

A Concise Taxonomic Revision of the Genus *Alopecurus* L. (*Gramineae*)

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Abstract: An account of 29 species and 12 subspecies identified in the genus *Alopecurus* L. is given including the genus description, a key for the species, species descriptions, flowering times, habitats, altitudes, type citations, citation of the specimens examined, general distributions and biogeography of the species.

Key Words: Taxonomy, *Alopecurus*, *Gramineae*.

Alopecurus L. (*Gramineae*) Cinsinin Kısa Bir Taksonomik Revizyonu

Özet: *Alopecurus* L. cinsinde saptanan 29 tür ve 12 alttürle ilişkin hazırlanan bu makale cins tanımını, tür anahtarını, tür tanımlarını, çiçeklenme zamanını, habitatları, yükseklik, tip örneği ile incelenen örneklerle atıfları, türlerin genel yayılış alanlarını ve biyocoğrafyasında içermektedir.

Anahtar Sözcükler: Taksonomi, *Alopecurus*, *Gramineae*.

Introduction

The genus *Alopecurus* L. (Foxtail), a member of the tribe *Aveneae*, contains 29 species and is distributed in almost all non-tropical regions of both hemispheres and, to a certain extent, in the alpine tropics with its main distribution in southwest Asia. The genus contains important fodder plants, such as *A. pratensis* L., *A. arundinaceus* Poir., *A. aequalis* Sobol., *A. geniculatus* L., *A. myosuroides* Hudson and *A. bulbosus* Gouan, and many arctic, alpine or high mountain species of the genus (i.e. *A. mucronatus* Hack. Ex. Paulsen, *A. textilis* Boiss., *A. glacialis* C. Koch, *A. vaginatus* (Willd.) Boiss., *A. borealis* Trin., *A. aucheri* Boiss., *A. laguroides* Ball., and *A. lanatus* Sm.) are valuable pasture grasses.

Sieber and Murray (1,2) studied the problem of the hybridization by means of the chromosome behaviour of natural and artificial hybrids between three tetraploid species, namely *A. pratensis*, *A. geniculatus* and *A. arundinaceus*. Chromosome numbers for some European species were given by Moore (3). Doğan (4) determined the counted chromosome numbers of *A. gerardii* Vill. and *A. aequalis* from Turkish material.

Meusel and Weinert (5) illustrated the geographical distribution of *A. creticus* Trin., *A. pratensis*, *A.*

arundinaceus, *A. mucronatus* and *A. apiatus* Ovez. The genus contains 5 species in the Aegean Islands (6), 6 species in Algeria (7), 4 species in Canada (8), 1 species in Egypt (9), 14 species in Europe (10), 14 species in Iran (11), 3 species in Iraq (12), 3 species in Japan (13), 9 species in Pakistan (14), 21 species in Turkey (15, 16), 9 species in the U.S.A. (17) and 13 species in the U.S.S.R (18).

Metcalfe (19) investigated the anatomical features of four *Alopecurus* species, namely *A. myosuroides*, *A. borealis*, *A. geniculatus* and *A. pratensis*. Doğan (20) examined the internal leaf morphology of eighteen Turkish species of *Alopecurus*. Doğan (21, 22) also gave a detailed account of the comparative reproductive and vegetative morphology of Turkish grasses, including a few *Alopecurus* species. After Linnaeus (23), a number of botanists, e.g. Ascherson and Graebner (24), Grisebach (25), Boissier (26), Komarov et al. (27), Bor (11), Tzvelev (18) and Tutin et al. (10), constructed new infrageneric groupings in the genus *Alopecurus*.

After giving a full historical account of the infrageneric delimitations in *Alopecurus*, Doğan (28) made an attempt to construct an infrageneric classification that would be permanent and would reflect

natural groupings in the genus. On the basis of the numerical taxonomy of the genus, Doğan identified seven sections and suggested that these sections could be grouped under two subgenera. Doğan (29) made an attempt to improve the infrageneric classification in the genus and identified three sections, namely *Alopecurus*, *Alopecurium* Dum. and *Colabachne* (Beauv.) Griseb.

This concise monographical account is based on material deposited in three main British herbaria, namely Edinburgh (E), Kew (K) and the British Natural History Museum (BM). Additional herbarium material referred to is kept in Geneva (G), Munich (M), Berlin (B) Prague (PR), Vienna (W), Istanbul (ISTE), Ankara (ANK, HUB), Izmir (EGE) and Leningrad (LE).

ALOPECURUS L. Sp. Pl.60 (1753).

Annuals, biennials or perennials. Ligule membranous. Leaf blades linear, acuminate, flat to convolute. Sheaths glabrous or hairy. Inflorescence a spike-like panicle, oblong to cylindrical or ovate, occasionally globose. Spikelets laterally compressed, with 1 floret. Rhachilla disarticulating below glumes. Glumes equal to subequal, acute to obtuse or terminating in an aristate point, 3-veined, always connate below; keels winged or unwinged, usually ciliate. Lemma 3-, 4- or 5-veined, obtuse-truncate, margins connate below, dorsally awned (rarely awn $\pm$ absent). Palea 1-veined, keeled, sometimes absent. Lodicules absent. Stamens 3. Styles connate below. Caryopsis laterally compressed, obliquely obovate in side view, glabrous. Embryo 1/3 x caryopsis.

Key to Species

1. Annual, biennial or occasionally short-lived perennial; glumes acute to acuminate or obtuse, $\pm$ equalling lemma. 2
 - Perennial; glumes usually terminating in aristate points, longer than lemma (incl. aristate point or) mucro 14
2. Glumes with a narrow or broad wing on keel . . . 3
 - Glumes without a wing on keel. 7
3. Panicle ovoid or obovate, 6-15 mm broad 1. *utriculatus*
 - Panicle cylindrical, 3-5 mm broad 4
4. Spikelets 2.5-4 mm; glumes connate for 1/2-4/5 of their length 5
 - Spikelets 4-6 mm; glumes connate for 1/3-1/2 of their length 6
5. Spikelets 2.5-3 mm, elliptic; glumes acute 8. *nepalensis*
 - Spikelets 3-4 mm, oblong; glumes obtuse 7. *creticus*
6. Spikelets 4-4.5 mm, elliptic-urceolate; glume wings 0.3-0.5 mm wide, extending all the way along glumes 4. *adanensis*
 - Spikelets 4.5-6 mm, elliptic; glume wings narrow, restricted to upper half of glumes. 3. *myosuroides*
7. Panicle ovate; spikelets urceolate; glumes connate for 1/3-4/5 of their length. 8
 - Panicle narrowly or broadly cylindrical; spikelets elliptic-oblong; glumes connate for 1/4 or less of their length 9
8. Spikelets 5-8.5 mm; glumes abruptly narrowed above middle, triangular; anthers 3.2-4.9 mm 2. *rendlei*
 - Spikelets 3.2-4.5 mm; glumes gradually narrowed above middle; anthers 1.5-2 mm 16. *setarioides*
9. Spikelets 7-8 mm 13. *japonicus*
 - Spikelets up to 5 mm 10
10. Glumes acute 11
 - Glumes obtuse 12
11. Spikelets 4-5 mm; panicle relatively loose 14. *saccatus*
 - Spikelets 3-3.5 mm; panicle dense 15. *howellii*
12. Annual; anthers 0.5 mm. 9. *carolinianus*
 - Short lived perennial; anthers longer than 0.6 mm 13
13. Awn of lemma exerted by 1.3-3 mm; anthers 1.4-1.7 mm, yellow to purplish 11. *geniculatus*
 - Awn of lemma not exerted or occasionally exerted by 1mm; anthers 0.6-1mm, orange 10. *aequalis*
14. Panicle narrowly cylindrical-oblong 15
 - Panicle ovate to elliptic, rarely broadly oblong. 18
15. Stem bulbous; spikelets 2.5-3.4 mm 12. *bulbosus*
 - Stem not bulbous; spikelets 3.5-7 mm 16
16. Palea present; leaves bluish-metallic when fresh 17. *anatolicus*

- Palea absent; leaves not as above 17
- 17. Lemma acute; glumes parallel or convergent at apex, shortly hairy on keel **5. pratensis**
 - Lemma obliquely truncate; glumes divergent at apex, long-hairy on keel **6. arundinaceus**
- 18. Basal sheaths villous, hispid, sericeous or tomentose 19
 - Basal sheaths glabrous. 21
- 19. Leaf-blades and upper sheaths white- tomentose. **27. lanatus**
 - Leaf blades and upper sheaths not as above . . 20
- 20. Basal sheaths covered with adpressed silky hairs; stem with dead sheaths remaining at base; palea present **29. textilis**
 - Basal sheaths tomentose; stem with thickened rootstock; palea absent. **28. davisii**
- 21. Awns of lemma not exerted or occasionally exerted by 0.5-1.5 mm. 22
 - Awns of lemma exerted by 2-8 mm 26
- 22. Rootstock thickened at base; spikelets whitish grey **18. gerardii**
 - Rootstock not thickened at base; spikelets purplish 23
- 23. Spikelets hairy only on keels. 24
 - Spikelets hairy all over. 25
- 24. Glumes acute at apex **20. apiatus**
 - Glumes mucronate at apex **21. mucronatus**
- 25. Spikelets oblong-urceolate; anthers 2-3.5 mm **19. glacialis**
 - Spikelets ovate-elliptic; anthers c.2 mm **22. borealis**
- 26. Lowest sheaths disintegrating into reticulate fibers; spikelets whitish grey **23. aucheri**
 - Lowest sheaths not disintegrating into reticulate fibers; spikelets purplish 27
- 27. Spikelets covered by long hairs; awns exerted by 8-10 mm **25. himalaicus**
 - Spikelet hairs short; awn exerted by c.5 mm. 28
- 28. Aristate points of glumes covered with silky hairs all over; lemma 2.4-3 mm; anthers 1-1.4 (1.7) mm **26. laguroides**
 - Aristate points of glumes glabrous; lemma 3-4 mm; anthers 2-3.3 mm. **24. vaginatus**

Sect. *Alopecurus*

Syn. *Tozzettia* Savi in Mem. Soc. Ital. Modena 8:477(1799).

Annual or perennials. Panicles ovoid-cylindrical to cylindrical; branches bearing 1-10 spikelets each. Glumes acute, equalling or longer than lemma, abruptly or gradually narrowed in upper half, connate for 1/4 -1/2 of their length in lower part. Palea absent.

Type: *A. pratensis* L.

1. *A. utriculatus* Sol. in Russell, Aleppo 2:243 (1794).

Annual. Rhizome with fibrous roots. Stem 5-30(40) cm, usually geniculately ascending from base, tufted, occasionally solitary, glabrous, smooth, 3-4 noded. Leaf-sheaths glabrous, uppermost strongly inflated; ligule 2-4 mm, obtuse, denticulate, blades 0.7-12 cm x 1-8mm, acuminate. Panicle 0.8-3 (4) cm x 0.6-1.5 cm, ovate to oblong, pale green to purplish; branches with 1-4 spikelets. Spikelets 6-8.5 mm, oblong-urceolate. Glumes acute, connate for 1/3-1/2 of their length in lower part, lanceolate. Lemma equalling glumes or slightly shorter, acute, awned from above base, margins connate in lower half; awn 6-15 mm, geniculate, twisted below. Palea absent. Anthers 3.2-4mm.

- 1. Glumes with a broad (0.5-1.2 mm) wing on keel **subsp. anthoxanthoides**
- 1. Glumes almost wingless or with a rather narrow (c.0.5 mm) wing on upper half of keel 2
- 2. Spikelets 5-5.5 mm, strongly purplish; panicle formed by 3-10 spikelets; stem 4-9 cm **subsp. gaziantepicus**
- 2. Spikelets at least 6 mm, pale or slightly purplish on margins of glumes; panicle formed by more than 10 spikelets; stem usually longer than 9 cm. 3
- 3. Panicle obovate, tapering to base; glumes acuminate **subsp. malatyaensis**
- 3. Panicle ovoid to broadly oblong, tapering to apex; glumes acute **subsp. utriculatus**

Subsp. *anthoxanthoides* (Boiss.) M. Doğan in Notes R.B.G. Edinb. 40:86 (1982).

Syn: *A. anthoxanthoides* Boiss., Diagn. Ser. 1(13):42 (1854)

Fl. 3-5. *Terra rossa hills, Quercus scrub, grazed rocky limestone slopes*, 270-1850m.

Type: (Turkey C5 Hatay) in monte Cassio Syriae borealis (Akra Da.), (V-VII 1846), Boissier (holo.GI).

Distribution:

Turkey: Adana, Bolkar Da., 1836, Kotschy. Maraş, 550 m, D. 27298! Hatay: Kırıkhan, Hand.-Mazz. 141!

Palestine: Hattin, 270 m. F.S. Meyers and J.E. Dinsmore 8467!

Lebanon: Montis Libani Tom Niha, 1500-1850 m. J. ball. 1757!

E. Medit. element. Bourgeau's record of this subspecies from Is: Rhodes requires confirmation.

Subsp. *utriculatus*.

Ic: Fl. Of Iraq 9: t. 104 (1968). Map 75!

Fl. 3-5. *Limestone rocks, waste areas, grassy banks*, 30-1854 m.

Type: (Syria) prope Aleppo, Russel (holo BM!).

Distribution:

Cyprus: Ayia Napa, 1862, Kotschy 130!

Turkey: p. Maraş: Maraş, 550 m, D. 27298p.p.! Diyarbakır: Çağgözü Köy, A. Uludağ 1296!

Syria: Saida, Blanche 1855:96!

Lebanon: 22 km S. of Tripoli, 45 m. J.C. Archibald 1038!

Transjordan: Bit Dabaghat to Shobet, 1524 m, D. 9136!

Palestine: Wadi Syr, 850 m, F.S. Meyer and J.E. Dinsmore (M 467!)

Jordan: Salt City, Nagbit-Dabour, D. Al-Eisawi 3520!

Iraq: Darbendikhar, 610 m, R. Wheeler Hanie 1630!

E. Medit. element.

Subsp. *gaziantepicus* M. Doğan, in Notes R.B.G. Edinb.45(1):114 (1988).

Fl. 4-5. *Sandy limestone rocks*, 853-1600 m.

Type: (Turkey C6 Gaziantep): Gaziantep, 853 m, 19 IV. 1935, E.K. Balls 2155 (holo.EI)

Distribution:

Turkey Maraş: Engizek Da., H. Duman 2530 ! Maraş: Ahır Da., 1300-1600m, H. Duman 3552!

Endemic to Turkey. Irano-Tur. element.

Subsp. *malatyaensis* M. Doğan, in Notes R.B.G. Edinb. 45 (1): 114-115 (1988).

Fl. 5-6. *On rocky limestone slopes*, 1400 m.

Type: (Turkey B6 Malatya): Malatya-Maraş, 40 km from Malatya, 1400 m, Stn. and Hend. 5462 (holo EI).

Distribution:

Turkey Maraş: Engizek Da., H. Duman 3147!

Iraq: Süleimanya, Pir Omar Gudram, 26 V 1961, R.W. Haines!

Irano-Tur. element.

2. *A. rendlei* Eig in J. Bot. (London) 75:187 (1937).

Syn: *Tozzettia utriculata* Savi, Ust. Ann. 24:50 (1800). *Phalaris utriculatus* L., Systema ed.10, 2:869 (1767) non *A. utriculatus* Sol. (1794). *A. utriculatus* (L.) Pers., Syn. Pl. 1:80 (1805). *Tozzettia pratensis* Savi, Mem. Soc. Ital. d. Sc. 8(2): 477 (1798).

Ic: Trin., Sp. Gram. 1(4): t.46 (1828) as *A. utriculatus* Schrader. Zangheri, Fl. Ital. 2:t. 183 f. 6673 (1976), as *A. utriculatus*. Map. 74.

Annual. Rhizomes with fibrous roots. Stem 8-58 cm, erect or geniculately ascending from base, loosely tufted, 3-4 noded. Leaf sheaths glabrous, uppermost one strongly inflated; ligule 1-3 mm, obtuse; blades 0.7-16 cm x 1-3 mm, acuminate, slightly rough on upper surface. Panicle 1-3.2 cm x 9-11 mm, ovate, tapering towards apex. Spikelets 5-8 mm, urceolate. Glumes subcoriaceous, connate for 1/3-1/2 of their length, gibbous at sides, abruptly triangular-cuspidate above middle, acute, slightly divergent at apex, ciliate on keel. Lemma equalling glumes or slightly longer, lanceolate, subobtusate to acute, awned above base, margins connate for 1/2 of their length; awn 7-18 mm. Palea absent. Anthers 3.4-4.9 mm. (2n=14). Fl. 3-6. *Water meadows near sea*, s.l.-252 m.

Type: the illustration of 'Gramen pratense' in Dalechamps, Historia Generalis Plantarum 1:425 (1587).

Distribution:

Germany: Wiesen bei Rieding unweit Saarbürg in Lothringen, 252 m, H. Petry 93!

Luxembourg: Reichlange, L. Reichling 6!

France: Yonne, Fontaine de Ste., Nitace, E. Ravin 1852:151!

Italy: Rome, Monti Mario, III. 1848, J. Ball.

Yugoslavia: 60 km N. of Skopljeon, F. Wrigley 65/1283!

Hungary: Budapest, 100 m, L. de Baan 257!

Bulgaria: In Campis Avfavova, 8. VI. 1899, V. Stribny!

Greece: Peloponnese, Megalopolis, C.C. Townsend 70/54!

Turkey: Tekirdağ, 10 km from Tekirdağ to Hayranbolu, A. Baytop (ISTE 19794!) Istanbul; Maltepe, 2 V. 1894, Azn. ! Kocaeli, Izmit, 1m, D.26250! Samsun; 1858, Tchihatcheff. Balıkesir; 9 km E. of Burhaniye, 100m, Sorger and Buchner 82-31-26! Bolu; Düzce, Kühne 2508!

3. *A. myosuroides* Hudson, Fl. Angl. 1:23 (Jan-Jun. 1762).

Annual. Rhizomes with fibrous roots. Stem 10-40 (100) cm, erect to geniculately ascending from base, densely or loosely tufted, sometimes solitary. Leaf sheaths glabrous, smooth, uppermost somewhat inflated; ligule 1-5 mm, obtuse; blades 1.5-23 cm x 2-8 mm, acuminate, glabrous. Panicle 2-10 cm x 2-6 mm, narrowly cylindrical, tapering towards apex. Spikelets 4.5-6 mm, oblong to lanceolate-oblong, green to purplish. Glumes narrowly oblong, acute, connate for 1/3-1/2 of their length, hairy at base. Lemma equalling glumes or slightly longer, elliptic-ovate, obtuse, margins connate for 1/3-1/2 of their length, awned above base; awn up to 12 mm. Palea absent. Anthers 2.5-4 mm. (2n=14).

1. Awn 8-12 mm, exerted from glumes by 5-6 mm
..... subsp. *myosuroides*

1. Awn not exerted from glumes, or absent
..... subsp. *tonsus*

Subsp. *myosuroides*

Syn: *A. agrestis* L., Sp. Pl. ed. 2: 89 (Sept. 1762). *A.*

purpurascens Link, Linnaea 17:400 (1843). *A. coerulescens* Steud. and Hochst. ex Steud. Nom. Bot. ed. 2: 1:60 (1840). *A. myosuroides* Huds. var. *versicolor* Biasoletto, Flora 12:512 (1829).

Ic: Hubbard, Grasses ed. 2:326 (1968). Fl. Iraq 9:t. 102 (1968).

Fl. 3-7. Dry marshy ground, clover fields, fallow fields, 25-2286 m.

Type: (England) in arvis, et ad vias, Hudson (holo. destroyed)

Distribution:

Spain: Aragon, Calatayud, B. Vicioso 1567!

France: Varzy Rievre, 2 IV 1863, C. Pin!

U.K., Scotland: Edinburgh, Mayburry Rd, J. A. Ratter 2723!

Belgium: Coseyde-Bouns, Samalree 6674!

Luxembourg: N. of d' Olingen, L. Reichling 20227!

Holland: Limburg, Roermond, near the River Ma, 19 V 1950, R. A. Maas

Gestaranus and H.J. van Hattum!

Germany: Berlin, 5. VI 1960, P.F.F. Schulz!

Sweden: Gotland, Klinte, 22. VI 1872, K.A. Th. Seth!

Denmark: Lolland; Nysted Lands, 20. VII 1959, C. M. Norrman!

Switzerland: Geneva, M. Zorab 462!

Czech Republic: Prague, Dejvice, 260 m, J. Rohlena 12!

Italy: Treviso, below Asolo, 100 m, D. 34092!

Bulgaria p. Rohope: Moncilgrad, Kardzali, 29 IV 1975, M. Stoeva and Z. Cerneva!

Greece p. Creta: d. Sitia, Rechinger 12480!

Turkey: Yozgat, 25 km from Çekerek to Alaca, 900m, Coode and Jones 1637!

Cyprus: Lefke, 30 m, A. Syngrassides 1564!

Syria: Avitioeh, 25 m, 20.IV 1938, J.E. Dinsmore!

Palestine: Shora, D. 4156!

Iraq: Rustain, V. Lozar 1179!

Iran: between Babameydan and Masiri, 800 m, D. 56490!

Afghanistan prov. Fariab: Maimana, 800 m, I. Hedge, P. Wendelbo and L. Ekberg (W. 8253)!

Pakistan: nr. Hangu, R.R. Stewart 28254!

India: Assaim (Satoi), 2286 m, Bor 16221!

Saudi Arabia: Buraydah, S. Chaudhary 7275!

Egypt: Ismailieh, III 1965, R. Muschler!

Australia: Mingenew, C. B. Palmer 27!

Mainly Euro-Sib. element.

Subsp. **tonsus** (Blanche ex Boiss.) M. Doğan **comb. et stat nov.**

Syn: *A. agrestis* L. var. *tonsus* Blanche ex Boiss., Fl. Or. 5: 485 (1884)! *A. myosuroides* Hudson var. *breviaristatus* Marchesetti ex Ascherson and Graebner, Syn. Mitteleur. Fl. 2: 130 (1899). *A. myosuroides* Hudson var. *tonsus* (Blanche ex Boiss.) R. Mill Fl. of Turkey 9:384 (1985).

Fl. 3-5. Marshy fields, roadsides, damp fields, bean fields, s.1-800 m.

Type: (Turkey B1 Izmir) in agris Smyrnae, Fleischer (E!); Syria littoralis ad Tripolium, Blanche (G!).

Distribution:

Greece: Lesvos, S. side of Mt Bourounia, 3 km E. of Keromia, 20 m, Edmondson 2360!

Cyprus: Kahopetria, 762 m, 28. III. 1966, Y. Loayou!

Turkey p. Izmir. Germencik, 50 m, D. 25226! Bursa; Manyas Kuş Cenneti, Regel and Leblebici (EGE 16366!) Antalya; Alanya bay, 2 m, D. 25912! Mersin; Kuyuluk, 10 km W. of Mersin, 2m, D. 26523! Maraş, Andiran, 13 km S. of Çatak, 800 m, Coode and Jones 1123B!

Medit. element.

4. ***A. adanensis*** M. Doğan Notes R. B. G. Edinb. 45 (1): 111 (1988).

Syn: *A. myosuroides* Hudson var. *latialatus* M. Doğan in Notes R. B. G. Edinb. 40:509 (1983).

Ic. M. Doğan, in Notes R. B. G. Edinb. 45 (1): 112 (1988).

Annual. Stem 32-57 cm, erect, tufted, stout, smooth, glabrous, 2-3 noded. Sheaths glabrous, smooth, uppermost inflated reaching to base of panicle. Ligule c. 4 mm, obtuse. blades 9.5-18 cm x 2-3 mm, acuminate, smooth, glabrous. Panicle 6-10 cm x 4-7 mm; cylindrical,

purplish. Spikelets 4-4.5 mm, urceolate. Glumes 3.8-4.3 mm, connate for 1/3 of their length at base, with a broad wing (c.0.3-0.5 mm) extending all along keel. Lemma 4-4.5 mm, acute, connate for 1/2 of their length at base. Palea absent. Anthers 3-3.5 mm, yellow. Fl. 3-5. *Roadside ditch, in ditch bed, dry surface.* nr.s.l.

Type: (Turkey C6 Adana). Adana to Karataş, 9 km S. of Adana, nr. s.l. 1. v. 1965, Coode and Jones 258 (holo E!)

Distribution:

Turkey C5 İçel. Tarsus, Karabucak Forest, s.l. A. Düzenli (ADA 676!)

Endemic to Turkey. E. Medit. element.

5. ***A. pratensis*** L., Sp. Pl. 60 (1753).

Syn. *A. soongaricus* Petrov. Fl. Jakut. Fasc. 1:147(1930). *A. seravschanicus* Ovcz in Kom., Fl. URSS 2:151, 745, p. 11, f.5. (1934). *A. antarcticus* Vahl, Symb. Bot. 2:18 (1791). *A. alpinus* β. *songaricus* Schrenk, Enum. Pl. Nov. 1 (1841). *A. laxiflorus* Ovcz in Kom., Fl. U.R.S.S., II. 151, 744 (1934). *A. pratensis* subsp. *alpestris* (Wahl.) Seland. Acta Phytogeogr. Suec. 28:33 (1950). *A. pratensis* β. *alpestris* Wahl. Fl. Lapp: 21 (1812). *A. alpinus* var. *ventricosus* Kar. et Kir. Bull. Soc. Nat. Moscou 14:361 (1841). *A. laguriformis* Schur, Arch Naturg. (Berlin) 18:362 (1852).

Ic: Trin., Sp. Gram. 1(4): t.44 (1828). Hubbard, Grasses ed. 2, 334 (1968).

Caespitose perennial. Stem 40-65 (70) cm, erect to geniculately ascending from base, glabrous, smooth, 2-noded. Leaf sheaths smooth, uppermost scarcely inflated; ligule 0.5-1.5 (2) mm, obtuse to acute; blades 1.5-8.5 (9) cm x 2-5 mm, acuminate, slightly scabrid on margins. Panicle 3-6 (7) cm x 6-7 mm, cylindrical, green to purplish. Spikelets 4.5-6 mm, lanceolate-oblong to elliptic. Glumes narrowly lanceolate, acute, connate for 1/4 of their length at base, with fine hairs on sides, ciliate on keels. Lemma equalling glumes or slightly shorter, ovate to elliptic, acute, connate for 1/4 of their length; awn 7-8 mm. Palea absent. Anthers 3-3.5 mm. Fl. 5-7. Damp places, mountain pastures, edge of meadows, 200-2600 m. (2n= 28).

Described from Europe (Hb. Linn. 82/1!).

Distribution:

Iceland: nr. Akureyri, 1941-2, G.H. Canduell 39!

U.K. p. Scotland: Salsburry Crags nr. Edinburgh, 4. VI 1846, R. Parnell!

Sweden: Södermanland, 27 VI 1927, E. Asplund 130!

Finland: Tavastia australis, par. Lammi, Ronni, C. Leopold 44!

Belgium: Bodeghem St. Martin, 25 VI 1922, V. Samherl!

Germany: Mütiburg, Baden, 114 m, A. Kneucker 1899:11!

Spain: Ronda, 610 m, E. Ellman and C. Hubbard 290!

Italy: Boschi di Valdemone, L. Todaro 604!

Yugoslavia: Jahorina, M.M.C. Webster 4018!

Hungary: Gyor, 7.VII 1962, C. M. Curle!

Switzerland: Mt. Chasseron, 5 VII 1870, L. Favrat and W. Barbey!

Albania: d. Moskopole, W. of. Korçe, 1128 m, A. H. G. Alston and N.Y. Sandwith 2024!

Greece: N. W. Macedonia, nr. Hagin Trias, 1280 m, A.H.G. Alston and N.Y. Sandwith 235!

Turkey: Edirne, Sarayı A. Baytop 6575!

Ukraine: Crimea d. Yalta, Nikitsky Yailla, D. 33384!

Afghanistan: d. Nuristan, Pashki 2000m, Kerst. 1358!

Iran d. Hamadan, Cahrcaman', S. Gauba 1641!

Turcomania: pr. Ashabad, D. Litwinow 2345!

Morocco: Oukaïmeden, 2600 m, D. 54440 A!

U.S.A.: New Hampshire, Strafford Country, 12 V 1942, R. Hodgdon and W.K. Rabel

Argentina: Tierra del Fuego, Estanci Harberton, D.M. Moore 1410!

Mainly Euro-Sib. element.

This species is mainly distributed in Eurasia and is naturalized in a few places in the New World, like Argentine and the U.S.A.

6. *A. arundinaceus* Poir. in Lam., Encyl. 8:776 (1808).

Syn: *A. ventricosus* Pers., Syn. Pl. 1:80 (1805) non Hudson (1778). *A. nigricans* Hornem., Hort Hafn. 1:68 (1813)! *A. pratensis* L. var. *armenus* C. Koch in Linnaea

21: 381 (1848). *A. armenus* (C. Koch) Grossh., Fl. Kavk. ed. 2, 1:173 (1939). *A. arundinaceus* Poir. subsp. *armenus* (C. Koch) Tzvelev in Novit. Syst. Pl. Vasc. (Leningrad) 8:18 (1971). *A. ventricosus* Pers. var. *exserens* (Gris.) Ascherson and Graebner. Syn. II: 134 (1898). *A. sibiricus* Hort. ex Roem. and Schult. Syst. Veg. 2:271 (1817). *A. muticus* Kar. et Kir., in Bull. Soc. Nat. Moscou 15:527 (1842). *A. brachystachyus* Bieb., Fl. Taur.-Cauc. 3:56 (1819). *A. lasiostachyus* Link, Hort. Berol. 1:71 (1827). *A. castellanus* Boiss. and Reut. Diagn. Pl. Hispan 26 (Bibl. Univ. Genève n. ser. 38: 218 (1842). *A. salvatoris* Losc. ex Willk. Suppl. Prodr. Fl. Hisp. 11 (1893). *A. repens* Bieb., Fl. Taur.-Cauc. 3:54 (1819). *A. candicans* Salzm. ex Steud. nom. Bot. ed. 2, 1:61 (1840). *A. ruthenicus* Weinm. Cat. Dorpat. 10 (1810).

lc: Zangheri, Fl. Ital. 2: t. 183, f.6670 (1976).

Perennial with creeping rhizomes. Stem 20-105 cm, erect, 2-noded. Leaf sheaths glabrous to hairy; ligule 1.5-5 mm, obtuse-truncate; blades 2.5-4.5 (4.8) cm x 3-10 mm, acuminate, scabrid on margins. Panicle 1.7-7 (8) cm x 6-15 mm, broadly cylindrical, green to purplish. Spikelets 3.5-7 mm, urceolate. Glumes lanceolate, acute, diverging at apex, connate for 1/4 of their length at base, ciliate on keels. Lemma 3.5-6 mm, ovate, obliquely truncate; awn 2-7.5 mm. Palea absent. Anthers 3-3.6 mm. (2n=28) Fl. 4-8. *Seashore, marshy ground, water meadows, cultivated land, roadsides, ditches, s.l. -3505 m.*

Distribution:

Sweden: Stockholm, C.F. Nyman!

Norway: Tromsø, s.l., 28-VII 1888, C. Baenitz!

Finland: Alandia, Brändö, 3. VII 1969, U. Laine and J. Virtanem!

Spain: Grenada, 1200 m, Reverchon 1900: 887!

Turkey d. Bolu: Köroğlu Da., 1800 m, Y. Akman 6381!

Palestine: N. of Jerash, F.S. Meyers and J. E. Dinsmore 1703!

Syria: Horno, D. 5583!

Iraq: Kapi Qaradaḥ, 1372 m, R.W. Haines 1156!

Iran: E. of Hamadan, 1830 m, J.C. Archibald 2621!

Armenia p. Tiflis; Gori, Bakurjani, 1600 m, O.R. Holmberg 1567!

Afghanistan p. Baniān: M. Kuh-i Baba, 3000 m, Rechinger 18528!

Pakistan p. Baluchistan: Quetta, Sariab Rd., 1700 m, J. Lamond 917!

India: Kashmir, 3505 m, W. Koelz 2968!

China p. Mongolia: 7 km NW of Ulan Bator, 1524 m, C. Jeffrey 1505!

Russia: Manchuria, A.E. Licent 8058!

Sect. *Alopecurium* Dum. Observ. Gram. Belg.: 132 (1823).

Syn. *Alopecurus* sect. *Alopecurellus* Tzvel. Novosti Sist. Vyssh. Rast. 6: 18 (1970). *Alopecurus* sect. *Annui* in Rech. f. Fl. Iran. 70:277 (1970). *Alopecurus* sect. *Pseudophalaris* Tzvel. Novosti Sist. Vyssh. Rast. 6:18 (1970).

Annuals or perennials. Panicles cylindrical to oblong; branches bearing 1-5 spikelets each. Glumes acute to obtuse, longer than or equalling lemma, connate for 1/8-4/5 of their length in lower part, coriaceous-membranous. Palea absent.

Type: *A. geniculatus* L.

7. *A. creticus* Trin. in Sprengel, Neue Entd. 2:45 (1820).

Syn: *A. thracicus* Penev and Kozuharov in Notes R.B.G. Edinb. 28:187 (1968).

Ic: Trin., Sp. Gram. 1(4): t. 41 (1828); Reichb., Ic. Fl. Germ. ed. 2, l:t. 178, f.475 (1850).

Tufted annual. Stem 7-39 cm, ascending from base, usually branched, 2-3 noded, rooting at lower nodes, glabrous, smooth. Leaf sheaths glabrous, uppermost inflated; ligule 2-3 mm, obtuse; blades 1-7.5 cm x 1-3.6 mm, acuminate, glabrous. Panicle 2-3.5 cm x 4-5.5 mm, oblong to cylindrical. Spikelets 3-4 mm, oblong, purple in upper half. Glumes obtuse, divergent, mucronate, connate for 1/2-4/5 of their length, ciliate in upper half especially on wings. Lemma slightly shorter than glumes, truncate at apex, margins connate for 1/2-2/3 of their length, awned above base; awn 3-6 mm, exserted by 1-4 mm. Palea absent. Anthers 1.2-2.5 mm. (2n=14). Fl. 4-5. *Marshes and wet places*, nr. s.l.

Type: (Crete) in Creta, Sieber (Iso LE!).

Distribution:

Bulgaria d. Svilengrad: Marica 1, 31 V 1959,

Kozuharov (as *A. thracicus*!).

Greece: Creta, Mt. Lafsiti, 914 m, V. 1846, De Heldreich!

Turkey: Istanbul: Soğuksu, Küçükçekmece G., H. Demiriz (ISTF 7185!). Istanbul: Kadıköy, 1 V 1918, Azn.! Aydın: Ak Boğaz, 1842, Boiss!

E. Medit. element.

8. *A. nepalensis* Trin. ex Steud., Syn. Pl. Glum. 1:148 (1854).

Syn: *A. borii* Tzvel., in Novosti Sist. Vyssh. Rast. 8:15 (1971).

Ic. Doğan, in Doğa-Tr. J. of Botany 15:129(1991).

Tufted annual. Stem 13-45 cm, erect to geniculately ascending from base, glabrous, 3-4 noded. Sheaths glabrous, uppermost one slightly inflated; ligule 2-3 mm, obtuse; leaf blades 3-10 cm x 2-3 mm, acuminate, glabrous. Panicle 1.5 cm x 3-5 mm, cylindrical, tapering towards apex. Spikelets 2.5-3.5 mm, elliptic. Glumes obtuse, unwinged, connate in lower 1/3, minutely ciliate on keel. Lemma longer than glumes, without an awn, connate in lower 1/3. Palea absent. Anthers 0.3-0.5 mm. Fl.6. *Dry slopes*, 1981 m.

Type: (Nepal) "Nepal", Wallich 3780.

Distribution:

Pakistan: Shebo, Baluchistan, G. Wingate!

India: Punjab, Karnal, J.R. Drummond 2120!

Bashahr, Sagareha, 1981m, J.H. Lace 923!

Saharo-Sindian element.

9. *A. carolinianus* Walt., Fl. Carol. 74(1788).

Ic. Hitchcock, Manual of the Grasses of the United States f. 507, p.362 (1950).

Tufted annual. Stem 1-50 cm, erect or geniculately ascending, branched at base. Sheaths glabrous, uppermost slightly inflated; ligule 3-4 mm, obtuse-acute; blades 3-6 cm x 0.5-1 mm, acuminate. Panicle 1.2-3 cm x 2.5-5 mm, cylindrical. Spikelets 2-2.5 mm, pale in color, elliptic. Glumes obtuse, ciliate on keel. Lemma equalling glumes, connate in lower half; awn 4-5 mm, attached in lower 1/3 of lemma. Palea absent. Anthers c. 0.5 mm. Fl. 4-8. *Damp open ground, old fields, wet sandy places*, 600 m.

Type: (U.S.A) Described from California.

Distribution:

U.S.A.p. Carolina: 10 km N.E. of Chapel Hill, H.E. Ahles 53325! Virginia: Coast of Virginia, Buckive 417! Indiana: nr.Mt. Vernon, V 1934, P. Weatherway! Illinois: Wady Petra, Stark Country, V.H. Chase 335! Oklahoma: nr. Cherokee, G. W. Stevens 643! Yellowstone Park, 2286 m, P.A. Rydberg and E.A. Bessey 356! Nebraska: Thayer, 600 m, W. Kiener 25931! California: Mesa, 9 km N. of. San Diego, L. Abrams 3448!

Endemic to U.S.A.

10. *A. aequalis* Sobol., Fl. Petrop. 16 (1799).

Syn: *A. fulvus* Sm. in Sowerby, Engl. Bot. 21:t.1467 (1803). *A. aristulatus* Michx. Fl. Bor Amer. 1:43 (1803). *A. aequalis* Sobol. var. *fluitans* (Parodi) M.C. Mariano Fl. Patagonica 3:348 (1978). *A. aequalis* Sobol. var. *violaceus* (Hackel) M. C. Mariano Fl. Patagonica 3:348 (1978). *A. geniculatus* L. var. *fulvus* Weinm. En. Petrop. 10 (1837). *A. geniculatus* L. β . *caesius* Neilr. Fl. Nieder-Oesterr. 35 (1859). *A. geniculatus* L. var. *aristulatus* (Michx.) Torr. Fl. North and Mid. U.S. 1:97 (1823). *A. baptarrhenius* S.M. Phillips. in Kew Bull. 41(4): 1027-1028 (1986). *A. subaristatus* Pers., Syn. Pl. 80 (1805). *A. diandrus* Griff., Not. 3, 11 (1851). *A. caespitosus* Trin., Sp. Gram. Icon. 3, t. 241 (1836). *A. aequalis* subsp. *amurensis* (Komarov) T. Koyama, Grasses of Japan and Neighbour Regions 485 (1987). *A. hitchcockii* Parodi, univ. Nac. Buenos Aires Rev. Agron. 7:366, f. 8 (1931).

Ic. Hubbard, Grasses ed. 2, 328 (1968). Zangheri, Fl. Ital. 2:t. 183, f. 6671 (1976).

Annual or biennial. Stem 9-65 cm, ascending geniculately from base, occasionally rooting at nodes. Uppermost sheaths sometimes inflated; ligule to 6 mm, obtuse; blades 2-11 cm x 1-4 mm, acuminate, rough on veins. Panicle 1.2-5(5.5)cm x 3-7 mm, narrowly cylindrical. Spikelets 1.9-2.7 mm, elliptic. Glumes narrowly oblong, obtuse or rounded, with hyaline band on margins, ciliate. Lemma equalling glumes or slightly longer, elliptic, obtuse, glabrous, connate for 1/3-1/2 of their length at base; awn 0.7-1.4 mm. Palea absent. Anthers 0.6-1 mm, yellow in early stage, orange at maturity. (2n=14). Fl. 1-8. *Damp places, marshy waterside habitats, rice fields, sandy soil*, 45-2600 m.

Type: (USSR, nr. Leningrad) habitat in locis uliginosis

cum praecedente (*A. geniculatus*). In lacubus natants est, Sobolewski (holo. LE!).

Distribution:

Iceland: Nordurandalur, VIII 1952, D. McVein!

U.K. p. Norfolk: between Appleton and Hillington, 29. VI 1936, C.E. Hubbard!

Norway p. Tromsö: Lyngen, Brtavarre, 27. VIII. 1899, E. Huglund and J. Karlström!

Finland: Satakunta, around Pietimajarvi lake, 17. VIII 1971, R. Alova and K. Alho!

Holland p. Gelderland: Kekerdomse Waard, 26 IV 1959, W. H. A. Hekking!

Germany: Nürnberg, 320 m, 10 VIII 1902, L. Gross 1902: 318!

France: Etang aude Chaville, bois de Meudon, prés Paris, VI 1852, Chaubard!

Spain: Sierra de Gredos, 2000 m, Deverall and Flannigan 491!

Switzerland: Pontresine, Upper Engadine, VII 1873, J. Ball!

Hungary: Budapest, nr. Danube river, C. de Flatt 1900: 22!

Italy: Piemont, 150 m, 10. VII 1970, O.R. Matthei!

Yugoslavia p. Kosova: Hajla Massif, 20 km N.W. of Pec, 1900m,

C.D.K. Cook, P.J. Grubb, E.I. Newman, T.C. Whitmore 180!

Greece: Moussafacli, 45 m, H.G. Tedd 930!

Turkey p. Ankara: Kyzylcahamam, I_yk Da., Khan, Prance and Ratcliffe 734!

Afganistan p. Munjan: Kalha, 2600m, Edelb. 2101!

Pakistan p. Chitral: Shandur, SE Mastuj, 3600m, Staint. 3039!

India p. Kashmir: Gandarbal (Srinagor), K.K. Koul 1713!

Burma p. Myitkyina: below Tangtung, 1524 m, C.W.D. Kermo de 17316!

Bhutan p. Thimphu: Babesa, Thimphuchu, 2340 m, A.J.C. Grierson and D.G. Long 4460!

China p. Yunnan: Mounq Hai, 1219 m, F. Kingdon-Ward 12698!

Russia p. Kamtchatka: betw. Petropaulovsk and

Savoika, E. Hulten 419a!

Taiwan: Tomita-cho, Taihoku-shi, T. Tanaha and Y. Shimada (Taihoku Imp. Univ. 13480!)

Japan p. Honshu: Kyoto, Kurama, 100m, N. Fukuoka and F. Konta 30!

Australia p. Victoria: East Grippsland, SW of Wulgulmerang, 12 1 1971, H.C. Beauglehole and K. C. Rogers!

U.S.A: Montana, Bozemann 1905:591!

Canada: NW. of Mackenzie District, W. J. Cody and J.B. McCause 2711!

11. *A. geniculatus* L. Sp. Pl. 60(1753).

Syn: *A. geniculatus* L. var *viridis* Neill., Flora Nieder Oesterr. 35 (1859).

Ic: Hubbard, Grasses ed. 2, 332 (1968). Trin., Sp. Gram. 1(4): t. 42 (1828).

Perennial. Stem 7-60 cm, geniculately ascending from base or decumbent, 1-5 noded, rooting at lower nodes. Leaf sheaths whitish-green, glabrous, uppermost sometimes inflated; ligule 2-5 mm, obtuse; blades 1-10(12) cm x 1.5-6(7) mm, acuminate, slightly rough on veins. Panicle 1-7 cm x 2-6 mm, narrowly cylindrical. Spikelets 2-3.5 mm, oblong, green to purplish. Glumes narrowly oblong, obtuse, connate at base, ciliate on keel. Lemma equalling glumes, or slightly shorter, oblong-ovate, truncate, margins connate at base; awn 3.5-5 mm. Palea absent. Anthers 1.4-1.8 mm, yellow to purplish. (2n=28). Fl. 2-8. *Wet places, cornfields*, s.1-1676 m.

Type: Described from Europe (Hb.Linn. 82/3!).

Distribution:

Iceland p. Kjosarsysla: Reykjavik, 10 m, D.Löve A 037!

U.K.: Dumfriesshire, Mabie Forest, P. H. Davis VC 72!

Norway: Bakkelar, VII 1862, N. Noel

Sweden p. Västergötland: Lerum parish, Hulan, 14.VI 1947 R. Ohlsen!

Finland: Helsinki, Salmisaari, Islamic cemetery, 25 VI 1978, E. Reinikba!

Germany p. Nürnberg: Marienberg, 320 m, L. Gross 1901:207!

Belgium: Charleroi, 17 VII 1864, Cosquiere!

Holland: Vianem, 28 VI 1930, G. Vermeulen!

France: Bords de l'Étang du Penay Seirne et Oise, 2 IX 1877, E. Bonnet!

Spain p. Madrid: Case de Cerro Casal, 1 V 1981, D.S. Mata!

Switzerland: GenÈve, VII 1848, Reuter!

Greece: Karagheuzleu, 15 V 1932, H. G. Tedd!

Turkey p. Çanakkale: Gelibolu, Sirjaev 133!

Afghanistan, Griff 6463!

Nepal: Gilam, Tila Valley, 1676 m, O. Polunin, W.R. Sykes and L. H. J. Williams 1915!

India: Dehra Dun. and vicinity, United Provinces, 701m, U. Singh 316!

Russia: Mandchourie, M. H. Bohnhof 82!

China p. Shantung: First Park, Tsingtao, C. V. Chiao 2413!

Australia: Mt. Lyndhurst, M. Koch 344!

U.S.A. p. South California: San Diego Country, L. Abrams 1903:3448!

Argentina p. Tierra del Fuego: Estancia Remolino, N.W. of settlement, D.M. Moore 1984!

12. *A. bulbosus* Gouan, Hort. Monsp. 37(1762).

Ic: Trin, Sp. Gram. 1(4): t 400 (1828). Hubbard, Grasses ed. 2, 330(1968).

Caespitose perennial. Stems 3-45 cm, erect to ascending from base, smooth, glabrous, 2-3 noded, bulbous. Leaf sheaths smooth, uppermost sometimes inflated; ligule 1.8-6 mm, obtuse; blades 1-10 cm x 1-3.5 mm, acuminate, later convolute, slightly rough on margins. Panicle 1.3-6 cm x 3-6 mm, narrowly cylindrical. Spikelets 2.4-3.5(4) mm, oblong. Glumes acute, narrowly oblong, shortly ciliate on keel and sides below middle, connate at base. Lemma shorter than glumes, narrowly oblong, obtuse, margins slightly connate at base; awn 1.8-5 mm, geniculate, twisted below. Palea absent. Anthers 1.3-1.8 mm. (2n=14) Fl. 5-8. Salt marshes, sea shores. s.1.

Type: (France) Habitat Monspeliensis frequens in pratis, Gouan (holo K.!).

Distribution:

Holland: Blauwhaun-Blakzigl, 1 VI 1936, Soest!

U.K.: Somerset, Cambwich, 15 VI 1974, D.M. Stewans OS367/74!

Germany: Hannover, 2-3 m, 10 VI 1903, G.F. Plettke 1903:429!

Italy: Piana dei Greci, Todaro 505!

Bulgaria: Vilosa, W.B. Turill 785!

Turkey p. Istanbul: Maltepe, 2 V 1897, Azn.!

Algeria: Bords du ruisseau a Rab-el-Qued près Alger., P. Jamin 219!

13. *A. japonicus* Steud. Syn. Pl. Gram 1:149(1855).

Syn: *Alopecuropsis japonica* (Steud.) Opiz, in Lotos 7:84 (1857). *A. malacostachyus* A. Grey in Perry, Exped. Jap. 2:328 (1856).

lc: Makinos, New Illustrated Flora of Japan f.2933, 734 (1963).

Tufted annual. Stem up to 45 cm, erect to geniculately ascending, smooth. Sheaths smooth, glabrous, uppermost inflated; ligule 2-5 mm, obtuse; blades 3-15 cm x 3-6 mm, acuminate. Panicle 4-7 cm x 5-8 mm, oblong. Spikelets 5-7(8) mm, elliptic-oblong. Glumes ciliate on keel, connate in lower 1/4, 5-5.5 mm. Lemma longer than glumes, glabrous, connate for 1/2 of their length in lower half, awned from lower 1/6; awn 5-14 mm, geniculate. Palea absent. Anthers c. 1 mm, white in color. Fl. 4-5. *Wet places*.

Type: "Described from Japan" Herb. Musei Lugd. Bot. Japonia.

Distribution:

Japon p. Kyushu: Taneyammamura in Higo, V. 1946, Y. Simada!

Japon p. Tokyo: Mt. Takao, Hachioji City, T. Makino (Makino Herb 159767!)

Japon p. Hondo: Kashigaya in Musashi, 5 V 1951, J. Ohwi (Nat. Sc. Mus. 26!).

Hong Kong: Swatow, 340 km NE of Hong Kong, 2 IV 1900, J. M. Dalziel!

China: Patung in W. of China, E. H. Wilson 1661!

Sino-Japanese element.

14. *A. saccatus* Vasey, in Coult. Bot. Gaz. 6:290 (1881).

lc: Hitchcock, Manual of the Grasses of the United States f. 509, p. 362(1950).

Solitary or tufted annual. Stem 7-38 cm, erect or geniculately ascending, smooth, 2-3 noded. Sheaths smooth, glabrous, uppermost strongly inflated; ligule 3-4 mm, acute; blades 2.5-8 cm x 2-3.5 mm, acuminate, glabrous, smooth, rough on upper surface. Panicle 2-4 cm x 7-8 mm, elliptic to broadly oblong. Spikelets 4-5 mm, elliptical. Glumes obtuse, ciliate on keel, connate in lower half. Lemma 3.5-4 mm, obtuse, with an awn attached in lower 1/4, connate in lower half; awn 7-10 mm, geniculate, exserted. Palea absent. Anthers 1 mm. Fl. 4-6. *Wet places, shallow pools, riversides*.

Type: Described from U.S.A.

Distribution:

U.S.A. p. Washington: Rockland, W.N. Suksdorf 1909: 4040! Oregon: Dalles City, W.N. Suksdorf 1909: 42! California: 9km NW. of Thornton, Sacramento Country, R.F. Hoover 2192! California: Delano, Kern Country, R.F. Hoover 3092! California: Woodland Reservoir, N. of Oakdale, Stanislaus Country, R.F. Hoover 1939! Oregon: Sauvies Island, Multnomah Co., 10 V 1991, M.W. Gorman!

Endemic to U.S.A.

15. *A. howellii* Vasey, in Bull. Torrey Bot. Club. 12 (1888).

Syn: *A. californicus* Vasey, in Bull Torrey Club. 15:13 (1888).

lc: Hitchcock, Manual of the Grasses of the United States f. 508, p. 362 (1950).

Tufted annual. Stem 15-30 cm, geniculately ascending from base, 3-4-noded. Uppermost sheaths ± inflated; ligule 4-5 mm, acute; blades 2.5-8(10) cm x 1.5-3 mm, acuminate. Panicle 2-6 cm x 4-7 mm, cylindrical oblong. Spikelets 3-3.5 mm, elliptical. Glumes 3-3.5 mm, ciliate on keel, adpressed-pilose on lateral veins, connate in lower 1/6. Lemma 2-3.5 mm, awned in lower 1/3; awn exserted, 3-5mm. Palea absent. Anthers c. 1 mm, orange. Fl. 4-8. *Wet places along ditches, 30-2330 m*.

Type: (U.S.A.) Described from Oregon.

Distribution:

U.S.A. p. California: California, A.A. Heller 1902: 5445! California: Bear Valley, San Bernardino Mount. L. Abrams 1902:2895! Oregon: Strawberry Lake, 2330 m, W.C. Cusick 1910:3533! California: Northern Coast region of California, 30-90 m, J.P. Tracy 3780! California: 10 km NE. of Sutter, A.A. Beetle 3860!

Endemic to U.S.A.

Sect. *Colobachne* (Beauv.) Griseb. In Ledeb. Fl. Ross. 4:460 (1852).

Syn. *Colobachne* Beauv. Ess. Agrost.: 22 (1812).

Perennials. Panicles broadly elliptical or cylindrical; their branches bearing 1-6 spikelets. Glumes with aristate point, longer than lemma, connate for 1/10-1/3 of their length in lower part, membranous or coriaceous-membranous. Palea present, rarely absent.

Type: *A. vaginatus* (Willd.) Pall. Ex Kunth.

16. *A. setarioides* Gren., Fl. Massil. Adv. 43(1857).

Syn: *A. neglectus* Azn., in Mag. Bot. Lap. 10:277 (1911). *A. setarioides* Gren. var. *juvenalis* Hack., Viertel-Jahr. Naturf. Ges. Zürich 53:271(1911).

Ic. Doğan, in Doğa-Tr. J. of Botany 15:128 (1991).

Annual. Stem 10-35 cm, erect or geniculate at nodes, tufted or solitary, simple or branched, rather slender, 2-3 noded. Leaf sheaths glabrous, uppermost strongly inflated; ligule 1-2.5 mm, acute to obtuse, denticulate; blades 1.2-10 cm x 0.8-3.5 mm, acuminate, slightly scabrid on upper surface. Panicle 0.8-3.2 cm x 4-11 mm, ovate. Spikelets 3.2-4.5 mm, elliptic urceolate. Glumes long ciliate on keel, acute, connate for 1/3 of their length; awn 6.5-10.5 mm, geniculate, twisted in lower half. Palea absent. Anthers 1.5-2 mm. Fl. 4-6. *Wet places, roadsides, dried-up and wet ditches, by sea*, nr. s.1.-1128 m.

Type: Described from Marseille (France).

Distribution:

France: Avnas, Rhine, Gandoger!

Italy: d. Aemilia: Bononia (Bologna), 242m, A. Fiori 1904: 212!

Greece: Kydonia, W. Crete Agia, 50m, J.H. Smittenberg 238! Agrapha (Dolopia Veterum): M. Pindi circa monasterium Kovona, 1067-1128 m, 20-28 VI 1885, Haussknecht!

Turkey d. Edirne: Havsa to Edirne, A. Baytop (ISTE 6549!) Istanbul: Haydarpasa, 11 VI 1911, Azn.! Bursa: Karacabey, Krause (ANKA. 480!) İzmir: Bornova, H. Peşmen (EGE 5044!) Muğla: Köyceğiz, Regel (EŞE 18969!)

Medit. element.

L. V. Lester-Gerland's record of this species from England (nr. Oxford) needs confirmation.

17. *A. anatolicus* M. Doğan in Notes R.B.G. Edinb. 45(1): 114 (1988).

Ic. Doğan, in Notes RBG Edinb. 45(1):113 (1988).

Caespitose perennial, with long creeping rhizomes. Stem 1.5-33 cm, stout, erect, glabrous, smooth, 2-noded. Leaf sheaths glabrous but lower ones hairy, uppermost ones inflated; ligule 2-4 mm, obtuse; blades 2-6 cm x 2-6 mm, acuminate, bluish-metallic when fresh, glaucous when dried. Panicle 2.5-3 cm x 0.7-1 cm, broadly oblong. Spikelets 5-7 mm, elliptical. Glumes connate for 1/6 of their length at base, long ciliate on keel, acuminate. Lemma 4-5mm, acute, connate in the lower half, awned from middle on dorsal surface; awn c. 6.5 mm, straight. Palea c. 3 mm. Anthers c. 3mm, yellow. Fl. 4. Marshy ground, 1500m.

Type: (Turkey B6 Sivas): between Sivas and Tatlica, 1500 m, 29 IV 1966, C. Tobey 1679 (holo EI)

Endemic to Turkey. Irano-Tur. element.

18. *A. gerardii* Vill., Fl. Delph. 5 (1786).

Caespitose perennial. Stem 6-45 cm, erect to geniculately ascending from base, glabrous, smooth, 2-noded, with a very stout rhizome. Leaf sheaths glabrous, uppermost ones inflated; ligule 1-2 mm, truncate; blades 1-7 cm x 1-4.2 mm, glabrous, slightly scabrid on margins, dark green. Panicle. 1-2 mm, glabrous, slightly scabrid on margins, dark green. Panicle 1-2 cm x 0.7-1 cm, ovoid. Spikelets 4-6.3 mm, whitish-grey, oblong. Glumes lanceolate, with aristate points (up to 1.5 mm), slightly connate at base, covered with long cilia on dorsal surface. Lemma 3-4 mm, obliquely truncate, dorsally awned; awn 0.8-6 mm. Palea 2.5-3.5 mm, ciliate in upper half of keel. Anthers 2-2.5 mm. (2n=14).

1. Awn of lemma not exserted, to 2 mm
 subsp. *gerardii*

1. Awn of lemma exserted, to 6 mm
 subsp. *cassius*

Subsp. *cassius* (Boiss.) M. Doğan *comb. et stat nov.*

Syn: *A. cassius* Boiss., Diagn. Ser. 1(13): 41(1854). *A. gerardii* Vill. var. *cassius* (Boiss) M. Doğan in Notes R.B.G. Edinb. 40:509(1983).

Fl. 6. *Alpine mountain summits*

Type: (Turkey C5/6 Hatay) in regione alpina montis Cassii (Akra Da.) (VI 1846), Boissier (holo GI)

Endemic to Turkey. East Medit. element.

Subsp. *gerardii*

Syn: *Colobachne gerardii* (Vill.) Link, Enum. Hort. Berol. Alt. 1:74 (1821). *A. phaleroides* C. Koch in Linnaea 19:5 (1846)p.p

Ic: Trin., Sp. Gram. 1(1): t. 1(1828), as *A. gerardii*. Zangheri, Fl. Ital. 2:t. 183, f.6665 (1976), as *A. gerardii*.

Fl. 6-9. *Open rocky places, snow pasture with Juniperus*, 1750-3000 m.

Type: (France) au fond du Valgaudemar, á Orcières, sur le Mont-Genèvre, vivace, Villars (holo, GRM)

Distribution:

Spain: Salve Quaderema Lozoya to Naficoa road, 1778 m, V.F. Mulford 98!

France: Vallon de Cote-Plane, paturages, 3000 m, E. De Valon 1856:11!

Italy: Calabria, Mt. Pollino, 2100 m, Herb. Dörfler 372!

Greece: Macedonia, Mt. Somlika, 2360 m, E.K. Balls and W.B. Gourlay 3433!

Greece: Olympos Mount., 2200 m, F. Sorger 60/5-3-101! Agrapha, Mount. Karava, 1676-1981m, 1-3 VII 1885, C. Haussknecht!

Turkey p. Bursa: Uludağ, 2000 m, P. Uotila 27229! Kahramanmaraş: Ahyr Da., 1750-1800 m, Z. Aykaç 4168!

Algeria p. Djurdjura: Heidzer above Tala Guilef (above Boghni), 1785 m, D. 59259!

Medit. (mt.) element.

19. *A. glacialis* C. Koch in Linnaea 21:382(1848).

Syn: *A. ponticus* C. Koch in Linnaea 21:382(1848). *Colobachne pontica* (C. Koch) Nyman in Bot. Not. 1851:69 (1851). *A. sericeus* Albov in Bull. Herb. Boiss.

1:251 (1893). *A. caucasicus* Seregin in Not. Syst. (Leningrad) 21:55 (1961).

Ic: Fl. URSS 2:t. 11, f.10 (1934). Fl. Gruzii 1:t.9(1941), as *A. sericeus*.

Caespitose perennial. Stem 30-70 cm, erect to geniculate, usually branched at base, 2-noded, with fibrous roots. Leaf sheaths glabrous, uppermost slightly inflated; ligule 1-1.5mm, obtuse; blades 2-15 cm x 1-2.7 mm, acuminate, scabridulous on upper surface, margin scabrid. Panicle 1-2.5 cm x 6-9 mm, ovate-elliptic to oblong. Spikelets 3.5-5.5 mm, oblong-urceolate, dark purple. Glumes lanceolate, slightly connate, with an aristate point, densely ciliate on dorsal surface. Lemma 3-4.5mm, glabrous, denticulate with a mucro, connate at base; awn 3-4.5 mm exserted or not, sometimes geniculate, attached in lower 1/2-1/3 of lemma. Palea 2-2.6 mm, sometimes missing. Anthers 2-3.5 mm. Fl. 7-8. *Rocky places in alpine steppe*, 2200-3200 m. (2n=14).

Type: (Turkey A8 Rize) auf dem Rücken des pontischen Gebirges, im Gause Hemschin, auf Granitboden, 2652 m, (VIII 1843), C. Koch (holo. B destroyed; iso. GI!).

Distribution:

Turkey p. Rize: İkizdere, Cermanin Tepe above Cimil, 3100-3200 m, D. 21094! Rize: İkizdere, Balta Tepe, 3200 m, D. 21106!

Georgia: Humensu Cbanetu, Uctoku, 1900-2100 m, 18 VII 1978, Mukhvetadze, Chelidze!

Caucasus: Dartlo, II VII 1876, Orodde 357!

Afghanistan p. Nuristan: Shtire, 2900 m, L. Edelberg 1037!

Euro-Sib. (mt.) element.

20. *A. apiatus* Ovcz. in Komarov , Fl. URSS 2:744(1934).

Ic: Bor, Fl. Iraq 9:296, t.106(1968).

Perennial, with creeping rhizomes. Stem 8.5-60 cm, erect, glabrous, smooth. Sheaths glabrous, uppermost ones inflated; ligule 2-3 mm; blades 1.5-15 cm x 2-6 mm, scabridulous on upper surface, acuminate. Panicle 1-4 cm x 7-9 mm, cylindrical, lanceolate-cylindrical. Spikelets 4.5-5 mm, urceolate-oblong, villous, purple. Glumes pilose on keel, with a small mucro, connate for 1/4-1/5 of their length in lower part. Lemma equalling glumes, truncate, pilose; awn 8-9 mm, slender,

geniculate. Palea absent. Anthers 2.5-3 mm. Fl. 5-7. *Alpine meadows and rocky mountain slopes*, 2000-3353 m.

Type: "Prope satat. Sary-Tasch, 3400 m, Alai, Fergana Alexeenko (LE).

Distribution:

Iraq: Mosul, Swara Tuka, Barkley 8094!

Iran: Maz., Kandovan, 2700 m, Rech. 940!

Afghanistan: Kabul, Paghman, 2000 m, Neub, 4716!

Afghanistan: Hojigah Pass, Koh-L-Baba, 2438-3353 m, P. Furse 8515!

Irano-Tur. element.

21. *A. mucronatus* Hack. ex Paulsen, Vid. Meddel. Dansk Naturk. Foren. Kjobenhavn 162 (1903).

Ic. Doğan, in Doğa-Tr. J. of Botany 15:129 (1991).

Rhizomatous perennial. Stem 5-14 cm, erect, glabrous. Uppermost sheaths inflated; ligule 2-3 mm, obtuse; blades 1.5-4 cm x 1-3 mm, acute, later inrolled. Panicle 1-2 cm x 8-10 mm, ovate-oblong, purple. Spikelets 3-4 mm (incl. mucro), ovate-oblong. Glumes slightly connate at base, hairy, with a mucro. Lemma slightly shorter than glumes, obliquely-truncate, with an awn attached from lower 1/3; awn 1.5-4 mm. Palea absent. Anthers 1.5-2 mm, purple. Fl. 5-7. *Moist slopes on marshy ground*, 3000-4000 m.

Type: Pamir, Tahatyr Tash, on moist ground, Ove Paulsen 772., Pamir. in swamps by the lake Bulug Kul., Ove Paulsen 1162.

Distribution:

Iran: Meadow on lake of Desht-arjin, V 1855, Staff 1370a! Kabul: NW. of Unai Pass, 3000 m, I. Hedge and P. Wendelbo (W. 4573!) p. Wakhan: Bazaa-i Gumbad, 4000 m, C.G. Wilson and T.F. Hower 1505! Turkistan: Turkistan, 21 VII 1897, S. Korshinsky 5606!

Irano-Tur. Element.

22. *A. borealis* Trin, Fund. Agrost.: 58 (1820)

Laxly caespitose perennial Stem 8-40 (60) cm, erect. Sheaths not inflated; ligule 1-3 mm, truncate; blades 2-12 cm x 2.5-7 mm, acuminate. Panicle 1-3 cm x 6-15 mm, ovoid or broadly cylindrical. Spikelets 3-4.5(5) mm,

ovate-elliptic. Glumes broadly acute, parallel at apex, covered with greyish hairs on keel, connate at base. Lemma 2.8-4 (4.6) mm, obtuse, connate at base, awn exerted or not, occasionally absent. Anthers c. 2 mm (2n=98-130).

1. Panicle ovoid; awn included or exerted up to 1 mm **subsp. borealis.**

1. Panicle broadly cylindrical; awn exerted by more than 2 mm **subsp. glaucus.**

Subsp. **borealis**

A. pseudobrachystachyus Ovcz in Fl. USSR.2:153, 745 (1934). *A. magellanicus* Lam. Tabl. Encycl. 1:168 (1791). *A. alpinus* Sm. β. *altaicus* Griseb., in Ledeb. Fl. Ross. 4:462 (1852). *A. alpinus* Sm. subsp. *stejnegeri* (Vasey) Hult. Ark. Bot. (Stockholm) 7(1):9 (1968). *A. stejnegeri* Vasey Proc. U.S. Nat. Mus. 10:153 (1887). *A. alpinus* Sm. subsp. *borealis* (Trin.) Jurtz. Novosti Sist. Vyssh. 462 (1852). *A. occidentalis* Scribn. and Tweedy, Bot. Gaz. 11:170 (1886). *A. alpinus* Sm. var. *occidentalis* (Scribn. and Tweedy) Boivin in Provancheria 12:32 (1981). *A. magellanicus* Lam. var. *brachyatherus* (Parodi) M.C. Mariano in Fl. Patagonica 3:345 (1978). *A. magellanicus* Lam. var. *bracteatus* (Phil) M.C. Mariano in Fl. Patagonica 3:344 (1978).

Ic: Doğan, in Doğa-Tr. J. of Botany 15: 129(1991), as *A. alpinus*

Fl. 6-8. *Alpine meadows*, s.l-4200 m.

Type: "in Asia et America boreali".

Distribution:

Alaska: 1 km E. of power station, Prudhoe Bay, NE coast of Alaska, G. Halliday A. 287/75!

Groenland: Syd. Kap., Scoresby Sund, 15 m, D.F. Chamberlain GR 188!

U.K. p. Scotland: Aberdeen, 914 m, 9VII 1933, R. Mackechnie!

Norway p. Spitzbergen: Wijde Bay, Fork Valley, G.S. Elton A. 183!

Russia: Bajcal prope pag. Posolsk., 21 VI 1915, G. Poplavska and Y. Zingerling!

India: Pamir region, 42000 m, I.M.S. Akock 17774!

Canada: Northwest Territories, 0.5 km SE. of Settlement, D.B.O. Savile and C.T. Watts 1515!

U.S.A. Wyoming, Battle Lake, A. Nelson 4017!

Subsp. *glaucus* (Less.) Comb. et stat. nov.

Syn: *A. glaucus* Less. Linnaea 9:206(1834).

A. tenuis Kom. Repert. Sp. Nov. Fedde 13:85 (1914).
A. roshevitzianus Ovcz in Fl. USSR 2:154, 745 (1934). *A. turczaninovii* O.D. Nikiforova in Bot. Zhurn. 73(11):1601 (1988). Fl.6. *Rocky lake shores, wet mountain slopes*. 1900-3000 m.

Type: (Russia) "In humidis montis Tagani 1900-3000 m" südliche Urals" Russia.

Distribution:

Russia: Siberia, Bajcal prop. pag. Posolsk., G. Poplovskaja et Y. Zinserling 1915:5306!

Euro-Sib. (mt) element.

The name *A. alpinus* Sm. is illegitimate, being predated by *A. alpinus* Villars (1786), a different species. The next available epithet is *A. borealis*.

23. *A. aucheri* Boiss. Diagn. ser. 1(1854). 1(13): 41 (1854).

Syn: *A. vaginatus* (Willd.) Boiss. subsp. *aucheri* (Boiss.) Vestb. in Trudy Bot. Sada Jur'ev 5:23 (1905).

Ic: Doğan, in Doğa-Tr. J. of Botany 15:128 (1991).

Caespitose perennial, with long creeping rhizomes. Stem 20-60 cm, erect or slightly geniculate at nodes. Sheaths glabrous, uppermost ones inflated, lower ones disintegrating into reticulate fibres; ligule c. 2 mm, obtuse; blades 3-15 cm x 2-6 mm, acuminate, glabrous, smooth. Panicle 1.5-2.5 cm x 1-1.5 cm, elliptic-oblong. Spikelets 4.5-5(6.2) mm (incl. aristate point), urceolate, whitish-grey. Glumes lanceolate, with divergent or straight aristate point c. 1.2 mm, ciliate, slightly connate at base. Lemma 3-4 mm, oblong, truncate, glabrous; awn 6.5-10 mm., attached from lower 1/3 of lemma, geniculate or not, somewhat twisted below. Palea absent. Anthers 1.8-2.7 mm. Fl. 5-8 *Rocky volcanic slopes, nr. permanent snow beds, alpine meadows*, 2000-3700 m. (2n=56?).

Type (Iran) "in monti Elbrus, Aucher 5457(G!)", ad nives deliquescentes ejusdem jugi supra pagum Asadbar, (9 VIII 1843), Kotschy, Pl. Per. Bor. 464(G!).

Distribution:

Turkey p. Maraş: Nurhak Da., 2000 m, Stainton and Henderson 5648! Maraş: Ahır Da., Yedikuyular Yaylası, 1800-2000 m, H. Duman and Z. Aykaç 3521! Sivas: Bey Da., S. of Zara, 2000 m, Stainton and Henderson 5285! Erzurum: Palandöken Da., Dadaş, Tatlı (ISTE 27889!)

Iran: Mt. Elbrus, Kendevan, 3100 m, Bornmüller 8350! Azarbaijan; Kuhhay Sabalan, 3500-3700m, J. Lamond 4753!

Irano-Tur. element.

24. *A. vaginatus* (Willd.) Boiss., Fl. Or. 5:488(1884).

Syn: *Polypogon vaginatus* Willd. in Ges. Nat. Freunde Berlin Mag. Neue Schr. 3:44 (1801). *A. angustifolius* Sm. in Sibth. and Sm., Fl. Graeca 1:48, t. 64 (1808). *Colobachne vaginata* (Willd.) P. Beauv., Ess. Agrost. 22 and 158 (1812). *A. dasyanthus* Trautv. Act. Hort. Petrop. 5:486 (1877).

Ic: Fl. Gruzii 1:10 and 11 (1941), t. 11 as *A. dasyanthus*. Fl. Iraq 9:t. 105 (1968).

Rhizomatous, caespitose perennial. Stem 6-32 cm, erect, slightly bent at base, slender, smooth, glabrous, 1-2-noded. Sheaths glabrous, uppermost inflated; ligule 0.5-2 mm, obliquely truncate; blades 1-15 cm x 0.5-2 mm, acuminate, mostly basal, convolute to flat, glabrous, scabrid on margins. Panicle 1.2-2.5 (3) cm x 7-14 mm, ovate to oblong. Spikelets 4.5-6.3 mm. (incl. aristate point), urceolate. Glumes ciliate on keel, with a slightly divergent aristate point (c. 0.6-1.8 mm), connate at base. Lemma 3-4 mm, obtuse; awn 5-10.5 mm, attached from lower 1/3 of lemma, geniculate, twisted. Palea present. Anthers 2.3-3.3 mm. (2n=56). Fl. 4-6. *Rocky alpine mountain slopes*, 700-3100 m.

Type: (Crimea) wächst in Taurien an trockenen Stellen und blüht im Mai, Pallas (holo B-Willd. 1556!).

Distribution:

Russia: Caucasus, Koktebel, 20. V-2. VI. 1907, Junge 1907:333! Crimea, Yalta, Nikitsy Yaila, 1350m, Davis 33372A!

Turkey: Amasya, 700 m, 10 IV 1899, Bornmüller! Bursa, Uludağ, 2300-2400 m, Davis 14853! Kahramanmaraş, Ahır Da., 1800 m-2000 m, Z. Aykaç and H. Duman 3524!

Iraq: Arbil, Ser Kurawa, 3000 m, Gillet 9738!

Iran d. Azarb.: Kuhha-ye Sabalan, Mird. in Gouba, K. 3434!

Afghanistan d. Nuristan: Pashki, 2700 m, Edelb, 991!

Irano-Tur. element.

25. *A. himalaicus* Hook. f., Fl. Brit. Ind. 7:238(1896).

Ic: Doğan, in Doğa-Tr. J. of Botany 15:129 (1991).

Caespitose perennial, with long rhizomes. Stem 12-30(80)cm, erect, 2-noded. Sheaths glabrous, uppermost ones slightly inflated; ligule obtuse, 2-8 mm; blades 2-16 cm x 2-7 mm, acuminate, rigid, scabridulous on margins. Panicle 1.5-3 cm x 0.8-1.3 cm, ovoid, elliptic to oblong-elliptic. Spikelets 3-4.5(5) mm, covered with greyish hairs (c. 3 mm), elliptic. Glumes acuminate, sometimes aristate, connate at base. Lemma shorter than glumes, broadly acute, connate for 1/3-1/2 of their length in lower part; awn c. 8-12 mm, exserted. Palea absent. Anthers 2-3 mm. (2n=56) Fl. 7-8. *Alpine slopes, near streams, wet soil among stones*, 3048-4200 m.

Type: "Kashmir et Drash, 3048-4420 m", Falconer, K.

Distribution:

Afghanistan p. Badakshan; Khumbuk area, Dorrah! Aghondorra, 3000 m, I. Hedge and P. Wendelbo (W. 9388!). Kapisa: W. slope of Samir Valley, 4540 m, W.B. Gibson 4! Parvan: 11 km W. of Salang tunnel, 4173 m, R.B. and E.M. Gibbons 821! Parvan: Panjshir Valley, W. side of Anjuman Pass, 4100 m, I. Hedge and P. Wendelbo (W. 5448!). Hindu Kush, 3658 m, P. Furse 8824!

Pakistan p. Barum fol: Medial moraine of S. Barum Glacier, 3800m, 12 VII 1950, P. Wendelbo!

India: 16km W. of Zuido, 3821m, S.U. 158!

Irano-Tur (mt.) element.

26. *A. laguroides* Bal. in Bull. Soc. Bot. Fr. 21:11(1874).

Syn: *A. vaginatus* (Willd.) Boiss. var *unipaleaceus* Boiss., Fl. Or. 5:489 (1884) p.p

Ic: Doğan, Doğa-Tr. J. of Botany 15:128 (1991).

Densely caespitose perennial, with creeping rhizomes. Stem 5-20 cm, glabrous, erect, ascending from base, 1-2 noded. Sheaths glabrous, scarious, uppermost inflated; ligule 0.3-1 mm, truncate, denticulate; blades 1-8 cm x 0.5-2.5 mm, mostly basal, obtuse-acuminate, convolute,

glabrous, smooth, scabrid on margins. Panicle 0.8-2 cm x 0.8-1.4 cm, ovoid-elliptic, ± purplish. Spikelets 4.5-6 mm (incl. aristate points), urceolate-oblong. Glumes linear, covered with long silky hairs, slightly connate at base, with an aristate point; aristate points 0.8-2 mm, attached from lower 1/4, geniculate, twisted. Palea absent. Anthers 1-1.7 mm. Fl. 8. *Rocky mountain slopes near snow beds*, 3000-4270 m.

Type: (Turkey A8 Rize) région alpine Karadeniz au-dessus de Djimil (Cimil) vers 3000 metres d' altitude, (15 VIII 1866), Balansa 1552 (holo P, iso E! G!)

Distribution:

Turkey p. Bitlis: Suphan Da., above Adilcevaz, 4054 m, Davis 24664! Bitlis: Suphan Da., 4267 m, R. Stileman 30! Rize: Ikizdere, Vercenin Tepe, 3400 m, Davis 21137!

Endemic to Turkey. Euro-Sib. (mt.) element.

27. *A. lanatus* Sm. in Sibth. and Sm., Prodr. Fl. Graec. 1:43 (1806).

Ic: Doğan, in Doğa Tr. J. of Botany 15:128(1991).

Caespitose perennial with a stout black cylindrical rootstock. Stem 3.5-30 cm, erect to slightly curved, sometimes geniculate at nodes, slender, glabrous, smooth, tomentose below, 1-noded. Sheaths tomentose, uppermost inflated; ligule 1.5-2.5 mm, acute; blades 1-5.5 cm x 2-3 mm, obtuse or mucronate, usually convolute, tomentose all over, mostly basal. Panicle 0.8-1.5 cm x 0.8-1.3 cm, ovoid-globose. Spikelets 4.5-6.2 mm, oblong. Glumes lanceolate, with an aristate point c. 1-1.5 mm, with dense hispid hairs, slightly connate at base. Lemma 2.4-3.5 mm, obliquely truncate at apex, ciliate, connate at base; awn 6.5-11 mm, attached from lower 1/5-1/7 of lemma, geniculate, twisted. Palea absent. Anthers 1.8-2.7mm, cream in color. Fl. 5-8. *Scree. on limestone rocks, rock crevices on high mountain slopes*, 1500-3450 m.

Type: (Turkey A2(A) Bursa) in summitate montis Olympi Bithyni, nive peracta, Sibthorp (holo. OXF, iso BM!)

Distribution:

Turkey p. Bursa: Uludağ, 2400 m, J. Watson 5520! Niğde: Ala Da., 3400-3450 m, E. Parry 194! Kayseri: Sarız, Binboğa Da., 1700-1800 m, Z. Aykaç and H. Duman 3672! Kayseri: Pınarbaşı to Gürün, Ziyaret Tepesi, 2000 m, Coode and Jones 1352! Maraş: Göksun,

Işık Da., above Karlı Y., 2800 m, Davis 19995! Antalya: Perge, 10 VII 1970, Pamukçuoğlu!

Endemic to Turkey. Irano-Tur. element.

28. *A. davisii* Bor in Notes R.B.G. Edinb. 25:63 (1963).

Ic: Doğan, in Tr-J. of Botany 15:128(1991).

Caespitose perennial with long stout rootstock. Stem 7-38 cm, erect, slender, glabrous, smooth, 1-noded. Upper sheaths inflated and glabrous, basal ones villous; ligule 0.5-2 mm, acute; blades 1-5 cm x 1-3 mm obtuse to mucronate, convolute, ciliate on margin. Panicle 0.9-2 cm x 0.7-1 cm, ovate, rather dense. Spikelets 4-6mm (incl. aristate point), cup-shaped. Glumes densely pilose, connate at base, with an aristate point (to 1.5 mm). Lemma 3.5-4 mm, obliquely truncate, connate for 1/3 at base; awn 7-10mm, geniculate, twisted in lower half. Palea absent. Anthers 2.5-3 mm. Fl.5. *Open places and stony mountain slopes*, 1220-1525 m.

Type: (Islands) Samos: Mount Kerkis, on Vigla, 1220-1525 m, Z.V. 1940, P.H. Davis 1688 (holo K!, iso. E!).

Distribution:

Turkey p. İzmir: Kemalpaşa, Nif Da., 1500 m, Seçmen, Peşmen and Aydar (EGE 16357!)

Greece p. Samos: Mt. Kerki, 1400 m, Rechinger 4112!

E. Medit. (mt.) element. Related to *A. lanatus*.

29. *A. textilis* Boiss., Diagn. ser. 1(13): 40 (1854).

Densely caespitose perennial with fibrous rhizomes. Stem 5-70 cm, erect to geniculate, glabrous, smooth, rather thickened at base, 1-2 noded. Lower sheaths covered with adpressed silky hairs, uppermost inflated; ligule 0.5-1mm, truncate, slightly hairy at apex; blades mainly basal, 5-30 cm x 1-3mm, acuminate, convolute to filiform or flat. Panicle 1-3 cm x 0.6-1.5 cm, elliptic. Spikelets 4.5-8 mm, elliptic. Glumes lanceolate, with an aristate point (c. 1-2 mm) or a mucro, hirsute on keels, connate in lower 1/4. Lemma 4-5.5 mm, truncate, ciliate at apex, connate at base; awn 8-14(17) mm, attached from lower 1/3 of lemma. Palea 2.5-4 mm slightly hairy at apex. Anthers 3.5-4 mm. (2n=56).

1. Spikelets 4.5-6.5 mm (incl. aristate point); leaves convolute subsp. *textilis*

1. Spikelets 7-8 mm (incl. aristate point); basal leaves flat subsp. *tiflisiensis*

Subsp. *textilis*

Syn: *A. vaginatus* (Willd.) Boiss. subsp. *pubescens* Westb. var. *textilis* (Boiss.) Westb. in Trudy Bot. Sada Jur'ev.5:23 (1905).

Ic: Doğan, in Doğa Tr-J. of Botany 15:128 (1991).

Fl. 5-8. *On scree, Rocky slopes, alpine summit*, 1675-3353 m.

Type: (N. Iran) in glareosis vulcanicis jugi Besmitschel montis Demawend, 2743 m, (21 VI 1843), Kotschy 351 (holo. G, iso E!, K!)

Distribution:

Turkey p. Giresun: Balaban Da. (Kılıç Tepe) above Tamdere, 2900 m, Davis 20619! Niğde: Çamardı, Ala Da., 2740 m, A. Burt 7! Tunceli: Munzur Da., above Ovacık, 2800 m, Davis 31228!

Iraq: Qandil Range, 3000-3290 m, A. Rawi 241/3!

Iran p. Damghan-Semnan: Zentral Elburs, 8 km N. of Djaschm, 2900 m, E. Behboudi and P. Aellen 1961!

Caucasus p. Ordubad: M. Yaglodara et Agh-yurt, 8 VIII 1933, I. Karjagin and G. Isaev!

Turkmonia: Mt. Rifazasch, D. Litwinow 2203!

Irano-Tur. (mt.) element.

Subsp. *tiflisiensis* (Westb.) Tzvelev in Novit. Syst. pl. Vasc. (Leningrad) 5: 15(1971).

Syn: *A. vaginatus* (Willd.) Boiss. subsp. *pubescens* Westb. var. *tiflisiensis* Westb. in Trudy Bot. Sada Jur'ev. 5:23 (1905). *A. tiflisiensis* (Westb.) Grossh. in Grossh. and Schischkin, Sched. Herb. Pl. Or. Exs. 3:15 (1924).

Ic: Fl. Gruzii 1:t. 12(1941).

Fl. 5-7. *Limestone mountain slopes, damp soil*, 2300-4100 m.

Type: (Armenia) nazvanie ottogo, chto tpichnyya rasteniya sovranıy okolo Tiflisa, Westberga (holo. TBI, iso. LE!).

Distribution:

Turkey p. Van: Gevaş, Artos Da., 2500-3000 m, E.M. Rix et al. 741! Bitlis: Süphan Da., S. facing slope, 3890 m, R. Stileman 28!

Iraq p. Erbil: Mount. Qandil, 3500-3700 m, Rechinger 11174!

Iran p. Azerbaijan: Qotar su, N. Side of Kuhhaye Sabal, 2300-2800 m, J. Lamond 4675!

Irano-Tur. (mt.) element.

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References

1. Sieber, V.K. and Muray, B.G. 1981a. Hybridization between tetraploid species of *Alopecurus* L. (Poaceae): morphological studies of natural and artificial hybrids. Bot. Journal of the Linnean Society 83:285-292.
2. Sieber, V.K. and Muray, B.G. 1981b. Hybridization between tetraploid species of *Alopecurus* L. (Poaceae): chromosome behaviour of natural and artificial hybrids. Bot. Journal of the Linnean Society 83:293-310.
3. Moore, D.M. 1982. Flora Europaea. Check-List and Chromosome Index. Cambridge Univ. Press. 423pp.
4. Doğan, M. 1984. Chromosome Counts of Turkish Grasses, Willdenowia 13:345-347.
5. Meusel, H., Jager, E. and Weinert, E. 1965. Vergleichende Chorologie Der Zentraleuropäischen Flora VEB Gustav Fischer Verlag, Jena.
6. Rechinger, K.H. 1943. Flora Aegaea. Denkschr. Akad. Wiss. Wien, Math-Nat. Kl. 105.
7. Quézel, P. and Santa, S. 1962. Nouvelle Flore De L' Algérie. Editions Du Centre National De La Recherche Scientifique, Paris.
8. Scoggon, H.J. 1978. The Flora of Canada Part 2. National Museum of Canada.
9. Tackholm, G. and Drar, M. 1941. Flora of Egypt. Vol. 1. Bull. Fac. Sci. 17. Cairo.
10. Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walters, S.M. and Webb, D.A. 1980. Flora Europaea, Vol. 5. Cambridge Univ. Press.
11. Bor, N.L. 1970. in Rechinger, K.H. (ed.) Flora Iranica: Gramineae. 573pp. Graz.
12. Bor, N.L. 1968. Flora of Iraq, Vol. 9. Ministry of Agriculture Publ. Baghdad.
13. Ohwi, J. 1965. Flora of Japan (in English). Smithsonian Institution, Washington, DC. 1067pp.
14. Cope, T.A. 1982. Flora of Pakistan: Poaceae. Islamabad.
15. Doğan, M. 1985. *Alopecurus* L. in Davis, P.H. (ed.) Flora of Turkey, Vol. 9, 373-386. Edinburgh Univ. Press.
16. Doğan, M. 1988. New Taxa of *Alopecurus* (Gramineae) from Turkey. Notes R.B. G. Edinb. 45(1):111-115 (1988).
17. Hitchcock, A.S. 1950. Manual of the Grasses of the United States. U.S.A. Government Printing Office, Washington.
18. Tzvelev, N.N. 1984. Grasses of the Soviet Union. Part I (English Translation), A. A. Balkema/Rotterdam.
19. Metcalfe, C.R. 1960. Anatomy of the Monocotyledons I. Gramineae, Oxford.
20. Doğan, M. 1985. Comparative Reproductive Morphology of Turkish Grasses, Doğa Bilim Dergisi A2, 9 (2): 196-213.
21. Doğan, M. 1986. Comparative Vegetative Morphology of Turkish Grasses. Doğa Bilim Dergisi A2 10(3):331-349.
22. Doğan, M. 1991. Taxonomic Significance of Vegetative and Floral Morphologies in the Genus *Alopecurus* L. (Gramineae) Doğa-Tr.J. of Botany 15, 124-132.
23. Linnaeus, C. 1753. Species Plantarum Vol. 1. Holmiae.
24. Ascherson, P. and Graebner, P. 1892-1902. Synopsis der Mitteleuropäischen Flora 2(1). Leipzig.
25. Grisebach, A. 1853. Gramineae. In Ledebour, C.F. Flora Rossica. Vol. IV. Stuttgartiae.
26. Boissier, E. 1884. Flora Orientalis. Vol. 5. Geneva-Basel.
27. Komarov, V.L., Rozhevits, R. Yu. and Shishkin, B.K. 1963. Flora of URSS Vol. II (English Transl). Israel Program for Scientific Translations, Jerusalem.
28. Doğan, M. 1991. Assessment of the morphological variation by means of numerical taxonomy in *Alopecurus* (Gramineae). Flora et Vegetatio Mundi, IX:75-81.
29. Doğan, M. 1997. Numerical taxonomic study on the genus *Alopecurus* L. (Gramineae). The Herb Journal of Systematic Botany 4(2):71-76 (1997).