

STUDIES ON THE AUTUMN PLANTS OF KAVIR, IRAN

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A brief information on the autumn vegetation of Kavirs In Iran is given, followed by the collecting stations. Then list of plants including 104 species is added. *Stipagrostis karelinii* (Trin. & Rupr.) Tzelev (*Gramineae*) and *Zygophyllum eichwaldii* C. A. Mey. (*Zygophyllaceae*) are recorded as new to the flora of Iran. *Salsola abarghuensis* Assadi, sp. nov. and *S. yazdiana* Assadi, sp. nov. (*Chenopodiaceae*) are described as new species to the science. Comments are also given for some of the species presented.

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مطالعاتی در مورد گیاهان پائیزه کویر، ایران
از: مصطفی اسدی

اطلاعات مختصری در مورد پوشش گیاهی کویر و لیست ایستگاههایی که از آن مناطق نمونه برداری شده ارائه میگردد. سپس لیست اسامی گونههایی که شناسایی شده شامل ۱۰۴ گونه اضافه میشود. در این لیست دو گونه گیاهی به نامهای *Stipagrostis karelinii* و *Zygophyllum eichwaldii* برای اولین بار از ایران گزارش داده میشوند و ۲ گونه دیگر به نامهای *Salsola abarghuensis* و *S. yazdiana* بعنوان گونههای جدید برای دانش گیاه شناسی نامگذاری و شرح آنها توضیح داده میشود.

INTRODUCTION

In years 1981 and 1982 two Chenopod excursions made to the Kavirs of Iran by the author and N. Abouhamzeh (a herbarium specimen mounter in the herbarium of Research Institute of Forests and Rangelands). First excursion started from 10. 10. 1981 for 11 days, starting from Tehran going to Kashan, Yazd, Bafgh, Kavirs N. and NE. of Bafgh to the small village Saghandi situated between Tabas and Yazd. Again starting from Yazd in direction of SW. going to the Kavir-e Abarghou and then to Abadeh and Isfahan. Third part of this excursion was to the Eastern part of Esfahan and W. of Batlagh-e Gavkhuni. In this excursion altogether 297 numbers from 36319 to 36616 collected (no. 1—52 in locality list). Second excursion made to the margins of great Kavir of Iran. Starting from Tehran to Semnan and Sabzevar, from Sabzevar to Kashmar and then Tabas and Yazd. From Yazd through the villages E. of Batlagh-e Gavkhuni and going back to Tehran. This excursion started from 21. 10. 1982 for 11 days, collecting 293 numbers from 40002 to 402295 (no. 53—98 in locality list). All originals are deposited in the herbarium of Research Institute of Forests and Rangelands (TARI). In this paper some notes given on the vegetation of the area, followed by the localities list,

then list of species is given. Numbers after names refer to localities list. UTM grid square designations are added in order to make relocation of the localities easier.

NOTES ON THE VEGETATION

As the nature of autumn Chenopod collections demand long distances travelled during the two excursions and because first aim was to collect the plant family *Chenopodiaceae* and not to study the vegetation of the area, which extensive time consuming studies are needed for a limited area. Therefore what is discussed here is a rough explanation on the autumn vegetation of different habitats and also some of the interesting vegetation features seen in the excursions.

Dry steppe vegetation

The characteristic feature of this type of vegetation which mostly seen on limestone hills and foot mountains is plant communities of *Artemisia herba-alba*. This species is dominant and ⁺ always mixed with *salsola tomentosa*. This type of vegetation frequently seen between Tehran and Naein, beginning of the road Yazd to Abarghou, mountains between Semnan and Shahrud and especially on the mountain slopes between Ferdows to Boshrooyeh which make a beautiful

dense coverage of mixed *Artemisia herba-alba* and *Salsola tomentosa*. Following species collected or observed here.

Artemisia herba-alba
Salsola tomentosa
S. orientalis
S. incanescens
S. nitraria
Zygophyllum eurypterum
Aellenia subaphylla
Noaea mucronata
Salvia eremophila
Heliotropium aucheri

In valleys following species are more frequent:

Pulicaria gnaphalodes
Launaea acanthodes
Pteropyrum sp.

Salty wet places

The vegetation of this kind of habitat seen in salty wet riverbeds and flat grounds with underground water table close to the surface of the soil. Especially in the second type of habitat due to the depth of underground water table and, or density of the saltiness, co-centric circles of plant communities seen. Following species from this kind of habitat can be mentioned:

Salicornia herbacea
Halocnemum strobilaceum

Seidlitzia rosmarinus
Suaeda spp.
Bienertia cycloptera
Halostachys bellangeriana
Halimione verrucifera
Limonium iranicum
Cressa cretica
Salsola turkomanica
Halopeplis pygmaea
Aeluropus littoralis
 – *lagopoides*
Phragmites australis
Tamarix spp.
Frankenia hirsuta

Sand dunes

following psammophiles can be mentioned:

Stipagrostis pennata
S. karelinii
S. plumosa
Hammada salicornica
Haloxylon ammodendron
Zygophyllum eichwaldii
Cornulaca leucantha
Calligonum spp.
Heliotropium transoxanum
Agriophyllum minus
A. latifolium
Salsola sclerantha

LIST OF LOCALITIES

1. Tehran: 51 km from Ghom to Kashan

- (WT1), 800 m, flat *Artemisia* steppe.
2. Tehran: 50 km from Kashan to Ardestan (WT4), 1250 m, flat *Artemisia* steppe.
3. Esfahan: 10 km to Ardestan on the road from Natanz (XT2), 950 m, flat desert dominated by *Cornulaca monacantha* Del.
4. Esfahan: 10 km from Ardestan to Zavareh (XS1), 1050 m, flat *Artemisia* steppe.
5. Esfahan: Ardestan, E. of Zavareh (XT2) 950 m, in a *Haloxylon ammodendron* woodland.
6. Esfahan: Ardestan, ca. 20 km E. of Zavareh (XT4), 900 m, salty flat desert.
7. Esfahan: 5 km from Zavareh to Ardestan (XT2), 1000 m, at a brooklet-side.
8. Esfahan: 32 km from Ardestan to Naein (XS1), 1830 m, *Artemisia* steppe.
9. Esfahan: near Naein, Bafran (YS2), 1450 m.
10. Esfahan: 25 — 40 km from Naein to Anarak (YS1, 2), 1120 m, flat *Artemisia* desert.
11. Esfahan: 25 km from Naein to Anarak (YS2), 1300 m, flat *Artemisia* steppe.
12. Yazd: 61 km from Naein to Ardakan (YS2), 1120 m, Salty place.
13. Yazd: 29 km to Ardakan from Naein (YR3), 1100 m.
14. Yazd: 8 km to Ardakan from Naein (YR3), 1000 m.
15. Yazd: 21 km from Ardakan to Yazd (BA1), 1100 m.
16. Yazd: beginning of Bafgh road (BA4), 1200 m.
17. Yazd: 26 km from Yazd-Kerman road to Bafgh (BA4), 1200 m, Pebbly desert of *Hammada salicornica*.
18. Yazd: 36 km from Yazd-Kerman road to Bafgh (BA4), 1320 m, mountain base of *Artemisia* steppe.
19. Yazd: 57 — 67 km from Yazd-Kerman road to Bafgh (CA2), 1280 m, in a wadi dominated by *Seidlitzia rosmarinus*.
20. Yazd: near Bafgh, Rud-e Shur (CV1), 950 m, river bed with salty soil.
21. Yazd: ca. 15 — 25 km NE. of Bafgh (CA4), 900 m, sand dunes.
22. Yazd: ca 40 km NE. of Bafgh (CA4), 1200 m, sterile slopes.
23. Yazd: ca. 75 — 85 km NE. of Bafgh (CA3), 1750 m, *Artemisia* steppe.
24. Yazd: 4 km from Saghandi to Khoranagh (CA1), 1350 m.
25. Yazd: 43 km from Saghandi to Khoranagh (BA3), 1100 m, Pebbly flat desert.
26. Yazd: near Khoranagh (BA3), 1600 m.
27. Yazd: 11 km from Khoranagh to Yazd (BA3), 1750 m.
28. Yazd: 42 km from Khoranagh to Yazd (BA3), 1200 m, river bed dominated by *Cornulaca monacantha*.

29. Yazd: 6 km from Yazd to Mehriz (BA4), 1200 m, in field.
30. Yazd: 20 km from Mehriz to Dehshir (BV3), 1600 m, *Artemisia* steppe.
31. Yazd: 46 — 53 km from Mehriz to Abarghou (BV1), 2200 m, slopes dominated by *Artemisia*.
32. Yazd: ca. 40 km SE. of Dehshir (YQ3), 1750 m, *Artemisia* steppe.
33. Yazd: ca. 30 km S. of Dehshir (YQ3), 1600 m, Partly sand dunes.
34. Yazd: ca. 11 km from Dehshir to Abarghou (YQ3), 1500 m.
35. Fars: 6 km W. of Abarghou (YQ2), 1500 m.
36. Fars: 31 km W. of Abarghou, near Faragheh (YQ2), 1700 m.
37. 23 km to Abadeh from Shiraz (XQ4), 1850 m, flat place dominated by *Anabasis aphylla*.
38. Fars: 28 km From Abadeh to Shahreza (XQ1), 2200 m.
39. Esfahan: 10 km from Shahreza to Esfahan (WR3), 1600 m.
40. Esfahan: ca. 50 km SE. of Esfahan, near Mohammadbabad (WR3), 1450 m, flat place dominated by *Anabasis aphylla*.
41. Esfahan: ca. 85 — 114 km SE. of Esfahan, near Yangabad (XR1), 1500 m, partly gypsum soil dominated by *Anabasis calcarea*
42. Esfahan: ca. 120 km SE. of Esfahan, 7—14 km from Hoseinabad to Varzeneh (XR3), salty wet place.
43. Esfahan: W. of Batlagh-e Gavkhuni, 41 km from Hoseinabad to Varzeneh (XR3), 1350 m, salty wet place.
44. Esfahan: W. of Batlagh-e Gavkhuni (XR3), 1350 m.
45. Esfahan: 19 km S. of Kuhpayeh, near Harand (XS2), 1500 m.
46. Esfahan: 4 km from Kuhpayeh to Esfahan (XS2), 1650 m, flat *Artemisia* steppe.
47. Esfahan: Murche-Khort (WS1), 1600 m, dominated by *Anabasis aphylla*
48. Esfahan: 7 km from Meimeh to Delijan (WT2), dominated by *Anabasis aphylla*
49. Esfahan: 42 km from Meimeh to Delijan (VT4).
50. Esfahan: 35 km to Delijan from Meymeh (VT4), 1700 m.
51. Tehran: 11 km from Neyzar to Ghom, 1100 m.
52. Tehran: 11 km from Ghom to Tehran, 1800 m.
53. Tehran: ca. 20 km from Garmsar to Semnan (XV2), 800 m, salty wet soil dominated by *Halocnemum strobilaceum*.
54. Semnan: Sorkheh (YV2), 1100 m.
55. Semnan: 5 km S. of Semnan (YV3), 1100 m.
56. Semnan: 24 km SE. of Semnan (YV2), 1200 m.
57. Semnan: 15 — 22 km from Semnan to Damghan (YV1), 1500 — 1700 m.

58. Semnan: 31 km from Semnan to Damghan (YV1), 2000 m.
59. Semnan: 15 km to Damghan from Semnan (BE1), 1200 m.
60. Semnan: 10 — 25 km from Shahrud to Sabzevar (CF2), 1400 m, flat *Artemisia* steppe.
61. Semnan: 33 km from Shahrud to Sabzevar (CF2), 1500 m.
62. Semnan: 89 km from Shahrud to Sabzevar (CF2), 1300 m.
63. Semnan: 117 — 130 km from Shahrud to Sabzevar (DF2), 1200 m.
64. Semnan: 144 km from Shahrud to Sabzevar (DF4), 900 m, salty wet place.
65. Khorasan: between Mazinan and Khosroabad (DF4), 900 m.
66. Khorasan: 6 — 8 km from Davarzan to Sabzevar (DF4), 1000 m.
67. Khorasan: Sabzevar, Haresabad (E-E3), 1000 m.
68. Khorasan: 33 km from Sabzevar to Kashmar, after Halakabad (EE3), 1600 m.
69. Khorasan: 65 — 87 km from Sabzevar to Kashmar (EE2), 1400 — 1500 m, salty wet place.
70. Khorasan: 102 km from Sabzevar to Kashmar (EE2), 1300 m.
71. Khorasan: SW. of Kashmar, 8 — 14 km from Kondor to Bajestan (ED1), 1000 m.
72. Khorasan: SW. of Kashmar, 35—52 km from Kondor to Bajestan (ED3), 800 — 900 m.
73. Khorasan: near Bajestan (FD2), 1200 m.
74. Khorasan: 40 km from Bajestan to Ferdows (FC1), 1700 m.
75. Khorasan: 6 km from Ferdows to Boshrooyeh (FC1), 1300 m, *Artemisia* steppe.
76. Khorasan: 40 km from Ferdows to Boshrooyeh (EC4), 1250 m, *Artemisia* steppe.
77. Khorasan: 21 km to Boshrooyeh from Ferdows (EC1, 3), 1000 m.
78. Khorasan: Boshrooyeh (CE2), 900 m.
79. Khorasan: 18 — 36 km from Boshrooyeh to Tabas (EC2), 900 m.
80. Khorasan: 90 km from Boshrooyeh to Tabas (EC2), 900 m.
81. Khorasan: 15 km to Tabas on the road from Boshrooyeh (EC2), 800 m, wadi dominated by *Cornulaca monacantha*.
82. Khorasan: near Tabas (DC4), 1000 m.
83. Khorasan: 50 km from Tabas to Yazd (DC4), 1000 m.
84. Khorasan: 107 km from Tabas to Yazd (DB1), 1300 m, *Artemisia* steppe.
85. Khorasan: 121 km from Tabas to Yazd (DB1), 1350 m, sand dune.
86. Khorasan: 169 km from Tabas to Yazd (DB1), 900 m.
87. Yazd: near Robot-e Posht-e Badam (CB3), 1300-1700 m.

88. Yazd: 243 km from Tabas to Yazd (CB3), 1200 m, sand dune.

89. Yazd: Tabas road, near Saghandi (CB2), 1300 m.

90. Yazd: 12 km from Yazd to Taft (BA2), 1500 m.

91. Yazd: ca. 30 km W. of Taft, near Nasrabad (YR4), 2500 m.

92. Yazd: ca. 50 — 60 km NWW. of Taft, near Nadushan (YR4), 2100—2300 m.

93. Yazd: ca. 70 km NW. of Taft, near Soork (YR4), 2300 m, salty wet soil dominated by *Halocnemum strobilaceum*.

94. Yazd: near Aghda (YR3), 1500 m, dried river bed.

95. Yazd: 62 km to Naein from Aghda (YR3), 1300 m, salty wet river bed.

96. Esfahan: 58 km to Ardestan from Naien (YS1, 3) 2000 m.

97. Tehran: ca. 40 km E. of Kashan (WT3), 800 m, sand dune.

98. Tehran: 24 km E. of Kashan (WT3), 900 m, ⁺salty wet place.

LIST OF SPECIES

ANGIOSPERMAE - DICOTYLEDONES

Boraginaceae

Heliotropium cf. *agdense* Bge. — 16.
In Riedl (1967) only known from the type locality near Aghda.

H. aucheri DC. — 8, 15, 16, 26, 28.

H. transoxanum Bge. — 43, 66, 71, 77.

Capparidaceae

Cleome heratensis Bge. & Bien. ex Boiss. — 66.

Locally a very frequent species.

Cleome sp. — 16.

Chenopodiaceae

Aellenia auriculata (Moq.) Ulbrich — 71.

A. glauca (C. A. Mey.) Aellen — 61.

A. subaphylla (C. A. Mey.) Aellen — 18, 21, 23, 33, 49, 56, 58, 59, 60, 71, 76, 80, 84, 87.

Agriophyllum latifolium Fisch. & C. A. Mey. — 77, 85.

Ag. minus Fisch. & C. A. Mey. — 43

Anabasis aphylla L. — 37, 38, 39, 40, 41, 47, 48, 50, 55, 57, 59, 60, 92, 96.

Especially a very frequent species on heavy soil in flat areas around Esfahan.

An. calcarea (Sharif & Aellen) Bokhari & Wendelbo — 34, 41, 56.

Syn. *Esfandiarica calcarea* Sharif & Aellen
Always found on whitish Soil with gypsum. The only plant growing in places with a high density of gypsum.

An. eriopoda (Schrenk) Benth. — 62

Only found in small. patches of whitish clay soil on slopes of small hills.

An. setifera Moq. 1, 9, 11, 14, 15, 16, 17, 19, 20, 21, 22, 26, 28, 33, 34, 35,

36, 41, 43, 46, 52, 56, 59, 62, 63, 64, 79, 80, 82, 86, 87, 89, 90, 92.

This species always recorded as a perennial species, but in the areas mentioned, small annual plants mostly on not stabilized soils seen which believed to be only annual specimens of this species, in some places even annuals and perennials grow together, hence synonymy of *A. annua* Bge. with this species has to be considered. I have not seen the type specimen of *A. annua*, but comparing with the description, it may be that the description of *A. annua* has been based on a more fleshy annual specimen of *A. setifera*, often found on soft soils along the roads.

Anthochlamis multinervis Rech. f. — 52, 56, 71.

Atriplex cf. *tatarica* L. — 5, 42, 44, 54, 67.

At. turcomanica Fisch. & C. A. Mey. — 54, 63.

Bienertia cycloptera Bge. ex Boiss. — 65, 67, 69, 72, 75.

Ceratocarpus arenarius L. — 47, 60, 66.

Chenopodium urbicum L. — 49

Cornulaca leucantha Charif & Aellen — 9, 41, 43, 45, 52, 77, 85, 97.

Co. monacantha Del. — 3, 4, 5, 6, 10, 16, 17, 18, 21, 28, 29, 32, 33, 35, 81, 82, 90, 94.

Eurotia ceratoides (L.) C. A. Mey. — 60, 61.

Gamanthus gamocarpus (Moq.) Bge. — 71.

Girgensohnia oppositiflora (Pall.) Fenzl — 16, 29, 39, 41, 71, 74, 75.

Halanthium rariflorum C. Koch — 40, 41, 45, 51, 56, 87, 92.

Halimione verrucifera (M. B.) Aellen — 50, 67

Halocnemum strobilaceum (Pall.) M. B. — 12, 20, 42, 43, 44, 53, 64, 67, 69, 76, 89, 93, 95.

Pure stands of this species seen in many places on salty wet soil.

Halopeplis pygmaea (Pall.) Bge. — 42, 43, 44, 64, 67, 69.

Halostachys bellangerian (Moq.) Botsch. — 44, 67, 93.

Halotis occulta Bge. — 56, 70, 71.

Specimens identified as *Halimocnemis longifolia* Bge. by P. Wendelbo in K. H. Rechinger (1977 p. 163) are identical with my specimens. I have not seen the type or authentically named material of *H. occulta* but my specimens fit well with the description of this species. Presence of small wings on the outer perianth segments of mentioned specimens which separate the genus *Halotis* from *Halimocnemis* is a good reason that correct generic name is *Halotis* and not *Halimocnemis*. In P. Wendelbo (l. c.) *H. occulta* included as a synonymy in *H. pilifera* (Moq.) Botsch., but in original description of *H. occulta* 5 perianth segments as

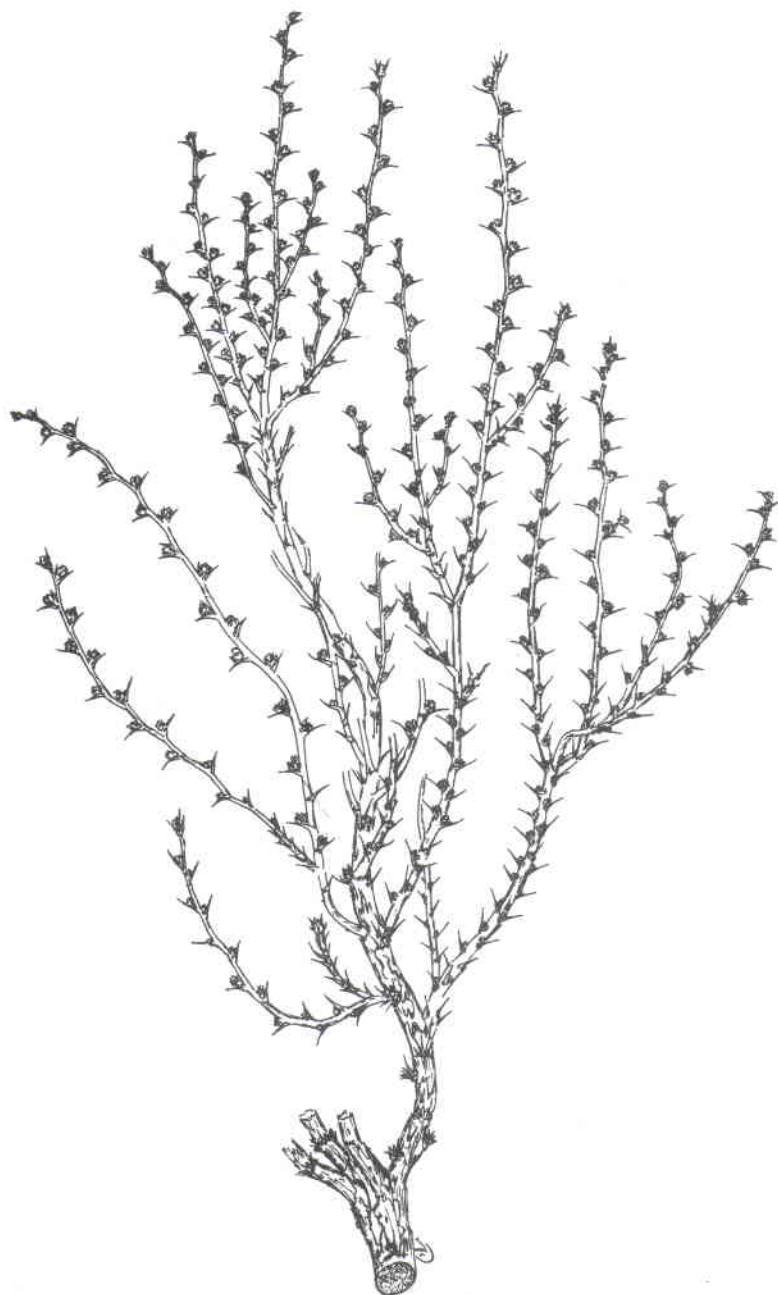


Fig. 1. *Cornulaca monacantha* (x 1/2).

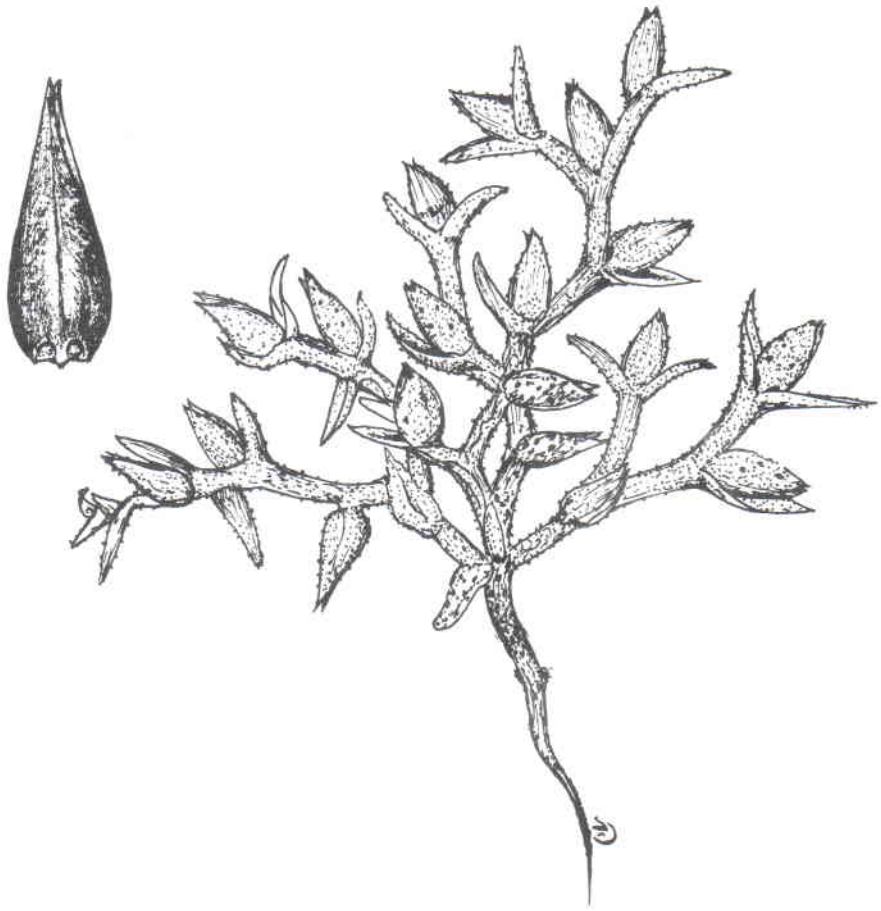


Fig. 2. *Halotis occulta* (nat. size; fruit x3).

seen in above mentioned specimens is a good character to recognize it from *H. pilifera* and therefore synonymy of them must be quite uncertain.

Halotis pilifera (Moq.) Botsch. syn.: *Halotis pilosa* (Moq.) Iljin — 22, 50, 56, 60, 62, 63, 69, 89.

Haloxylon ammodendron (C. A. Mey.) Bge. syn.: *H. aphyllum* (Minkw.) Iljin

— 5, 22, 33, 55, 60, 63, 71, 81, 82, 87. Shrubs to trees ca. 5 m high. In locality no. 5 making dense woodland. Cultivated in many places, mostly for stabilization of sand dunes. Easily has been escaped from the cultivation and therefore single shrubs frequently seen.

Haloxylon persicum Bge. — 67.

Cultivated tree to about 10 m high.

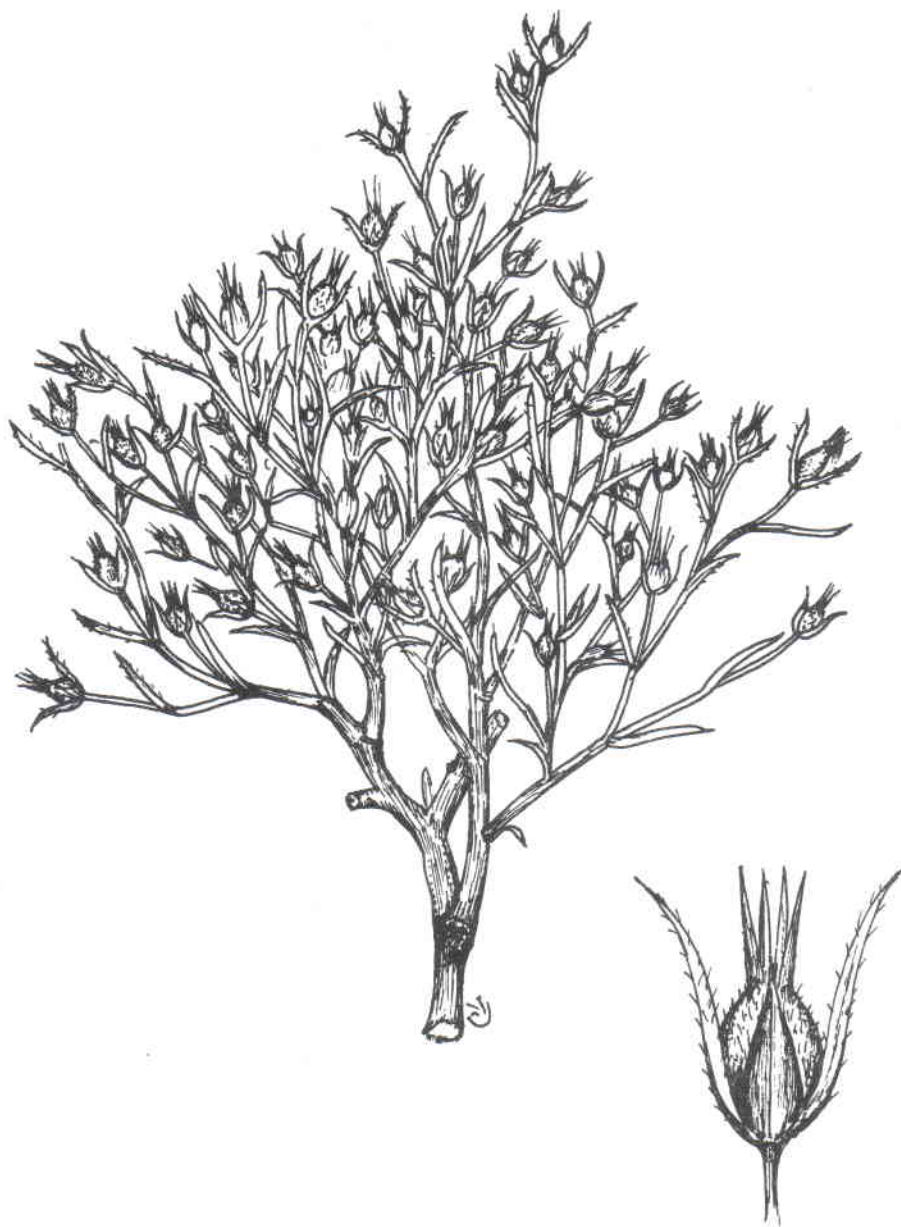


Fig. 3. *Halotis pilifera* (nat. size; fruit x4).

Hammada salicornica (Moq.) Iljin syn.:
Haloxylon salicornicum Moq. — 16, 17,
21, 33, 77, 82, 84.

Horaninowia platyptera Charif & Aellen
— 18, 22, 35, 56, 60, 66, 86.

Kochia stellaris Moq. ssp. *stellaris* — 16,
35, 60, 61, 66, 81.

Kochia scoparia (L.) Schrad. — 49.

A road side weed.

Noaëa mucronata (Forssk.) Aschers. &
Schwein. — 1, 31, 37, 39, 48, 60.

Petrosimonia glauca (Pall.) Bge. — 43,
50, 63.

P. triandra (Pall.) Simonk. — 42.

Salicornia herbacea L., s. l. — 44, 50.

***Salsola abarghuensis* Assadi, sp. nov.**

Frutex usque ad 2 m altus. Caules plures
et profuse ramosi; rami juniores eburnei;
hornotini dense pilosi. Folia usque ad 2
cm longa et 3—4 mm lata, carnosa, ter-
etia, inferiora alterna, superiora plus
minusve opposita, obtusa, supra bases
dilatatum constricta. In axillis foliorum
fasciculis pilorum praedita, post lapsum
folium persistens. Inflorescentia apicalis,
ramosa et dense spiciformis. Bracteae
carnosae, ovatae vel suborbiculatae, mar-
ginibus scariosis, 1.5 mm longae, perian-
thiis multo brevioribus. Bracteolae brac-
teis equiformae et equimagnae, margine
late scariosae. Perianthii segmenta 5,
membranacea, obtusa, linearo-lanceolata,
2 mm longa. Perianthium fructiferum
alatum ca. 6 mm latum. Alae stramineae

vel dilute brunneae ca. perianthio medio
insertae, inaequales, obovatae ca. 2 mm
longae. Stamina exserta; antherae 1 mm
longae, appendiculatae, usque ad app-
endices separatae. Stylus brevis ca. 0.4
mm longus, plus minusve stigmatate aeq-
uilongus. Semina horizontalia.

Typus: Persia, Province Yazd, 30 km S.
of Dehshir, Kavir-e Abarghou, on soft
solonchak soil (YQ3), 1500 m, 16. 10.
1981, Assadi & Abouhamzeh 36481
(Holotypus TARI).

Shrub to 2 m high, many stemmed and
profusely branched. Younger branches
ivory white; branches of the current year
densely hairy. Leaves to 2 cm long, 3—4
mm broad, fleshy, terete, lowers alter-
nate, uppers [±] opposite, obtuse, con-
stricted above the dilated base. Hair
bundle present in axil of leaves, rem-
aining after fall. Inflorescence apical,
branched and densely spiciform. Bracts
fleshy, ovate to suborbicular, scarious at
margin, 1.5 mm long, much smaller than
perianths. Bracteoles similar in shape and
size to bracts, broadly scarious at margin.
Perianth segments 5, membranous, ob-
tuse, linear-lanceolate, 2 mm long. Fru-
iting perianth winged, about 6 mm bro-
ad; wings straw coloured to pale brown,
about the middle of perianths inserted,
inequal, obovate, ca. 2 mm long. Sta-
mens excluded; anthers 1 mm long,
shortly appendaged, separated to the

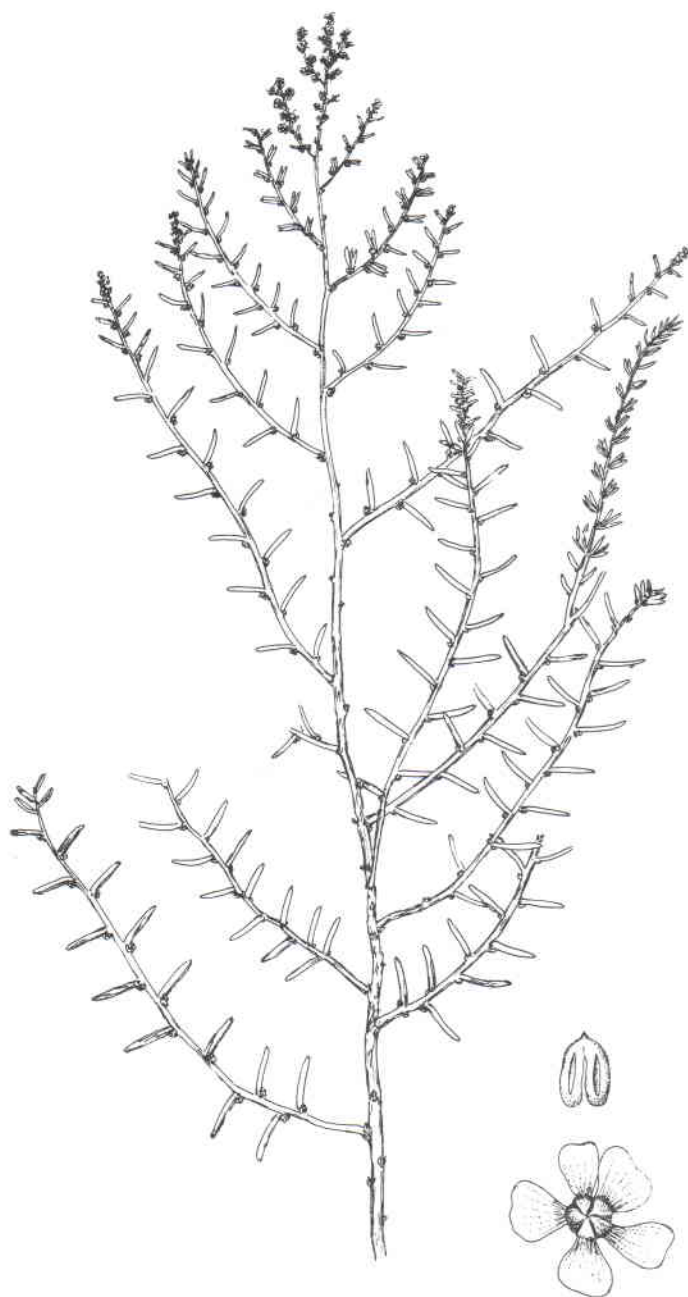


Fig. 4. *Salsola abarghuensis* (x 1/2; fruit x3; anther x 9).

appendages. Style short ca. 0.4 mm long, + as long as stigma. Seed horizontale.

The new species is very distinct species which most close affinities should be in the Sec. *Anchophyllum* Iljin. It is distinguishable from most species of this section (if not all) by having bracts equal to the bracteoles, whereas in the species of this section bracts are always much longer than bracteoles.

Comparing new species with *S.arbuscula* pall., *S.arbusculiformis* Drob., *S.laricifolia* (Turcz.) Litw. and *S. richteri* karel. of the Sec. *Anchophyllum* more to the completely different habit and size of bracts in relation to bracteoles following differences can be mentioned: Usually taller shrub, leaves cylindrical and not filiform of subfiliform, fruiting perianths smaller (cf. Komarov Flora of the USSR Volume 6).

S. abarghuensis is the only plant growing in places closer to the centre of desert with extreme habitat. The soil is very characteristic with a hard raised up layer and no real construction. The humidity and solouble salt are in high amount.

Young branches of the new species readily eaten by camels.

Salsola arbuscula pall. — 63, 84, 86, 87.

S. dendroides pall. — 33, 63, 68, 74.

S. incanescens C. A. Mey. — 4, 5, 6, 14,

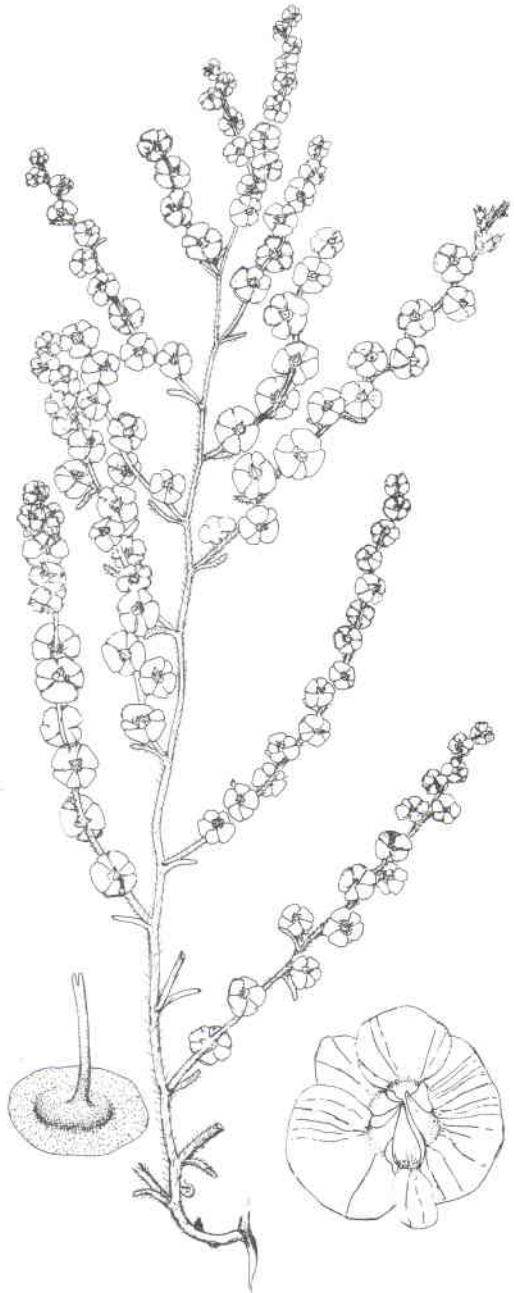


Fig. 5. *Salsola lanata* (x 1/2; fruit x 2.3; ovary x 6.5).

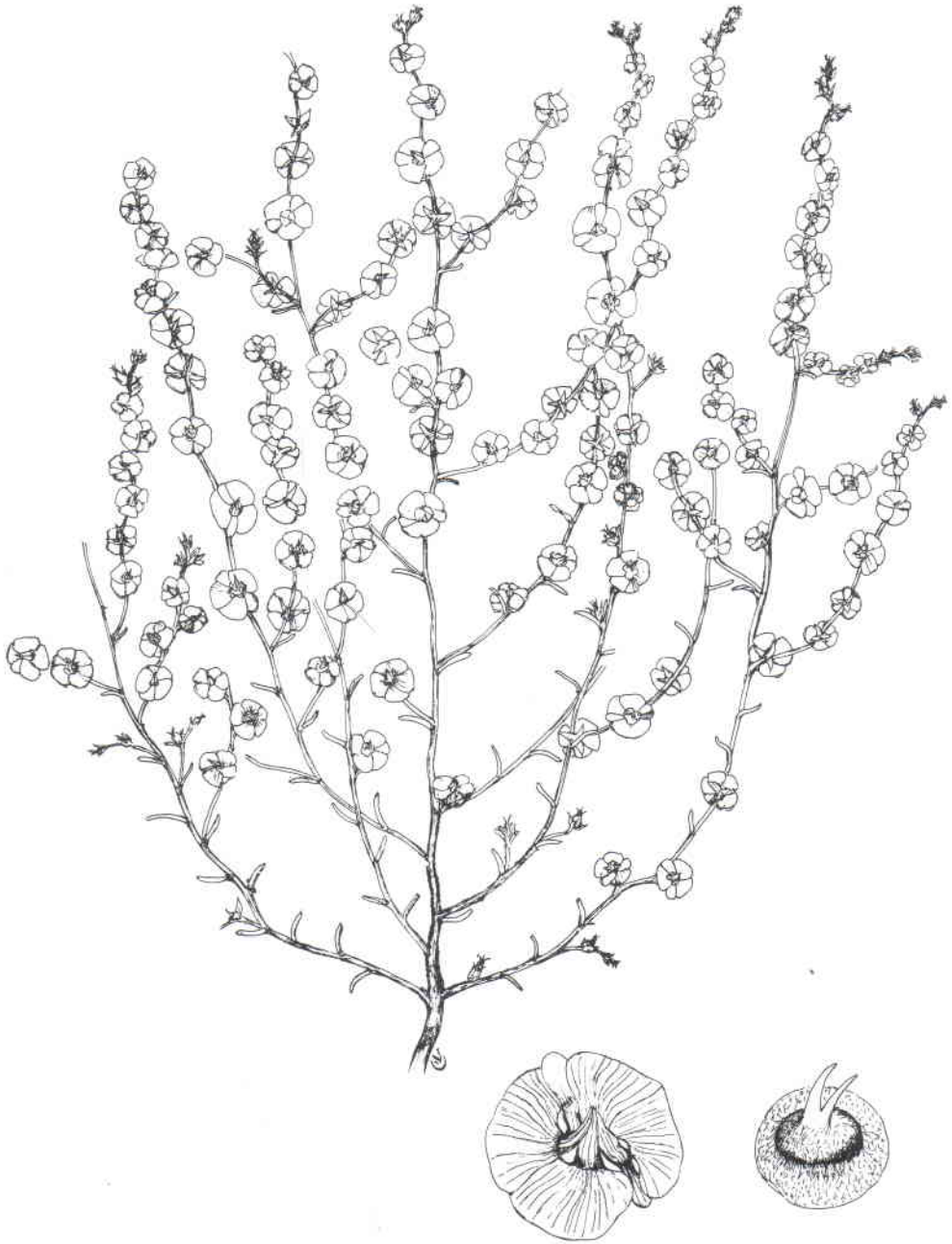


Fig. 6. *Salsola turkomonica* (x 1/2; fruit x 2; ovary x6).

20, 23, 29, 47, 50, 52, 68.

S. kali L. — 16, 48.

S. lanata pall. — 22, 50, 54.

S. leptoclada Gand. — 71.

S. nitraria Pall. — 8, 17, 26, 33, 40, 41, 47, 49, 60, 62, 63, 65, 69, 70, 76, 77, 86, 87.

S. orientalis Gmel. Syn.: *S. rigida* pall. — 56, 60, 61, 96.

S. sclerantha C. A. Mey. — 54, 77.

S. tomentosa (Moq.) Spach. Syn. *S. aurantiaca* Bge. ex Boiss. — 1, 2, 8, 9, 10, 11, 16, 18, 21, 22, 23, 24, 25, 26, 31, 32, 35, 36, 40, 41, 45, 46, 47, 51, 53, 54, 56, 57, 60, 61, 63, 64, 71, 73, 74, 75, 76, 78, 84, 87, 90, 92, 96.

The most common shrubby species of the area growing together with *Artemisia herba-alba* on foot hills and mountain slopes. Fruit wing variously coloured from yellow to orange and red, † always deeper at centre.

S. turkomanica Litw. — 14, 20, 33, 38, 41, 42, 50, 53, 55, 56, 63, 65, 67, 69, 71, 72, 78, 82, 86.

Salsola yazdiana Assadi, sp. nov.

Frutex 50 — 100 cm altus, omnino profuse ramosus. Rami juniores squamis valde angustis diaphanis tectis. Folia alterna, triangularia, curva, semiamplexicaulia, usque ad 4 mm longa, dense hispida. Bracteae foliorum similes sed minores, ca. 1.5 mm longae. Bracteolae

bracteis duplo longiores et latiores. Inflorescentia ramosa et spiciformis. Flores solitarii. Perianthium floriferum conicum, squamis angustis dense adpressis tectum, 4—5 mm longum; Perianthii segmenta ovata vel ovato-lanceolata, acuta, basi foliacea, apice scariosa. Perianthium fructiferum alatum, 6—8 mm latum. Alae inequales, cremaeae vel interdum rubrae. Antherae ad media separatae, appendiculatae, ca. 3 mm longae; appendix flava, lanceolata, 0.7 mm longa. Stigma stylo parum breviora. Semen horizontalis.

Typus: Persia, Province Yazd, 61 km from Kerman junction on the road to Bafgh (CA2) 1000 m, 13. 10. 1981, Assadi & Abouhamzeh 36410 (Holotypus TARI). It was also collected in locality no. 21, 23, 24, 56, 87.

Shrub 50 — 100 cm high, profusely branched throughout. Young branches covered with very narrow transparent scales. Leaves alternate, triangular, curved, semiamplexicaule, to 4 mm long, densely hairy. Bracts similar to the leaves, but smaller, ca. 1.5 mm long. Bracteoles double longer than the bracts and broader. Inflorescence branched and spike-like. Flowers solitary. Flowering perianth cone-shaped, densely covered with appressed narrow scales, 4—5 mm long; perianth segments ovate or ovate-lanceolate, acute, foliaceous at the base, sca-

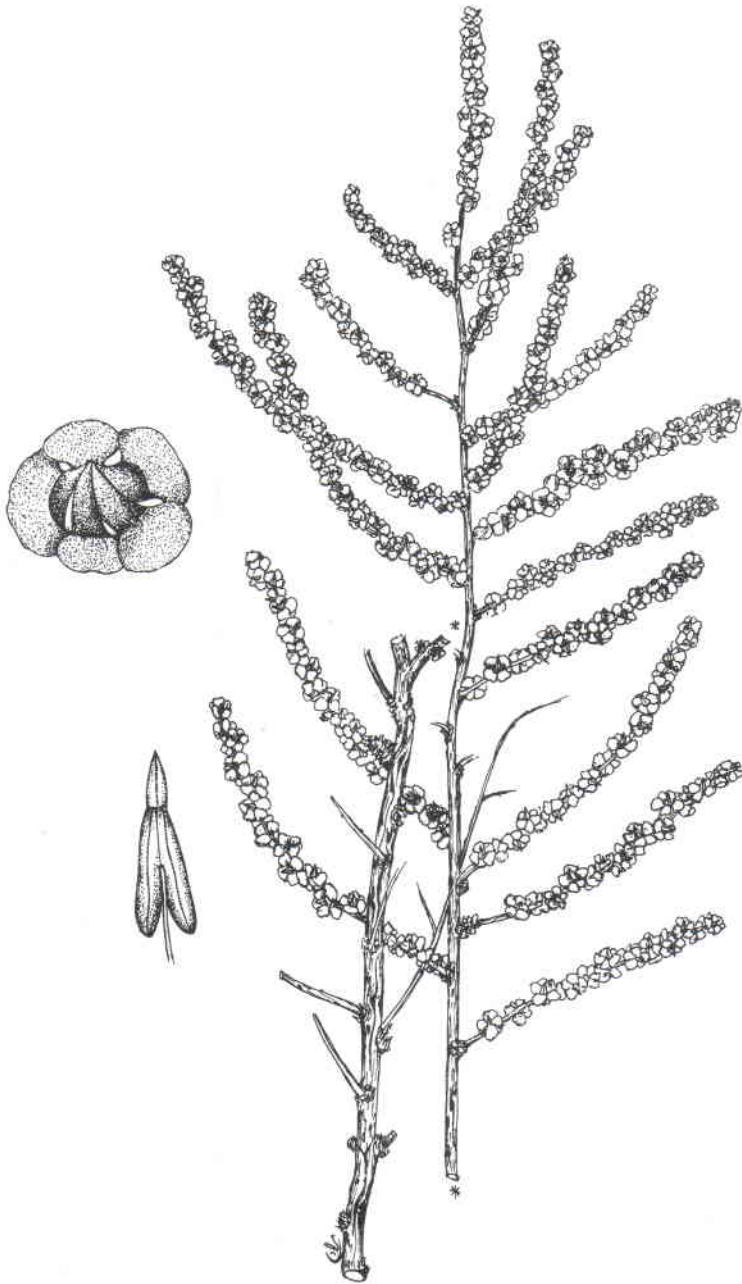


Fig. 7. *Salsola yazdiana* (x 2/3; fruit 2.4; anther 6.3).

rious at the top. Fruiting perianths winged, 6–8 mm broad, wings unequal, cream-coloured or sometimes red. Anthers separated to the middle, appendaged, ca. 3 mm long; appendix yellow, lanceolate, acute, 0.7 mm long. Style 1.3 mm long. Stigma a little shorter than the style, obtuse. Seed horizontale.

The new species most closely related to *S. gemmascens* pall. but more to the different habit and branching system following differences can be mentioned: shrub to 1 m high, woody base of plants well developed to long distance from the soil surface, anthers much longer about 3 mm separated to the middle, stigma \pm equal with the style. In *S. gemmascens*: shrub up to 50 cm, woody only at the base of stem, anthers much smaller about 1 mm separated to the summit, stigma much longer than the style.

S. sp. — 1, 56, 71, 77, 81, 82, 89.

An annual plant possibly close to *S. incanescens* C. A. Mey. but different in habit, indumentum etc.

Salsola spp. — 45, 62.

Seidlitzia cinerea (Doq.) Bge. ex Botsch. — 5, 16, 19, 22, 27, 35, 36, 38, 41, 49, 56, 60, 89, 92.

An annual plants which sometimes in herbariums named *Anabasis annua* Bge. *S. rosmarinus* (Ehr.) Bge. — 11, 12, 19,

20, 28, 33, 34, 43, 44, 52, 80, 83, 86, 88, 89, 95, 97.

Suaeda arcuata Bge. — 19, 20, 42, 44, 53, 67, 69, 72, 87.

S. microphylla pall. — 63.

S. spp. — 6, 7, 69, 44.

Compositae

Artemisia herba-alba L. — 5, 8, 10, 14, 17, 23, 27, 30, 36, 38, 39, 41, 46, 48, 51, 52, 54, 56, 57, 60, 63, 66, 69, 73, 75, 76, 77, 79, 84, 87, 92.

A. spp. — 57, 58, 61, 68, 69, 81, 91.

Cousinia congesta Bge. — 71.

Echinops sp. — 16.

Hertia angustifolia (DC.) O. Kuntze — 92.

Jurinea stenocalathia Rech. f. — 58.

Launaea acanthodes (Boiss.) O. Kuntze — 1, 4, 66.

Pulicaria gnaphalodes (Vent.) Boiss. — 2, 13, 16, 36, 40, 53, 66, 68, 79, 87.

Scariola orientalis (Boiss.) Sojak — 16.

Cruciferae

Farsetia heliophila Bge. ex Cosson — 24, 25.

Fortuynia garcinii (Burm.) Shuttlew. — 16.

Matthiola dumulosa Boiss. & Buhse — 61.

Cucurbitaceae

Citrullus colocynthus (L.) Schrad. — 13, 18.

Euphorbiaceae

Andrachne telephioides L. — 54.

Chrozophora hierosolymitana Spreng. — 29.

Euphorbia granulata Forssk. — 97.

E. sp. — 91.

Frankeniaceae

Frankenia hirsuta L. 69.

Labiatae

Salvia eremophila Boiss. — 2, 13, 31, 36, 79, 94.

In some places such as locality no. 31 very frequent, even dominant plant in the area.

Leguminosae

Alhaji camelorum Fisch. — 6.

Prosopis farcta (Banks & Sol.) Macbride — 14, 55.

Sophora pachycarpa C. A. Mey. — 68.

Malvaceae

Alcea aucheri (Boiss.) Alef. — 39.

Plumbaginaceae

Limonium iranicum (Bornm.) Lincz. — 1/2).

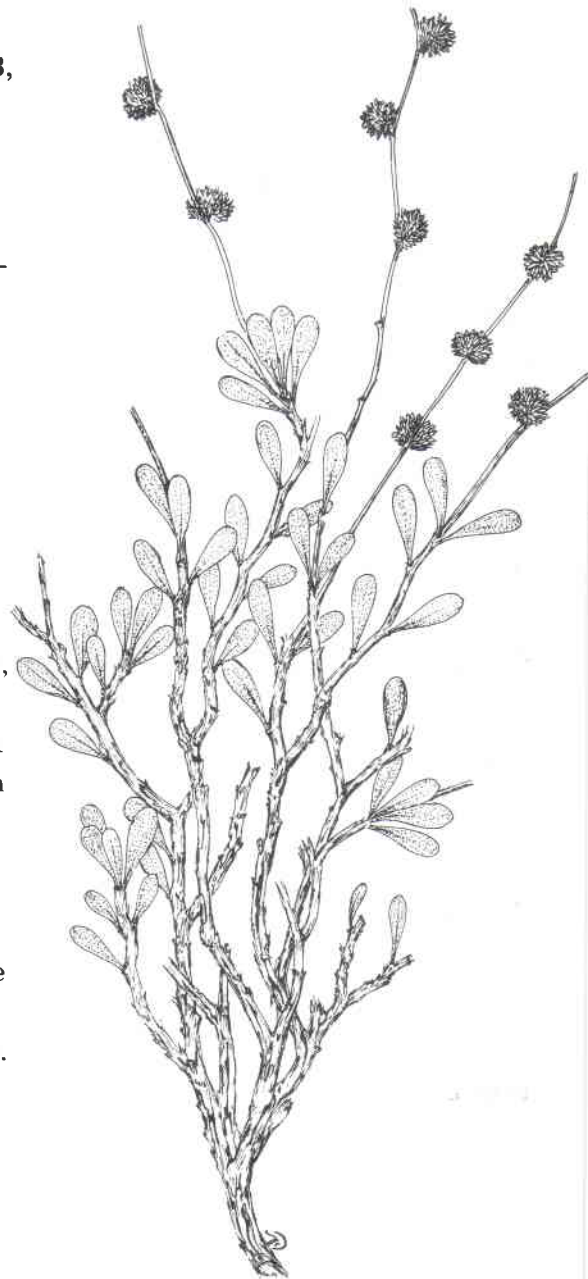


Fig. 8. *Limonium suffruticosum* (x 1/2).

53, 69.

L. suffruticosum (L.) O. Kuntze — 83.**Primulaceae***Dionysia janthina* Bornm. & Wink. — 31.**Resedaceae***Reseda aucheri* Boiss. ssp. *rotundifolia* (Kotschy ex Mull. — Arg.) Rech. f. — 71.**Rutaceae***Haplophyllum robustum* Bge. — 77.**Solanaceae***Lycium depressum* Stocks — 51.*L. ruthenicum* Murray — 54.**Tamaricaceae***Reaumuria cistoides* Adam. — 4.*R. oxiana* (Ledeb.) Boiss. — 24, 89.

Described from Central Asia and in Helene Schiman-Czeika (1964 P. 2) only known from an old Bunge's gathering in Khorassan.

R. turkestanica Gorschk. — 27, 56, 71.*Tamarix aphylla* (L.) Karst. — 33.

Most probably cultivated.

T. aucheriana (Decne) Baume — 44.*T. spp.* — 7, 51.**Umbelliferae***Echinophora platyloba* DC. — 60.*Pycnocyla spinosa* Decaisn. — 36.**Zygophyllaceae***Fagonia bruguieri* DC. — 16.*Tribulus longipetalus* Viv. ssp. *macropterus* (Boiss.) Maire ex Ozenda & Quezel — 1, 21, 77.*Zygophyllum eichwaldii* C. A. Mey. — 43, 67, 98.

A semishrub plant to 50 cm high. Leaves consist of a pair of leaflets and petiole, petiole terminates to a mucro or linear-lanceolate organ. Capsule globose, 5 ribbed, 9 x 9 mm.

This species has not been recorded for Iran and not included in *zygophyllaceae*, K. H. Rechinger, flora Iranica (1972). It was previously known from Central Asia.**ANGIOSPERMAE — MONOCOTYLEDONES****Cyperaceae***Cyperus* sp. — 44.*Scirpus* sp. — 97.**Gramineae***Aeluropus lagopoides* (L.) Trin ex Thw-

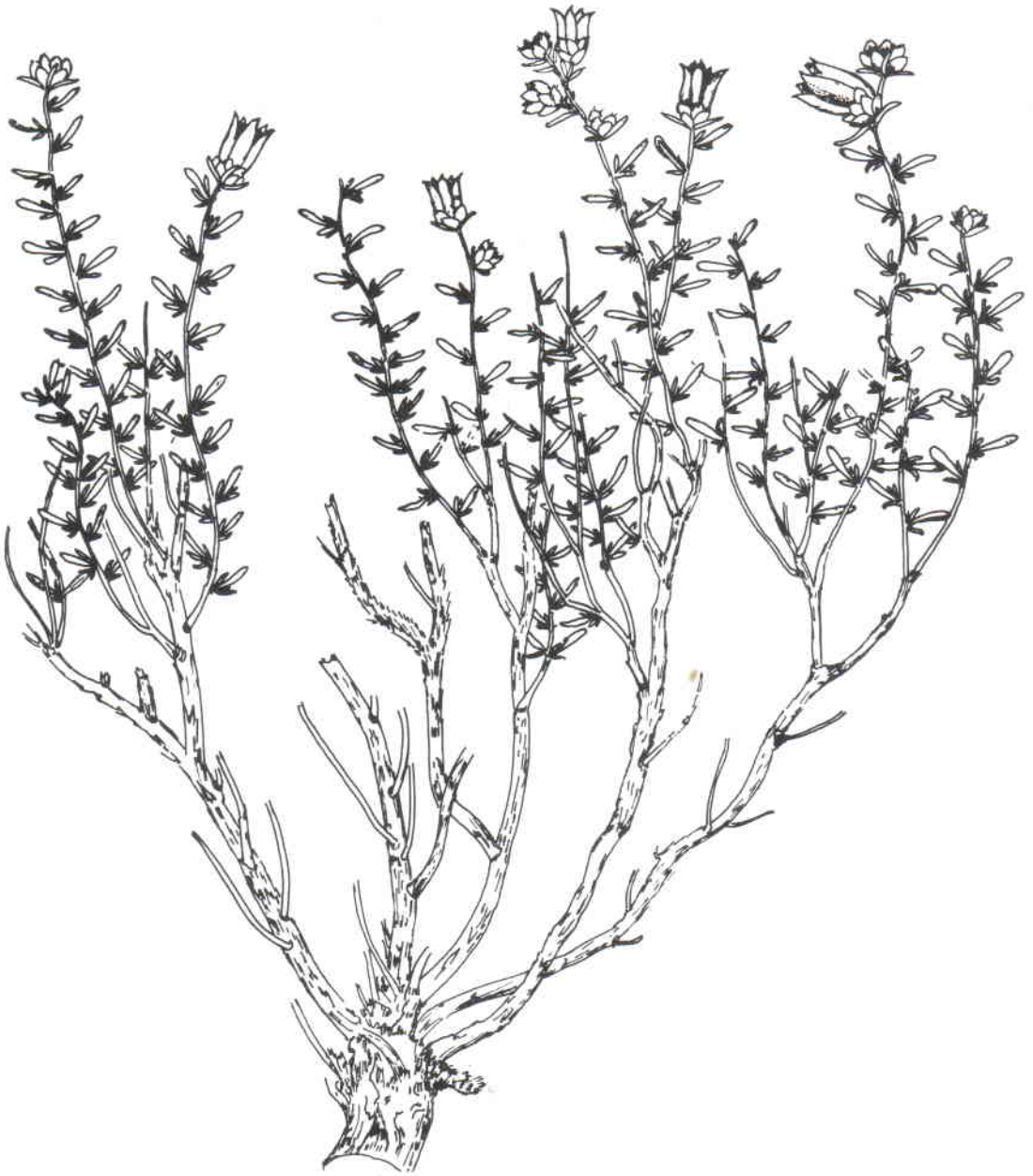


Fig. 9. *Reaumuria oxiana* (x 2/3).

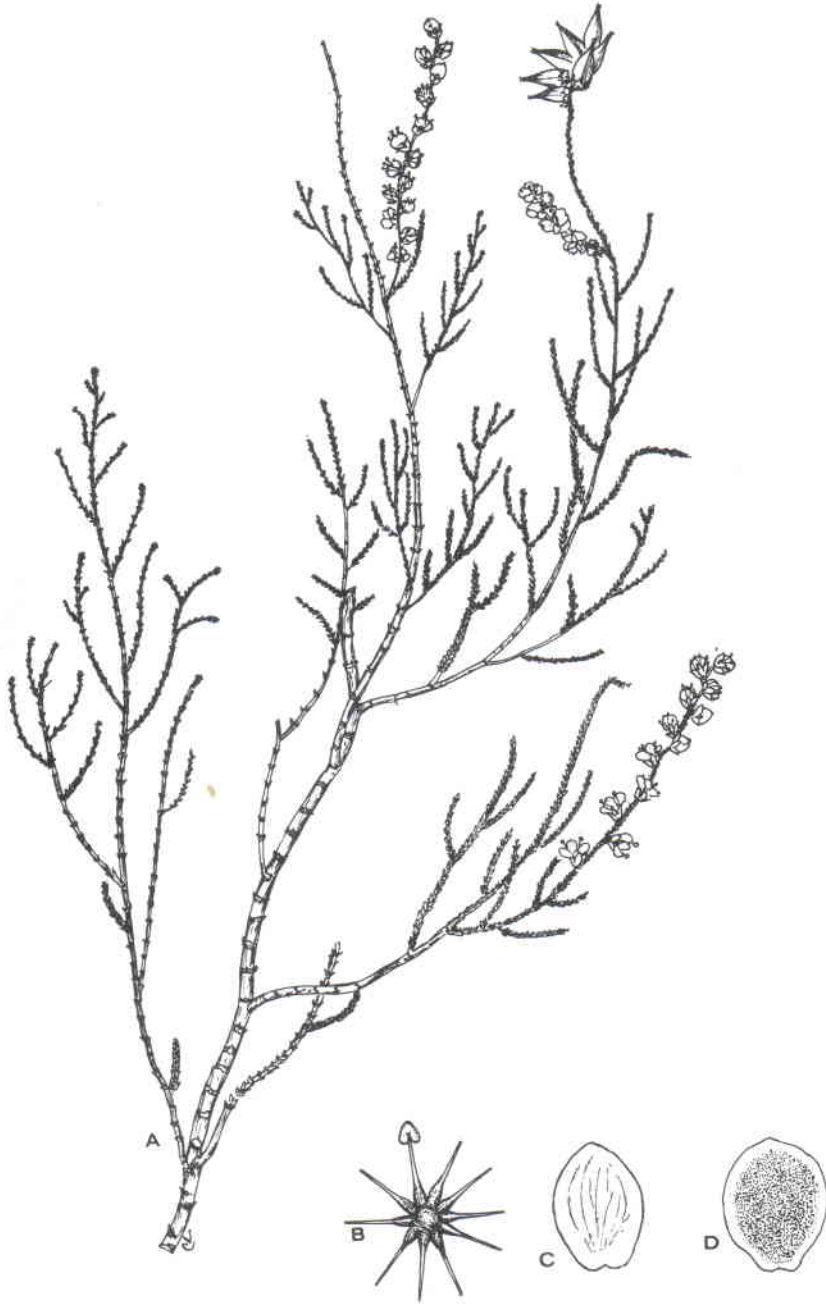


Fig. 10. *Tamarix aucheriana*. — A. Twig. (nat. size) — B. Disk (x3). — C. Petal (x3). — D. Sepal (x6.5).



Fig. 11. *Zygophyllum eichwaldii* (x 1/2; fruit nat. size).

aites — 42, 67.

A. littoralis (Gouan) Parl. — 6, 42, 87.

Arundo donax L. — 15.

Phragmites australis (Cav.) Trin. ex Steud. — 67, 83.

Stipagrostis karelinii (Trin. & Rupr.) Tzelev — 6, 97.

This species has not been included in K. H. Rechinger flora Iranica. It was previously known from Soviet Central Asia (cf. V. L. Komarov Flora of the USSR vol. 2 sub. *Aristida*). In locality no. 97 both this species and *S. pennata* (Trin.) De winter growing together on sand dunes. Most of the herbarium specimens which have been named *S. pennata* are in reality *S. karelinii* therefore distribution of the species in Iran is more widespread. It is most probable that also in Bor (1970 P. 375) at least some of the records for *S. pennata* are in reality *S. karelinii* which wrongly have been named.

S. pēnnata (Trin.) De winter — 43, 97. see notes under *S. karelinii*.

S. plumosa (L.) Munro ex T. Anders. — 16, 57, 77, 97.

Juncaceae

Juncus rigidus Desf. — 26.

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