

A SHORT SURVEY ON THE GENUS *ASTRAGALUS* OF BOZGHOSH 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

نگرشی اجمالی بر جنس گون در کوه بز قوش

علی اصغر معصومی، استاد مؤسسه تحقیقات جنگلها و مراتع کشور

ولی اله مظفریان، دانشیار مؤسسه تحقیقات جنگلها و مراتع کشور

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دو گونه جدید از جنس گون برای ایران و جهان شرح داده شده و تصاویر آنها ارائه می گردد و چک لیستی از گون های ارتفاعات کوه بز قوش ارائه می گردد که قریب ۷۵ گونه گون براساس فلورا ایرانیکا شناسایی و ارائه می گردد. گونه های جدید عبارتند از

Astragalus Sect. (Malacothrix) *bozghoushensis* و (Incani) *turkaman-chaiensis*

صفات تاکزومیک گونه های مذکور ارائه شده و با نزدیک ترین گونه ها مقایسه می شود.

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 Mehmandust, 1670-1885 m
- 4- Azarbaijan: Miane, Bozghoush Mount. Area, Kuhe Bouzgosh 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 Livanlu, 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, Gharibduit, Kalhur to Bozghoush, top mountain, 2425 m
- 11- Azarbaijan: Miane, Bozghoush Mount. Area, Bozghoost top mountain from Gengadik and Khanghah, 2965 m
- 12- Azarbaijan: Miane, Bozghoush Mount. Area, Blucan, 1880 m
- 13- Azarbaijan: Miane, Bozghoush Mount. Area, Gharibduit, 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
- 16- Azarbaijan: Miane, Bozghoush Mount. Area, Turkmanchai, Mulla hagi, 1700-2000 m
- 17- Azarbaijan: Miane, Bozghoush Mount. Area, Fandughlu, Bozghoush 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 Mushbaglu, Gheshlaghe Berzliegh, ca. 1800 m
- 20- Azarbaijan: Miane, Bozghoush Mount. Area, Avenligh to Mushabaglu, ca. 2100 m
- 21- Azarbaijan: Miane, Bozghoush Mount. Area, Turkmenchai, Kalhor 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 Ghafllankuh, ca. 1100 m
- 29- Azarbaijan: Miane, Bozghoush Mount. Area, Turkmenchai, 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 mountain 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. *Adiastepus* 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

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. & Maasoumi 32, M. & R. 97490 (TARI)

Astragalus gypsaceus G. Beck 16, M. & R. 101996 (TARI)

Astragalus kiripiczchnikovii Grossh. 30 M. & R. 97482 (TARI)

Astragalus macropelmatus Bunge subsp. *macropelmatus*, M. & R. 101993 (TARI)

Astragalus ovinus Boiss. 12, M. & R. 94741 (TARI)

Astragalus pineterum subsp. *pinetorum* 9, 11, 31 M. & R. 94648 (TARI), 97486 (TARI), 94591 (TARI)

Sect. *Dissitiflori* DC.

Astragalus xiphidium Bunge 28, M. & R. 96603 (TARI)

Sect. *Heterodontus* Bunge

Astragalus guttatus Banks & Soland. 23, M. & R. 96503 (TARI), 96501 (TARI)

Sect. *Hololeuce* Bunge

Astragalus alyssoides Lam. 33, M. & R. 97497 (TARI)

Sect. *Hymenostegis* Bunge

Astragalus bashmaghensis Maassoumi & Podlech 6, 7, M. & R. 93446 (TARI), 94519 (TARI)

Astragalus chrysostachys Boiss. 5 M. & R. 93433 (TARI)

Astragalus hymenostegis Bunge 13, 27, M. & R. 94768 (TARI), 96553 (TARI), 93477 (TARI)

Astragalus lagupoides Lam. 3, M. & R. 93300 (TARI)

Astragalus recognitus Fischer 4, 17, M. & R. 93382 (TARI), 93386 (TARI)

Astragalus seidabadensis Bunge 6, 21, M. & R. 93447 (TARI), 96460 (TARI)

Astragalus tabrizianus Fischer 40, M. & R. 97488 (TARI)

Sect. *Incani* DC.

Astragalus curvirostris Boiss. 20, 30 M. & R. 97485 (TARI), 96441 (TARI)

Astragalus refractus C. A. Mey. 15, 29 M. & R. 93468 (TARI), 97472 (TARI), 94987 (TARI)

Astragalus robustus Bunge 33, M. & R. 97495 (TARI)

Astragalus rollovii Rech.f. 20, 21, M. & R. 96438 (TARI), 101992 (TARI)

Astragalus sabetii Podlech & Maasoumi 6, 7, 29, M. & R. 93468 (TARI), 97478 (TARI), 94542 (TARI), 96294 (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), leaflets 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* Kirchoff

Astragalus dictyolobus C. A. Mey. ex Bunge 27, M. & R. 96555 (TARI)

Sect. *Macrophyllum* Boiss.

Astragalus oleaifolius 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 belgheisicus Maassoumi 34, M. & R. 93463 (TARI).

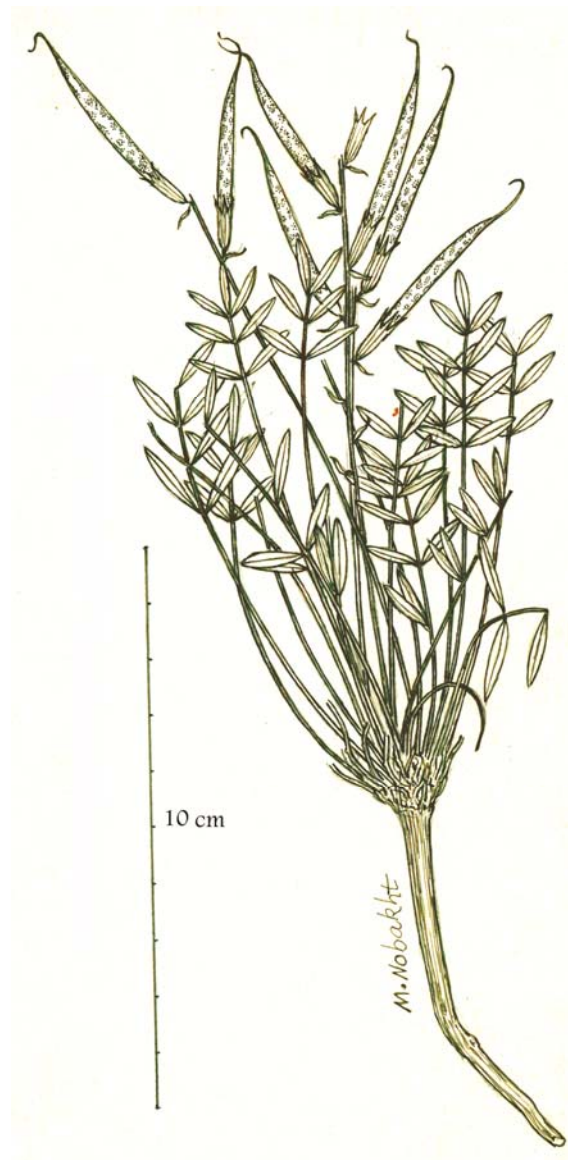


Fig. 1. *Astragalus turkman-chaiensis* Maassoumi, Mozaff. & Ramezani.

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, like the rachis slender, loosely to rather densely covered with, ascending white 0.2–0.3 mm long hairs. Leaflets in 7–10 pairs, elliptic, 6 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, \pm 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; blades 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.

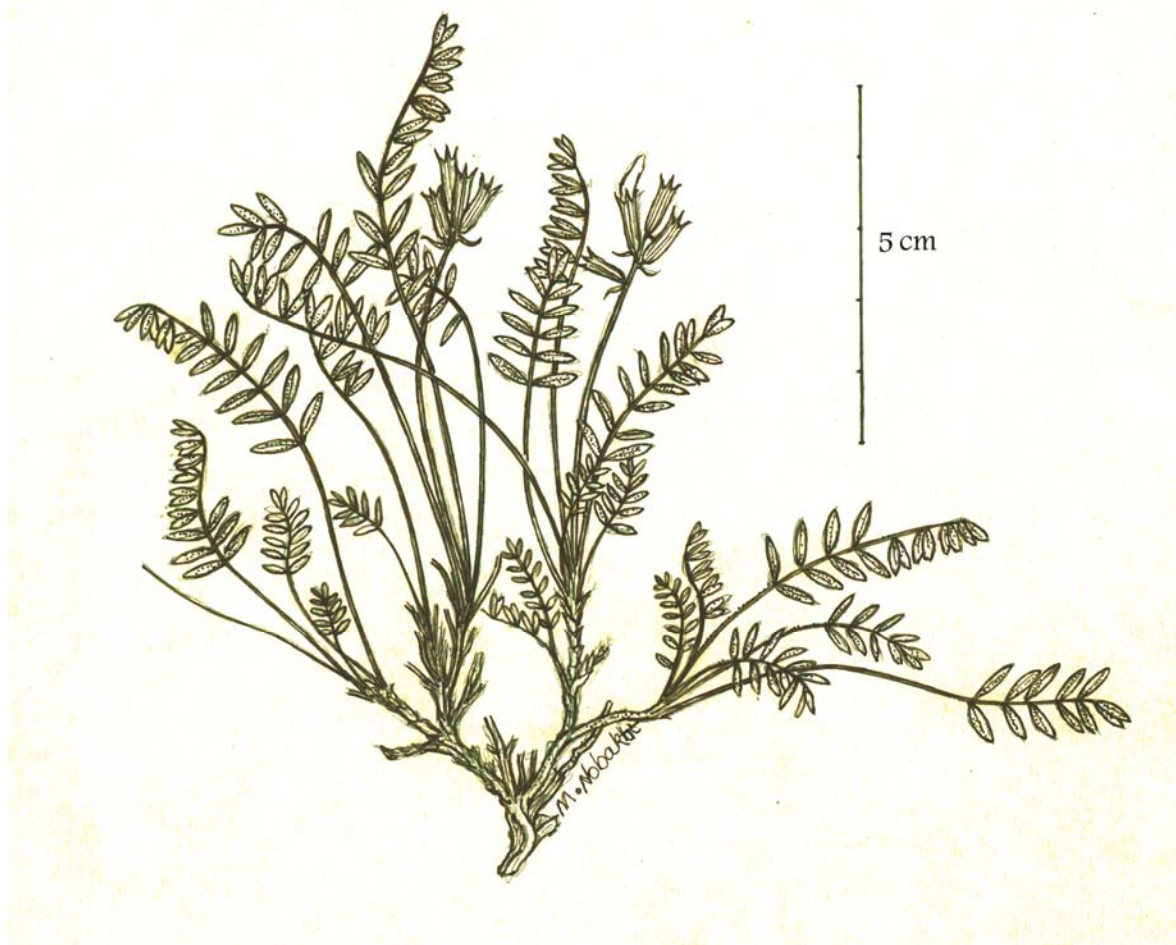


Fig. 2. *Astragalus bozghoushensis* Maassoumi, Mozaff. & Ramezani.

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. 2500m a. s. l., Ramezani & Mozaffarian 101991 (holtypus 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 Boiss. & Hausskn. 29, M. & R. 97471 (TARI), 93268 (TARI)

Astragalus taebiae Zarre & Podlech 26, M. & R. 101997 (TARI)

Sect. *Onobrychioidei* DC.

Astragalus effusus Bunge 26, 30, M. & R. 96541 (TARI), 96483 (TARI)

Astragalus lilacinus Boiss. 29, 32, M. & R. 97480, 97491 (TARI)

Astragalus onobrychis L. 2, M. & R. 101994 (TARI)

Astragalus scapiger Ranjbar & Maassoumi 32, M. & R. 97491 (TARI)

Astragalus vegetus Bunge 6, 27, M. & R. 96554 (TARI), 93465 (TARI)

Sect. *Ornitopodidum* Bunge

Astragalus brachyodontus Boiss. 27, M. & R. 96547 (TARI)

Astragalus glochidiatus Maassoumi 9, M. & R. 94804 (TARI)

Sect. *Oxyglottis* Bunge

Astragalus schmalhauseni Bunge 2 M. & R. 101995 (TARI)

Sect. *Platonychium* Bunge

Astragalus microcephalus subsp. *microcephalus* 2, 14, 22 M. & R. 93311 (TARI), 96478 (TARI)

Astragalus microcephalus subsp. *pyncocladus* 19, M. & R. 96415 (TARI)

Sect. *Platyglottis* Boiss.

Astragalus camptoceras Bunge 9, M. & R. 96611 (TARI)

Sect. *Rhacophorus* Bunge

Astragalus compactus 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 tribuloides 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. *Theiochrus* Bunge

Astragalus siliquosus Boiss. 29, M. & R. 97473 (TARI)

Sect. *Trachycercis* 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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