Astragalus sect. Alopecuroidei (Fabaceae) in Iran, complementary notes with a key to the species

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Abstract


New findings and a key to the 24 species of Astragalus sect. Alopecuroidei in Iran are provided. Two species, A. neo-maassoumianus and A. foliosus are described as new to science. A. alopecurus is a new record for the flora of Iran. A. phlomoides is transferred from A. sect. Laxiflori to sect. Alopecuroidei. A. ajubensis is reduced to a synonym of A. macrocephalus subsp. finitimus and A. ovalifoliolatus to a synonym of A. kirrindicus.

Introduction


Astragalus sect. Alopecuroidei was taxonomically revised by Becht (1978) and treated for the “Flora iranica” by Podlech (1999). Studies focussing on A. sect. Alopecuroidei in Iran have been carried out by A.-A. Maassoumi and M. Ranjbar since 1991. Several new species were described (Maassoumi & Ranjbar 1994) but could not be incorporated in the “Flora iranica” treatment of the section (Podlech 1999). Also other findings have since been gained by the present authors. Hence, the purpose of this joint contribution is to complement the previous treatments of the section for Iran according to our current knowledge.

Astragalus sect. Alopecuroidei DC., Prodr. 2: 294. 1825
Perennial, caulescent herbs with erect, basifixed, white hairs. Leaves imparipinnate, stipules free, or shortly adnate to the petiole but free from each other. Flowers mostly large, yellow to brownish or greenish, subsessile, in sessile or pedunculate, globose or cylindrical, very dense axillary inflorescences. Bracteoles present or absent. Calyx campanulate or more rarely shortly cylindrical, somewhat inflated in fruit. Standard with the lamina straight or recurved, glabrous or rarely sericeous; wings and keel with claws adnate to the base of the staminal tube only; lamina of the keel often large (except A. subsect. Microtropi). Pod sessile, firm or sometimes membranous or corky, completely bilocular.

Key to the species of Astragalus sect. Alopecuroidei

1. Calyx ebracteolate .............................................. 2
   – Calyx bibracteolate ........................................... [A. hirrindicus group] 20
2. Inflorescence sessile ........................................... 3
   – Inflorescence stipitate, peduncle 1-7 cm long .......... [A. macrocephalus group] 11
3. Limb of keel 10-12 mm long, 3-6 mm broad ............ [A. megalotropis group] 4
   – Limb of keel 6-8 mm long, 2.5-3.5 mm broad ...... [A. alopecurus group] 5
4. Plant covered with villose hairs; flowers often brownish, calyx teeth 9-15 mm .......... A. megalotropis C. A. Mey. ex Bunge
   – Plant densely covered with pubescent hairs; flowers yellow, calyx teeth 7-9 mm ................. A. hamadanus Boiss.
5. Inflorescence cylindrical, 6-10 cm long ....................... 6
   – Inflorescence spherical, 3.5-4 cm long ................. 7
6. Standard c. 23 mm long, limb obovate; surface of leaflets glabrous . A. alopecurus Pall.
   – Standard c. 19-20 mm long, limb ovate to elliptic; leaflets hairy on both sides .......... A. alopecias Pall.
7. Stem, peduncle and rachis glabrous .......................... 8
   – Stem, peduncle and rachis tomentose ...................... 9
8. Leaflets up to 30 mm long; stipules 15-20(25) mm long; calyx teeth narrowly triangular, 1-2 mm long .......... A. ponticus Pall.
   – Leaflets up to 15 mm long; stipules 4-6 mm long; calyx teeth subulate, 2-4 mm long .... A. hymenocalyx Boiss.
   – Leaflets in 20-30 pairs, oblong to narrowly elliptic ............................................ 10
10. Standard pandurate, contracted in middle section; calyx teeth 2-3 mm .......... A. foliosus Podlech, Maassoumi & Ranjbar
    – Standard elliptic-orbicular; calyx teeth 1-2 mm long .......... A. saetiger Becht
11. Standard sericeous ................................................ A. turbinatus Bunge
    – Standard glabrous ........................................... 12
12. Standard elliptic, 23-27 mm long ......................... 13
    – Standard orbicular to rectangular, shorter than 23 mm ........................................ 14
13. Stem, peduncle and rachis glabrous; leaflets orbicular-ovate .... A. phlomoides Boiss.
    – Stem, peduncle and rachis densely covered with spreading hairs; leaflets ovate-elliptic .... A. neo-maassoumianus Ranjbar
14. Stem, leaflets, rachis and peduncle appressed-hairy .......... 15
    – Stem, leaflets, rachis and peduncle glabrous .................. 16
15. Stem, peduncle and stipule densely covered with appressed hairs; leaflets lanceolate, in up to 11 pairs; corolla yellow ................. A. maabudii Ranjbar
    – Stem, peduncle and stipule laxly covered with appressed hairs; leaflets ovate, in 11-14 pairs; corolla yellow .......... A. zarjabadensis Ranjbar
16. Peduncle shorter than capitulate inflorescence in diam. .............. 17
Peduncle equal with capitulate inflorescence in diam. or longer ..........18
17. Stipules longer than 25 mm; corolla shorter than 20 mm, standard rectangular ...........

.......................... A. arasbaranensis Maassoumi & Ranjbar

18. Leaflets in more than 11 pairs ............ A. macrocephalus Willd.
19. Leaflets broadly ovate, obtuse ............ A. schahrudensis Bunge

19. Leaflets lanceolate, acute ............ A. jessenii Bunge

20. Stem, peduncle and rachis densely covered with appressed hairs; leaflets elliptic ........

.......................... A. echinops Aucher ex Boiss.

21. Inflorescence more than 4 cm in diam.; corolla longer than 20 mm .......... 22
22. Leaflets in 12-16 pairs ............ A. meridionalis Bunge
23. Leaflets orbicular or obcordate, emarginate at apex ........ A. obtusifolius DC.

24. Leaflets hairy on both sides, pyriform; calyx teeth shorter than tube; flowers reddish ..

.......................... A. sarzehensis Ranjbar

.......................... A. stepporum Podlech

New species

Astragalus neo-maassoumianus Ranjbar, sp. nova
Holotype: Iran, Khorasan, Bojnoord, Garyolan, Agerghayeh to Khesht, Teloo mountain, 1200 m, 28.6.1994, Musavi & Lotfai 3495 (TARI).

Differt ab A. turbinato Bunge, A. christophii Trautv. et A. grisebachiano Aitch. & Baker vexillo glabro (nec sericeo), foliolis 7-10- (nec 16-25-)jugis, caulibus dense patenter (nec appresse) pilosis.

Plantae perennes, 40-50 cm altae. Caulis erectus, densissime pilis brevissimis obtectus. Stipulae 10-13 mm longae, herbaceae, lanceolato-lineares, acuminatae, petiolo per 1-2 mm adnatae. Folia 10-15 cm longa, petiolo brevissimo, sicut rachis brevissime piloso. Foliola 7-10-juga, 16-24 mm longa et 11-17 mm lata, ovata ad elliptica, obtusa, saepe mucronulata, supra glabra vel sparse et imprimis marginem versus pilosa, subtus dense appresse pilosa. Inflorescentiae in axillis foliorum superiorum dipositae, rotundato-capitatae, 5-6 cm diametro, pedunculis 6-7 cm longis pilosis suffultae. Bracteae filiformes, 11-13 mm longae, pilosae. Bracteolae nullae. Calyx 22-25 mm longus, tubulosi-camanulatus, pilis villosis densis 2-3.5 mm longis obtectus, dentibus tubum subaequantibus vel subbrevioribus. Corolla glabra, flavo-viridula; vexillum 23-27 mm longum, lamina elliptica, apice integra, rotundata; alae 24-26 mm longae, lamina oblonga, antice rotundata, basi auriculata, 1-1.5 mm longa; carina c. 25 mm longa; lamina triangularis. Ovarium sessile, dense villosum, stylo usque medio hirto. Legumen ignotum.

Astragalus foliosus Podlech, A.-A. Maassoumi & Ranjbar, sp. nova
Holotype: Iran, Azarbayejan, Khalkhal, 18 km on the road, from Khalkhal to Kivi (protected area of Lomber), 1800-2350 m, 21.6.1986, Maassoumi & Abouhamzeh 56921 (TARI; isotype MSB).

Differt ab A. pandurato Bunge foliolis 9-20 × 4-7 (nec 22-40 × 7-15) mm, pedunculis 0-0.5 (nec 2-4.5) cm longis, stipulis 10-13 (nec 16-25) mm, bracteis 7-10 (nec 6-7) mm.
Plantae perennes, 40-60 cm altae. Caulis erectus, subdensissime pilis brevissimis obtectus. Stipulae 10-13 mm longae et 3-4 mm latae, herbaceae, lanceolate-acuminatae, petiolo per 1-2 mm adnatae. Folia 15-25 cm longa, petiolo brevissimo 1-3 cm longo, sicut rachis brevissime piloso. Foliola 14-17-juga, 9-20 mm longa et 4-7 mm lata, oblongo-ovata vel oblonga, obtusorotundata vel emarginata, supra glabra vel sparse et imprimis marginem versus pilosa, subtus dense appresse pilosa. Inflorescentiae in axillis foliorum superiorum dispositae, rotundato-capitatae, 3-4 cm diametro, pedunculis 0-0.5 cm longis pilosis. Bracteae lineari-lanceolatae, 7-10 mm longae, sparse et imprimis marginem versus pilose. Bracteae nullae. Calyx 14-15 mm longus, tubulosocampanulatus, pilis villosis densis 2-3 mm longis obtectus, dentibus triangulari-lanceolatis 2-3 mm longis. Corolla glabra, flava; vexillum 17-22 mm longum, lamina pandurata, apice integra, rotundata; alae 24-26 mm longae, lamina oblonga, apice rotundata, basi auriculata, 1-1.5 mm longa; carina 13-15 mm longa, lamina triangulari. Ovarium sessile, dense villosum, stylo usque 1/3 hirto. Legumen ignotum.

Revised position of Astragalus phlomoides Boiss.

Astragalus phlomoides Boiss. is an interesting species restricted to central Iran. For its inflorescence features it was placed in A. sect. Laxiflori by Agerer-Kirchhoff & Agerer (1997), with A. baijiensis C. Towns. as a synonym. Both species are actually clearly distinct (Table 1) and allopatric, as was already assumed by Maassoumi (1998). The placement of A. phlomoides in A. sect. Laxiflori is, moreover, doubtful; because of the dense inflorescence and the (secondarily) reticulate seed testa the species is in our opinion much better placed in the A. macrocephalus group of A. sect. Alopecuroidei. Besides, we have the impression that A. sect. Laxiflora is a very artificial taxon and morphologically not actually separable from A. sect. Alopecuroidei.

Table 1. Differential characters of Astragalus phlomoides and A. baijiensis.

<table>
<thead>
<tr>
<th>A. phlomoides</th>
<th>A. baijiensis</th>
</tr>
</thead>
<tbody>
<tr>
<td>inflorescence ovate to spherical, c. 5 cm</td>
<td>inflorescence cylindrical, c. 10 cm</td>
</tr>
<tr>
<td>leaflets in 14-17 pairs</td>
<td>leaflets in 20-32 pairs</td>
</tr>
<tr>
<td>standard 25-35 mm long</td>
<td>standard 23-25 mm long</td>
</tr>
<tr>
<td>wings and keel 28-30 mm long</td>
<td>wings and keel 22-24 mm long</td>
</tr>
</tbody>
</table>

New record for the flora of Iran


Specimen seen

Note. – This species was reported by Becht (1978) from the western Alps, Bulgaria, Turkey and Armenia eastwards to China. Because of its flowers and chartaceous stipules it is rather similar to A. ponticus Pall. but differs by the long, cylindrical inflorescences and the more or less dense indumentum.

New synonyms

1. Stipules often subcordate, longer than 35 mm .......... subsp. macrocephalus
– Stipules narrowly triangular, shorter than 25 mm .......... subsp. finitimus

subsp. macrocephalus
Specimens seen
IRAN: Between Jolfa and Ahar, near Jushin, 1250 m, 20.6.1988, Assadi & Shahsavari 65844 (TARI); Uromiyeh, Gardan-e Ghooshchi, 2000 m, 16.7.1991, Mozaffarian 70085 (TARI); Uromiyeh, Maku-Kandi, 10.6.1981, Tarighi, Ghaafari & Amin 1355 (TARI); Salmas, Ghooshchi pass, 1800 m, 5.7.1976, Amini 6983 (TARI); Uromiyeh, Maku-Kandi, 10.6.1981, Tarighi, Ghaafari & Amin 1355 (TARI); Salmas, Ghooshchi pass, 1800 m, 5.7.1976, Amini 6983 (TARI); Uromiyeh, Ghooyandaghi, 1350 m, 3.6.1974, Wendelbo, Assadi & Shirdelpur (TARI).


Specimens seen

Note. — Astragalus macrocephalus is one of the most widespread species of the A. macrocephalus group. Its subspecies are not well separated geographically. Strong similarities in shape and size of calyx and petals, in habit and in the glabrescence of the leaves indicate a close relationship between the taxa. A. ajubensis Bunge perfectly matches A. macrocephalus subsp. finitimus (Bunge) Chamberlain, and cannot be maintained as a separate species.


Specimens seen
IRAN: Bakhtaran: Mountains above Kerend, beginning of the road Dalahu, 1700-2000 m, 18.6.1987, Assadi 60790 (TARI); 40 km from Bishetun to Songhor, E of the main road, Bakhtari village, 8.6.1987, 1960 m, Hamzehee & Hatami 1121 (TARI). — Chaharmahal-e Bakhtiari: Lordegan, Sarkhon, Shalile to Douab-e Bazof and Karon, 1200 m, 27.6.1986, Mozaffarian 54904 (TARI); road from Lordegan to Brojen, Boldaji, kuh-e chiro Bagh-e chiro, 2220-2600 m, 1.7.1986, Mozaffarian 57318 (TARI); Shahr-e Kord, Baba-Heidar, 2150-2500 m, 1.6.1986,
Mozaffarian 54805 (TARI); top mountain of Saldaron from Deh-e Chesmeh W slope, 2200 m, 16.7.1986, Mozaffarian 57869 (TARI). — Esfahan: Semerom, Padena, between Tang-e Rigan and Deh-Bid, 1950 m, 11.6.1983, Nowroozi 2397 (herb. Esfahari). — Kohgilouyeh & Boirahmad: Neck mount, between Babameidan and Yasuj, 1800 m, 10.6.1992, Mozaffarian 71274 (TARI); 5 km S of Sisakht on the road to Isfahan, 2400 m, 17.7.1983, Assadi & Abouhamzeh 46219 (TARI). — Kordestan: c. 25 km SSE of Sanandaj, mountains above the village Narran, 2200-2600 m, 15.6.1987, Assadi 60377 (TARI); first tunnel, of Sanandaj-Kamyaran Route, 1420 m, 15.5.1986, Fattahi 1444 (TARI). — Lorestan: 39 km from Khorramabad on road to Nowjian and Kashvar, 2150 m, 27.6.1977, Runemark & Lazari 26015 (TARI); 45 km on road from Khorramabad to Nowjian and Kashvar, 1850 m, 27.6.1977, Runemark & Lazari 26086 (TARI); Khorramabad, 1400 m, 1.7.1970, Reihani 25142 (TARI); 55 km from Arak to Malayer, 2100 m, 15.6.1984, Mozaffarian & Maassoumi 48079 (TARI); Oshtorankuh, above the village Tahun, 2000-2500, 12.7.1981, Assadi & Mozaffarian 37088 (TARI). — Hamadan: on road of Malayer from Siahkamar to Kordkhorod, Gheshlage Abhenhou, 1900 m, 9.6.1988, Mozaffarian 64648 (TARI); Nahavand, Borzol, Gian, kuh-e garrin, 1970-2700 m, 14.7.1988, Mozaffarian 65078 (TARI); Lalejin to Taher, Jamshidabad and gonbadan, 1900 m, 8.6.1988, Mozaffarian 64579 (TARI). — Tehran: Arak, Shahzand, Souroneh, 2000-2650, 17.7.1984, Mozaffarian 48281 (TARI); 23 km N of Qazvin, Abdollah-abad, protected area, 1680 m, 1.7.1972, Foroughiaw 15254 (TARI); Markazi, Qarehchay terzahah, 55 km, NW of Tafresh, 9.6.1974, 1300 m, Amin & Bazargan 18799 (TARI); Arak, Slope of kuh-e Rasvand from Baba-Khodadad, 2100-2750, 10.7.1985, Mozaffarian 64057 (TARI); Arak, Hesar, kuh-e Rasvand, 2000-3000, 18.7.1984, Mozaffarian 48329 (TARI); Arak to Mahallat, Late-dar, Late-dar Mts, Mozaffarian & Maassoumi 47966 (TARI); Arak, Toureh, besri, NE of slope kuh-e Aladagh, 2100-3100 m, 11.7.1985, Mozaffarian 64066 (TARI); Arak, Shahzand, Hafteh-o Emarat, Alimabad, kuh-e Alvand 2100-2800 m, 8.7.1985, Mozaffarian 63875 (TARI). — Zanjan: 133 km from Zanjan on the road to Bijar, 1750 m, 17.7.1974, Assadi & Amini 13581 (TARI).

Note. — Astragalus kirrindicus is the most variable and widely distributed species in the section. It is known from western, northern and central Iran. Plants with large leaflets were separated previously as Astragalus ovalifoliolatus but further studies led us to the conclusion that plants with large leaflets are connected by numerous intermediates with typical Astragalus kirrindicus, making a separation of two species impossible.

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