Botanical Journal of the Linnean Society, 2008, **158**, 696–700. With 2 figures

Tripleurospermum ziganaense (Asteraceae, Anthemideae), a new species from north-east Anatolia, Turkey

HUSEYIN INCEER* and SEMA HAYIRLIOGLU-AYAZ

Karadeniz Technical University, Faculty of Sciences and Arts, Department of Biology, 61080 Trabzon, Turkey

Received 1 August 2007; accepted for publication 20 May 2008

A new species of *Tripleurospermum* Sch.Bip., ***Tripleurospermum ziganaense*** Inceer & Hayırlıoglu-Ayaz (Asteraceae, Anthemideae), is described and illustrated. The species grows in open places, on rocky slopes and on roadsides in north-east Anatolia, Turkey. The diagnostic morphological characters that distinguish it from closely related taxa are discussed, and its conservation status is indicated. © 2008 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2008, **158**, 696–700.

ADDITIONAL KEYWORDS: Compositae – conservation – morphology – taxonomy.

INTRODUCTION

A critical and taxonomically difficult group, *Tripleurospermum* Sch.Bip. is a small genus of *c*. 38 species, and comprises plants often included in the genus *Matricaria* L. (Applequist, 2002). There has been some disagreement about the limits of the two genera (Bremer & Humphries, 1993): some do not separate *Tripleurospermum* from *Matricaria*, although the former has one adaxial and two lateral seed ribs and the latter has four or five adaxial seed ribs (Bremer, 1994). It belongs to subtribe Matricariinae, which is the largest in the Anthemideae in terms of the number of genera (Garcia *et al.*, 2005). It is mainly distributed in Europe and temperate Asia, with a few species also in North America and North Africa (Bremer & Humphries, 1993).

In June 2006, during a field study for the project, 'Revision of the Genera *Matricaria* and *Tripleurospermum* in Turkey', the first author collected some *Tripleurospermum* specimens in the Gümüşhane region of Zigana Dağı. In the field, the specimens looked like *Tripleurospermum elongatum* (Fisch. & Mey.) Bornm. because of their habit. After a close examination of the specimens in the herbarium and cross-checking with descriptions in the *Flora of Turkey and the East Aegean Islands* (Enayet Hossain, 1975), it was realized that the specimens were different from *T. elongatum* in terms of their morphology. A study of the specific descriptions of *Tripleurospermum* in Kay (1976), Podlech (1986), Avetisian & Oganesian (1995), Pobedimova (1995) and Inceer (2003) showed that the specimens represented a species new to science.

Tripleurospermum was revised for the *Flora of Turkey and the East Aegean Islands* (Enayet Hossain, 1975), with 26 taxa recognized. Later, *T. subnivale* Pobed. was recorded for the *Flora of Turkey* (Inceer & Beyazoglu, 2004a), which, together with the species described here, brings the total number of *Tripleurospermum* to 28.

DESCRIPTION

TRIPLEUROSPERMUM ZIGANAENSE INCEER & HAYIRLIOGLU-AYAZ, SP. NOV. (FIG. 1)

Type: Turkey. A7 Gümüşhane: Zigana Dağı, between Zigana pass and Torul, 1200–1300 m a.s.l., 6.vii. 2006, *Inceer 216* (holotype: KTUB; isotype: GAZI).

*Corresponding author. E-mail: inceer@ktu.edu.tr

Downloaded from https://academic.oup.com/botlinnean/article-abstract/158/4/696/2418343 by Karadeniz Teknik University Library (KTU) user on 08 June 2020

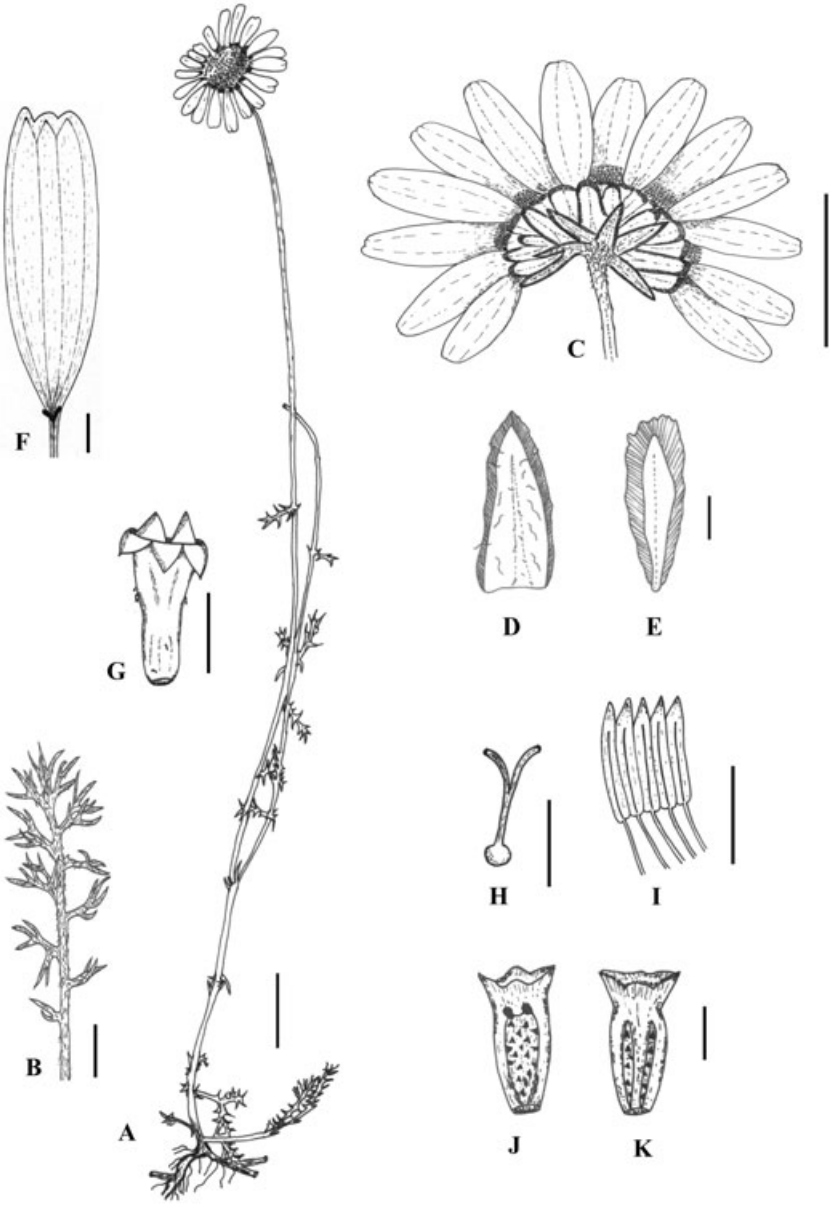


Figure 1. ***Tripleurospermum ziganaense*** Inceer & Hayırlıoglu-Ayaz, **sp. nov.**: A, habit; B, bottom leaf; C, capitulum; D, outer involucral bract; E, inner involucral bract; F, ray floret; G, disc floret; H, style; I, cylinder of anthers; J, achene from dorsal side; K, achene from ventral side. Scale bars: A, 2 cm; B, 2 mm; C, 1 cm; D–K, 1 mm.

Diagnosis: Herba biennis, 25–30 cm alta. Folia 1–3-pinnatisecta, lamina laciniis crassis linearioblongis vel linearibus cuspidatis instructa. Capitula solitaria, radiata. Involucrum 9–14 × 3–4.5 mm, hemisphaericum, bracteis exterioribus pubescentibus, triangulariacutis, interioribus glabris, oblongobtusis, marginibus brunneis vel albis, membranaceis. Flosculi radii 15–20, feminei, limbo albo, late elliptico, leviter trilobulato; flosculi disci hermaphroditi, lutei, tubulosi, lobis ad apicem eglandulosis. Achenia oblonga, compressa, copiose mucilagina, facie dorsali tuberculatorugulosa, facie ventrali trinervia. Corona alba, lobulata, achenio quadruplo brevior.

Description: Biennial, 25–30 cm. STEMS numerous, unbranched or few branched. LEAVES one- to three-pinnatisect, laciniae thick, linear-oblong or linear, terminating in a cusp, ±densely pubescent, hairs simply unbranched uniseriate; BOTTOM LEAVES 14–21 mm long, 4–7 mm wide, with petioles (petioles 7–12 mm long); CAULINE LEAVES 10–18.5 mm long, 6–11 mm wide, sessile, with axis widened at base beset with

Downloaded from https://academic.oup.com/botlinnean/article-abstract/158/4/696/2418343 by Karadeniz Teknik University Library (KTU) user on 08 June 2020

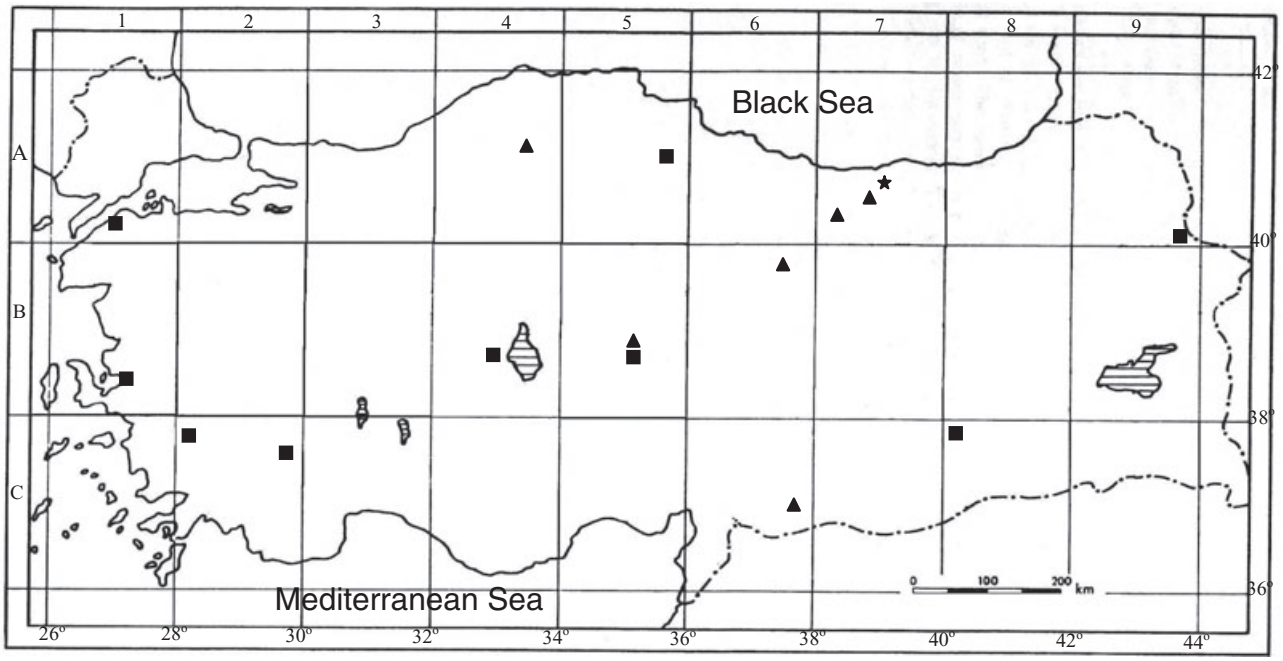


Figure 2. Distribution of ***Tripleurospermum ziganaense*** **sp. nov.** (★), *T. elongatum* (▲) and *T. parviflorum* (■) in Turkey.

short linear segments. CAPITULA heterogamous, radiate, solitary, terminal, peduncles 40–50 mm long, naked or puberulent, especially dense below the head; INVOLUCRE 9–14 × 3–4.5 mm, hemispherical with *c*. 30–40 bracts arranged in three to four rows, imbricate; OUTER BRACTS 2.5–3 × 0.8–1 mm, sparsely pubescent with adpressed hairs, triangular-acute, margins brown membranous; INNER BRACTS 4–5 × 1.3–1.8 mm, glabrous, oblong-obtuse, margins brown or white membranous. RECEPTACLE conical or ovate-conical ± solid, epaleate. RAY FLORETS female, 15–20 per capitulum, limbs white, broadly elliptic, shallowly three-lobed at apex, 9–14 × 2–3.5 mm. DISC FLORETS numerous, hermaphrodite, yellow with five deltoid lobes 0.3–0.5 mm, tube 1.8–2.1 mm, cylindrical, sparsely glandular, clearly widening at base and enveloping the top of the achene, corolla lobes eglandular at tips; ANTHERS 5, coherent along most of their length and forming a *c*. 1.1 mm tube around style, filaments *c*. 0.6 mm, inserted *c*. 0.4 mm above tube expansion, appendages conical, blunt at base; STYLE of ray florets 1.6–2.1 mm, longer than tube bifid (rarely trifid), branches 0.3–0.5 mm, slightly expanded at tip; STYLE of disc florets 1.4–1.9 mm, shorter than florets, branches 0.4–0.5 mm, deeply two parted. ACHENES oblong, compressed, ± incurved, 1.9–2 × 0.75–1.25 mm, brown at maturity, copiously mucilaginous, dorsal side tuberculate-rugulose, ventral side three-ribbed, ribs thickened, white, fissures narrow; CORONA lobulate, white, one-quarter as long as achene.

Phenology: Flowering and fruiting from June to July.

Etymology: This new species is named after Zigana Dağı, where the specimens were collected.

Ecology: The species grows in open places, on rocky slopes and along roadsides at an altitude of 1200–1300 m a.s.l. *Tripleurospermum ziganaense* shares its habitat with other plants, such as *Tripleurospermum oreades* (Boiss.) Rech.f., *Tanacetum sorbifolium* (Boiss.) Grierson, *Senecio vulgaris* L., *Vicia sativa* L. subsp. *nigra* (L.) Ehrh., *Achillea millefolium* L. subsp. *millefolium*, *Anthemis tinctoria* L. var. *tinctoria* and *Myosotis* sp.

Distribution and suggested conservation status: Tripleurospermum ziganaense is found on Zigana Dağı, Gümüşhane Province, north-east Anatolia, Turkey (Fig. 2). It is known from only one population at the type locality. The population seems to be small and scattered. Therefore, it should be regarded as belonging to the Critically Endangered CR (criterion B2ab) category (IUCN, 2001) because of its local distribution and small population size.

DISCUSSION AND CONCLUSIONS

This new species was collected from Zigana Dağı (Gümüşhane). Table 1 details some of the morphological characters used to distinguish *T. ziganaense* from

Downloaded from https://academic.oup.com/botlinnean/article-abstract/158/4/696/2418343 by Karadeniz Teknik University Library (KTU) user on 08 June 2020

Table 1. Comparison of the diagnostic characters of ***Tripleurospermum ziganaense***, *T. elongatum* and *T. parviflorum*

Character	***T. ziganaense***	*T. elongatum*	*T. parviflorum*
Habitat	Open places, rocky slopes, roadsides, 1200–1300 m a.s.l.	Open slopes, 300–1660 m a.s.l.	Rocky places, fields, orchards, saline soil, 30–1180 m a.s.l.
Life cycle	Biennial	Biennial or perennial	Annual
Habit	Unbranched or few branched	Unbranched or few branched	Unbranched
Stem height (cm)	25–30	5–18	4–35
Leaves	1–3 pinnatisect; laciniae thick, linear-oblong or linear, acute, pubescent	1–2 pinnatisect; laciniae thick, oblong or linear-oblong, acute, pubescent	Shortly 1–2 pinnatisect; laciniae filiform or lanceolate-subulate
Capitulum breadth (mm) (excluding ray limb)	11–14	3.5–9	4–12
Involucral bracts	Pubescent, outer triangular-acute, inner oblong-obtuse, margins membranous, brown or white	Pubescent, outer triangular-acute, inner oblong-obtuse, scarious, brown at margins	Glabrescent, oblong-obtuse, margins membranous, reddish-brown or white
Receptacle shape	Conical or ovate-conical	Hemispherical	Conical or elongate-conical
Ray limb length (mm)	9–14.5	3–6	2.5–8
Corolla lobe of disc florets	Eglandular at tips	Eglandular at tips	Eglandular at tips
Achene shape	Oblong, compressed	Obpyramidal or oblong ± incurved	Shortly oblong ± incurved
Achene size (mm)	1.9–2 × 0.75–1.25	1.2–1.5 × 0.3–0.5	1–1.5 × 0.3–0.8
Ripe achene colour	Brown	Black	Black or dark-brown
Achene surface	Tuberculate-rugulose	Lineolate or smooth	Two-ribbed (anteriorly) or smooth
Relative corona size in achenes	One-quarter as long as achene	One-third as long as achene	One-third to one-half as long as achene

related species. *Tripleurospermum ziganaense* closely resembles *T. elongatum*, but differs in having a large capitulum (11–14 mm not 3.5–9 mm), conical or ovate–conical receptacle (not hemispherical), long ray limbs (9–14.5 mm not 3–6 mm) and different achene characters. *Tripleurospermum ziganaense* also resembles *T. parviflorum* (Willd.) Pobed., but differs in having a biennial habit, long ray limbs and short coronate achenes.

Tripleurospermum ziganaense can also be easily distinguished from *T. oreades* by its life cycle (biennial not rhizomatous perennial), although they share the same geographical area. Furthermore, the achene of *T. ziganaense* is more mucilaginous than that of *T. oreades*, and the achene base is not truncate as in *T. oreades*.

Chromosome counting of *T. ziganaense* has not been undertaken, but chromosome numbers of the related species are given as $2n = 2x = 18$ in *T. elongatum* and *T. parviflorum* and $2n = 4x = 36$ in *T. oreades* (Inceer & Beyazoglu, 2004b).

ACKNOWLEDGEMENTS

The authors wish to thank the Scientific and Technical Research Council of Turkey (TUBITAK, TBAG Project No.106T162) for financial support and an anonymous referee for providing helpful suggestions that improved the manuscript.

REFERENCES

Applequist WL. 2002. A reassessment of the nomenclature of *Matricaria* L. and *Tripleurospermum* Sch. Bip. (Asteraceae). *Taxon* **51:** 757–761.

Avetisian VE, Oganesian ME, eds. 1995. *Flora Armenii 9. Campanulacae, Asteraceae*. Havlickuv Brod: Koeltz Scientific Books.

Bremer K. 1994. *Asteraceae. Cladistics and classification*. Portland, OR: Timber Press.

Bremer K, Humphries CJ. 1993. Generic monograph of the Asteraceae-Anthemideae. *Bulletin of the Natural History Museum of London. Botany Series* **23:** 71–177.

Enayet Hossain ABM. 1975. *Tripleurospermum* Schultz Bip.

Downloaded from https://academic.oup.com/botlinnean/article-abstract/158/4/696/2418343 by Karadeniz Teknik University Library (KTU) user on 08 June 2020

In: Davis PH, ed. *Flora of Turkey and the East Aegean Islands*, Vol. 5. Edinburgh: Edinburgh University Press, 295–331.

Garcia S, Inceer H, Garnatje T, Valles J. 2005. Genome size variation in some representatives of the genus *Tripleurospermum*. *Biologia Plantarum* **49:** 381–387.

Inceer H. 2003. Doğu Karadeniz Bölgesi *Tripleurospermum* Sch. Bip. (Asteraceae) türlerinin morfolojik ve sitotaksonomik yönden incelenmesi. Doctoral Thesis, Karadeniz Technical University, Trabzon, Turkey (in Turkish).

Inceer H, Beyazoglu O. 2004a. A new record for the Flora of Turkey: *Tripleurospermum subnivale* Pobed. (Asteraceae). *Turkish Journal of Botany* **28:** 599–601.

Inceer H, Beyazoglu O. 2004b. Karyological studies in *Tripleurospermum* (Asteraceae, Anthemideae) from north-east Anatolia. *Botanical Journal of the Linnean Society* **146:** 427–438.

IUCN Species Survival Commission. 2001. *IUCN red list categories and criteria. Approved by the 51st Meeting of the IUCN Council, Version 3.1*. Gland: IUCN.

Kay QON. 1976. *Matricaria* L. In: Tutin TG, Heywood VH, Burges NA, Moore DM, Walters SM, Webb DA, eds. *Flora Europaea*, Vol. 4. Cambridge: Cambridge University Press, 165–167.

Pobedimova EG. 1995. *Tripleurospermum* Sch. Bip. In: Shiskin BK, Bobrov EG, eds. *Flora U.S.S.R.*, Vol. 26. Koenigsten: Bishen Singh Mahendra Pal Singh and Koeltz Scientific Books, 181–213.

Podlech D. 1986. *Tripleurospermum* Sch. Bip. In: Rechinger K, ed. *Flora Iranica*, Vol. 158. Graz: Gruck V. Verlagsanstalt, 73–80.

Downloaded from https://academic.oup.com/botlinnean/article-abstract/158/4/696/2418343 by Karadeniz Teknik University Library (KTU) user on 08 June 2020