

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

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**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 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

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**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

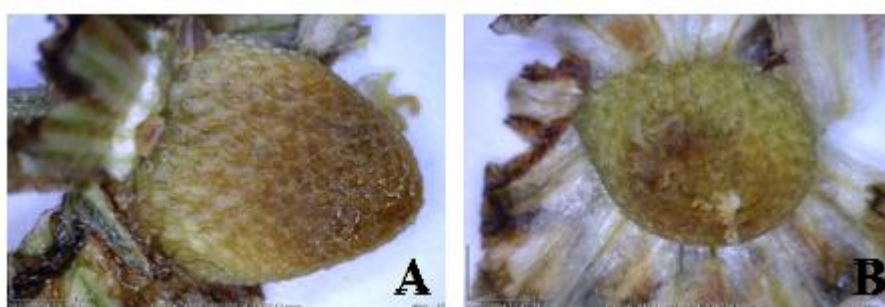
## INTRODUCTION

*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 speci-

es 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;

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

| Taxon                     | Locality                       | Voucher specimen |
|---------------------------|--------------------------------|------------------|
| <i>T. caucasicum</i>      | Azarbajejan, Maku, 2050 m      | Khayati 10320    |
|                           | Azarbajejan, Chaldoran, 2500 m | Khayati 10321    |
| <i>T. monticolum</i>      | Azarbajejan, Urmia, Silvana    | Sonboli 1330     |
| <i>T. transcaucasicum</i> | Azarbajejan, Chaldoran, 1888 m | Khayati 10501    |
|                           | Azarbajejan, Chaldoran, 2500 m | Khayati 10201    |
|                           | Azarbajejan, 2350 m            | Khayati 10202    |
|                           | Azarbajejan, Chaldoran, 2200 m | Khayati 10203    |

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

Hossain, 1975) and the occurrence 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 Azarbajejan province, a new record to Iran namely *Tripleurospermum transcaucasicum* (Mandén.) Pobed. came to light. The aim of this study is to examine the various characters such as morphological and anatomical characteristics in *T. transcaucasicum* 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 observation took place using an Olympus B×51 light microscope.

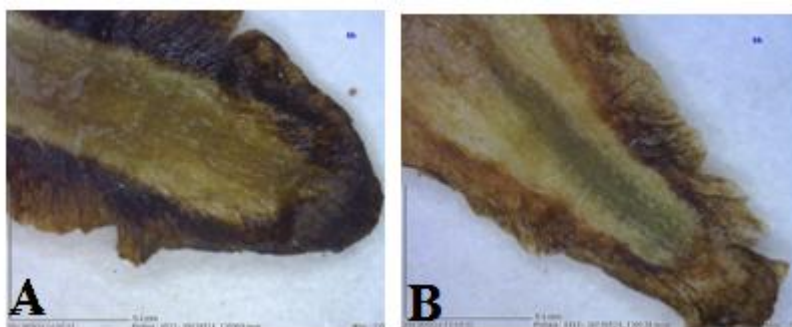
## RESULTS AND DISCUSSION

### Morphological properties

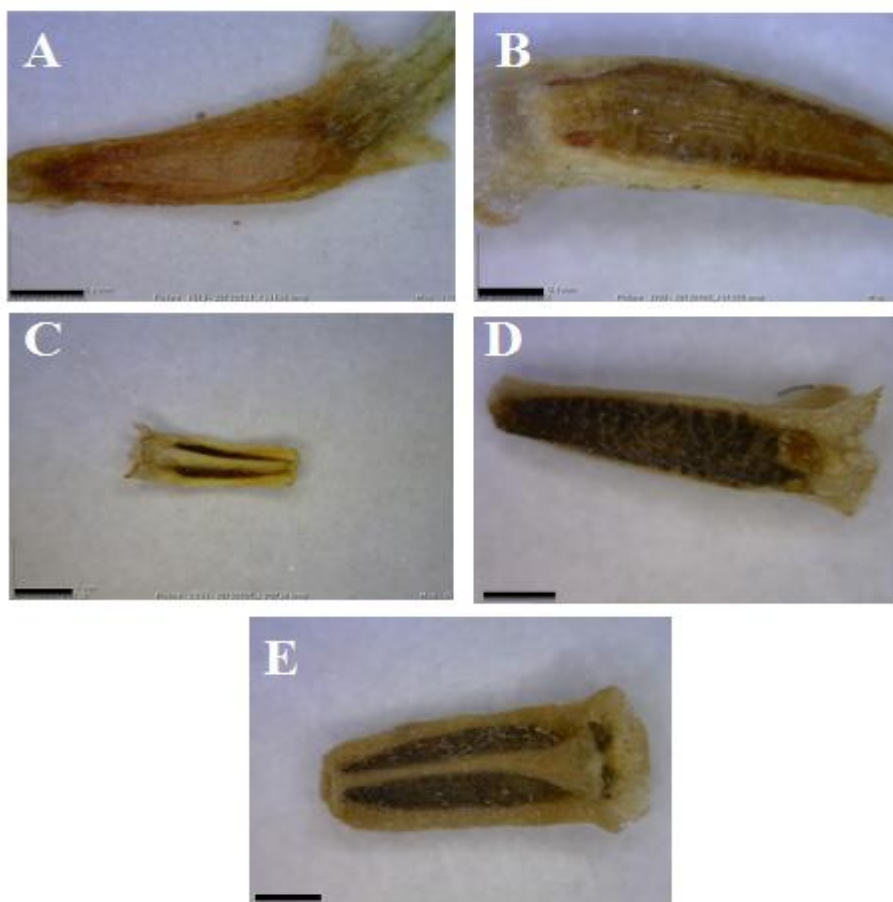
*T. transcaucasicum* is taxonomically similar to *T. monticolum* (Boiss. & A.Huet) Bornm. and *T. caucasicum* (Willd.) Hayek. The achene surface of new record is tuberculate and has 3 thin ribs, but in the two mentioned species they are smooth. Also, the achene is larger in this species than the two 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.

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

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

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

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

| Species \ Characters      | Type of secretory hair | No. bundle | Sclerenchymatose sheath thickness (µm) | Wood parenchyma thickness (µm) | Parenchyma thickness (µm) | Epidermis thickness |
|---------------------------|------------------------|------------|--|--------------------------------|---------------------------|---------------------|
| <i>T. caucasicum</i>      | Mono and multicellular | 17         | 132.45 – 170.15                        | 41.24 – 49.88                  | 102.9– 174.56             | 18.22 – 22.17       |
| <i>T. monticolum</i>      | multicellular          | 18         | 109.12 – 123.59                        | 47.4 – 48.26                   | 52.14 – 73.78             | 13.63- 18.35        |
| <i>T. transcaucasicum</i> | multicellular          | 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 µm). The number of vascular bundles in *T. transcaucasicum* was more than that in the two others (Figs. 4, 5; Table 4).

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

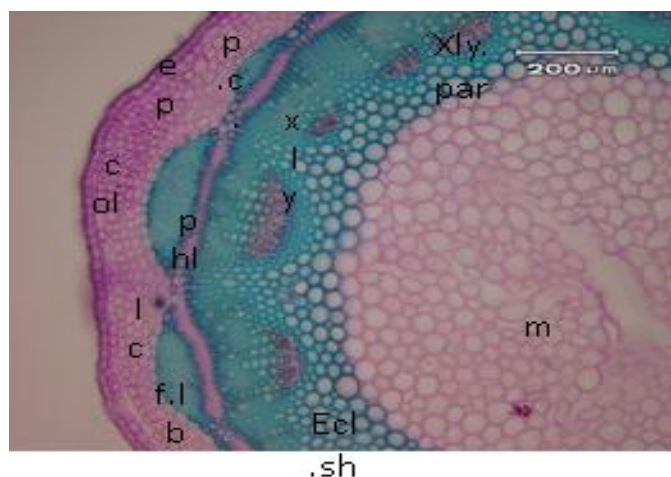
*T. transcaucasicum* (Manden.) Pobed. In Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR, 21: 346 (1961).

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

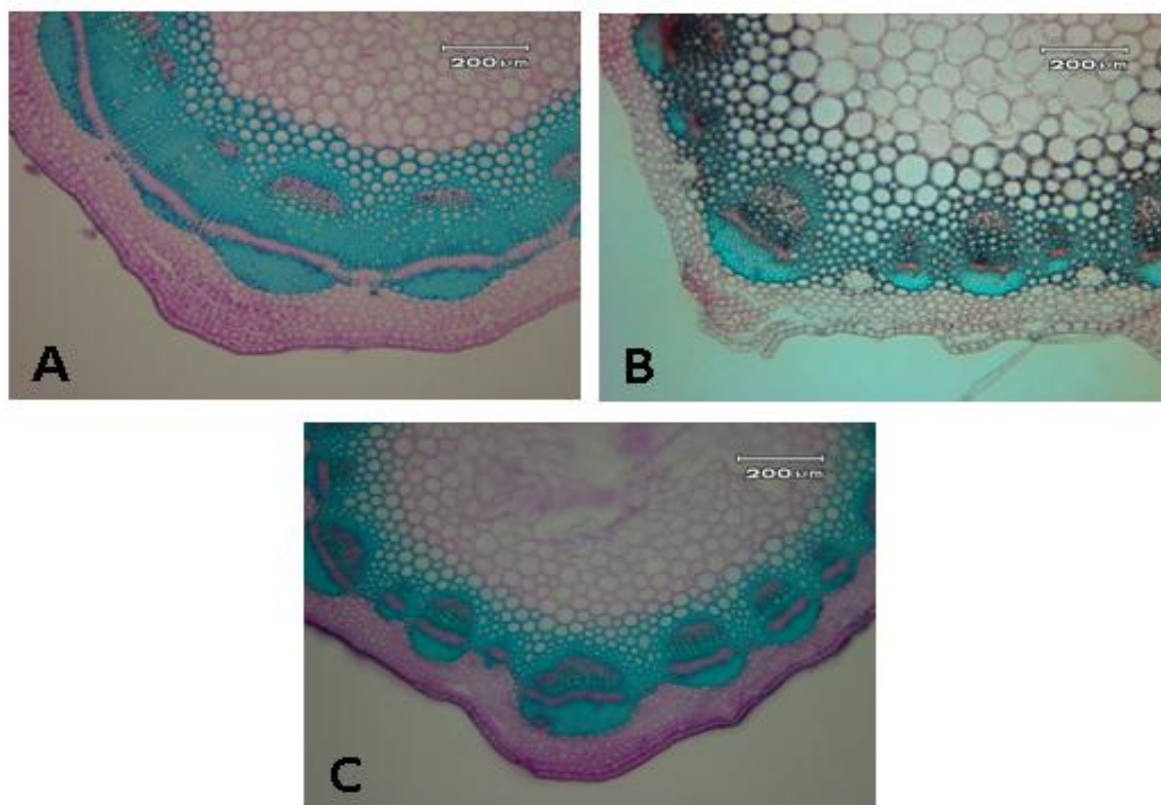
Illustrations: Figs. 1, 2, 3.

### Description

Annual or prennial herbs. Stem height up to 60 cm, unbranched or branched 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-



**Fig. 4.** Transverse section of stem in *T. caucasicum*. ep: epidermis; col: cholenchyma; p.c. cortex parenchyma; 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. transcaucasicum* (scale bar=200 μm).

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

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

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## REFERENCES

- Bremer, K. and Humphries, C.J.** 1993. Generic monograph of the Asteraceae-Anthemideae. – Botany Series 23: 71-177.
- Ghafoor, A.** 2002. Asteraceae, Flora of Pakistan 207. – Missouri Botanical Garden Press, Missouri.
- Hossain, E.** 1975. *Tripleurospermum* (Manden.) Pobed. In Davis P.H. (ed.), Flora of Turkey5. – University Press, Edinburgh.
- Pobedimova, E.G.** 1985. *Tripleurospermum* (Manden.) Pobed. In: Schischkin, B.K and Boborv, E.G. (ed.), Compositae in Flora URSS 26: 152-177. (Translated in English). – Rekh Printers Pvt, New Delhi.
- Thiers, B.** 2016. [continuously updated]. Index herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden, Bronx, NY. Available from: <http://sweetgum.nybg.org/ih/> (accessed 29 July 2016)

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