A SHORT SURVEY ON THE GENUS ASTRAGALUS OF BOZGHOUS MOUNTAIN

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Two new species of Astragalus are described and illustrated, besides a checklist of about 75 Astragalus species collected from 33 different localities in Bozghoush chain Mountain are provided. The taxonomic characters of the new species are discussed and compared with the closely related species.

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Key words: Bozghoush Mountain; checklist; Fabaceae; Astragalus; new species; Azarbaijan; Iran

INTRODUCTION

Bozghoush Mountain Range is situated on the North of Miane and South of Sarab Plain in E. Azerbaijan, Iran. Bozghoush Mountain Range prolonging from east to west, estimated approximately 120 km long and 45 km wide, containing 326000 hectares of top area, rocky mountain and the vast plans. The highest peak of this mountain is about 3320 m. Annual precipitation is about 281.1 mm, but in higher altitudes increasing up to 400-500 mm. The annual temperature range is 5-15˚C.

Vegetation feature of this area is the shrubs such as Amygdalus, Crataegus, Malus and various types of annuals and perennial herbs. Bozghoush Mountain Range with capturing the humidity of Caspian Sea and with different type of geological structure provided different of micro-climatical conditions and several characteristic habitats.

The rich vegetation and the flora within all Azarbaijan areas are very distinctive but there are poor botanical expeditions and knowledge for this area. The flora of Iran consists of nearly 8000 wild plant species and Astragalus is the largest genus of its flora with nearly 826 species (Ghahremaninejad, 2015). Based on huge plant collections, the genus Astragalus which is widely covered the area and plays the great role in the soil protection of the area, has been deeply studied. In this research program more than 75 distinct species of Astragalus based on Podlech, Podlech & al (1999-2012) in Astragalus in Flora Iranica and Astragalus of Iran, A. A. Maassoumi, Bozghoush vegetation, Mozaffarian – Adel Ramezani, (2013) were identified and two new species are described as new to the science.

MATERIALS AND METHODS

During years 2006 to 2011, in more than 25 botanical excursions to the thirty three collecting sights
as representatives of the area more than 2000 plant specimens (Mozaffarian & Ramezani “M. & R.”) were collected and deposited in the Central Herbarium of Iran in Research Institute of Forests and Rangeland (TARI).

Collecting sites
The following sites have been expedited and plant materials were collected:

1. Azarbaijan: Miane, Bozghoush Mount. Area, Charan, 1600 m
2. Azarbaijan: Miane, Bozghoush Mount. Area, beginning of the road from Gharibdust to Yengeje, 1670 m
3. Azarbaijan: Miane, Bozghoush Mount. Area, between Gharibdust and Yengeje, around Mehmendust, 1670-1885 m
4. Azarbaijan: Miane, Bozghoush Mount. Area, Kuhe Bouzugosh from Varzaghan village, 1960 m
5. Azarbaijan: Miane, Bozghoush Mount. Area, Varankesh village, 1950 m
6. Azarbaijan: Miane, Bozghoush Mount. Area, Neshagh village, 1880 m
7. Azarbaijan: Miane, Bozghoush Mount. Area, from Tushmanlu and Livianlu, 2210 m
8. Azarbaijan: Miane, Bozghoush Mount. Area, Neshagh, 2570 m
9. Azarbaijan: Miane, Bozghoush Mount. Area, Neshagh, top mountain, 2560 m
10. Azarbaijan: Miane, Bozghoush Mount. Area, Gharibdust, Kalhur to Bozghoush, top mountain, 2425 m
11. Azarbaijan: Miane, Bozghoush Mount. Area, Bozhooost top mountain from Gengadik and Khanghah, 2965 m
12. Azarbaijan: Miane, Bozghoush Mount.area, Blucan, 1880 m
13. Azarbaijan: Miane, Bozghoush Mount. Area, Gharibdust, 1600 m
14. Azarbaijan: Miane, Bozghoush Mount. Area, Kalhour to top, 1900-2500 m
15. Azarbaijan: Miane, Bozghoush Mount. Area, Tark, after Sarighamish, fandughlu, foot mountain Bozghoush, 1700-2000 m
17. Azarbaijan: Miane, Bozghoush Mount. Area, Fandughlu, Bozhoush mountain, 2000-2700 m
18. Azarbaijan: Miane, Bozghoush Mount. Area, Fandughlu to Sevin village to Barzagh 2200-2800 m
19. Azarbaijan: Miane, Bozghoush Mount. Area, Avenligh to Mushbaglbu, Gheslaghe Berzleigh, ca. 1800 m
20. Azarbaijan: Miane, Bozghoush Mount. Area, Avenligh to Mushabaglu, ca. 2100 m
21. Azarbaijan: Miane, Bozghoush Mount. Area, Turkmenchai, Kalhur to Bozghoush to top mountain ca. 3000 m
22. Azarbaijan: Miane, Bozghoush Mount. Area, Charan, Khalifelu (Bozghoush mountain), ca. 2500 m
23. Azarbaijan: Miane, Bozghoush Mount. Area, Avenligh, ca. 1900 m
24. Azarbaijan: Miane, Bozghoush Mount. Area, Bulucan, Helemsi, ca. 2500 m
25. Azarbaijan: Miane, Bozghoush Mount. Area, Neshagh to top of Bozghoush, Benarun, 2600-3000 m
26. Azarbaijan: Miane, Bozghoush Mount. Area, Gharibdust, 1600 m
27. Azarbaijan: Miane, Bozghoush Mount. Area, Turkmenchai, ca. 1600 m
28. Azarbaijan: Miane, around Ghaflankuh, ca. 1100 m
29. Azarbaijan: Miane, Bozghoush Mount. Area, Turkmenshai, Zarringhaba, ca. 2100 m
30. Azarbaijan: Miane, Bozghoush Mount. Area, Gharibdust, 1650 m.
31. Azarbaijan: Miane, Bozghoush Mount. Area, Varankesh, top mountain of Bozghoush ca. 2900 m
32. Azarbaijan: Miane, Bozghoush Mount. Area, Tark to Khalkhal, Hajikhalile village ca. 1900 m
33. Azarbaijan: Miane, Bozghoush Mount. Area, varzaghan, Bozghoush top montian Azarbaijan: Miane, Bozghoush Mount. Area, Charan, 1600 m

RESULTS
In this investigation about 1200 species belonging to different families including Astraceae (67 genera with 206 species); Fabaceae (22 genera with 159 species); Poaceae (45 genera with 98 species); Lamiaceae (45 genera with 69 species); Brassicaceae (39 genera with 63 species); Apiaceae (41 genera with 61 species); Rosaceae (21 genera with 47 species); Boraginaceae (19 genera with 38 species); Scrophulariaceae (12 genera with 36 species) and Caryophyllaceae (19 genera with 63 species) as the major dominant taxa were collected.

About 35 plant families with few species were also observed. The majorities of these families are: Alismataceae, Amaryllidaceae, Anacardiaceae, Araceae, Aristolochiaceae, Callitrichaceae, Cornaceae, Coryllaceae, Ephedraceae, Fagaceae, Juglandaceae, Lythraceae, Oleaceae, Ulmaceae.

Within the determined genera, the genus Astragalus with 75 species, Centaurea with 20 species and Ranunculus with 17 distinct species are remarkable and abundant taxa in the area.

The genus Astragalus with 75 species (29 sections) is one of the genera with high number of species in the
studied sight. The checklist of *Astragalus* species with their corresponding sections are shown below:

**Sect. Adiaspastus Bunge**
*Astragalus michauxianus* Boiss. 8, 12, M. & R. 94566 (TARI), 94727 (TARI)
*Astragalus aureus* Willd. 14, M. & R. 94932 (TARI)
*Astragalus polyanthus* Bunge 11, M. & R. 94662 (TARI)

**Sect. Alopecuroidei DC.**
*Astragalus echinops* Boiss. 3, 8, M. & R. 93328 (TARI), 94556 (TARI)
*Astragalus maaboudi* Ranjbar 24, M. & R. 96513 (TARI)
*Astragalus speciosus* Boiss. & Hohen. 4, M. & R. 93359 (TARI)

**Sect. Ankylotus Bunge**
*Astragalus commixtus* Bunge 30, M. & R. 97484 (TARI)

**Sect. Annulares DC.**
*Astragalus Campylorrhynchus* F. & M. 28, M. & R. 96610 (TARI)
*Astragalus cruciatus* Schultz, 28, M. & R. 96612 (TARI)

**Sect. Astragalus**
*Astragalus caragana* Fisch. & C. A. Mey. 1, M. & R. 93273 (TARI)

**Sect. Brachycalyx Bunge**
*Astragalus caspius* Bieb. 2, 10, 19, 16, M. & R. 93312 (TARI), 96417 (TARI), 96410 (TARI), 96365 (TARI)

**Sect. Bucerates DC.**
*Astragalus hamosus* L. 2, M. & R. 93307 (TARI)

**Sect. Caprini DC.**
*Astragalus aegobromus* Boiss. & Hohen. 31, M. & R. 97489 (TARI)
*Astragalus angustiflorus* C. Koch subsp. angustiflorus 4, 7, 31, M. & R. 97487 (TARI), 94553 (TARI), 93406 (TARI)
*Astragalus basilicus* Podl. & Maassoumi 32, M. & R. 97490 (TARI)
*Astragalus gypsaceus* G. Beck 16, M. & R. 96438 (TARI), 101992 (TARI)
*Astragalus lagupoides* L. 3, M. & R. 97488 (TARI)
*Astragalus robloundii* Rech.f. 20, 21, M. & R. 96438 (TARI), 101992 (TARI)
*Astragalus robustus* Bunge 13, 27, M. & R. 94768 (TARI), 96553 (TARI), 93477 (TARI)
*Astragalus recognitus* Fischer 4, 17, M. & R. 93382 (TARI), 93386 (TARI)
*Astragalus saeidabadensis* Bunge 6, 21, M. & R. 93447 (TARI), 96460 (TARI)
*Astragalus tabrizianus* Fischer 40, M. & R. 97488 (TARI)

**Sect. Dissitiflori DC.**
*Astragalus xiphidium* Bunge 28, M. & R. 96603 (TARI)

**Sect. Heterodontus Bunge**
*Astragalus guttatus* Banks & Soland. 23, M. & R. 96500 (TARI), 96501 (TARI)

**New species**
*Astragalus turkman-chaiensis* Maassoumi, Mozaff. & Ramezani sp. nov. (fig. 1).

Differs from *Astragalus rostratus* Bunge with having the yellow corolla (not violet), inflorescence 2-3 flowered (not 5-15), petals 4-5 pairs (not 5-15); from *Astragalus delutulus* Maassoumi with having dense white appressed hairs (not spreading).

Plant densely caespitose, ca. 8-10 cm tall, much divided at the base, densely covered with remnant of petioles and stipules. Stipules pale purple, ca. 7 mm long, at the base in ca. 2.5 mm adnate to the petiole, loosely to rather densely covered with asymmetric bifurcate hairs mixed with basifixed white hairs. Leaves 7-9 cm long; petioles 3-3.5 cm long, like the rachis loosely to rather densely covered with asymmetric flattened appressed white hairs. Leaflets 3-4 (-5) pairs, remote, narrowly elliptic, acute, ca. 10-15 mm long and 2-4 mm wide, both sides densely covered with symmetric bifurcate appressed hairs, indistinctly purplish dotted. Peduncle 3-4 cm long, hairy like the rachis. Pedicels 1.5-2 mm long, densely black hairy. Bracts 4-5 mm long, narrowly triangular, loosely covered with symmetric to asymmetric black and white hairs. Bracteoles ca. 1 mm long, at the base of calyx, covered with sparse black and white hairs. Inflorescence 2-4 flowered. Petals yellow, fading to
pale violet. Calyx ca. 12 mm long, with 5 distinct nerves, densely covered with symmetric appressed black hairs; teeth subulate, ca. 2.5 mm long. Standard ca. 22 mm long, the limb rhomboid, at the middle ca. 6 mm wide, elongated toward the apex. Wings ca. 20 mm long; limb elliptic, rounded at apex, ca 7 mm long and 2 mm wide; auricle 1 mm long; claw 13 mm. Keels ca. 19 mm long; claw 12 mm. Ovary pilose, sessile. Pods linear, erect, maculate, ca. 30-35 mm long and 3.5 mm wide, ventrally carinate, dorsally flattened, fully bilocular. Valves coriaceous, densely covered with asymmetrically bifurcate appressed to subappressed white hairs ca. 0.7 mm long; beak straight, ca. 10 mm long.

Type: Azerbaijan: Mianeh, Turkman Chai, 1600 m, a.s.l., Mozaffarian & Ramezani 96551 (holotypus TARI).

Sect. Laxiflori Kirchhoff
Astragalus dictyolobus C. A. Mey. ex Bunge 27, M. & R. 96555 (TARI)
Sect. Macrophyllum Boiss.
Astragalus oleafolius DC. 5, M. & R. 93431 (TARI)
Sect. Malacothrix Bunge
Astragalus aznabjurticus Grossh. 29, M. & R. 97470 (TARI)
Astragalus Becki Bornm.11, M. & R.94632 (TARI)
Astragalus belgheiscus Maassoumi 34, M. & R. 93463 (TARI).

Fig. 1. Astragalus turkman-chaiensis Maassoumi, Mozaff. & Ramezani.
New species  
*Astragalus bozghoushensis* Maassoumi, Mozaff. & Ramezani sp. nov. (fig. 2).

Differs from *Astragalus anodiophilus* Podlech & Maassoumi with having the standard ca. 15 mm long, blade broadly ovate or shortly orbicular (not rhomboid-elliptic), Wing and keel at the base adnate to staminal tube.

Plant 7–8 cm tall, acaulescent, densely caespitose. Rootstock slender, repeatedly branching, with short subterranean stem. Stems very short, rather densely covered with subappressed to spreading hairs up to 0.2 mm long. Stipules greenish, narrowly triangular, 4–5 mm long, adnate to the petiole for 2 mm, shortly vaginate-connate behind the stem, with subappressed white hairs. Leaves 3–6 (-8) cm long; petiole 1–3 cm long, slender and like the rachis covered, with short subepigastrous hairs, rachis 6 mm long, like the petiole. Leaflets in 7–10 pairs, elliptic, 5 mm long, 1.5–2 mm wide, rounded to subacute at the apex, on both sides rather densely to densely covered with spreading to ascending hairs 0.2–0.3 mm long. Peduncle slender, 3–4 cm long, rather densely covered with ascending white, towards the raceme also some black hairs 0.2–0.3 mm long. Raceme short, rather dense, 5–10-flowered. Bracts greenish, triangular, 1–3 mm long, sparsely black and white hairy. Pedicels very short. Calyx 8–10 mm long, tubular, ± truncate at the mouth, rather densely covered with ascending to spreading white hairs 0.5–0.7 mm long and at the dorsal side and toward the teeth with somewhat shorter black hairs, teeth subulate, 2 mm long, black and white hairy at the inner side. Petals greenish yellow. Standard ca. 15 mm long; blade 7 mm wide, ovate to orbicular, abruptly narrowed towards the claw, retuse at apex. Wings 14 mm long; blade narrowly oblong, obtuse at the apex, 7 x 3 mm; auricle ca. 1 mm long, claw 7 mm long. Keel ca. 13 mm long; blades oblong-curved, in upper part widely curved, in lower edge slightly concave, subacute at the apex, 5 x 3 mm; auricle minute, acute, claw ca. 6 mm long. Staminal tube truncate at the mouth. Ovary sessile, ellipsoid, white hairy; style glabrous. Legume unknown.

Fig. 2. *Astragalus bozghoushensis* Maassoumi, Mozaff. & Ramezani.
The unusual features such as claw of the wings and keels in the higher part adnate to staminal tube are not known in sect. *Malacothrix* Bunge, but they are common in Tragacanthic species.

Typus: Azarbayjan: Bozghoush area, Varnakesh, top area, 19.5.2011, ca. 2500 m a. s. l., Ramezani & Mozaffarian 101991 (holotypus TARI).

*Astragalus comosus* Bunge 29, M. & R. 97474 (TARI)
*Astragalus elegans* Bunge 29, M. & R. 97479 (TARI)
*Astragalus eriopodus* Boiss. 28, M. & R. 96600 (TARI)
*Astragalus iranicus* Bunge 29, M. & R. 97475 (TARI)
*Astragalus lisaricus* Maassoumi 33, M. & R. 97494 (TARI)
*Astragalus patrius* Maassoumi, 45, M. & R. 97477 (TARI)
*Astragalus pauperiflorus* Bornm.; 20, M. & R. 96440 (TARI)
*Astragalus podocarpus* C. A. Mey. 32, M. & R. 97492 (TARI), 93297 (TARI)
*Astragalus podolobus* Boiss. & Hohen. 2, M. & R. 93297 (TARI)
*Astragalus senilis* Bornm., 29, M. & R. 97476 (TARI)
*Astragalus singarensis* Zarre & Podlech 26, M. & R. 101997 (TARI)

*Sect. Onobrychioidei* DC.
*Astragalus effusus* Bunge 29, 30, M. & R. 96541 (TARI), 96440 (TARI)
*Astragalus lilacinus* Boiss.29, 32, M. & R. 97480, 97491 (TARI)
*Astragalus onobrychis* L. 2, M. & R. 97492 (TARI)
*Astragalus sceppiger* Ranjbar & Maassoumi 32, M. & R. 97491 (TARI)
*Astragalus vegeus* Bunge 6, 27, M. & R. 96554 (TARI), 93465 (TARI)

*Sect. Ornitopodidum* Bunge
*Astragalus brachyodontus* Willd.; 6, 19, 28, , M. & R. 96416, 93448 (TARI), 96611 (TARI)
*Astragalus paralipomenus* Bunge 4, M. & R. 93393 (TARI)

*Sect. Sesamei* DC.
*Astragalus asterias* Hohen. 23, M. & R. 96501 (TARI)
*Astragalus triboloides* Delile 23, M. & R. 96507 (TARI)

*Sect. Stereothrix* Bunge
*Astragalus capito* Boiss. 18, M. & R. 96404 (TARI)

*Sect. Synocreati* DC.
*Astragalus fragrans* Willd.1, 14, 25, M. & R. 93250 (TARI), 94966 (TARI), 96517 (TARI)

*Sect. Theiochrous* Bunge
*Astragalus siliculosus* Boiss. 29, M. & R. 97473 (TARI)

*Sect. Trachyercis* Bunge
*Astragalus barnassari* Grossh. 11, 33, M. & R. 94651 (TARI), 97493 (TARI)

*Sect. Tricholobus* Bunge
*Astragalus tricholobus* DC. 26, M. & R. 96543 (TARI)

*Sect. Uliginosi* A. Gray
*Astragalus odoratus* Lam. 2 M. & R. 93303 (TARI)

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