



Asparagus bojnurdensis (Asparagaceae), a new species from Iran

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Summary. *Asparagus bojnurdensis* is described as a new species from the North-East of Khorasan province. The new species is compared with its closest relative *A. verticillatus*. It is similar to *A. verticillatus* in having unequal cladodes, branched stem, cladode with acute apex, cladode straight and scale leaves. *A. bojnurdensis* is also similar to *A. khorasanensis* in having unequal cladodes, branched stem, cladode with acute apex, spur and berry size. Further information on the species, their morphology, micromorphology, habitats and distribution is also provided.

Key Words. Distribution, micromorphology, morphology, taxonomy.

Introduction

The genus *Asparagus* is widely distributed throughout the world and its origin is mostly from South Africa, Europe and Asia (Baker 1875; Sebsebe 2008). Baker (1875) recognised 120 species, of which 10 species are found in Iran (Baker 1875; Browicz 1990; Davis 1984; Hamdi & Assadi 2009; Iljin 1935; Parsa 1949; Wendelbo 1964, 1985) and a revision of Asparagaceae has been completed for Iran (Browicz 1990). During studies of herbarium material and field work for the *Flora of Iran*, throughout the mountainous area in the province North-East Khorasan from 2009 to 2011, an interesting taxon of the genus *Asparagus* L. was observed. This is described below as the new species, *A. bojnurdensis* Hamdi & Assadi.

Material and Methods

This study on *Asparagus* in Iran is mainly based on plant materials deposited in the Iranian herbaria: FUMH and TARI (acronyms according to Thiers 2008). Several field trips have been conducted in different parts of Iran, and collections are located in the cited herbaria. Seed surface of several specimens belonging to two species of *Asparagus* sect. *Asparagus* (*A. bojnurdensis* and *A. verticillatus* L.) was studied. For SEM studies, mature seed surfaces were selected, and then mounted directly on 12.5 mm diam. stubs and attached with sticky tape. The specimens were coated in a sputter-coater with approximately 25 µm of gold-palladium. The specimens were then studied and photographed by a TESCAN Scanning Electron Microscope. For certainty about the stability of characters

in the species, several specimens from the same or different populations were examined for each taxon (Specimens studied are listed in Appendix 1).

Taxonomic Treatment

***Asparagus bojnurdensis* Hamdi & Assadi sp. nov.** Type: Iran, Khorasan Prov., Bojnurd, Bojnurd west, between Shahabad and Aghemam, near Satellate, 1200 m, Zangoeei & Alvani 15,793 (holotype FUMH).

<http://www.ipni.org/urn:lsid:ipni.org:names:60473290-2>

Glaucous, perennial *herbs* with only the lower part woody, branched; long *stem*, bent, glabrous, erect to recumbent, 80 – 120 cm long, 18 – 35 mm between fascicles; cladodes bent, 1 – 5 per fascicle, triangular, 8 – 25 × 1 – 2 mm, longest cladode 25 mm long, acute, unequal, straight. Scale-like *leaves*, membranous, 1.7 – 2.2 mm long, spurred. *Pedicels* 0.3 – 0.5 mm long, shorter than articulated perianth, flowers binary. *Stamens* 6, 3 – 3.5 mm; anther 1 – 1.3 mm. *Berry* 7 – 8 mm long, stalk 1 – 1.3 mm, spherical, brown-blackish. *Seed* 1 within berry, 5 – 6 mm long, seed coat with papillate ornamentation. Figs 1 & 2D – F.

RECOGNITION. *Asparagus bojnurdensis* differs from *A. verticillatus* in having 1 – 5 cladodes (vs 5 – 12), cladode 1 – 2 mm diam. (vs 0.4 – 0.5 mm), longer scale-like leaves 1.7 – 2.2 mm long (vs 0.5 – 0.7 mm long). *A. bojnurdensis* differs from *A. khorasanensis* Hamdi & Assadi in having a bent cladode (vs straight), triangular cladode (vs cylindrical), longest cladode is

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Fig. 1. *Asparagus bojnurdensis*. A habit; B leaf; C fruit; D pedicel. From Mousavi, Abassi & Paryab 8956 (FUMH). DRAWN BY R. HABIBI.

25 mm long (vs 50 mm long), pedicel 0.3 mm (vs 1 – 2 mm long), calyx 3 – 3.3 mm (vs 7 – 8 mm long).

DISTRIBUTION AND HABITAT. Iran, Khorasan Prov., North-East of Iran, Bojnurd. The species lives above

1200 m. There is proof of its presence in the region of Bojnurd west, between Shahrabad and Aghemam. Its presence seems to be limited to the Iran-Touranian province, Eurosiberian region.

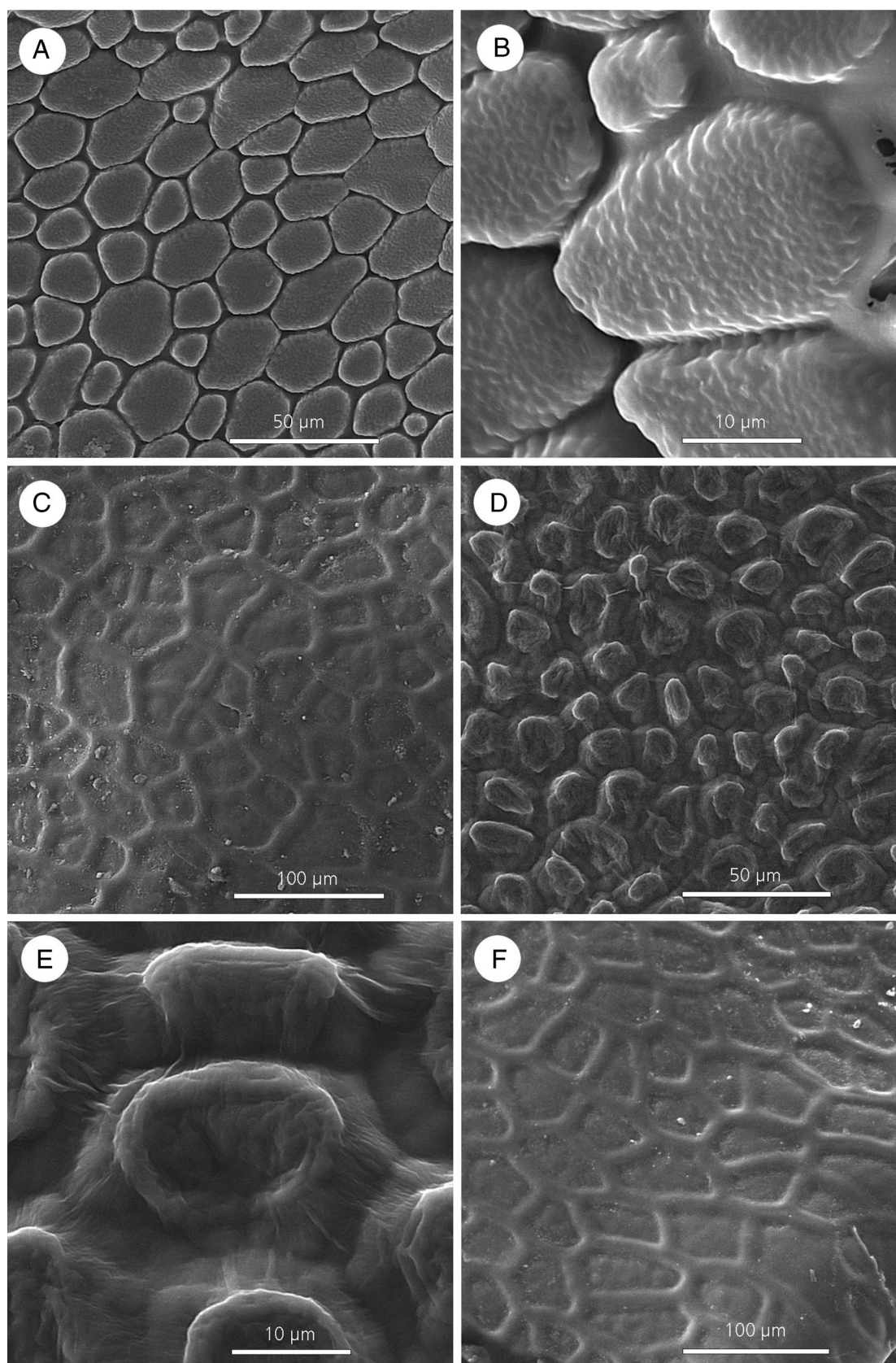


Fig. 2. Scanning electron micrographs of seeds of *Asparagus*. A – C *A. verticillatus* (Gaub 29,605, IRAN): A, B testa cells of seed corpus; C testa cells of fruit. D – F *A. bojnurdensis* (Mousavi, Abassi & Paryab 8956, FUMH): D, E testa cells of seed corpus; F testa cells of fruit.

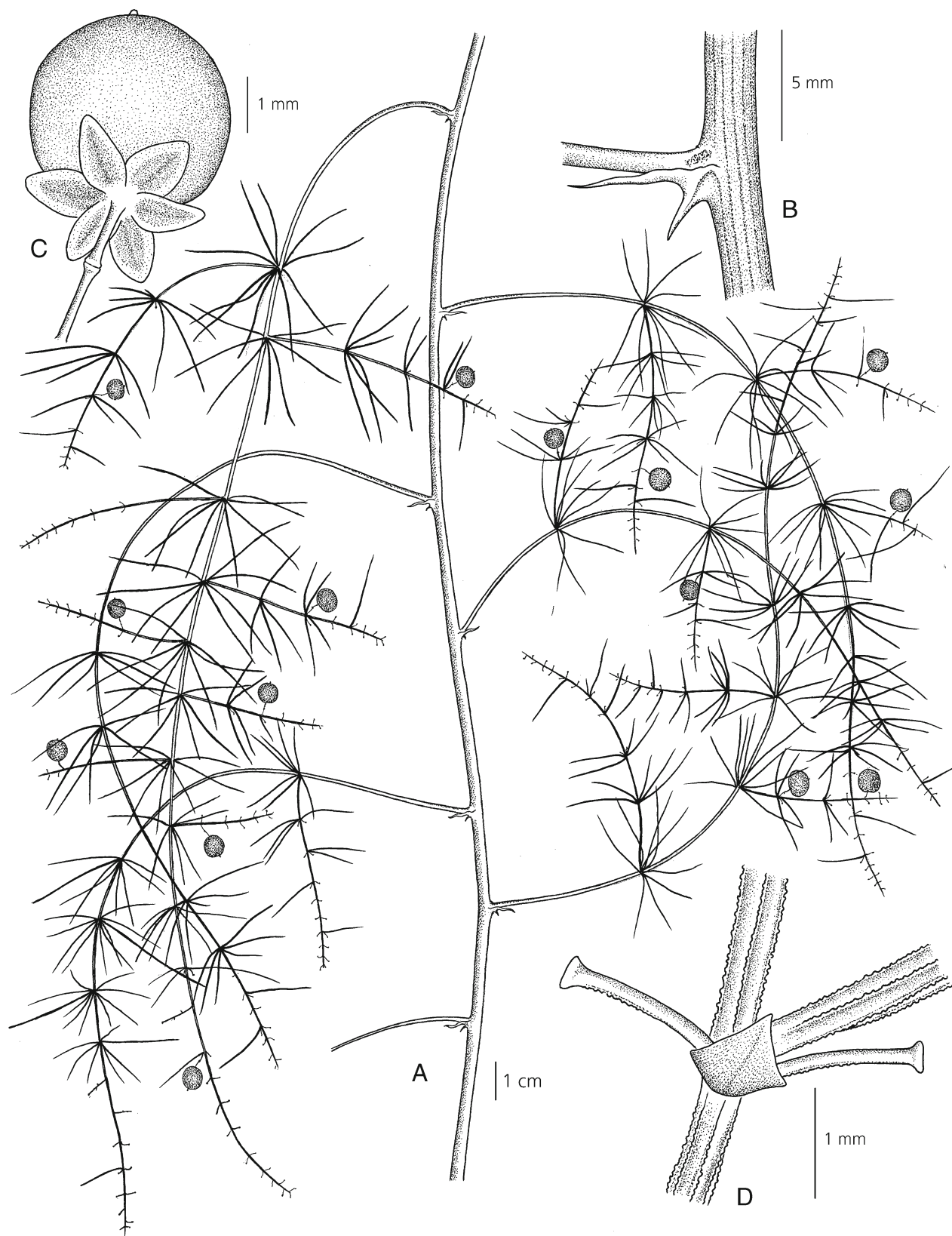


Fig. 3. *Asparagus verticillatus*. A habit; B part of stem; C fruit; D pedicel. From Assadi & Vosoughi 24,581 (TARI). DRAWN BY MEHRENFARD.

Table 1. Comparison of *Asparagus bojnurdensis* with *A. verticillatus* and *A. khorasanensis*

Characters	<i>A. bojnurdensis</i>	<i>A. verticillatus</i>	<i>A. khorasanensis</i>
Stem (cm)	80 – 120	70 – 90	30 – 70
Stem diam. (mm)	7 – 8	3 – 5	1.5 – 2
Branch type of stem	bent	bent	straight
Leaves type	scale or membrane	scale or membrane	scale or membrane
Colour of plant	glaucous	green	usually glaucous
Cladode number	1 – 5	5 – 12	2 – 4
Cladode type	triangular	linear	cylindrical
Cladode apex	acute	acute	acute
Longest cladodes (mm)	25	30	50
Cladode equal/unequal	unequal	unequal	unequal
Cladode diam. (mm)	1 – 2	0.4 – 0.5	1.5 – 2
Spur (crowed leaf) size (mm)	1.7 – 2.2	1.3 – 1.6	2 – 2.5
Cladode straight/curved	straight	straight	straight/curved
Pedicels (mm)	0.3	2	1 – 2
Number of flowers on base of branch	2	1	1
Calyx (mm)	3 – 3.3	2 – 2.2	7 – 8
Berry (mm)	7 – 8	5 – 5.5	7 – 8
Berry stalk (mm)	1 – 1.3	2 – 2.2	1
Seed number	1	2	1 – 2
Seed size (mm)	5 – 6	2 – 2.5	4.5 – 5
Seed shape	spherical	spherical	spherical
Size of surface of periclinal cell wall of seed (µm)	25 – 30 × 15 – 20	7 – 25 × 5 – 15	32 – 48 (–50) × 25 – 30 (–35)
Shape of surface cells of seed	irregular hexagonal	irregular penta- and hexagonal	irregular penta- and hexagonal
Ornamentation of surface cells of seed	papillate	rough	smooth
Ornamentation of periclinal walls	rough	papillate	smooth
Size of surface of periclinal cell wall of fruit (µm)	22 – 66 × 30 – 40	25 – 65 × 20 – 50	32 – 48 (– 50) × 25 – 30 (–35)

From a phytosociological point of view, it is part of grassland communities.

SPECIMEN EXAMINED. IRAN: Khorasan Prov., Bojnurd, Bojnurd west, between Shahabad and Aghemam, near Satellate, 1200 m, *Zangooei & Alvani* 15,793 (holotype FUMH).

CONSERVATION STATUS. Critically Endangered.

ETYMOLOGY. The new species is named after Bojnurd city, in central Khorasan, NE Iran.

NOTES. Morphological differences amongst the three taxa studied are indicated in Table 1. They

can be distinguished from each other by a number of morphological and micromorphological characters. An identification key for the three taxa is provided.

The new species is compared with its closest relative *Asparagus verticillatus* (Figs 2A – C, 3). *A. bojnurdensis* is similar to *A. verticillatus* in having unequal cladodes, branched stem, cladode with acute apex and straight, scale leaves and is similar to *A. khorasanensis* in having unequal cladodes, branched local stem, cladode with acute apex, spur and berry size.

Key for identification of *Asparagus bojnurdensis*, *A. khorasanensis* and *A. verticillatus*

1. diameter of cladode >1 mm, cladode non-linear, berry more than 7 mm long 2
- 1'. diameter of cladode <1 mm long, cladode linear, berry 5 – 5.5 mm long ***A. verticillatus***
2. cladode cylindrical, longest cladode 50 mm, calyx 7 – 8 mm long ***A. khorasanensis***
- 2'. cladode triangular, longest cladode 25 mm, calyx 3 – 3.3 mm long ***A. bojnurdensis***

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Appendix 1. Specimens examined.

Asparagus bojnurdensis

IRAN: Khorasan Prov.: Bojnurd, Bojnurd west, between Shahabad and Aghemam, near Satellate, 1200 m, 7

Sept. 1987, *Zangoeei & Alvani* 15,793 (FUMH); Bojnurd, Almehr toward Soulgard, 1250 m, 13 July 2002, *Mousavi, Abassi & Paryab* 8956 (FUMH).

Asparagus verticillatus

IRAN: Azerbaijan Prov., Arasbaran, between Talva-Nemli and Veinagh, 900 m, 26 May 1987, *Assadi & Vosoughi* 24,581 (TARI); Dasht-e Moghan, Khoda Afarin, 28 Aug. 1987. Golestan province, Parke Golestan, Tange-gool, 800 m, 3 June 1987, *Mozaffarian & Abohamzeh* 58,996 (TARI). Mazandaran prov. Chalus, Dasht-e-Nazir Mts, 1300 m, 15 July 1940, *Gauba* 29,605 (IRAN).

Asparagus khorasanensis

IRAN: Khorasan Prov.; Kashmar towards Nishaboor, 5 km to Chalapoo village, margin of road, 1870 – 1900 m, 22 May 2007, *Memariani & Zangoeei* 38,939 (FUMH).

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