

**NOTES ON THE FLORA OF IRAN: 1. *ASPARAGUS*
(*ASPARAGACEAE*) AND *NITRARIA*
(*ZYGOPHYLLACEAE*)**

H. AKHANI*

Asparagus lycaonicus P.H. Davis (*Asparagaceae*), a species hitherto known only from E Central Turkey, is reported from Iran. A review of *Nitraria* (*Zygophyllaceae*) in Iran together with critical comments on the account of the genus in *Flora Iranica* are given, and Iranian records of *N. komarovii* Iljin & Lava are referred to *Atraphaxis suaedifolia* Jaub. & Spach (*Polygonaceae*).

Keywords. *Atraphaxis*, *Flora of Iran*, halophytes, Irano-Turkish disjunction, *Liliaceae*.

INTRODUCTION

This paper is a continuation of the author's studies on Iranian halophytes (Akhani & Ghorbanli, 1993; Akhani, 1996). It provides supplementary and critical notes on accounts of the genera *Asparagus* and *Nitraria* in *Flora Iranica* (El-Hadidi, 1972; Browicz, 1990).

ASPARAGUS LYCAONICUS P.H. DAVIS NEW TO IRAN

Asparagus lycaonicus P.H. Davis, Notes Roy. Bot. Gard. Edinburgh 41: 48 (1983). Type: E Central Anatolia, west of Tuz Gölü, Konya, Cihanbeyli, Boluk Gölü, 1010m, 4 viii 1960, Khan, Prance & Ratcliffe 438 (holo. E!, iso. K!). **Fig. 1A.**

Additional specimen examined. IRAN. Ostan-e Markazi (Arak), SE of Kavir-e Meyghan, near the margin of Arak salt lake, 25 ix 1986, H. Akhani 1124 (hb. Akhani, hb. Shahid Beheshti Univ.). **Fig. 1B–D.**

The material cited was found 15 years ago on highly saline soils associated with *Aeluropus littoralis* (Gouan) Parl., *Climacoptera turcomanica* (Litw.) Botsch., *Petrosimonia glauca* (Pall.) Bunge, *Halanthium rariflorum* C. Koch and *Atriplex ver-rucifera* M. Bieb. As the account of *Asparagus* in *Flora Iranica* (Browicz, 1990) had not then been published, I consulted the *Flora of Turkey* (Davis, 1984). Surprisingly, my specimen matched well the description of *Asparagus lycaonicus* described and hitherto known only from E Central Anatolia. During a herbarium visit to Kew and Edinburgh in April and May 1997, the identity of the Iranian collection was confirmed by comparison with the types of *A. lycaonicus*.

* Department of Biology, Faculty of Science, University of Tehran, PO Box 14155-6455, Tehran, Iran.
E-mail: akhani@khayam.ut.ac.ir

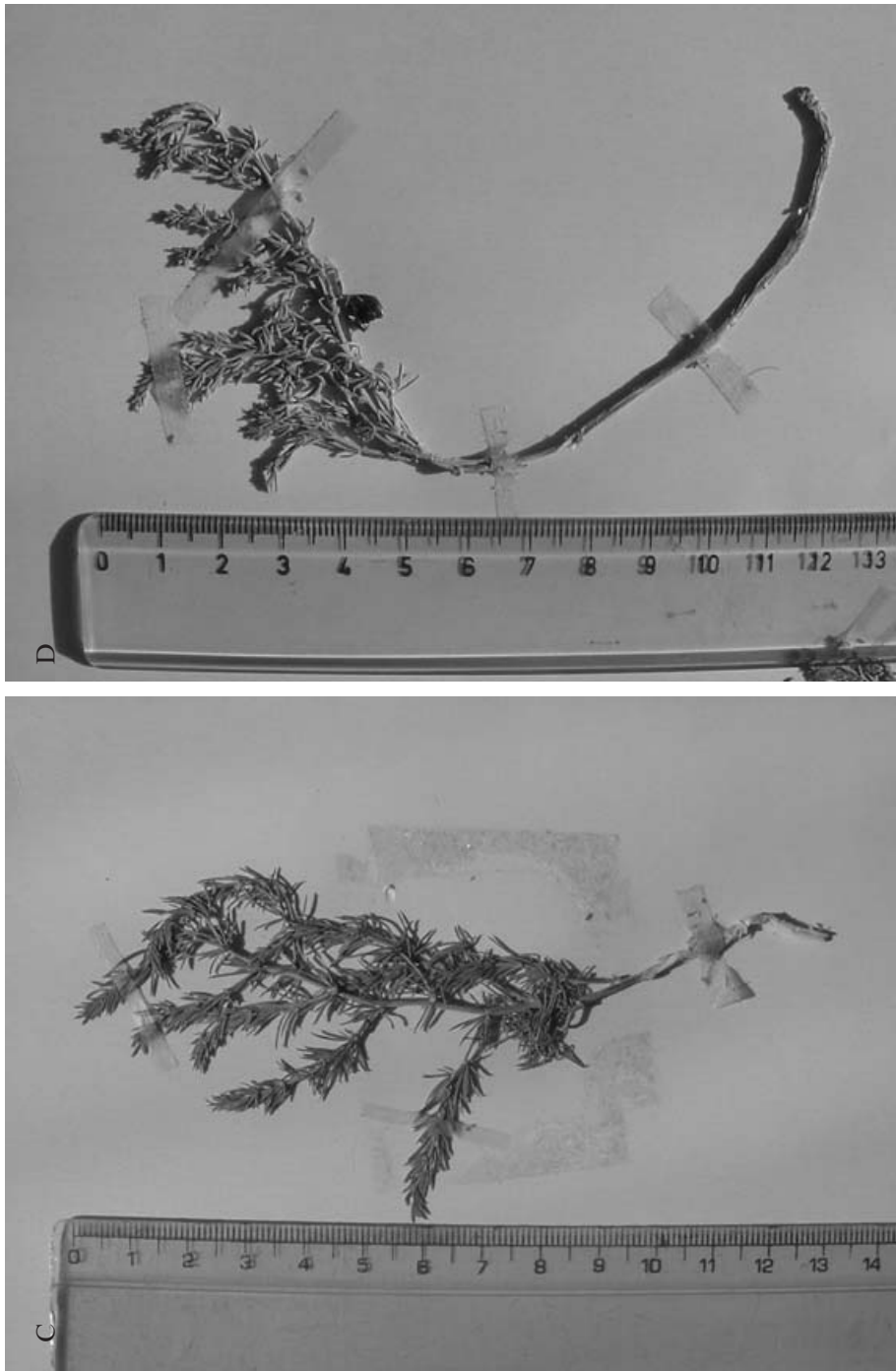


FIG. 1. A, *Asparagus lycanicus*, isotype (K); B–D, Iranian collection (*H. Akhani* 1124): B, entire sheet; C, enlarged flowering plant; D, enlarged fruiting plant.

Asparagus lycaonicus seems to be an isolated species, distantly related to *A. griffithii* Baker, another halophytic species known from a few localities in C and NE Iran (Browicz, 1990; Akhiani, 1998). According to the Convention on the Conservation of European Wildlife and Natural Habitats (<http://www.ecnc.nl/doc/europe/legislat/bernappl.html>), *A. lycaonicus* is a strictly protected species.

The disjunction of this species (c.1600km) is of great phytogeographical interest. A somewhat similar distribution pattern has already been reported for *Microcnemum coralloides* (Loscos & Pardo) Buen (*Chenopodiaceae*) and *Arabidopsis parvula* (Schrenk) Schulz (*Cruciferae*) (Akhiani, 1988; Hedge, 1997). Recently Freitag & Özhatay (1997) and Freitag *et al.* (1999) added a new subspecies of *Salsola canescens* (Moq.) Boiss. from SW Anatolia and reported *Anabasis aphylla* L. from NW Central Anatolia (Ankara Province) with somewhat similar disjunctions. Zarre (2000) cited *Astragalus dipodurus* Bunge, which is distributed in S Central Anatolia and N of Uromieh Lake in Iranian Azerbaijan, as another example. Although several interpretations are possible for such disjunctions, the most satisfactory one traces them back to the drier climatic conditions during the Pleistocene and early Holocene, when the dominant vegetation consisted of *Artemisia* and species of *Chenopodiaceae* (Bottema & van Zeist, 1989).

THE GENUS *NITRARIA* IN IRAN

In *Flora Iranica*, El-Hadidi (1972: 9–11) reported three species of *Nitraria* from Iran: *N. sibirica* (DC.) Pall., *N. komarovii* Iljin & Lava and *N. schoberi* L. However, the author had apparently overlooked the monograph of the genus by Bobrov (1965), resulting in some misinterpretation of the species occurring in Iran. Unfortunately El-Hadidi's account was uncritically accepted by Akhiani (1993) in her treatment of the *Zygophyllaceae* for the new *Flora of Iran* in Farsi. Based on field and herbarium studies, the present author accepts only two species in Iran, *N. retusa* and *N. schoberi*, which can easily be separated using the following key:

- 1a. Leaves obovate, or broadly spatulate, to 20mm long, 1–2 times as long as broad; some leaves retuse, dentate or crenate at apex _____ **1. *N. retusa***
 1b. Leaves linear-oblongate, or narrowly spatulate, to 50mm long, 3–5 times as long as broad; all leaves entire, obtuse at apex _____ **2. *N. schoberi***

1. *N. retusa* (Forssk.) Aschers. in Verh. Bot. Ver. Prov. Brandenb. 18: 94 (1876). Type: Egypt, Alexandria, 1 iv 1761, *Forsskål* 463 (C).

Syn.: *Peganum retusum* Forssk., Fl. Aegypt.-Arab.: 211 (1775).

Additional specimen. Khuzestan, Mahshahr, Khure Doragh, 5m, *Howeizeh & Dinarvand* 4050 (hb. Research Center of Natural Resources, Ahvaz, n.v.).

This species is newly reported from Iran by Howeizeh & Dinarvand (2000). Although the specimen has not been seen, their illustration and a record close to the Iranian border in Iraq (Browicz, 1996) almost certainly confirm its occurrence in Iran.

2. *N. schoberi* L., Syst. Nat. ed. 10: 1004 (1759). Type: 624.1 (hb. LINN!) (cf. Ghazanfar in Fl. W. Pakistan 66: 4 (1974)).

Specimens examined. **Arak (Ostan-e Markazi).** Davoodabad, 6 vii 1968, *Abai & Mojib* 14089 (W); NW of Kavir-e Meyghan, stabilized sand, 1650m, 11 vi 1986, *H. Akhani* 945 (hb. Shahid Beheshti Univ.). **Azerbaijan.** Uromieh Lake, Ashk Island, c.1280m, 21 vi 1991, *H. Akhani* 7503 (MMTT); western coasts of Uromieh Lake, 25km NE of Uromieh, Zanbil, 14 ix 1990, *Khara* (MMTT); Ardabil to Astara, 5mi E of Ardabil, 5000ft, waste ground near cornfield and sand, 6 vi 1962, *P. Furse* 2460 (K, W, sub. *N. sibirica*); between Marand and Khoi, 1200m, *Gaub & Sabeti* 703 (W). **Esfahan.** ESE of Kashan, c.8–10km NW of Abu-Zeid Abad, sand dunes, 900m, 9 ix 1989, *H. Akhani* 5764 (MMTT); 5km NW of Robot-e Turk towards Delijan, river bed dominated by *Tamarix*, 16 xi 1991, *H. Akhani* 7899 (MMTT). **Kerman.** In alveo lapidoso supra Nehbid (Nabid), inter Kerman et Bam, 2250m, 6 v 1948, *Rechinger, Aellen & Esfandiari* 3567 (W). **Khorassan.** E parts of Golestan National Park: North of Mirza-Baylu plains, Cheshmeh Shur, around saline spring, 1250m, 37°21'N, 56°12'E, 6 x 1995, *H. Akhani* 12140 (W, hb. Akhani); near Sarn Bonab, northern parts of the Great Kavir, 1000m, 16 v 1933, *A. Gabriel* 54 (W). **Qom.** SW of Heuz-e Soltan lake, 5 vi 1987, *Ghorbanli & H. Akhani* 4712 (MMTT); **Semnan.** Touran Protected Region, margin of Great Kavir, 750m, 22 viii 1977, *Breckle & Badresa* 5067 (TARI); *ibid.*, 4km E of Rازه, 1280m, 25 iv 1978, *Freitag & Mozaffarian* 28515 (TARI); *ibid.*, deviation of Ahmadabad road to Allah Kuh, 1020m, 12 v 1978, *Freitag & Jadidi* 29003 (TARI); Sharud-Abbasabad, Sabzevar road, 8 xi 1973, 820m, *Foroughi* 10600 (W). **Tehran.** In ditione oppidi Keredj [Karaj Region], in montibus Halkedar ad Murdabad [Mardabad], c.1300m, 15 vi 1937, *Rechinger* 1045 (W); Kavir Protected Region, Mobarakieh, c.800m, 10 viii 1988, *H. Akhani* 65346 (TARI); *ibid.*, 20 iv 1975, *Wendelbo & Assadi* 16003 (TARI).

Nitraria schoberi is sporadically but widely distributed on sandy-saline soils in C, NE and NW Iran (see Browicz, 1996); some populations appear to be in danger.

In *Flora Iranica*, *N. schoberi* is represented by var. *caspiica* Pall. and var. *roborowskii* (Komar.) Hadidi. In herbarium LINN there are two specimens of *N. schoberi* with the same number: 624.1. One has already been chosen as the lectotype of the species. The other, bearing the name var. *caspiica*, seems to show no reliable differences to distinguish it from the lectotype. This is probably a polymorphic species in which any infraspecific classification is unsatisfactory.

EXCLUDED SPECIES

N. sibirica (DC.) Pall., Fl. Ross. 1: 80 (1784).

El-Hadidi (1972: 10) reported *N. sibirica* from Azerbaijan, based on the two specimens *Aucher* 4535 and *Furse* 2460. The *Furse* collection from Ardabil to Astara has been studied at Kew and Vienna. The specimens are rather spiny and I found no significant differences from Iranian populations of *N. schoberi*, which are sometimes spiny. According to Bobrov (1965), *N. sibirica* is restricted to the mountains of Siberia from the Tobol river to Abakan and to Central Asia from Lake Balkhash to Transbaikalia and the Tibetan mountains. Therefore phytogeographical data also suggest that its occurrence in NW Iran is unlikely.



FIG. 2. *Atraphaxis suae difolia*, Bowles Scholarship Bot. Exp. 2427 (K), described and figured as *Nitraria komarovii* Iljin & Lava in *Flora Iranica* 98: tab. 10, 2.

N. komarovii Iljin & Lava, *Priroda* 5-6: 117 (1944). Type: 'Krasnowodsk', coll. ign. (LE, n.v.).

The citation of *N. komarovii* from Iran and the relevant photograph (tab. 10, 2) in *Flora Iranica* (El-Hadidi, 1972) (Fig. 2) refer to a specimen from Azerbaijan: 32km E of Mianeh, 1650m, *Bowles Scholarship Exp.* 1572. Based on my repeated but

unsuccessful attempts in 1987 and 1989 to re-collect this species there, and careful study of the figure selected by El-Hadidi, I am persuaded that this plant doesn't belong in the *Zygophyllaceae* at all, but is actually a member of the *Polygonaceae*. This interpretation was confirmed when I checked the specimen in Kew, eight years later. The specimen figured by El-Hadidi (1972) is in fact the rare endemic *Atraphaxis suaedifolia* Jaub. & Spach. This narrow endemic has been reported twice: firstly the type collection near Tabriz (Rechinger & Schiman-Czeika, 1968) and secondly by Assadi & Wendelbo (1977) from 20km along the Tabriz–Ahar road at 1450m, 14 v 1975, *Wendelbo & Assadi* 17119 (W).

According to Bobrov (1965), *N. komarovii* differs from *N. schoberi* in its narrower and longer linear-spathulate leaves with narrowed bases and narrower inflorescence. It is reported from three small coastal areas on the Caspian Sea: Krasnovodsk, the Apsheron Peninsula and the delta of the Volga river. From 10–11 ix 1994 I travelled along the SE Caspian coast of Turkmenistan, near Chelekeh, c.60km S of Krasnovodsk, in search of *N. komarovii*. There I observed *Nitraria schoberi* as the dominant shrub on sandy and saline soils in several different forms obviously caused by varying conditions of salinity and water supply. Usually plants growing at a greater distance from the coast were characterized by smaller fruits and denser indumentum. The shape of leaves and inflorescence proved to be highly polymorphic, as shown in the specimens *H. Akhani* 10101, 10116 and 10120 (hb. Akhani). Therefore they cannot be considered as constant specific characters, and *N. komarovii* is most likely just a form of *N. schoberi*. Nevertheless, final judgement requires examination of the type, which has not been seen by the present author.

ACKNOWLEDGEMENTS

Comments and suggestions on the first draft of this paper by Professor H. Freitag (Kassel) and I. Hedge (Edinburgh) were much appreciated. The cooperation of the curators and other staff members of the herbaria mentioned in the paper is also acknowledged.

REFERENCES

- AKHANI, H. (1988). Plant records from Kavire-Meyghan (Arak), new to Iran. *Iran. J. Bot.* 4(1): 105–107.
- AKHANI, H. (1996). A new species and a synonym in *Chenopodiaceae* from Iran. *Sendtnera* 3: 5–11.
- AKHANI, H. (1998). Plant biodiversity of Golestan National Park, Iran. *Stapfia* 53: 1–411.
- AKHANI, H. & GHORBANLI, M. (1993). A contribution to the halophytic vegetation and flora of Iran. In: LIETH, H. & AL MASOOM, A. (eds) *Towards the Rational Use of High Salinity Tolerant Plants*, Vol. 1, pp. 35–44. Dordrecht: Kluwer Academic Publishers.
- AKHANI, H. (1993). *Zygophyllaceae*. In: ASSADI, M., KHATAMSAZ, M. & MAASSOUMI, A. A. (eds) *Flora of Iran* 7: 1–49. Tehran: Research Institute of Forests and Rangelands (in Persian).

- ASSADI, M. & WENDELBO, M. (1977). New and interesting plant records from NW Iran. *Iran. J. Bot.* 1(2): 97–108.
- BOBROV, E. G. (1965). On the origin of the flora of the Old World deserts, as illustrated by the genus *Nitraria* L. *Bot. Zhurn.* 50(8): 1053–1067 (in Russian, with English summary).
- BOTTEMA, S. & VAN ZEIST, W. (1989). *Middle East Vegetation in the Late Pleistocene and Holocene: Examples Southern Levante, Northwestern Anatolia, Northwestern Zagros*. Tübinger Atlas des Vorderen Orients, Reihe A. VI 3. Wiesbaden: Dr Ludwig Reichert Verlag.
- BROWICZ, K. (1990). *Asparagus*. In: RECHINGER, K. H. (ed.) *Flora Iranica* 165: 167–176. Graz: Akademische Druck-u.-Verlagsanstalt.
- BROWICZ, K. (1996). *Chorology of Trees and Shrubs in South-West Asia and Adjacent Regions, Supplement*. Poznan: Polish Academy of Sciences, Institute of Dendrology.
- DAVIS, P. H. (1984). *Asparagus*. In: DAVIS, P. H. (ed.) *Flora of Turkey and the East Aegean Islands* 8: 75–81. Edinburgh: Edinburgh University Press.
- EL-HADIDI, N. (1972). *Zygophyllaceae*. In: RECHINGER, K. H. (ed.) *Flora Iranica* 98: 1–32. Graz: Akademische Druck-u.-Verlagsanstalt.
- FREITAG, H. & ÖZHATAY, E. (1997). A new subspecies of *Salsola canescens* (*Chenopodiaceae*) from SW Anatolia, Turkey. *Willdenowia* 27: 185–190.
- FREITAG, H., VURAL, M. & ADIGÜZEL, N. (1999). A remarkable new *Salsola* and some new records of *Chenopodiaceae* from Central Anatolia, Turkey. *Willdenowia* 29: 123–139.
- HEDGE, I. C. (1997). *Microcnemum* Ungern-Sternb. (*Chenopodiaceae*). In: RECHINGER, K. H. (ed.) *Flora Iranica* 172: 132–133. Graz: Akademische Druck-u.-Verlagsanstalt.
- HOWEIZEH, H. & DINARVAND, M. (2000). *Nitraria retusa* (Forssk.) Aschers., a new record for the flora of Iran. *Iran. J. Bot.* 8(2): 209–211.
- RECHINGER, K. H. & SCHIMAN-CZEIKA, H. (1968). *Polygonaceae*. In: RECHINGER, K. H. (ed.) *Flora Iranica* 56: 1–88. Graz: Akademische Druck-u.-Verlagsanstalt.
- ZARRE, SH. (2000). Systematic revision of *Astragalus* sect. *Adiaspastus*, sect. *Macrophyllum* and sect. *Pterophorus* (*Fabaceae*). *Englera* 18: 1–218.

Received 25 January 2001; accepted with moderate revision 20 April 2001