Research Article

Nova Biologica Reperta 9(2): 139-143 (2022)

Print ISSN: 2423-6330/Online ISSN: 2476-7115

https://nbr.khu.ac.ir; Kharazmi University Press; DOI: 10.29252/nbr.9.2.139

مقاله پژوهشی

یافته‌های نوین در علوم زیستی

جلد ۹، شماره ۲، صفحات ۱۳۹ الی ۱۴۳ (۱۴۰۱)

انتشارات دانشگاه خوارزمی

Halimocnemis commixta (تیره تاج‌خروسیان)، گزارش جدیدی برای فلور ایران

زهره آتشگاهی، فرشید معماریانی، محمدرضا جوهرچی و وحید جعفری پلگرد

گروه گیاه‌شناسی، پژوهشکده علوم گیاهی، دانشگاه فردوسی مشهد، مشهد، ایران

مسئول مکاتبات: فرشید معماریانی، memariani@um.ac.ir

چکیده. گونه *Halimocnemis commixta* به عنوان گزارش جدیدی برای فلور ایران از باقیمانده جنگل‌های پسته وحشی در شمال شرق ایران معرفی می‌شود. این گونه در فضاهای باز بین درختان و بر روی خاکهای شور و به همراه سایر گیاهان شاخص شورپسند دیده می‌شود. در این مقاله تصاویر این گیاه ارائه و با گونه‌های خویشاوند نزدیک خود مقایسه می‌شود. این گونه با گل‌های دسته‌ای و میوه‌های شاخدار نامنظم از گونه خویشاوند *H. gamocarpa* و با کرک‌های کاملا کوتاه و خوابیده از گونه *H. pilosa* قابل تشخیص است. نکاتی نیز درباره پراکندگی، بوم شناسی و موقعیت حفاظتی این گونه ارائه می‌شود.

واژه‌های کلیدی. آرایه‌شناسی، تیره اسفناجیان، جغرافیای گیاهی، حفاظت، خراسان-کپه‌داغ

Halimocnemis commixta (Amaranthaceae), a new record for the flora of Iran

Zohreh Atashgahi, Farshid Memariani, Mohammad Reza Joharchi & Vahid Jafari Polgerd

Herbarium FUMH, Department of Botany, Research Center for Plant Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

Correspondent author: Farshid Memariani, memariani@um.ac.ir

Abstract. *Halimocnemis commixta* is recorded as a new species for the flora of Iran from *Pistacia vera* woodland remnants in NE Iran. It grows on open salty soils with several typical halophytic plants. The new species record is illustrated and compared with the closely related species. It can be distinguished from *H. gamocarpa* by its clustered flowers and irregularly horned fruits and differs from *H. pilosa* by its entirely short and adpressed hairs. We provide some additional notes on the distribution, ecology, and conservation status of the newly recorded species.

Keywords. Chenopodiaceae, conservation, Khorassan-Kopet Dagh, phytogeography, taxonomy

Received 13.10.2021/ Revised 07.11.2021/ Accepted 22.11.2021/ Published 01.09.2022

دریافت: ۱۴۰۰/۰۷/۲۱/ اصلاح: ۱۴۰۰/۰۸/۱۶/ پذیرش: ۱۴۰۱/۰۹/۰۱/ انتشار: ۱۴۰۱/۰۶/۱۰

[Downloaded from c4i2016.khu.ac.ir on 2024-10-12]

[DOR: 20.1001.1.24236330.2022.9.2.6.8]

[DOI: 10.52547/nbr.9.2.139]

[Downloaded from c4i2016.khu.ac.ir on 2024-10-12]

[DOR: 20.1001.1.24236330.2022.9.2.6.8]

[DOI: 10.52547/nbr.9.2.139]

INTRODUCTION

Chenopodiaceae (Amaranthaceae, *sensu* APG IV, 2016) is a cosmopolitan family diversified mainly in arid, semi-arid, and salty deserts. The members of the tribe Salsoleae are distributed in the Old World with the main center of diversity in Central and SW Asia (Hedge et al. 1997; Akhani et al. 2007). They are mainly succulent halophytes and xerophytes with diverse morphological, anatomical, and physiological traits (Pyankov et al. 2001; Voznesenskaya et al. 2002). Based on phylogenetic relationships and unclear generic boundaries of *Gamanthus* Bunge, *Halanthium* K.Koch, *Halotis* Bunge, and *Halimocnemis* C.A.Mey., Akhani et al. (2007) considered recognition of all these genera within *Halimocnemis* s. l. which comprises 27 annual species primarily distributed in the central and eastern parts of the Irano-Turanian region, 8 of which occur in Iran (Assadi, 2001).

During floristic and vegetation surveys in *Pistacia vera* L. woodland remnants in NE Iran, we collected some unknown Chenopods. Using the identification keys in the relevant Floras, they were determined as *Halimocnemis commixta* (Bunge) Akhani which is new for the flora of Iran. The isolated xerophilic woodlands of the wild pistachio are mainly located in the Jangal-e Khajeh Protected Area, near Chahchaheh village adjacent to Iran-Turkmenistan border (Saberi et al. 2010; Memariani 2020), however, there are several isolated and poorly-explored remnants of *P. vera* that occur as isolated stands in foothills of Hezar-Masjed Mountains. In this paper, we aim to document the new species record collected from wild pistachio remnant stands and provide the description of the species with additional notes on taxonomy and biogeography.

MATERIALS AND METHODS

The collected specimens were labeled, pressed, and dried to preserve as herbarium specimens and then identified using the relevant standard Floras for Iran and the adjacent countries (Iljin, 1936; Hedge et al. 1997; Assadi, 2001). We consulted several representative specimens or pictures of the newly recorded species and its close relatives in FUMH, LE, MW, and W herbaria (herbarium codes based on Thiers, 2021). The threat status of the species was determined based on the IUCN Red Listing guidelines (IUCN, 2019).

RESULTS AND DISCUSSION

New record

Halimocnemis commixta (Bunge) Akhani, Int. J. Pl. Sci. 168(6): 948 (2007) (Fig. 1-2).

Syn.: *Gamanthus commixtus* Bunge, Mém. Acad. Imp. Sc. Pétersb. 7. Sér., 4, 11: 76 (1862).

Annual, with a short pubescent indumentum of simple hairs. Stems many-branched, spreading erect. Leaves well-developed, alternate, fleshy, semi-amplexicaul, linear, terete, with a short terminal dehiscent mucro. Flowers hermaphrodite, sessile, solitary, or few in leaf axils and almost hidden by the leaf bases. Bracts 2, hidden by subtending leaves. Perianth segments 5, oblong, membranous, free, scarcely hardening in fruit, not developing lateral wing-like appendages. Stamens 5, anthers linear, connective appendages prominent, vesicular, oblong–globose, yellow, stipitate. Styles 2, free to near base. At the fruiting time, the flower–subtending leaves and the bracts indurate and expand, forming a very nut-like structure, enclosing the two seeds, which fall as a single dispersal unit or disseminule. Fruits compressed. Seeds vertical with a spiral embryo, endosperm absent.

Examined specimen: IRAN, Razavi Khorassan province, NW Kalat–e Naderi, between Kalo and Polgerd, in *Pistacia vera* woodland, 734 m, 37°10′34.7″N, 59°25′24.6″E, Atashgahi & Jafari Polgerd 9732 (FUMH).

Notes on distribution, habitats, and taxonomy: *Halimocnemis commixta* was spelled by Akhani et al. (2007) as a new combination of "*H. commixtus*". According to article 23.5 of the International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code; Turland et al. 2018), the specific epithet, in adjectival form, agrees with the gender of the generic name and the epithets not conforming to this rule are to be corrected based on Art. 32.2. *H. commixta* is known from Afghanistan and Middle Asia and grows on salty soils and clay hills (Hedge et al., 1997). This new record extends the distribution range of the species more westward to the northeast of Iran. It grows on salty soils as small patches in the open grounds between *Pistacia vera* trees in Polgerd (Fig. 2A). The Khorassan-Kopet Dagh foothills and lowlands are enriched by several central Iranian and Aralo-Caspian elements from the surrounding deserts (Memariani et al. 2016; Memariani 2020). The main co-occurring species are *Caroxylon dendroides* (Pall.) Tzvelev, *Kaviria tomentosa* (Moq.) Akhani, *Halothamnus subaphyllus* (C.A.Mey.) Botsch., *Halothamnus glaucus* (M.Bieb.) Botsch., and *Noaea mucronata* (Forssk.) Asch. & Schweinf.

The closely related species are *H. gamocarpa* Moq. and *H. pilosa* (Pall.) Akhani, however, the newly recorded *H. commixta* (Fig. 2b-c) can be distinguished from the former by its clustered (not solitary) flowers and irregularly (not equally) horned fruits. It differs from the latter by its entirely short and more or less adpressed

[Downloaded from c4i2016.khu.ac.ir on 2024-10-12]

[DOR: 20.1001.1.24236330.2022.9.2.6.8]

[DOI: 10.52547/nbr.9.2.139]

Figure 1. Herbarium specimen of *Halimocnemis commixta* (Atashgahi & Jafari Polgerd 9732-FUMH).

Table 1. Morphological comparison of *Halimocnemis commixta* and its closely related species.

	Halimocnemis commixta	***Halimocnemis gamocarpa***	***Halimocnemis pilosa***
Stem	divaricately branched, prostrate, or ascending	divaricately branched, prostrate, or ascending	many–branched
Indumentum	short ±adpressed hairs or glabrescent	short canescent hairs or glabrescent	short ±adpressed hairs and longer spreading hairs
Upper leaves subtending the flowers	indistinctly alternate	always opposite	sub–opposite
Flowers	in clusters of (2–)3–7	solitary (–2)	in clusters of 3–4
Perianth segments	acute entire	acute entire	obtuse bilobed
Fruits	irregularly 2(3)–horned	equally 2–horned	irregularly 2–horned

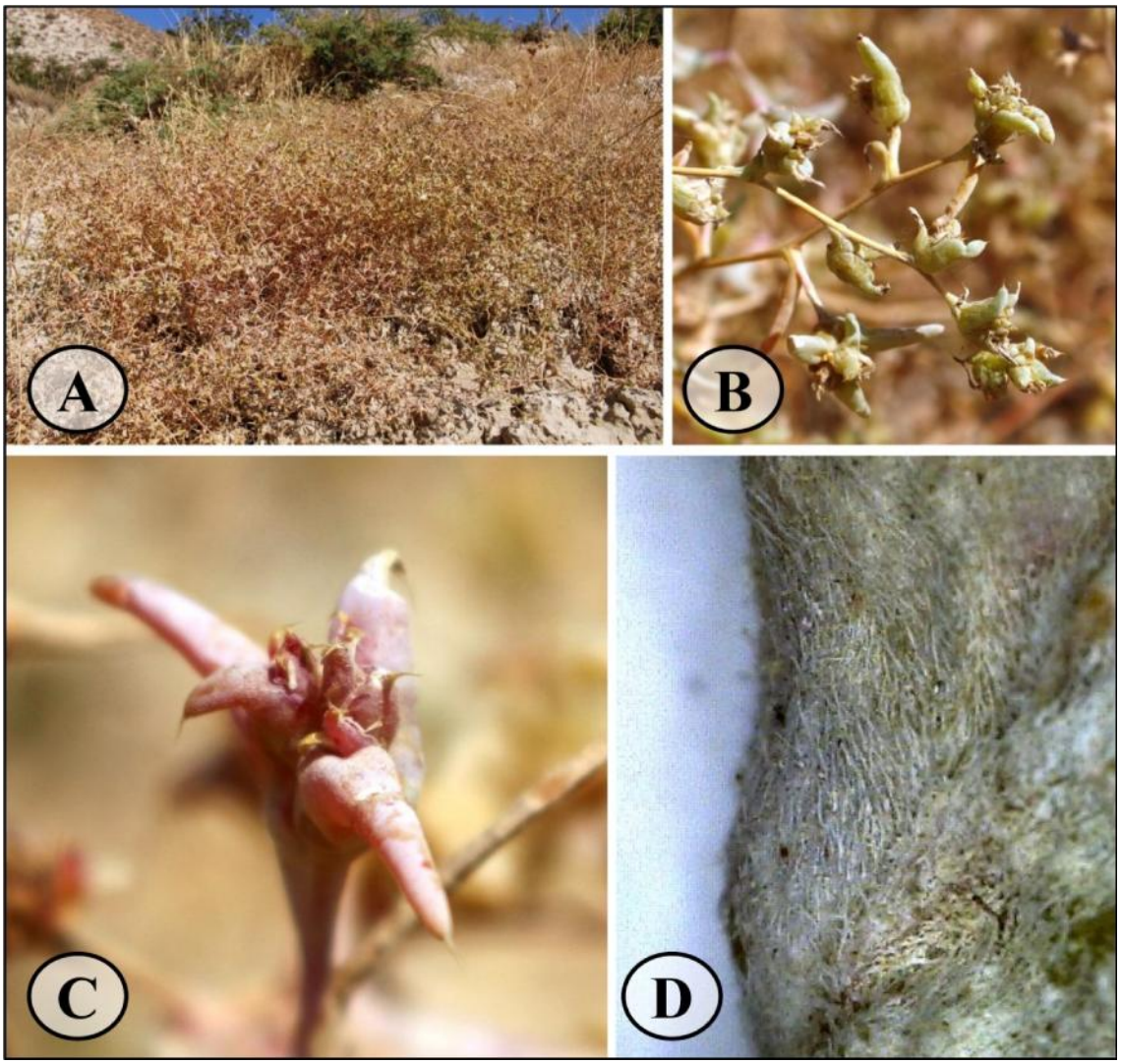

Figure 2. Halimocnemis commixta (Bunge) Akhani, new to the flora of Iran: **A.** In its natural habitat mainly on salty soils near the *Pistacia vera* trees. **B–C.** Close–up view of branches, leaves, and flowers. **D.** Short and adpressed hairs on flower parts.

[Downloaded from c4i2016.khu.ac.ir on 2024-10-12]
[DOR: 20.1001.1.24236330.2022.9.2.6.8]
[DOI: 10.52547/nbr.9.2.139]

hairs (not mixed with long spreading ones) (Table 1, Fig. 2D). It is highly probable *H. commixta* to be confused with the similar and closely related species; therefore, there is insufficient information on its distribution range in NE Iran. Based on criterion D2 of the IUCN Red List guidelines (IUCN, 2019), *H. commixta* is provisionally evaluated as a vulnerable (VU) species in Iran.

ACKNOWLEDGMENT

This work is a part of the results of the research project (No. 2/50786) on flora and vegetation of pistachio woodlands in NE Iran, supported by the Research Council of Ferdowsi University of Mashhad. We acknowledge gratefully the field assistance of Ali Asghar Basiri.

REFERENCES

Akhani, H., Edwards, G. & Roalson, E.H. 2007. Diversification of the Old World Salsoleae *s.l.* (Chenopodiaceae): Molecular phylogenetic analysis of nuclear and chloroplast data sets and a revised classification. International Journal of Plant Sciences 168: 931-956.

Angiosperm Phylogeny Group. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society 181: 1-20.

Assadi, M. 2001. Chenopodiaceae. *In* Assadi, M., Khatamsaz, M., Maassoumi, A.A. (editors), Flora of Iran. Vol. 38. Research Institute of Forests and Rangelands, Tehran.

Hedge, I.C., Akhani, H., Freitag, H., Kothe-Heinrich, G., Podlech, D., Rilke, S. & Uotila, P. 1997. Chenopodiaceae. *In* Rechinger, K.H. (editor), Flora Iranica. 172: 1-370+212 tables. Akademische Druck und Verlagsanstalt, Graz.

Iljin, M.M. 1936. Chenopodiaceae. *In* Shishkin, B.K. (editor), Flora S.S.S.R. Vol 6. Izdatel'stvo Akademii Nauk SSSR, Leningrad. (In Russian).

IUCN. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Subcommittee. Available from: http://www.iucnredlist.org/ documents/Red List Guidelines.pdf.

Memariani, F. 2020. The Khorassan-Kopet Dagh Mountains. *In* Noroozi, J. (ed.), Plant biogeography and vegetation of high mountains of Central and South-West Asia. Springer Nature Switzerland AG, Cham, pp. 93-116.

Memariani, F., Zarrinpour, V. & Akhani, H. 2016. A review of plant diversity, vegetation and phytogeography of the Khorassan-Kopet Dagh floristic province in the Irano-Turanian region (northeastern Iran – southern Turkmenistan). Phytotaxa 249: 8-30.

Pyankov, V.I., Ziegler, H., Kuz'min, A. & Edwards, G.E. 2001. Origin and evolution of C4 photosynthesis in the tribe Salsoleae (Chenopodiaceae) based on anatomical and biochemical types in leaves and cotyledons. Plant Systematics and Evolution 230: 43-74.

Saberi, A., Ghahremaninejad, F., Sahebi, S.J. & Joharchi, M.R. 2010. A floristic study of Chahchaheh *Pistacia* forest, NE Iran. Taxonomy and Biosystematics 2: 61-92.

Thiers, B. 2021. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: http://sweetgum.nybg.org/science/ih/ (accessed 21 September 2021).

Turland, N.J., Wiersema, J. H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T. W., McNeill, J., Monro, A.M., Prado, J., Price, M. J. & Smith, G.F. 2018. International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Regnum Vegetabile 159. Koeltz Botanical Books, Glashütten.

Voznesenskaya, E.V., Franceschi, V.R., Kiirats, O., Artyusheva, E.G., Freitag, H. & Edwards, G.E. 2002. Proof of C4 photosynthesis without Kranz anatomy in *Bienertia cycloptera* (Chenopodiaceae). Plant Journal 31: 649-662.

*****

How to cite this article:

Atashgahi, Z., Memariani, F., Joharchi, M.R., Jafari Polgerd, V. 2022. *Halimocnemis commixta* (Amaranthaceae), a new record for the flora of Iran. Nova Biologica Reperta 9: 139-143.

[Downloaded from c4i2016.khu.ac.ir on 2024-10-12]
[DOR: 20.1001.1.24236330.2022.9.2.6.8]
[DOI: 10.52547/nbr.9.2.139]