

Pentanema divaricatum Cass. (Inuleae, Asteraceae), A New Record for the Flora of Turkey

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ABSTRACT

Pentanema divaricatum species was collected from Arıcak (Elazığ) district in Turkey and it was given a new record for the Flora of Turkey. The description, details photographs and distribution maps of this new record are also given.

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ÖZET

Pentanema divaricatum türü Türkiye'nin Arıcak (Elazığ) ilçesinden toplanmış ve Türkiye Florası için yeni bir kayıt olarak sunulmuştur. Makalede türün betimi, doğal ortamında çekilmiş detaylı fotoğrafları ve dağılım haritası verilmiştir.

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INTRODUCTION

Turkey's biological richness; increases with new studies. Until 1999, the genus *Pentanema* Cass. was not included in the Flora of Turkey and the distribution of any of its members was not given. A *Pentanema* species (*P. alanyense* H. Duman & Anderb) was first described from Turkey (Antalya-Mediterranean Region) in 1999 (Duman and Anderberg 1999; Güner 2000).

The genus *Pentanema* was previously represented by about 20 species in the world and was distributed in the Central Asia, Iran, Afghanistan, Iraq, Pamir-Alai and Tien-Shan (Gorskova 1959, Ling 1979, Rechinger 1980, Duman and Anderberg 1999, Maroofi and Ghaderi 2016; Gutiérrez-Larruscain et al. 2018).

There was only one species (*Pentanema alanyense*) of this genus in Turkey (Duman and Anderberg 1999).

Some species belonging to the genus *Inula* L. were transferred to the genus *Pentanema*, taking into account the data obtained in some molecular and morphological (capitula features, cypselae shape and size, number of pappus hairs, etc.) studies carried out in recent years (Gutiérrez-Larruscain et al. 2018). As a result of these studies, the number of taxa of the genus *Pentanema* in the world has reached approximately 40. In the light of these recent studies, the number of *Pentanema* members in Turkey has increased to 10 (Duman and Anderberg 1999; Gutiérrez-Larruscain et al. 2018). Members of the genus are widespread in SW, S, Central Asia, Africa

and Europe (Gutiérrez-Larruscain et al. 2018).

We collected interesting *Pentanema* samples during the flora studies carried out in Arıcak district (Elazığ province) in 2021. We decided that these specimens collected through detailed literature check are belong to *Pentanema divaricatum* (Rechinger 1980; Gorschkova 1959; Güner 2000), which is a new record for the flora of Turkey. Thus, with the recent studies, the number of *Pentanema* species, which has 10 species in the flora of Turkey, has increased to 11 (Duman and Anderberg 1999; Gutiérrez-Larruscain et al. 2018). This paper describes and illustrates the new record of the *Pentanema* species.

MATERIAL and METHODS

Specimens of *Pentanema divaricatum* (Figure1,2) were collected in the Arıcak (Elazığ) district in Eastern Anatolia, Turkey. *Pentanema* specimens were identified with the “Flora Iranica” (Rechinger

1980) and the “Flora SSSR” (Gorschkova 1959). In addition, photographs of specimens found in P and E herbariums related to this species were examined (MNHN and Chagnoux 2021). Specimens of *P. divaricatum* were deposited in the herbarium of Bingöl University and ANK.

RESULTS and DISCUSSION

Pentanema divaricatum Cass., Bull. Sci. Soc. Philom. Paris 1818: 75 (Cassini 1818). (Figure1, 2).

Syn: *Vicoa pentanema* Aitch. & Hemsl. in Trans. Linn. Soc. London, Bot. 3(1): 75 (1888); *Inula divaricata* (Cass.) Boiss. Fl. Or. 3: 200 (1875); *Inula pentanema* (Aitch. & Hemsl.) Kitam., Fl. Afghan. (Results Kyoto Univ. Sci. Exped. Karak. & Hinduk. 1955, ii.) 426 (1960).

Typus: Verisimiliter, inter Baghdad et Aleppo, Olivier & Bruguier *s.n.*, P.



Figure 1. A view from the original habitat of *Pentanema divaricatum*.

Şekil 1. *Pentanema divaricatum*'un orjinal habitatından bir görüntü.

Description: Annual, stems 5–22 cm high, densely covered with 2–3 mm long, thin, white multicellular hairs and rarely thin short-stalked glands (except corolla of tubular florets); root slender, filiform. Stem brownish or violet, slender, usually divaricate branched, branches filiform. Leaves bluish-green, thin, distant, sessile; basal leaves usually rosulate 1.5–2.5 × 0.8 cm obovate or oblong spatulate, obtuse; middle leaves 2.0–4.0 × 0.7–1.5 cm, oblong or obovate-

oblong, at base usually tapering; upper leaves 1.0 × 0.5 cm, ovate or oblong, cordately auriculate, round, almost amplexicaule; floral leaves up to 0.5 × 0.2 cm, small, linear or oblong. Capitulum many flowered, on long filiform peduncles. Involucre many-rowed, imbricate, ca. 0.6 cm wide; involucre bracts 1-veined, outer bracts spatulate-filiform, densely glandular-hairy, obtuse, 3 × 0.3 mm, revolute, middle bracts 4.5–5.0 × 0.3 mm, erect, linear, subulate, sparsely

glandular-hairy in upper part as also outer ones pilose and ciliate; inner bracts 4.0×0.2 mm, erect, linear, almost smooth. Ligulate florets 6 mm long, yellow, 5 mm long corolla, tube filiform, 3 mm long, linear, as long as pappus, almost recurved, 2.0×1.0 – 1.5 mm ligules, 3-or 4-veined, 3-toothed hairs

outside, teeth glandular hairy; tubular florets 4 mm long, yellow, obconical filiform, 3 mm long corolla, as long as or shorter than pappus, teeth pubescent outside. Achenes 1 mm long, oblong, appressed hairy; pappus with 5 bristles, 2.5–3.0 mm long.

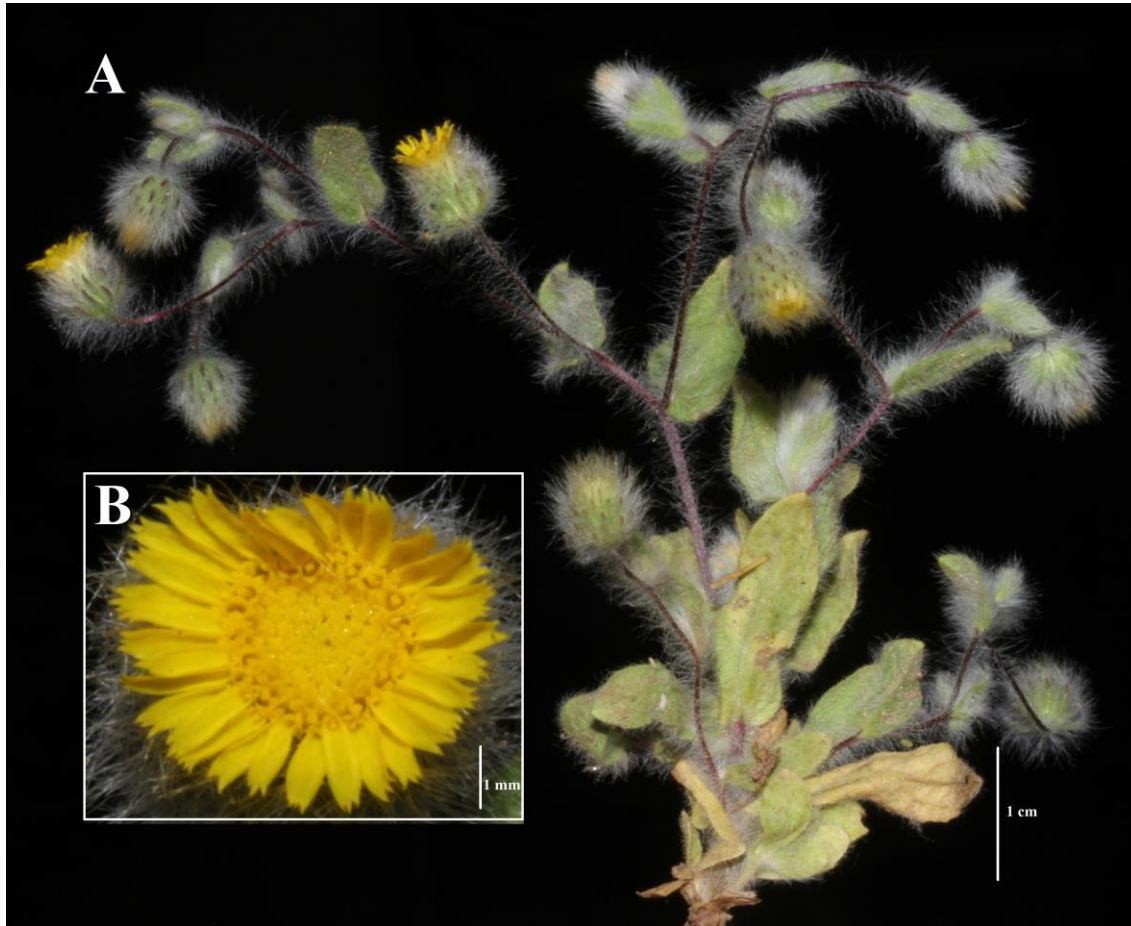


Figure 2. *Pentanema divaricatum*: A- habit, B- capitulum.

Şekil 2. *Pentanema divaricatum*: A- genel görünüş, B- kapitulum.

Flowering: May-June

Fruiting: June-July

Distribution: Afghanistan, Gulf States, Iran, Iraq, Lebanon-Syria, Myanmar, Oman, Pakistan, Saudi Arabia, Tadjikistan, Turkmenistan, Uzbekistan, Turkey (Rechinger 1980; POWO 2021) (Figure 3).

Specimens examined: B8 Turkey: Elaziğ, Arıcak district, Arıcak-Bingöl border, between Karakaş and Çobançesmesi villages, road side, dry stream beds, 860 m, 20.05.2021, *Y.Yapar & L.Behçet* 5585; *ibid.* 05.06.2021, *Y.Yapar* 5995; Photo of *P. divaricatum* in P (P03304036!; P03304026!; P03304032!; P02706637!; P02706637!; P02706645!) and E (E00591582!; E00591577!; E00591580!)

Ecology: *Pentanema divaricatum* is distributed on dunes in dry stream beds with *Aegilops columnaris* Zhuk., *Arenaria serpyllifolia* L., *Brachypodium distachyon* (L.) P.Beauv., *Chrysopogon gryllus* (L.) Trin., *Legousia falcata* (Ten.) Fritsch ex Janch.,

Lolium rigidum Gaudin, *Phleum boissieri* Bornm., *Rostraria cristata* (L.) Tzvelev, *Stipa bromoides* (L.) Dörf., *Vitex agnus-castus* L.

CONCLUSION

Gutiérrez-Larruscain et al. (2018) transferred some species within the genus *Inula* to the genus *Pentanema* in their molecular and partially morphological-based study in 2018. Based on this study, 9 *Inula* species distributed in Turkey were included in the genus *Pentanema*.

Annual *P. divaricatum* is most similar to the *P. alanyense*, mainly because of its divaricate branching and number of pappus bristles, but the latter species differs, e.g. in life form, leaf-shape, in having an almost distinctly conical receptacle and a indumentum features on the involucre.

A total of 11 *Pentanema* species (*Pentanema alanyense* and with 9 species transferred from the

genus *Inula* (*Pentanema aschersonianum* (Janka) D.Gut.Larr. \equiv *Inula aschersoniana* Janka, *P. britannicum* (L.) D.Gut.Larr. \equiv *Inula britannica* L., *P. conyzae* (Griess.) D.Gut.Larr. \equiv *I. conyzae* (Griess.) Meikle, *P. ensifolium* (L.) D.Gut.Larr. \equiv *Inula ensifolia* L., *P. germanicum* (L.) D.Gut.Larr. \equiv *Inula germanica* L., *P. mariae* (Bordz.) D.Gut.Larr. \equiv

Bordz., *P. oculus-christi* (L.) D.Gut.Larr. \equiv *Inula oculus-christi* L., *P. orientale* (Lam.) D.Gut.Larr. \equiv *Inula orientalis* Lam., *P. salicinum* (L.) D.Gut.Larr. \equiv *Inula salicina* L.) (Gutiérrez-Larruscain et al. 2018) are distributed in Turkey, together with *P. divaricatum*, which was given as a new record for the flora of Turkey from Arıcak (Elazığ).

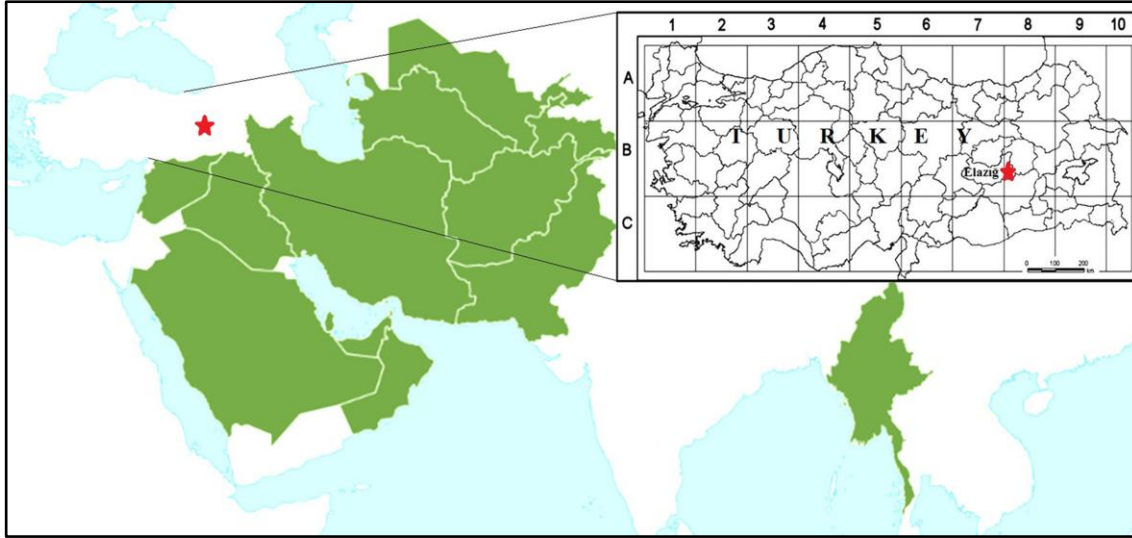


Figure 3. Distribution of *Pentanema divaricatum* in World and Turkey (from POWO 2021).
Şekil 3. *Pentanema divaricatum*'un dünya ve Türkiye'deki yayılışı (POWO 2021'dan).

Pentanema divaricatum, which is widely distributed in the southern neighbors (Iran, Iraq and Syria) of Türkiye, is likely to be distributed in similar habitats in the eastern and southeastern Anatolia regions of Turkey.

Arıcak district is a very rich and little-known place in terms of floristics. Two new plants have been identified in the district with the studies carried out in recent years (Behçet et al. 2019; Yapar and Behçet 2020). The southern parts of Arıcak, which is located in the south of the Eastern Anatolia Region, are mostly under the influence of the southern Anatolian climate. The distribution of *P. divaricatum* in the dry stream beds in the south of the district is an interesting but expected situation.

P. divaricatum is easily distinguished from other *Pentanema* species by its life form (annual), hairy structure (densely covered with 2–3 mm long, thin, white multicellular hairs) and achene characteristics (the achene of *Pentanema divaricatum* and *P. alanyense* have 5 bristles, other *Pentanema* species have 8–35 (45) (Rechinger 1980; Duman and Anderberg 1999).

Statement of Conflict of Interest

Authors have declared no conflict of interest.

Author's Contributions

The contribution of the authors is equal.

REFERENCES

- Behçet L, Yapar Y, Olgun Ş 2019. *Prangos arıcakensis* (Apiaceae), a new species from eastern Turkey. *Phytotaxa* 401(1): 55–63. DOI: 10.11646/phytotaxa.401.1.5.
- Cassini H 1818. Aperçu des Genres nouveaux formés par M. Henri Cassini dans la famille des Synanthérées. *Bulletin des Sciences, parla Societe Philomatique*, pp. 73–77.
- Duman H, Anderberg AA 1999. An undescribed species of *Pentanema* Cass. (Asteraceae-Inuleae) from Turkey, with notes on the phylogenetic status of the genus. *Botanical Journal of the Linnean Society* 129: 333–338. DOI: 10.1006/bojl.1998.0228.
- Gorschikova SG 1959. *Pentanema* Cass. In: Schischkin BK (ed.) *Flora SSSR*, vol: 25, Academy of Sciences of the USSR, Moscow & Leningrad, pp. 477–486.
- Gutiérrez-Larruscain D, Santos-Vicente M, Anderberg AA, Rico E, Martínez-Ortega MM 2018. Phylogeny of the *Inula* group (Asteraceae: Inuleae): Evidence from nuclear and plastid genomes and a recircumscription of *Pentanema*. *Taxon* 67(1): 149–164. DOI: 10.12705/671.10
- Güner A 2000. *Pentanema* Cass. In: Güner A, Özhatay N, Ekim T, Başer KHC (eds) *Flora of Turkey and the East Aegean Islands*, vol: 11 (suppl. 2), Edinburgh University Press, Edinburgh, pp. 154–155.

- Ling Y. 1979. *Pentanema* Cass. In: Ling, Y (ed.) Flora reipublicae popularis sinicae, vol: 75, Academia Sinica, Beijing, pp. 281–286.
- Maroofi H, Ghaderi H 2016. *Pentanema kurdistanicum* (Inuleae, Asteraceae), a new species from subalpine cliffs of Kurdistan, Iran. *Phytotaxa* 253(3): 223–226. DOI: 10.11646/phytotaxa.253.3.7
- MNHN, Chagnoux S 2021. The vascular plants collection (P) at the Herbarium of the Muséum national d'Histoire Naturelle (MNHN - Paris). Version 69.236. MNHN - Museum national d'Histoire naturelle. Occurrence dataset <https://doi.org/10.15468/nc6rxy> accessed via GBIF.org on 2021-11-18. https://www.gbif.org/occurrence/gallery?taxon_key=3146524
- POWO 2021. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet: <http://www.plantsoftheworldonline.org/> (Access: 02.09.2021).
- Rechinger KH 1980. *Pentanema* Cass. In: Rechinger KH (ed.) Flora Iranica, 145, Akademische Druck- und Verlagsanstalt, Graz, pp. 96–105.
- Yapar Y, Behçet L 2020. A new subspecies of *Ornithogalum malatyanum* (Asparagaceae: Scilloideae) from eastern Anatolia, Turkey. *Nordic Journal of Botany* 38(11): 1-5. DOI: 10.1111/njb.02837.