گزارشی جدید از *Tripleurospermum* Sch.Bip. (تیره کاسنیان) از ایران

مریم خیاطی[۱]، منیژه پاکروان[۱*] و علی سنبلی[۲]

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[۱]دانشکده علوم زیستی، دانشگاه الزهرا، تهران، ایران
[۲]پژوهشکده گیاهان دارویی، دانشگاه شهید بهشتی، تهران، ایران
[*]مسئول مکاتبات: pakravan@alzahra.ac.ir

چکیده. *Tripleurospermum transcaucasicum* (Manden.) Pobed. (تیره کاسنیان و طایفه Anthemideae) به عنوان گزارش جدیدی از استان آذربایجان شرقی در شمال غربی ایران گزارش می‌گردد. از نظر ریخت شناسی مشابه گونه‌های *T. caucasicum* (Willd.) Hayek و *T. monticolum* (Boiss. & A.Huet) Bornm است. ویژگی‌های متمایز کننده و تشریحی گونه گزارش شده با گونه‌های نزدیکش مقایسه شده است. پراکنش جغرافیایی گونه ی مذکور و گونه‌های نزدیک در ایران ارائه شده است.

واژه‌های کلیدی. آسیای جنوب غربی، تاکسونومی، تشریح، تیره کاسنیان، ریخت شناسی

A new record of *Tripleurospermum* Sch.Bip. (Asteraceae) from Iran

Maryam Khayati[1], Maneezheh Pakravan[1*] & Ali Sonboli[2]

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[1]Faculty of Biological Science, Alzahra University, Tehran, Iran
[2]Department of Biology, Medicinal Plants & Drugs Research Institute, Beheshti University, Tehran, Iran
[*]Correspondent author: pakravan@alzahra.ac.ir

Abstract. *Tripleurospermum transcaucasicum* (Manden.) Pobed (Asteraceae, Anthemideae) is newly recorded from East Azarbayejan Provice, NW Iran. It is morphologically similar to *T. caucasicum* (Willd.) Hayek and *T. monticolum* (Boiss. & A.Huet) Bornm. The morphological and anatomical diagnostic characters of new record are compared with closely related species. The geographical distribution of new records and related species in Iran are presented.

Keywords. anatomy, Compositae, morphology, S.W. Asia, taxonomy

INTRODUCTION

Tripleurospermum Sch.Bip., with 38 species in the world belongs to the tribe Anthemideae, is one of the genera of Asteraceae family. It has 5 species in Iran (Rechinger, 1986). The classification of the annual and herbaceous perennial species of this genus is problematic. Most of the species are from Europe and temperate Asia although a few are from North America and North Africa (Bremer & Humphries, 1993). Some of the species are placed in *Matricaria* L. by some authors, also some species are similar to *Tanacetum* L. (emend Briq.). Plants typically have lobed leaves that are composed of one to three opposite pairs cut almost to the leaf midrib; they have indehiscent one celled fruits that have 3-ribs and two resinous glands at the base. *Matricaria* species are distinguished from these species by lacking fruits with three ribs and the two glands (Ghafoor, 2002;

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Table 1. List of species and voucher information used in the present study. (vouchers were preserved at ALUH)

Taxon	Locality	Voucher specimen
T.caucasicum	Azarbayejan, Maku, 2050 m	Khayati 10320
	Azarbayejan, Chaldoran, 2500 m	Khayati 10321
T.monticolum	Azarbayejan, Urmia, Silvana	Sonboli 1330
T. transcaucasicum	Azarbayejan, Chaldoran, 1888 m	Khayati 10501
	Azarbayejan, Chaldoran, 2500 m	Khayati 10201
	Azarbayejan, 2350 m	Khayati 10202
	Azarbayejan, Chaldoran, 2200 m	Khayati 10203

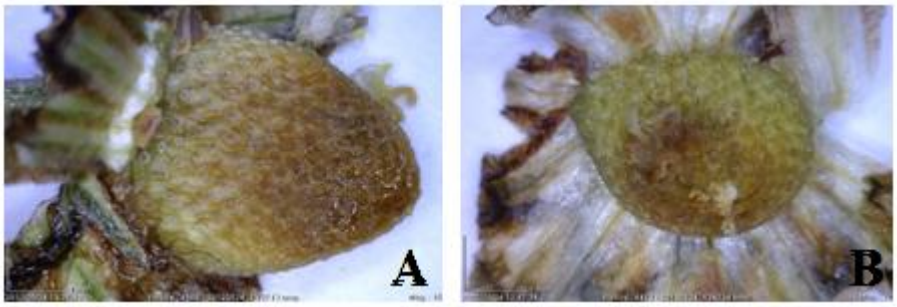


Fig. 1. Receptacle in *Tripleurospermum* species. **A**: *T. caucasicum*, **B**: *T. transcaucasicum* (Scale bar = 1mm).

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Hossain, 1975) and the occurence of a tetrasporic embryo sac (Harling, 1951). During the study on the genus *Tripleurospermum* in Iran, many specimens have been collected from different localities. Between the collected materials from East Azarbayejan province, a new record to Iran namely *Tripleurospermum transcaucasicum* (Manden.) Pobed. came to light. The aim of this study is to examine the various characters such as morphological and anatomical characteristics in *T. transcaucasic-um* and closely related species to evaluate the new record for flora of Iran.

MATERIAL AND METHODS

The present study is based on fresh material collected from the field and also materials preserved in the herbaria ALUH and TARI, TUH as well as on digital image of type material in the herbaria of B, P, W and WU (acronyms according to Thiers, 2016). The voucher specimens are preserved in the ALUH. Specimens were examined using a Dino-Lite digital microscope AM413T model. For light microscopy observations, dried flowers were taken.

Transverse sections of stem were prepared by hand cutting of the middle part of stem. Then sections have been soaked in boiling water and glycerol and have been stained with Carmen and methyl green, then sections were mounted in glycerin. All microscopic observationstook place using an Olympus B×51 light microscope.

RESULTS AND DISCUSSION

Morphological properties

T. transcaucasicum is taxonomically similar to *T. monticolum* (Boiss. & A.Huet) Bornm. and *T. caucasicum* (Willd.) Hayek. The achene surface of new record is tuberculate and has 3 thin ribs, but in the two mentioned species they are smooth. Also, the achene is larger in this species than the two others, it is 3-3.25 mm long (not 2-3 in two other species) (Fig. 3).

Papus in *T. monticolum* is large and has reddish brown corona (it is very short, marginiform and white in *T. transcaucasicum*) (Fig. 3; Table 3).

The leaf laciniae are filiform in *T. transcaucasicum* and mucronate but it is linear in *T. monticolum*. Other differences are given in Table 2 and 3.

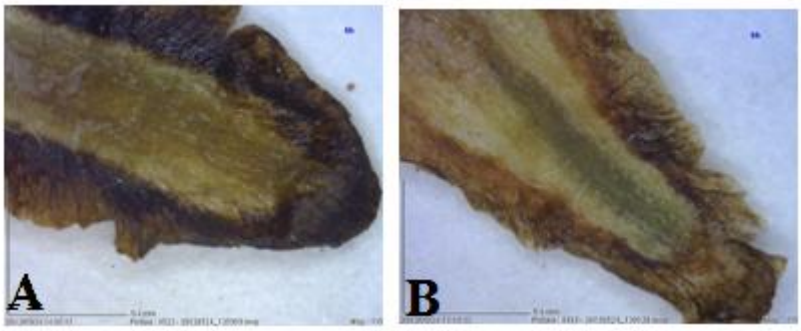


Fig. 2. Involucres' bract in. **A**: *T. caucasicum*, **B**: *T. transcaucasicum* (Scale bar= 0.4 mm).

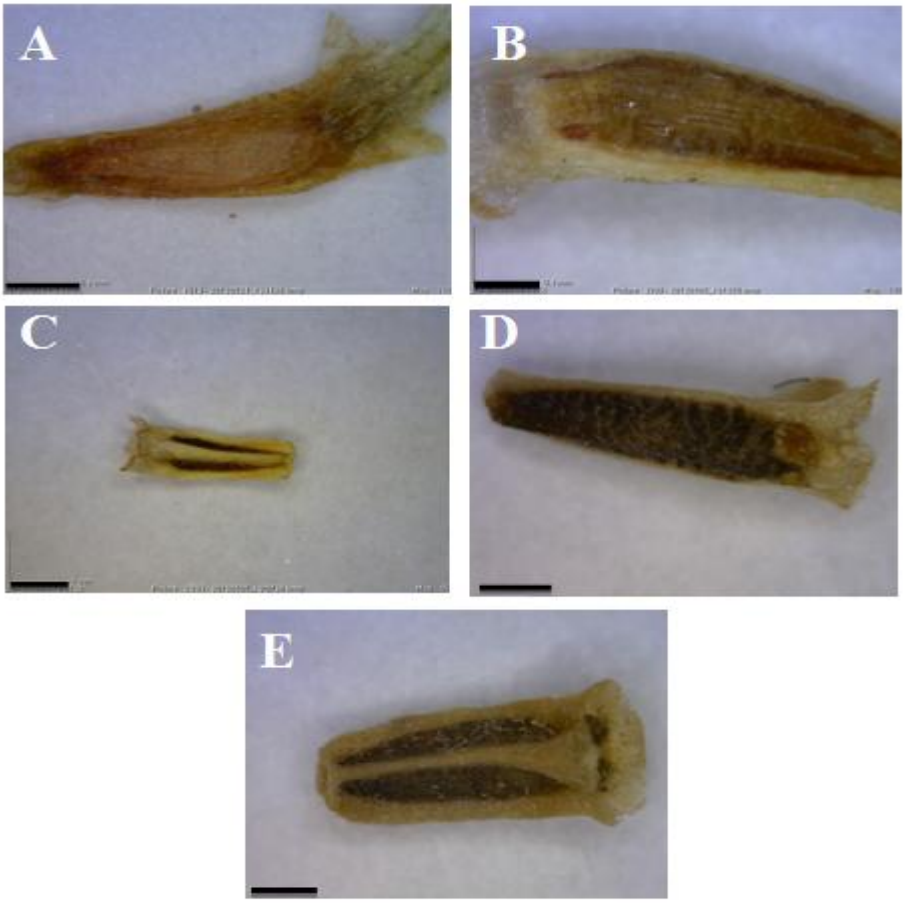


Fig. 3. Achene and papus characters in *Tripleurospermum* species. **A**: *T. caucasicum*, **B & C**: *T. monticolum*, **D & E**: *T. transcaucasicum* (**A, B, D, E**: scale bar=300 µm; **C**: scale bar= 600 µm).

Table 2. Diagnostic characters of capitulein *Tripleurospermum* species.

Character / Species	Length of ligulateflorlet(mm)	Shape of receptacle	Color of bracts margin	Shape of outer involucre bracts
T.caucasicum	5.8	Ovate	Black	Triangle- obtuse
T. monticolum	9	Semi circular	Brown	Triangle -acute
T. transcaucasicum	8.35	Semi circular-ovate	Brown	Triangle-acute

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Table 3. Diagnostic characters of achenin *Tripleurospermum* species.

Species	Shape of achene	Achene surface	Achene size(mm)	Pappus characters		
				Length (mm)	color	shape
T. caucasicum	oblong	smooth	2.13 × 0.55	0.59	White with brown margin	Middle lob longer and free
T. monticolum	Obpyramidal-curved	papillose	2.94 × 0.85	0.61	White with brown margin	Middle lob equal to the others and free
T. transcaucasicum	Obpyramidal-oblong	papillose	3.25×0.63	0.38	White with pale brown margin	All lobs are equal and middle lob free

Table 4. Anatomical characters in stem of *Tripleurospermum* species.

Characters / Species	Type of secretary hair	No. bundle	Scleranchymatose sheath thickness (µm)	Wood parenchyma thickness (µm)	Parenchyma thickness (µm)	Epidermis thickness
T.caucasicum	Mono and multi cellular	17	132.45 – 170.15	41.24 – 49. 88	102.9– 174.56	18.22 – 22.17
T.monticolum	multi cellular	18	109.12 – 123.59	47.4 – 48.26	52.14 – 73.78	13.63- 18.35
T.transcaucasicum	multi cellular	25	57.95 – 85.64	40.95- 32.73	83.88 – 112.88	11.86 – 19.32

Anatomical properties

Unicellular secreting hair has been observed only in *T. caucasicum*, but in *T. monticolum* and *T. transcaucasicum* secreting hairs were unicellular.

The thickness of sclerenchymatous sheath in *T. transcaucasicum* was less than that in the two others (57.95-85.64 um).The number of vascular bundles in *T. transcaucasicum* was more than that in the two others (Figs. 4, 5; Table 4).

T.transcaucasicumhas easily separated from two closely related species by morphological and anatomical characters. The description of new record is as follow.

T. transcaucasicum (Manden.) Pobed. In Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR, 21: 346 (1961).

Syn. *Chamaemelum transcaucasicum* Manden. In Zan. Sist. Geogr. Rast. 21: 64 (1959).

Illustrations: Figs. 1, 2, 3**.**

Description

Annual or prennial herbs. Stem height up to 60 cm, unbranched or branced from middle, glaber or with very scatter hair. Leaves 1-2- pinnatisect, segments filiform and mucronate. Inflorescence laxly corymbose rarely solitary, with 6-8 capitule, 8-

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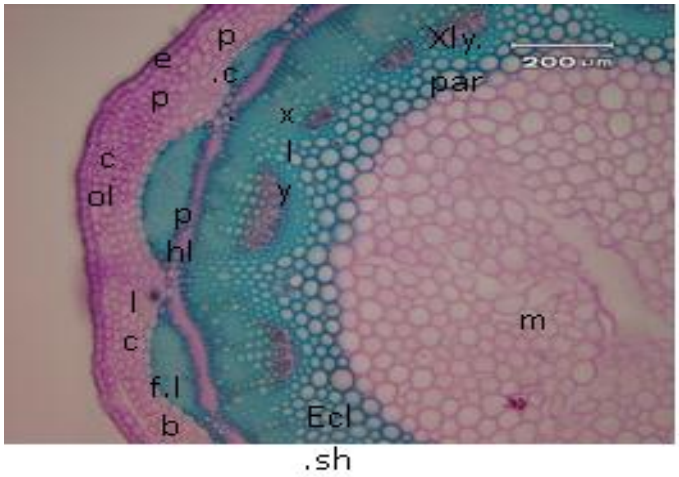


Fig. 4. Transverse section of stem in *T.caucasicum.* ep: epidermis; col: cholenchyma; p.c. cortex parenchama; f. lb: phloem fiber; phl: phloem; xly: xlyem; xly.par: xylar parenchyma; scl.sh: sclerenchymatus sheath; m: pith (scale bar=200 µm).

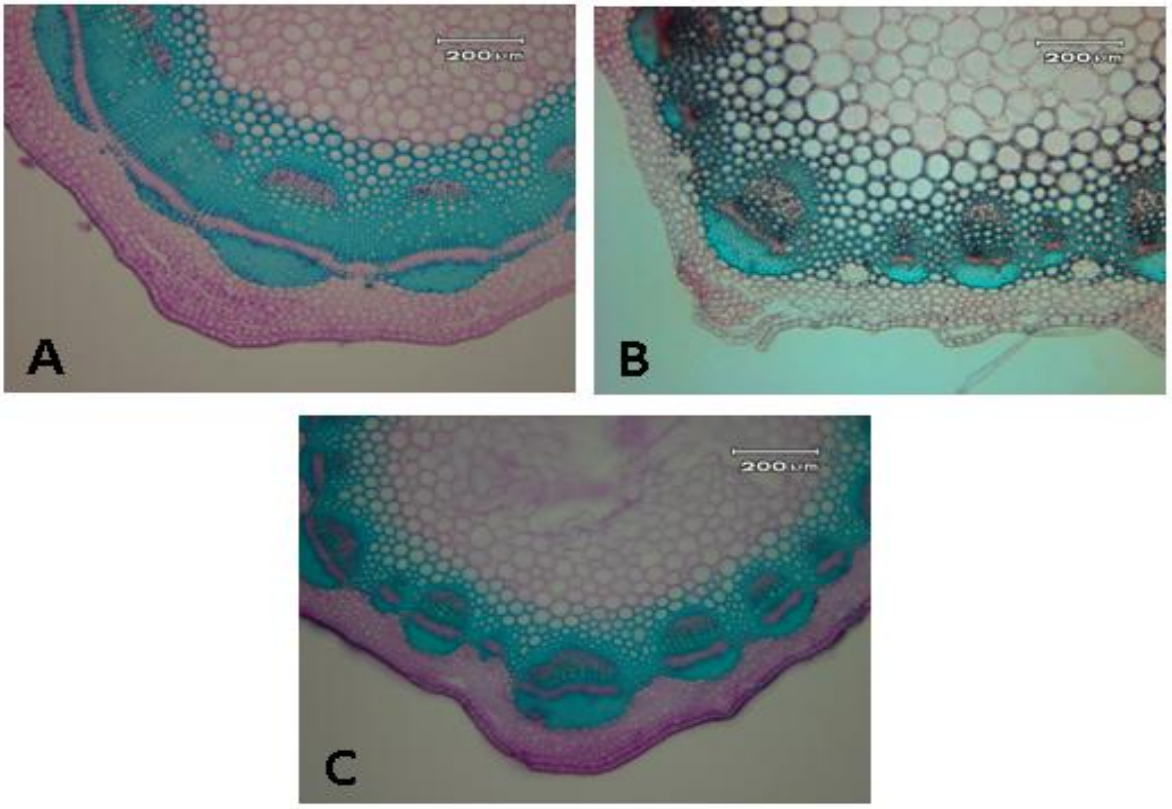


Fig. 5. Transverse section of stem in *Tripleurospermum* species. **A**: *T. caucasicum*, **B**: *T. monticolum*, **C**: *T. transcau casicum* (scale bar=200 µm).

13 mm broad (excl. ligulate); phyllaries hairy or glabrescent, 3-4 series, outer seri triangularacute with very scatter hair or glabrescent, dark brown in the margin, middle seri pale green and glaber, inner serioblanceolate-obtuse.

Receptacle ovoid, glaber. Ligules white, 7-13 mm long, tubular floret without gland at tips. Achenes 2.8-3.3×0.35 mm, with three lobes, mucilaginoue, posteriorly 3-withe ribed, ribs thin; corona very short, marginaliform, 3-lobed, the length 1/8-1/6 as long as achene length.

Phenolog. Flowering from May to June and fruiting from the last of June to August.

Specimens seen. Iran, Azarbayejan province, Chaldoran, Siahcheshmeh, 1888 m, 14 June 1990, Khayati 10201; Chaldoran, Avajigh village, 2500 m, 20 June 1990, Khayati 10201; Same place, 2350 m, 20 June 1990, Khayati 10202; Same place, 2200 m, 20 June 1990, Khayati 10203 (ALU-H).

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Geographical distribution. *T.transcaucasicum* widely distributed in Iran, Turkey and Russia.

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