REVISION OF THE GENUS ASTRAGALUS L. SECT. LEUCOCERCIS BUNG (LEGUMINOSAE) FROM IRAN

A. A. Maassoumi & M. Ranjbar


Astragalus species of the sect. Leucocercis Bge. from Iran are revised, the existing species are compared with their closest relatives. Full descriptions, ecological adaptations and geographical distributions are given. A. crassispinus Bge. is excluded as a doubtful species from this section and transferred to sect. Acantherioceras Rech. f.

Ali Asghar Maassoumi, Research Institute of Forests and Rangelands, P. O. Box 13185-116 Tehran, Iran. -Massoud Ranjbar, Department of Biology, Herbarium division, University of Bu-Ali Sina P. O. Box 65155-111, Hamadan, Iran.

مروری بر بخش از جنس Astragalus در ایران

Leucocercis

علي اصغر معصومی و مسعود رنجبر

Astragalus از جنس Leucocercis

گونه‌های بخش Leucocercis Bge. موجود با ندیکترین خویشاوندان خود مقایسه می‌گردند، شرح کامل و سازش اکولوژیک همراه با پراکنش جغرافیایی ارائه می‌گردد، گونه A. crassispinus همراه با براکنش جغرافیایی ارائه می‌گردد، گونه مشکوک از این بخش خارج و به بخش Acantherioceras انتقال می‌یابد.
Introduction

Identification of *Astragalus* species of three medifixed haired sections started sometime ago. Section *Xiphidium* is distributed in western part, section *Ammodenron*, penetrates to the eastern part and the section *Leucocercis* Bge. with distinct species forming a natural group within the medifixed haired Astragali, and they are distributed in the central part of the Iranian territory around the central kavir, in some cases penetrate to the saline parts and show a higher adaptation with another halophytic taxa. The section *Leucocercis* is one of the endemic sections of the genus *Astragalus* with the total species exclusively adapted to the Iranian ecological conditions.

Ecological adaptation

The section *Leucocercis* with seven distinct species distributed in the central part of the country surrounding the central desert of Iran; around Esfahan, Yazd, Fars, Kerman, Baluchestan and south of Semnan, in few cases extend to 2200 m. but never penetrate to higher elevations. The species of this section in some parts are mixed with the elements of the sections *Eremophyusa*, *Poterion*, *Microphysa* and the annual Astragali. This aspect more or less shows that these sections are positively correlated with the low altitude and high temperature with little annual precipitation which is clearly, the ideal ecological condition, for the annual Astragali. In this reason the phenological diversity of these sections with a spring flowering time show a tendency toward the annual Astragali strategy.

Treatment

with appressed hairs. Pods ovoid or ellipsoid, rugose, sessile, covered with short or long simple spreading hairs mixed with few submediofixed hairs, unilocular, seeds orbicular or reniform.

Key to the species

1. Calyx densely covered with villous hairs
   6. A. semnanensis
      - Calyx sparsely to densely covered with appressed hairs
2. Pod ellipsoid or crescent
   3. Pod straight
      5. A. phylloketrous
         - Pod crescent
4. Pod spherical, covered with tomentose hairs
   3. A. mucronifolius
      - Pod ovate
5. Pod yellowish, densely covered with short appressed hairs
   2. A. curviflorus
      - Pod brownish, densely to sparsely covered with short appressed hairs
6. Leaflets 7-8 pairs, symmetric, mucrone ca. 0.5 mm long
   7. A. talimansurensis
      - Leaflets ca. 4 pairs, asymmetric, mucrone ca. 2 mm long
4. ovoideus


Type. Persia media, inter Isphahan et Tabriz; inter Gomsche et Yazd Khast, 1800 m, ca. 200 km ab oppido Isfahan austro orientem versus, J. Geutier (P; W.).

Perennial, suffrutescent-caespitose, subshrub, spiny, 13-15 cm tall. Stem 4-6 cm long and ca. 10 mm in diameter, divided from the base, covered by stipules and petioles. Stipules 4-6 mm long and ca. 5 mm broad, chartaceous, triangular, acute or acuminate, at the base 1-2 mm adnate to the petiole, covered by long, lax and dense white hairs. Leaves 8-15 cm long; paripinnate, straight or curved, thick, covered by dense appressed hairs; petiole 7-8 mm long; leaflets 5-6 pairs, ca. 10 mm long and ca. 6 mm broad, elliptic to orbicular, mucronate, covered by dense, short appressed hairs on both sides. Inflorescence lax, elongate, 12-18 flowered. Peduncle 2-4 cm long, 1/4 as long as the leaves, covered by sparse appressed and subappressed hairs. Bracts membranaceous, ca. 2 mm long, subulate, acute, hairy. Calyx tubular, 7-9 mm long, covered by lax to dense appressed hairs; teeth linear-lanceolate, ca. 3 mm long. Corolla reddish-violet. Standard 13-14 mm long and 6-8 mm broad, the limb ovate-orbicular,
rounded at the apex. Wing-petals 14-15 mm long; limb 7-8 mm long, oblong; auricle ca. 1 mm long, rounded; claw 7-8 mm long, filiform. Keel 10-12 mm long; limb 5-6 mm long, subtriangular, slightly auriculate at the base, acute. Ovary 3-4 mm long, oblong, covered with dense appressed hairs. Pods crescent, 12-17 mm long and 4-6 mm broad, purplish-brown, covered by dense appressed hairs, unilocular. Seed ca. 3 mm long and ca. 2 mm broad, reniform, brown.

Specimens seen. Esfahan: Road from Natanz to Ardestan, near Emamzadeh Abyazan, 1380 m, 15. 5. 1974, Wendelbo & Foroughi 11462; Delijan protected area, 1500 m, 5. 7. 1985, Nowroozi 3920; Kashan-Natanz, 1600 m, 4. 5. 1978, Amin & Rajamand, 32873; 60 km. Delijan to Ghom, 1140 m, 24. 5. 1972, Amin & Mousavi 16119.


Type. Persia australis, Aucher-Eloy, 4388 (W.).

Perennial, suffrutescent-caespitose, subshrub, spiny, ca. 15 cm tall. Stem 4-7 cm long, ca. 5 mm in diameter, divided from the base, covered by stipules and petioles. Stipules ca. 2 mm long and 2-3 mm broad, chartaceous, triangular-subulate, at free portion acute to acuminate, at base 0. 5-1 mm of their length adnate to the petiole. Leaves 3-5 cm long, paripinnate, thick, spiny, covered by short appressed white hairs; petiole 1. 5-2 mm long; leaflets ca. 5 pairs, elliptic-oblong, symmetric, ca. 10 mm long and 2-3 mm broad, mucronate; mucro ca. 0. 5 mm long, both surfaces densely covered with very short appressed hairs. Inflorescence axillary, elongate, 5-flowered; peduncle slender 0. 5-1 cm long, shorter than the leaves, covered by sparse appressed hairs. Bracts membranaceous, 1-2 mm long, triangular-subulate, acute, covered by sparse appressed white hairs. Calyx tubular, 5-6 mm long; covered by densely short appressed hairs, teeth subulate, ca. 2 mm long. Corolla yellowish. Standard 10-12 mm long and 5-6 mm broad, the limb suborbicular, rounded at the apex. Wing-petals 10-12 mm long; limb oblong; auricule ca. 1 mm long; claw 4-5 mm long, filiform. Keel 9-11 mm long; limb 5-6 mm long, slightly auriculate at the base. Ovary 2-3 mm long, oblong, densely appressed hairy. Pods ovaloid, 8-9 mm long and 4-5 mm broad, yellowish, unilocular, covered by dense short appressed hairs. Seed ca. 3 mm long and ca. 2 mm broad.
reniform, brown.

Specimens seen. Fars: 25 km S E. of Salou village, Kuh-e Raz, 1600-2200 m, 5. 6. 1983, V. Mozaffarian 46805; 13 km from Zarghand toward Band-e Amir, 1450 m, 1. 7. 1989, Zehzad et al. 66937.

Type. inter Yazd et Isfahan, Aucher-Eloy, 4400 (W.)


Perennial, suffrutescent-caespitose, subshrub, spiny, 15-20 cm tall. Stem 7-8 cm long and 10-20 mm in diameter, divided from the base, covered by stipules and petioles. Stipules 5-7 mm long and ca. 2 mm broad, chartaceous, triangular, at free portion acute, at base 1-2 mm of their length adnate to the petiole, covered with scattered white hairs, ciliate at margins. Leaves 6-15 cm long, paripinnate; thick, covered by dense appressed hairs; petiole 2-4 cm long; leaflets ca. 5 pairs, elliptic to orbicular, 8-9 mm long and 3-5 mm broad, mucronate, micro 2-3 mm long, covered by dense, short appressed hairs on both sides. Inflorescence axillar, elongate, 12-19 flowered. Peduncle 5-8 cm long, shorter than the leaves, covered by sparse to dense appressed and subappressed hairs. Bracts membranaceous, ca. 1 mm long, shorter than the pedicel, ovate-lanceolate, acute at the apex, covered by sparse appressed white hairs. Calyx tubular, 6-7 mm long; covered with scattered long appressed hairs, teeth triangular-linear to subulate, 2-3 mm long. Corolla pale-violet. Standard 11-12 mm long and 5-8 mm broad, the limb cordate-elliptic, rounded at the apex. Wing-petals 11-13 mm long; limb 2-3 mm broad, oblong; auricle ca. 1 mm long, claw 4-5 mm long, filiform. Keel 8-9 mm long; limb 4-5 mm long, subtriangular, slightly auriculate at base, acute. Ovary 2-3 mm long, oblong, densely appressed hairy. Pods spherical, 8-10 mm long and 4-6 mm broad, purplish-brown, covered by lax to dense short and long appressed hairs, unilocular. Seed ca. 3 mm long and ca. 2 mm broad, reniform, greenish-brown.

Specimens seen. Baluchestan: Taftan region, between Chou Kalaki, between Jonabad and Kharestan, 2200 m, 27. 5. 1985, V. Mozaffarian 52973; Taftan Mt. s-slope above the village of Torshab, 1900-2300 m, 11. 3. 1977, Runemark, Assadi & Sardabi 22627; Sarbaz. 74 km Zaboli road, 1280 m, 11 March 1974, Foroughi 10789; 25 km on road from Bazman to Bam, 1200 m, 10. 3.
1977, Runemark, Assadi & Sardabi 22621. Bandar Abbas: 55 km from Sirjan to Bandar-Abbas, above the tunnel, 1700-1900 m, 26. 4. 1984, V. Mozaffarian 49473. Fars: Fasa, Gharebeigon, 1200 m, 12. 5. 1992, Mozaffarian 71287; Jiroft, 750 m, 3 Apr. 1972, M. Riazi 6012; 75 km SE. Shiaz, 1450 m, H. Pabot 6240; 30 km SE. Abadeh, 1810 m, 26. 4. 1961, H. Pabot 5814; 35 km from Izadkhast, toward Abadeh, 1950 m, 29. 6. 1989, Zehzad & Taheri 66896.

*Type.* Persia austro-orientalis: Kerman: In montibus Djamal (Jebal) Bariz, inter Bam et Djiroft, in declivibus borealis infra Deh Bakri, 1800 m, Rechinger, Aellen & Esfandiar 3565 (W).

Perennial, suffrutescent-caespitose, subshrub, 7-15 cm tall. Stem 3-7 cm long and 7-10 mm in diameter, divided from the base, covered by stipules and petioles. Stipules 4-6 mm long and 1-2 mm broad, chartaceous, linear-lanceolate, at free portion acute or acuminate, 1-2 mm of their length adnate to the petiole, covered by scattered white hairs. Leaves 4-6 cm long, paripinnate; straight or more or less curved, thick, covered by dense appressed hairs, petiole 2-3 mm long; leaflets ca. 4 pairs, 5-7 mm long, elliptic to obovate, ca. 2 mm broad, symmetric, mucronate, mucro ca. 2 mm long, covered by dense, soft, short appressed hairs on both sides. Inflorescence, elongate, 3 flowered. Peduncle slender, 2-3 cm long, shorter than the leaves, covered by dense, soft appressed and subappressed hairs. Bracts membranaceous, 1-1.5 mm long, subulate, acute, hairy or ciliate at the margins. Calyx tubular, ca. 6 mm long, purplish, covered by short appressed hairs; teeth linear-lanceolate, ca. 2 mm long. Corolla pale violet. Standard 12-13 mm long and ca. 7 mm broad; the limb orbicular, slightly emarginate at the apex. Wing-petals 12-13 mm long; limb 6-7 mm long, oblong; auricle ca. 1 mm; claw 5-6 mm long, filiform. Keel 9-11 mm long; limb 5-6 mm long, subtriangular, slightly auriculate at base. Ovary 3-4 mm long, oblong, dense appressed hairy. Pods ovaloid, 8-9 mm long and 3.5-4 mm broad, purplish, covered by dense short appressed hairs, unilocular. Seed ca. 3 mm long and ca. 2 mm broad oblong-elliptic or reniform, brown. 

*Specimens seen.* Baluchestan: 80 km from Zahedan on the road to Khash, 1750 m, 25. 4. 1977, M. Assadi 22782; ca. 40 km N. of

**Type.** Persia occidentalis: In monte Latetar, Strauss, (JE).

Perennial, suffrutescent-caespitose, subshrub, 10-15 cm tall. Stem 3-5 cm long and 8-10 mm in diameter, much divided, covered by stipules and petioles. Stipules 4-6 mm long and 2-3 mm broad, chartaceous, linear-lanceolate at the free portion, acute or acuminate at the apex, 1-2 mm of their length adnate to the petiole, covered by sparse appressed and subappressed hairs. Leaves 5-10 cm long, paripinnate, spiny, thick, covered by dense appressed hairs; petiole 2-4 cm long; leaflets 4-5 pairs, 8-10 mm long and 5-6 mm broad, elliptic to obovate, covered by soft and short appressed hairs on both sides, mucronate; mucro 2-3 mm long. Inflorescence, axillary, lax, elongate, 9-11 flowered. Peduncle slender, 2-3 cm long, 1/2-1/3 as long as the leaves, covered by dense, soft appressed or subappressed hairs. Bracts membranaceous, 1-1.5 mm long, subulate, acute at the apex, covered by sparse appressed white hairs; ciliate at the margins. Calyx tubular, 9-11 mm long, covered by short appressed hairs, teeth setaceous, 3-4 mm long. Corolla pale violet. Standard 10-12 mm long and 6-7 mm broad, the limb orbicular-ovate, slightly emarginate at the apex. Wing-petals 11-13 mm long; limb oblong, 6-7 mm long; auricle ca. 1 mm long; claw 5-6 mm long, filiform. Keel 9-11 mm long; limb 4-5 mm long, triangular, slightly auriculate at the base. Ovary 3-4 mm long, oblong, densely appressed hairy. Pods oblong, purplish, covered by densely, short appressed hairs, unilocular.

**Specimens seen.** Esfahan: Kashan, 850 m, 28. 4. 1974, Dini & Bazargan 7972; Muteh protected area, 1000 m, 20. 10. 1981, V. Mozaffarian & Karimi 37818; 55 km. of Delijan to Khomaen, 1600 m, 18. 5. 1974, Babakanlou & Amin 8769; Ardestan to Nain, Zafarghand, 1550 m, 8. 5. 91, M. Nowroozi & M. T. Feyzi 8003; 54 to Nain on the road from Ardestan, 28. 5. 1986, Assadi & Bazgosha 55973; 14 km Natanz, 1480 m, 12. 5. 61, H. Pabot 7175; Nadjafabad, Janatabad, 1600 m, 28. 5. 1981, Nowroozi 489; 10 km to Natanz-Ardestan,

_Type._ Persia boreali-orientali: Damghan-Semnan, in desertis ad Sorcheh, prope Semnan, 1600 m, Rechinger 1249 (W).

Perennial, suffrutescent-caespitose, subshrub, 20-25 cm tall. Stem 8-10 cm long and 7-8 mm in diameter, much branched, covered by stipules and petioles. Stipules 4-6 mm long and 3-4 mm broad, chartaceous, triangular-lanceolate at free portion, acute or acuminate at the apex, 1-2 mm of their length adnate to the petiole, covered by long and soft hairs. Leaves 7-12 cm long, paripinnate, spiny, thick, covered by dense appressed hairs; petiole 1.5-2.5 mm long; leaflets ca. 6 pairs, 9-11 mm long and 5-7 mm broad, orbicular to obovate, mucronate, mucro 2-3 mm long, covered by dense short appressed hairs on both sides. Inflorescence axillary, lax, elongate, 12-15 flowered. Peduncle slender, 2-3.5 cm long, shorter than the leaves, covered by dense, long, soft, appressed or subappressed hairs. Bracts membranaceous, 1-1.5 mm long, linear-lanceolate, acute at the apex, covered by sparse appressed white hairs or ciliate at the margins. Calyx tubular-campanulate, 10-12 mm long, densely covered by long hairs, teeth linear-lanceolate, ca. 6 mm long. Corolla yellowish-red. Standard 13-15 mm long and 6-8 mm broad, the limb orbicular, rounded at the apex. Wing-petals 12-14 mm long; limb 6-7 mm long, oblong; auricle ca. 1 mm long; claw 6-7 mm long, filiform. Keel 11-12 mm long; limb 4-5 mm long, subtriangular, slightly auriculate at the base. Ovary 3-4 mm long, oblong densely appressed hairy.

Specimens seen. Semnan, beginning of the road Firouzkuh, 1500 m, 26. 6. 1986, M. Assadi 56644; Semnan, 1120 m. 20. 5. 1987, V. Mozaffaian 58865.


_Type._ Persia australis Tali-Mansur, in montibus Bakhtiaricis in rupestribus, Koelz 15090 (W).

Perennial, suffrutescent-caespitose, 11-13 cm tall. Stem 3-6 cm long and 5-7 mm in diameter, divided from the base, covered by stipules and petioles. Stipules 3-4 mm long and 2-3 mm broad, chartaceous,
linear-lanceolate, at free portion acute or acuminate, 1-1.5 mm of their length adnate to the petiole, covered by long subappressed hairs. Leaves 4-6 cm long, paripinnate spiny, thick, covered by dense appressed hairs; petiole 2-3 mm long; leaflets 7-8 pairs, 6-7 mm long and ca. 2 mm broad, obovate or elliptic to oblong, terminating in a long arista, covered by dense, short appressed hairs on both sides. Inflorescence axillary 5 flowered. Peduncle slender, 2-3 cm long, shorter than the leaves, covered by dense, subappressed hairs. Bracts membranaceous, 1-2 mm long, filiform, covered by sparse, short appressed white hairs and ciliate at the margins. Calyx tubular, 5-6 mm long., covered by short appressed hairs, teeth triangular-linear to subulate, 2-3 mm long. Corolla violet. Standard 11-13 mm long and ca. 9 mm broad; the limb orbicular, slightly emarginate at the apex. Wing-petals 12-13 mm long; limb 7-8 mm long, panduriform; auricle ca. 1 mm long, rounded; claw ca. 5 mm long, filiform. Keel 11-12 mm long equal or shorter then wing; limb 5-6 mm long, subtriangular, slightly auriculate at the base. Ovary oblong, densely appressed hairy. Pods ovaloid, 12-14 mm long and 5-7 mm broad, purplish to brown, covered by dense short appressed hairs, unilocular. Seed ca. 3 mm long and ca. 2 mm broad, orbicular to reniform.

Specimens seen. Fars: ca. 40 km W. of Nurabad, near Babamounir, 1300-1500 m, 14. 4. 1982, Assadi and Aboohamzeh 38378; ca. 15 km S. of Nurabad, near Deh-shur, 1000 m, 13. 4. 1982, Assadi & Aboohamzeh 38338; Kazerun, Chenarshahijan, 920 m, 22 April 1972, Foroughi 3234; Nurabad, Babamounir, 960 m, 2. 3. 1987, V. Mozaffarian 63413. Lorestan: Khorramabad, Tange Malavi, 880 m, 18 March 1972, Foroughi 3247. Khuzestan: Baghmalek, 750 m, V. Mozaffarian 53619; Masjedsoleyman, Lali, Tugah, 480 m, 16 March 1972, Foroughi 3216; Between Behbahan and Pol-e Kheirabad, ca. 300 m, 13. 5. 1986, V. Mozaffarian 63273; Behbahan, 400 m, Foroughi 8881; Ramhormoz, 450 m, 30 April 1973, Z. Rowshan 9447; Haftgel, 450 m, 5 March 1972, Foroughi 3230; 58 km Behbahan on the road to Ramhormoz, 240 m, 6. 3. 1978, Runemark & Mozaffarian 30929. Koughilouyeh and Boirahmad: Between Dehdasht and Lende, around Dezak, 950 m, 28. 4. 1992, V. Mozaffarian 71221; Dehdasht on the road from Basht, 800 m, 17. 4. 1982, Assadi & Aboohamzeh

Excluded species

A. crassispinus Bge.

A. crassispinus Bge. with the imperfect diagnosis (Bunge 1869) described on the basis of the specimen Griff. 1592 from Afghanistan. The imperfect description and the unusual distribution show the uncertain position of this species. For this reasons, this taxon is excluded from the section Leucocercis Bge. It is worthy to notice that the relative section namely: sect. Acantherioceras Rech. f. with two species is distributed in the same area in Afghanistan (Rechinger, 1959). So at the moment the mentioned species is suggested to be transferred to the Sect. Acantherioceras.

References


