRACT: In this paper, *Crepis setosa* subsp. *topaliana* (Asteraceae), which is known as endemic to Greece, is recorded as a new taxon for the flora of Turkey. It grows in scrub and in cultivated and grassy roadside places in the northwest and western parts of Turkey. An extended description of *C. setosa* subsp. *topaliana* is presented here, together with an identification key. The conservation status of this subspecies and its chromosome number are indicated.

KEYWORDS: *Crepis*, endemic, new record, taxonomy, Turkey

Received: 26 September 2018

Revision accepted: 06 November 2018

UDC: 582.998.1:581.95(560)

DOI: <https://doi.org/10.2298/BOTSERB1901109I>

Crepis L. is a large, critical and taxonomically problematic genus in the tribe Cichorieae of the family Asteraceae. It comprises over 200 species (BREMER 1994), mainly distributed throughout the northern hemisphere and Africa (ENKE 2009). The annual, biennial and perennial *Crepis* taxa grow in various habitats, such as meadows, steppes, fieldsides, woodlands and rocky places (LAMOND 1975). The genus has ca. 40 taxa in Turkey, eight of which are endemic to Turkey (INCEER & AKSU KALMUK 2018).

Crepis setosa Haller f. is an annual species with a relatively wide distribution in Europe, Asia Minor, North and South America and New Zealand (BABCOCK 1947). It was recognised by BABCOCK (1947) as a variable species in his traditional taxonomic treatments of *Crepis*, and he described two subspecies - subsp. *setosa* (as *typica* Bab.) and *topaliana* Bab. *Crepis setosa* subsp. *setosa* is distributed almost throughout whole range of the species. *Crepis setosa* subsp. *topaliana* is mainly found in Greece, and it is distributed in Thessaly and on the Sporades Islands (BABCOCK 1947). On the other hand, in the Flora of Turkey and the East Aegean Islands, LAMOND (1975) noted the classification of BABCOCK (1947) within *C. setosa*, but she recognised a single species, viz., *C. setosa*, since the materials examined from Turkey were variable. *Crepis setosa* subsp. *topaliana* has been considered doubtful in Turkey (GREUTER 2006), and later this taxon was reduced to a synonym of *C. setosa* (EKIM 2012).

During our field studies of *Crepis* taxa in Turkey, we collected some intriguing specimens of *C. setosa* in the northwest and western parts of the country. After observing the morphological characters, checking specimens in the herbaria ANK, BULU, EGE, GAZI, HUB, ISTE and VANF (acronyms according to THIERS 2017) and consulting relevant literature sources (BABCOCK 1947; LAMOND 1975; EKIM 2012), we concluded that the specimens represented *C. setosa* subsp. *topaliana*, and this taxon was resurrected from a synonym of *C. setosa*.

Plant material. The plant material was collected from natural populations in Turkey. Vouchers were deposited in the herbarium of the Karadeniz Technical University, Department of the Biology (KTUB).

Morphological analysis. Size (length and width) of involucre and achenes as well as beak length in achenes were measured on five to 10 individuals in three populations of *C. setosa* subsp. *setosa* and five populations of *C. setosa* subsp. *topaliana*.

Chromosome counts. Root tips obtained directly from germinated ripe achenes were used for chromosome counts. They were pre-treated with a 0.05% aqueous colchicine solution for 3-5 h at room temperature and then fixed in absolute ethanol-glacial acetic acid (3:1) (SHAR-

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MA & SHARMA 1965) for at least 24 h at 4°C. They were hydrolysed in 1 M HCl at 60°C for 12–15 minutes. Staining was carried out in 1% aqueous lacto-propionic orcein for 12–18 h at room temperature, squashes were made in 45% acetic acid, and the preparations were mounted in Entellan (INCEER *et al.* 2016, 2018). Permanent slides were observed with a Leica DM 4000B microscope (Wetzlar, Germany) at a magnification of 1000 ×. The best metaphase plates were photographed using a Leica DFC 490 digital camera. Chromosome counts were carried out on five metaphase plates from five individuals.

Statistical analysis. In order to test the significance of differences in measured morphological characteristics between the two investigated subspecies of *C. setosa*, the t-test ($P < 0.05$) was applied. The statistical analysis was performed using STATISTICA for Windows, version 12.

Crepis setosa* subsp. *topaliana Babč. Univ. Calif. Publ. Bot. 19: 403. 1941.

Description. Caulescent annual, 28–85 cm. Root slender. Stem erect, branched from near base or base to summit, 6–22 capitulate, terete, hispid and setose. Basal leaves 5.5–18 × 1–3 cm, few or many, soon withering, elliptic, oblanceolate, denticulate or pinnately parted, terminal segment acute or obtuse, lateral lobes triangular to lanceolate, hispid, hairs pale. Cauline leaves 5–9 × 0.7–2 cm, lanceolate, denticulate, acute, amplexicaul-auriculate, hispid. Peduncles 0.6–7 cm, slender, erect, hispid, setose, setae yellow. Capitula many-flowered. Involucre cylindrical-campanulate, 6–7 × 4–4.5 mm, densely setose, setae yellow. Outer bracts 10–15, minute, 3–4 × 0.5–0.6 mm, linear, acute, pubescent, setose. Inner bracts 12–16, 7–7.5 × 1–1.2 mm, lanceolate, ± pubescent on inner face, pale-margined, becoming very prominently carinate dorsally in fruit, pubescent, densely setose. Receptacle areolate, shortly ciliate. Ligules yellow, 7–8 × 0.8–1 mm, teeth 0.14–0.22 mm, corolla tube 1.8–2.8 × 0.17–0.2 mm, pubescent. Anthers five, coherent along most of their length and forming a tube 2.17–2.64 mm long around style, yellow; filaments 0.66–0.7 mm; appendages 0.40–0.45 mm oblong, acute. Style 4.5–5 × 0.1–0.15 mm, pale green-yellow below, yellow above, branches 1.5–1.75 × 0.1 mm, pale yellowish-green, attenuate at tip. Achenes dimorphic, stramineous, marginal achenes 3–3.5 × 0.5–0.6 mm, not beaked, laterally compressed, ventrally straight, paler, dorsally convex, darker, gradually attenuate to narrow summit, with expanded pappus disc, inner achenes 2–2.5 × 0.4–0.6 mm, beaked, fusiform, terete, gradually attenuate into slender beak, with expanded pappus disc, 10-striate, striae strongly spiculate near base of beak. Pappus white, 3.75–4.2 mm, 2-seriate, fine, soft, deciduous, slightly expanded from involucre. Flowering and fruiting from May to June. Chromosome number: $2n = 8$.



Fig. 1. *Crepis setosa* subsp. *topaliana* (a–d): a. general view in habitat, b. capitulum with achenes, c. marginal achene, d. inner achene.

Crepis setosa subsp. *topaliana* (Fig. 1) is closely related to *C. setosa* subsp. *setosa*, differing in a few key characteristics:

a: Achenes monomorphic, slender beaked; involucre 8–8.5 mm long, 5–5.5 mm wide; style branches dark-green. ***C. subsp. setosa***

b: Achenes dimorphic, marginal achenes not beaked, inner ones slender beaked; involucre 6–7 mm long, 4–4.5 mm wide; style branches pale yellowish-green ***C. subsp. topaliana***

The statistical t-test showed that the plants determined as *C. setosa* subsp. *topaliana* significantly differed from those determined as *C. setosa* subsp. *setosa* with respect to quantitative diagnostic characters (Table 1). As can be seen in Table 1, involucre size in *C. setosa* subsp. *topaliana* is significantly smaller than in *C. setosa* subsp. *setosa*. Similarly, achene length as well as length of the achene beak in *C. setosa* subsp. *topaliana* is significantly smaller than in *C. setosa* subsp. *setosa*.

Voucher specimens: *Crepis setosa* subsp. *topaliana*: A1 Kırklareli: Between Kırklareli-Edirne, near Edirne, 150

Table 1. Comparison of quantitative diagnostic characters distinguishing *Crepis setosa* subsp. *topaliana* from *C. setosa* subsp. *setosa*. Mean value \pm standard deviation.

Character	<i>C. setosa</i> subsp. <i>topaliana</i>	<i>C. setosa</i> subsp. <i>setosa</i>	F-ratio variance	P-value
Involucre length (mm)	6.49 \pm 0.43	8.22 \pm 0.23	3.5483	<0.00001
Involucre width (mm)	4.35 \pm 0.21	5.30 \pm 0.22	1.0864	<0.00001
Achene length (mm)	2.12 \pm 0.30	4.20 \pm 0.84	7.6086	<0.001
Achene width (mm)	0.44 \pm 0.09	0.24 \pm 0.09	1.0000	<0.01
Beak length in achene (mm)	2.20 \pm 0.23	2.66 \pm 0.32	1.8727	<0.05

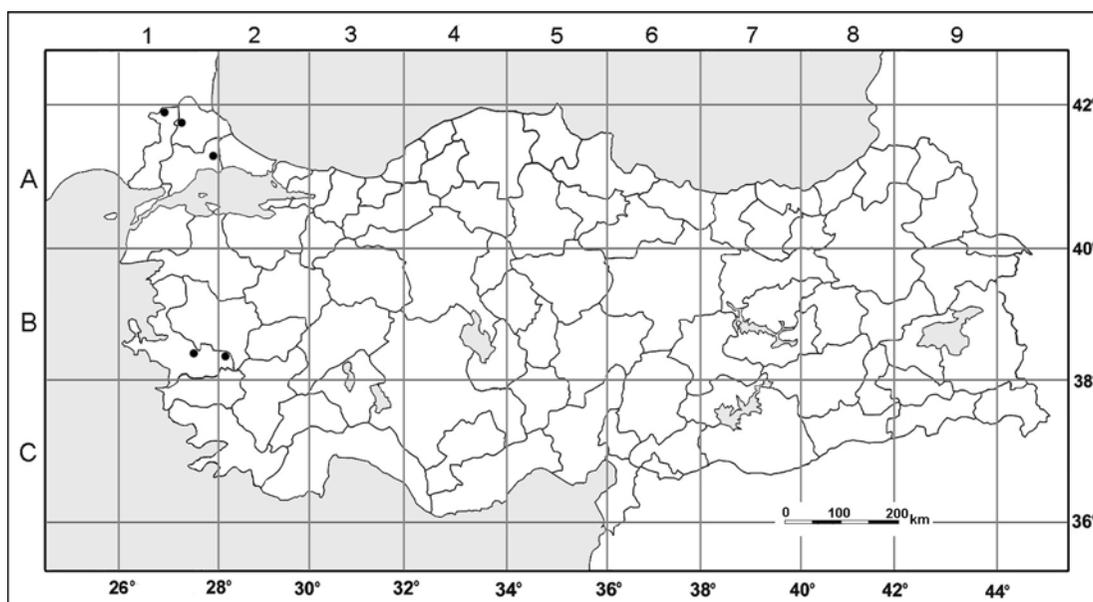


Fig. 2. Distribution of *Crepis setosa* subsp. *topaliana* (•) in Turkey.

m a.s.l., 12 June 2015, Inceer 1174 (KTUB); Edirne: Near Lalapasa, 100 m a.s.l., 12 June 2015, Inceer 1181 (KTUB); Tekirdağ: Çorlu, 170 m a.s.l., 13 June 2015, Inceer 1188 (KTUB); B1 Izmir: Between Bayındır-Odemis, 70 m a.s.l., 25 May 2011, Inceer 819 (KTUB); B2 Izmir: Near Bozdağ, 350 m a.s.l., 25 May 2011, Inceer 820 (KTUB). *Crepis setosa* subsp. *setosa*: A3 Sakarya: Near Karasu, 10 m a.s.l., 04 July 2011, Aksu 33 (KTUB); B1 Çanakkale: Between Ayvacık and Behramkale, 130 m a.s.l., 22 April 2013, Inceer 967 (KTUB); Çanakkale: Near Bozcaada harbor, 5 m a.s.l., 25 April 2014, Inceer 1079 (KTUB).

Distribution in Turkey and habitat. *Crepis setosa* subsp. *topaliana* is known only from the northwest and western parts of Turkey (Fig. 2). It grows in scrub and in cultivated and grassy roadside places at altitudes of 70–350 m a.s.l.

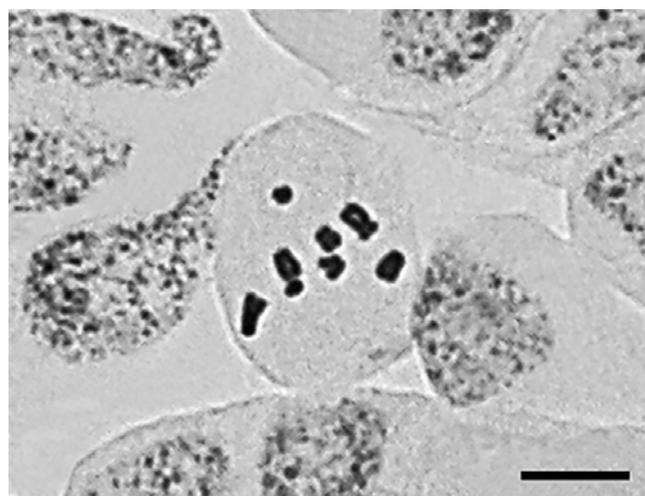


Fig. 3. Somatic metaphase chromosomes of *Crepis setosa* subsp. *topaliana* ($2n = 2x = 8$), scale bar = 10 μ m.

Cytology. *Crepis setosa* subsp. *topaliana* is diploid with $2n = 2x = 8$ chromosomes (Fig. 3). To our knowledge, this is the second count for the given taxon, and it is the first record from the Turkish population. In the only previous study on the chromosome number in this taxon, a value of $2n = 8$ was obtained in the Greek population (BABCOCK 1947). *Crepis setosa* subsp. *topaliana* has the same chromosome number as *Crepis setosa* subsp. *setosa* ($2n = 8$, BABCOCK 1947; DIMITROVA & GREILHUBER 2000; INCEER *et al.* 2018).

Conservation status. According to IUCN (2014), *C. setosa* subsp. *topaliana* can be regarded as vulnerable VU: Blab (i, ii, iii)+2ab (i, ii, iii) because of its distribution and the small size of populations in the flora of Turkey.

Acknowledgements – The authors thank curators of the herbaria ANK, BULU, EGE, GAZI, HUB, ISTE and VANF for helping with herbarium studies; two anonymous reviewers for providing helpful comments and suggestions that improved the manuscript; and the Scientific and Technological Research Council of Turkey (TUBITAK, Project No.112T132) for financial support.

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REZIME

Crepis setosa subsp. *topaliana* (Asteraceae): novi nalaz za floru Turske

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U ovom radu je predstavljena vrsta *Crepis setosa* subsp. *topaliana* (Asteraceae), poznata kao endemit Grčke, koja je zabeležena prvi put u flori Turske. Raste u šikarama, kultivisanim i travnim mestima pored puteva u severozapadnoj i zapadnoj Turskoj. U radu je dat prošireni opis taksona, kao i ključ za identifikaciju. Naveden je konservacioni status, a prikazan je i broj hromozoma.

KLJUČNE REČI: *Crepis*, endemiti, novi nalaz, taksonomija, Turska