

A taxonomic revision of *Elymus* sect. *Caespitosae* and sect. *Elytrigia* (Poaceae, Triticeae) in Iran

Author: Assadi, Mostafa

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MOSTAFA ASSADI

A taxonomic revision of *Elymus* sect. *Caespitosae* and sect. *Elytrigia* (*Poaceae*, *Triticeae*) in Iran

Abstract

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Elymus sect. *Caespitosae* and sect. *Elytrigia* in Iran are revised, a key to the taxa, synonymies, descriptions, quotation of selected collections, data on geographical distribution, and additional notes, where necessary, are presented. The genus is treated in a broad sense, as comprising the genera *Elytrigia*, *Pseudoroegneria*, *Thinopyrum*, *Lophopyrum*, and *Trichopyrum*. The combinations *Elymus pertenuis*, *E. tauri* var. *kosaninii*, *E. elongatiformis*, *E. hispidus* var. *podperae* and *E. hispidus* var. *villosus* are formed as names new to science. *Elymus nodosus* subsp. *dorudicus* and *E. gentryi* var. *ciliatiglumis* are described as subspecies and variety new to science, respectively.

Introduction

Elymus L. is the largest genus in the grass tribe *Triticeae* and comprises about 180 species world-wide. The delimitation of the genus has been dealt with in widely differing ways by different authors (Nevski 1933, Runemark & Heneen 1961, Melderis 1978, Löve 1984, Dewey 1984, Melderis 1985). In this paper, the delimitation and sectional subdivision of *Elymus* by Melderis (1978) have been followed, and *Agropyron* Gaertn. is excluded from *Elymus*, while the genera *Elytrigia* Desv., *Pseudoroegneria* (Nevski) Å. Löve, *Thinopyrum* Å. Löve, *Lophopyrum* Å. Löve and *Trichopyrum* Å. Löve are included in *Elymus* (see Assadi & Runemark 1995). Bor (1970) in “Flora iranica”, in contrast, included all the Iranian species that have been referred to *Elytrigia*, *Pseudoroegneria*, *Thinopyrum*, *Lophopyrum* and *Trichopyrum* in *Agropyron*. He recognized 13 species from Iran, which he all treated as members of A. sect. *Holopyron* Holmb.

Since Bor's (1970) treatment, some species have been subject to taxonomical and cytological investigations (Tzvelev 1976, Dewey 1978, 1980, Melderis 1985, Wang & al. 1986, Liu & Wang 1989, Jarvie 1992, Moustakas 1993). The present author has revised the Iranian representatives of the group in a biosystematic project including field observations, study of herbarium material (including type specimens) and plants in cultivation, mitotic and meiotic chromosome observations, crossing experiments, and hybrid fertility investigations (Assadi 1994a-b, 1995, 1996, Assadi & Runemark 1995). Tab. 1 shows a list of the *Elymus* species occurring in Iran, their chromosome numbers and genomic constitutions, as far as known. As it can be seen, the genomic constitution of the species does not agree with Melderis' subdivision based on

Tab. 1. The species, their chromosome numbers and genomic constitutions, as far as known, of the species of *Elymus* sect. *Caespitosae* and sect. *Elytrigia* (Melderis 1978) in Iran.

Species	2n	Genomes	References
<i>E. sect. Caespitosae</i>			
<i>E. libanoticus</i>	14	S	Dewey 1972
<i>E. . pertenuis</i>	28	SP	Assadi 1995
<i>E. tauri</i> var. <i>kosaninii</i>	28	not known	
<i>E. nodosus</i> subsp. <i>dorudicus</i>	28	SJ*	Liu & Wang 1989
<i>E. gentryi</i>	42	not known	
<i>E. elongatus</i> subsp. <i>ponticus</i>	70	jbjbjbje**	Moustakas 1993
<i>E. sect. Elytrigia</i>			
<i>E. hispidus</i>	42	SJJ	Löve 1986, Liu & Wang 1989
<i>E. repens</i>	42	SSH	Assadi & Runemark 1995
<i>E. elongatiformis</i>	56	SSHX	Assadi 1994b

* The data for the genomic constitution are based on *E. nodosus* subsp. *caespitosus*.

** See Assadi (1995).

caespitose or rhizomatous habit: *E. hispidus* is morphologically similar to *E. repens* in that it produces long, creeping rhizomes, but it is genomically closer to *E. nodosus* and probably also to *E. gentryi* from *E. sect. Caespitosae*. On the other hand, *E. libanoticus* and *E. pertenuis*, with different genomic constitutions, are morphologically so similar that they are difficult to distinguish from each other. *E. tauri* var. *kosaninii*, with an unknown genomic constitution, is morphologically intermediate between *E. pertenuis* and *E. nodosus* subsp. *dorudicus*. *E. repens* is morphologically similar to *E. elongatiformis* (SSHX) but has the same constitution SSH, as is found in *E. transhyrcanus* (Nevski) Tzvelev of *E. sect. Goulardia* (Husnot) Tzvelev (Tzvelev 1976, Dewey 1972).

Disagreement between traditional subdivisions of *Elymus* and the genomic constitution have been reported also for other sections of the genus (Lu 1993). However, further investigations are needed before genomic constitution can be used as the basis for a subdivision of the genus.

Taxa with different genomic constitutions are treated as distinct species in the present revision. In some cases, however, delimitation of species even with different genomic constitutions is difficult.

Material and methods

The study of herbarium specimens was based mainly on the collections at the herbarium of TARI (quoted without herbarium abbreviation under ‘selected specimens seen’), furthermore the herbaria of C, LD and LE were visited. Type specimens and some other specimens from Iran and adjacent countries were received from the herbaria BM, BRA, E, K, PR, UTC and W on loan.

The morphological characters given in the descriptions were measured on herbarium specimens. Since the length of the spikelets, rachis internodes and the density of spikelets varies along the spikes, the measurements refer to the middle part of the spike. Leaf blades are flat under controlled cultivation and under favourable conditions in the field. The leaf margin of many species growing in dry habitats, or of old leaves and in herbarium specimens are partially or totally rolled inwards and are then described as convolute. Measurements of leaf width refer to flat or unrolled leaves.

Taxonomic treatment

Elymus L., Sp. Pl.: 83. 1753.

= *Elytrigia* Desv. in Nouv. Bull. Soc. Philom. Paris 2: 190. 1810.

= *Pseudoroegneria* (Nevski) Á. Löve in Taxon 29: 168. 1980 ≡ *Elytrigia* sect. *Pseudoroegneria* Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 2: 77. 1934.

= *Thinopyrum* Á. Löve in Taxon 29: 351. 1980.

= *Lophopyrum* Á. Löve in Taxon 29: 351. 1980.

= *Trichopyrum* Á. Löve in Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 87: 49. 1986.

Perennials, densely caespitose or with long, creeping rhizomes, self- or cross-pollinating. Leaf sheaths ciliate or eciliate at the margin; ligules small and membranous; leaf blades flat to convolute. Inflorescence a lax or dense spike. Spikelets in Iranian species at the nodes laterally appressed towards the rachis, with 3 or more florets; rachilla disarticulating below the glumes or florets. Glumes 2, subequal or unequal, shorter than the florets, dorsally rounded and veined. Lemma with or without an awn. Palea as long as or somewhat shorter than the lemma, with two, often ciliate keels. Florets hermaphrodite, stamens 3, anthers yellow or purple; ovary hairy at the apex.

Key to the species of *Elymus* sect. *Caespitosae* and sect. *Elytrigia* in Iran

1. Culms usually > 100 cm tall and 3 mm in diameter at the base; spikelets strongly compressed laterally; florets 7–9 per spikelet; leaf blades broader than 3 mm, with c. 7 prominently ridged veins on the upper surface 6. *E. elongatus* subsp. *ponticus*
- Culms usually < 100 cm tall, not more than 2.5 mm in diameter at the base; florets 3–7 per spikelet; leaf blades if broader than 3 mm then with c. 15 veins on the upper surface 2
2. Plants not caespitose, with long, creeping rhizomes; leaf blades usually flat and broader than 3 mm 3
- Plants densely caespitose, without long, creeping rhizomes; leaf blades usually convolute and less than 3 mm broad 5
3. Glumes obtuse or truncate, rarely awned, sometimes ± densely hairy or ciliate; leaf sheaths always ciliate; plant dark or greyish green 7. *E. hispidus*
- Glumes acute, acuminate or shortly awned, never densely hairy; leaf sheaths glabrous or ciliate; plant light or yellowish green 4
4. Spike dense, greyish, usually turning violet; middle internodes 4–6 mm long; spikelets imbricate, 2–3 times longer than the internodes; lemma acuminate or awned; leaf sheaths never ciliate at the margin 8. *E. repens*
- Spike lax, green, usually turning yellow; middle internodes c. 6–8 mm as long as the internodes; lemma awnless; leaf sheaths sometimes ciliate at the margin 9. *E. elongatiformis*
5. Glumes softly coriaceous, triangular-lanceolate, lanceolate or ovate-lanceolate, with acute, acuminate or shortly mucronate tip 6
- Glumes coriaceous, oblong, with truncate, or rounded or, rarely, obtuse tip 7
6. Glumes narrowly triangular-lanceolate, gradually narrowing towards the tip, acute or acuminate, narrowly membranous at the margin, veins equal 1. *E. libanoticus*
- Glumes ovate-lanceolate, abruptly narrowing near the tip, often mucronate, broadly membranous at the margin, middle vein more prominent than lateral veins 2. *E. pertenuis*
7. Glumes coriaceous, with rounded and broadly membranous tip; culms densely hairy, sometimes puberulent or hairy in the lower part 3. *E. tauri* var. *kosaninii*
- Glumes woody coriaceous, with truncate or emarginate or, rarely, obtuse, leathery and green tip; culms glabrous, sometimes pubescent or hairy in the lower part 8

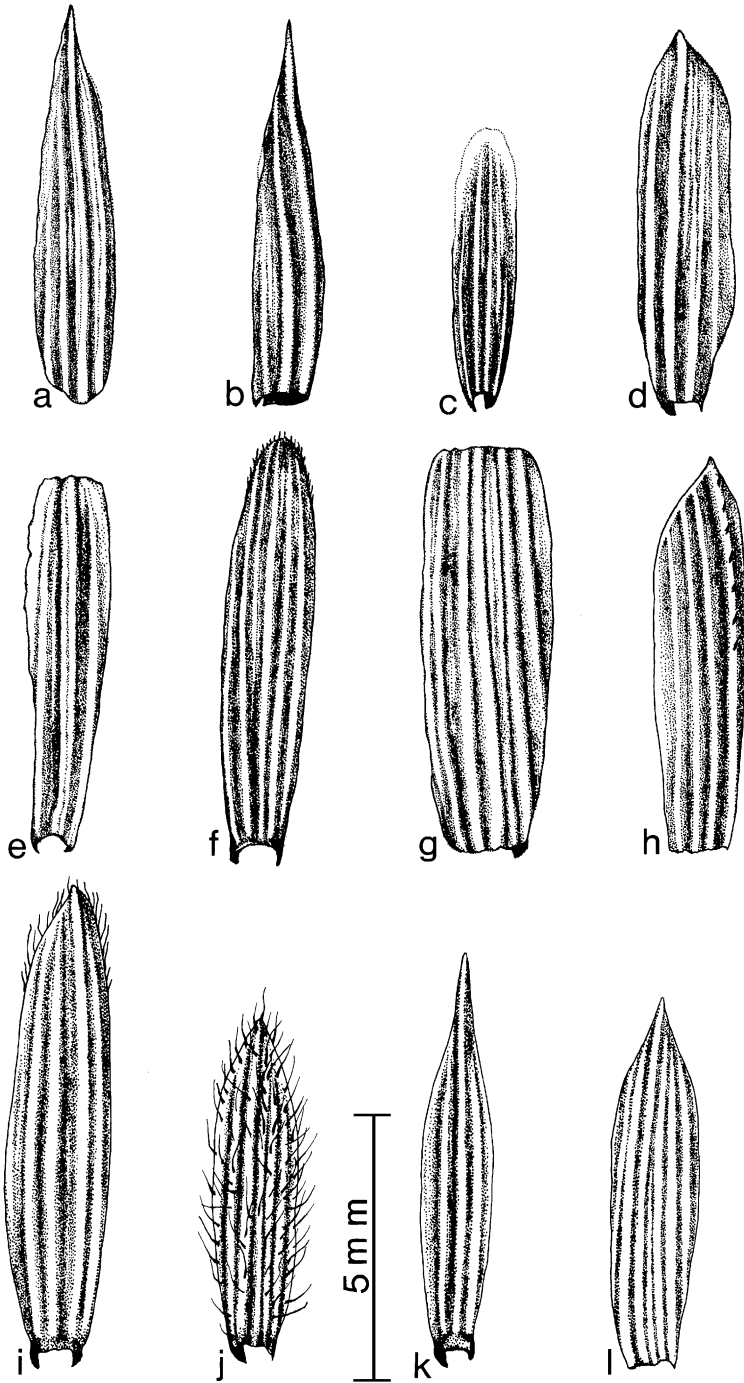


Fig. 1. Lower glumes of *Elymus* – a: *E. libanoticus*, b: *E. pertenuis*, c: *E. tauri* var. *kosaninii*, d: *E. nodosus* subsp. *dorudicus*, e: *E. gentryi* var. *gentryi*, f: *E. gentryi* var. *ciliatiglumis*, g: *E. elongatus* subsp. *ponticus*, h: *E. hispidus* var. *hispidus*, i: *E. hispidus* var. *podperae*, j: *E. hispidus* var. *villosus*, k: *E. repens*, l: *E. elongatiformis*.

8. Leaf blades 2–(3) mm broad, convolute; spikes lax; spikelets not or slightly overlapping; internodes more than 10 mm long at the middle of spikes; glumes narrowly membranous at the lateral margins; lemma sometimes shortly mucronate . . . 4. *E. nodosus* subsp. *dorudicus*
- Leaf blades 3–6 mm broad, flat or sometimes involute at the margin; spikes often broadly membranous at the lateral margins; sometimes auriculate near the tip; lemma often mucronate or awned 5. *E. gentryi*

Elymus sect. *Caespitosae* (Rouy) Melderis in Bot. J. Linn. Soc. 76: 375. 1978.

≡ *Agropyron* sect. *Caespitosae* Rouy, Fl. France 14: 315. 1913 ≡ *Elytrigia* sect. *Caespitosae* (Rouy) Tzvelev in Novosti Sist. Vysš. Rast. 10: 28. 1973.

Plants perennial, without long, creeping rhizomes.

1. *Elymus libanoticus* (Hack.) Melderis in Bot. J. Linn. Soc. 76: 377. 1978 – Fig. 1a.

≡ *Agropyron libanoticum* Hack. in Allg. Bot. Zeitschr. 10: 21. 1904 ≡ *Elytrigia libanotica* (Hack.) Holub in Folia Geobot. Phytotax. 12: 426. 1977 ≡ *Pseudoroegneria tauri* subsp. *libanotica* (Hack.) Á. Löve in Feddes Repert. 95: 445. 1984 ≡ *Pseudoroegneria libanotica* (Hack.) D. R. Dewey in Gustafson, Gene Manip. Pl. Improv.: 272. 1984. – Holotypus: Libanon, felsige Orte des westlichen Dschebel Sanin, Kreidekalk, ca. 2400 m, 6.–7. 1903, *E. Hartman* (W!; isotypus: C!).

= *Agropyron sosnovskyi* Hack. in Věstn. Tiflissk. Bot. Sada 29: 26. 1913 ≡ *Elytrigia sosnovskyi* (Hackel) Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 2: 82. 1936 ≡ *Elymus sosnovskyi* (Hack.) Melderis in Notes Roy. Bot. Gard. Edinburgh 42: 80. 1984 ≡ *Pseudoroegneria sosnovskyi* (Hack.) Á. Löve in Feddes Repert. 95: 445. 1984. – Syntypi: [Turkey], Prov. Kars, distr. Olty, locus Borachane, prope Olty, in collibus siccis, 29.5.1912, *D. Sosnowsky 11* (BM!, W!); Turkey, prope Olty, in rupestribus, 18.6.1911, *D. Sosnowsky 17* (BM!).

= *Agropyron gracillimum* Nevski in Komarov, Fl. SSSR 2: 638. 1934 ≡ *Elytrigia gracillima* (Nevski) Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 2: 79. 1936 ≡ *Pseudoroegneria gracillima* (Nevski) Á. Löve in Feddes Repert. 95: 447. 1984. – Holotypus: Caucasus, Daghestania, Mirka, 1.7.1885, *Radde 422* (LE!).

Perennial, caespitose, without creeping rhizomes. Culms 45–85 cm, glabrous, rarely finely puberulent in the lower part. Leaf sheaths glabrous, eciliate; leaf blades 1–2 mm broad, convolute, hairy on the upper surface, glabrous or pubescent beneath. Spikes 6–15 cm long; internodes 8–14 mm long at the middle of spike. Spikelets 10–15 mm long, not or slightly imbricate, with 3–6 florets. Glumes unequal, lower 6–8 mm and upper 7–9 mm long, triangular-lanceolate, acute or acuminate, narrowly membranous at the margin, glabrous, with 3–5 or, rarely, 7 veins. Lemma 8–9.5 mm long, lanceolate, usually acute, glabrous. Palea as long as or sometimes a little shorter than the lemma, usually ciliate on the keels, rarely scabrous or glabrous. Anthers 4–5 mm long. – 2n = 14; genomic constitution: S.

Flowering in 6–7. Mountain slopes, 1500–300 m.

Selected specimens seen

IRAN: AZARBAYEJAN: 41 km to Gharachman from Mianeh, 1410 m, *Assadi 70783*; 27 km from Khoy to Ghotur, 1550 m, *Assadi 70847*; 70 km W of Khoy, 2000–2250 m, *Assadi & Olfat 68907*; 20 km from Razi to Germi, 1600–2000 m, *Mozaffarian & Nowroozi 34751*. — KORDISTAN: 47 km to Divandarreh from Saghez, 2100 m, *Assadi 70852*. — TEHRAN: Ghazvin, Alamout area, 2200–2700 m, *Assadi & Maassoumi 51049*; Dizin, 2720 m, *Assadi 70880*; Kandavan, 2900–3050 m, *Pabot 27382*; Elburz mt., supra Farahzad, alp. Touchal, 1700 m, *Bornmüller 8481* (W).

Distribution: Lebanon, Turkey, Caucasus, Iraq and Iran (Fig. 2).

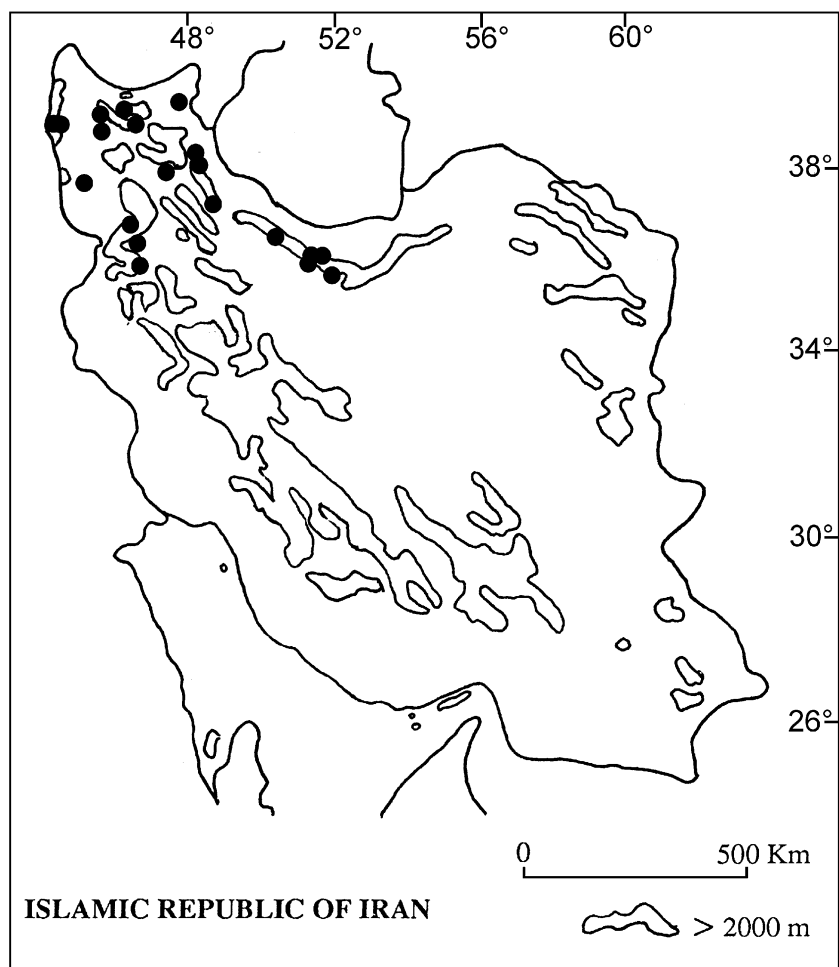


Fig. 2. Distribution of *Elymus libanoticus* in Iran.

Note: The type of the name *Agropyron sosnovskyi* differs from the type of *E. libanoticus* in having acuminate glumes with 3 veins. The type of *A. gracillimum* differs from *E. libanoticus* in having thinner leaves. These differences fall within the variation of the Iranian material of *E. libanoticus*. Hybrids in crossing experiments between different forms were fertile, with regular meiotic metaphase. Therefore the three names are considered as synonymous.

2. *Elymus pertenuis* (C. A. Mey.) Assadi, **comb. nova** – Fig. 1b.

≡ *Triticum intermedium* var. *pertenue* C. A. Mey., Verz. Pfl. Casp. Meer.: 25. 1831 ≡ *Agropyron pertenuis* (C. A. Mey.) Nevski in Komarov, Fl. SSSR 2: 640. 1934 ≡ *Elytrigia pertenuis* (C. A. Mey.) Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 2. 1936 ≡ *Elytrigia tauri* subsp. *pertenuis* (C. A. Mey.) Tzvelev in Novosti Sist. Vysš. Rast. 10: 30. 1973 ≡ *Elymus tauri* subsp. *pertenuis* (C. A. Mey.) Melderis in Notes Roy. Bot. Gard. Edinburgh 42: 81. 1984 ≡ *Pseudoroegneria pertenuis* (C. A. Mey.) Á. Löve in Feddes Repert. 95: 445. 1984. – Holotypus: In rupestribus subalpinis prope pagum Siwers, 14.6.1830, C. A. Meyer 133 (LE!).

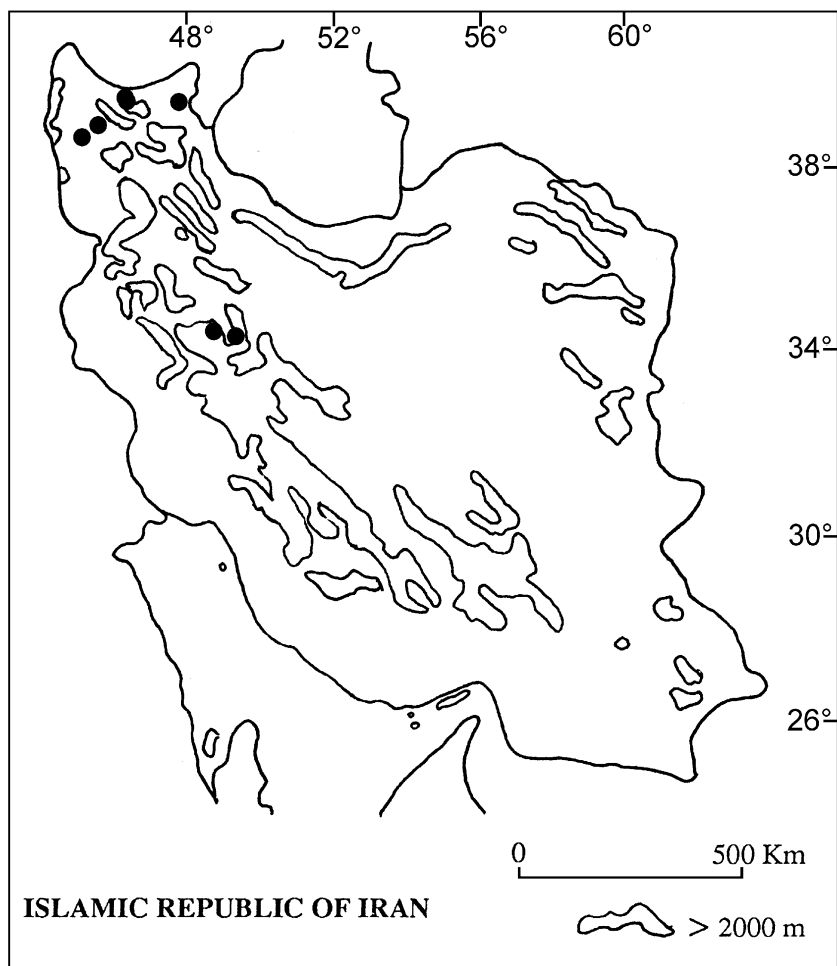


Fig. 3. Distribution of *Elymus pertenuis* in Iran.

Perennial, caespitose, without creeping rhizomes. Culms 45–80 cm, glabrous or finely pubescent to hairy towards the base. Leaf sheaths glabrous or sometimes minutely hairy, eciliate; leaf blades 1–2 mm broad, convolute, hairy on the upper surface, glabrous or pubescent beneath. Spikes 5–10 cm long, $\pm$ dense; internodes 5–8(–9) mm long at the middle of spike. Spikelets 10–15 mm long, often distinctly imbricate, with 3–6 florets. Glumes unequal, the lower 5–7 mm and the upper 6–8 mm long, lanceolate to ovate-lanceolate, abruptly narrowing to an acute or mucronate tip, broadly membranous at the margin, glabrous, with 4–6 veins, the middle vein more prominent, $\pm$ carinate towards the apex. Lemma 6–9 mm long, lanceolate, obtuse or acute or shortly mucronate, glabrous. Palea as long as the lemma, ciliate on the keels, rarely scabrous. Anthers 3–4 mm long. – $2n = 28$; genomic constitution: SP.

Flowering in 6–8. Mountain slopes, 1500–2500 m.

Selected specimens seen

IRAN: AZARBAYEJAN: (Talysh?), Anburani, 24.6.1880, *Radde* (LE); prope Tabriz, Ejnal-Zeinal, 1850–1800 m, 15.6.1924, *A. Grossheim* (LE); Marand to Makou, between Koshksarai and

Erelan, 1300–1500 m, *Assadi 70794*. – TEHRAN: Arak, slopes of Kuhe Rasvand, 2100–2750 m, *Mozaffarian 64028*.

Distribution: Caucasus and Iran (Fig. 3).

Note: This species differs from *E. tauri* mainly in having lanceolate, acute to obtuse, and often shortly mucronate glumes. In *E. tauri* the glumes are elliptical and rounded at the tip, with a broad membranous margin.

3. *Elymus tauri* (Boiss. & Balansa) Melderis var. *kosaninii* (Nábělek) Assadi, **comb. & stat. nov. – Fig. 1c.**

≡ *Agropyron kosaninii* Nábelek in Spisy Přír. Fak. Masarkovy Univ. 111: 25. 1929 ≡ *Elytrigia kosaninii* (Nábělek) Holub in Folia Geobot. Phytotax. 12: 426. 1977 ≡ *Pseudorogneria kosaninii* (Nábělek) Á. Löve in Feddes Repert. 95: 445. 1984 ≡ *Elymus kosaninii* (Nábělek) Melderis in Notes Roy. Bot. Gard. Edinburgh 42: 79. 1984. – Holotypus: Kurdistan turcicae distr. Ramoran, mons Halakur-Dagh ad orientem ab urbe Seert, ca. 2400 m, *Nábělek 3336* (BRA!).

Perennial, caespitose, without creeping rhizomes. Culms 55–60 cm, hairy, sometimes pubescent or hairy only in the lower part. Leaf sheaths hairy, eciliate; leaf blades up to 2.5 mm broad, convolute, both sides hairy or pubescent only beneath. Spikes 6–10 cm long, lax; internodes 9–14 mm long at the middle of spike. Spikelets 10–14 mm long, not or slightly imbricate, with 3–5 florets. Glumes unequal, the lower 6 mm and the upper 7 mm long, oblong, rounded at the tip and with a broad membranous margin, glabrous, with 4–5 veins. Lemma 8–9 mm long, triangular-lanceolate, acute to obtuse, glabrous. Palea as long as or a little shorter than the lemma, ciliate on the keels. – $2n = 28$.

Specimens seen

IRAN: FARS: N side of Kuhe Dena, near Abmalakh, 2800–3600 m, *Assadi & Mozaffarian 31462*. — TEHRAN: Arak, Kuhe Latedar, 2200–2650 m, *Mozaffarian 63833*; Bordsch, 50 km SSW Sultanabad, 2600 m, *Köie 98* (C); Arak, Rasband, 1960 m, *Mirdamadi 1709* p.p. (IRAN).

Note: The difference between this variety and var. *tauri*, represented in Turkey, is in its indumentum. However, the hairiness of the culm varies (from pubescent to partly hairy in the lower part or totally hairy) in different plants. The genomic constitution of *E. tauri* var. *kosaninii* is unknown.

4. *Elymus nodosus* (Nevski) Melderis subsp. *dorudicus* Assadi, **subsp. nova – Fig. 1d.**

Holotypus: [Iran], Lorestan, Doroud, Oshtoankuh, 2400–2700 m, 9.8.1991, *Assadi 70752* (LD; isotypus: TARI).

Gramen perenne, caespitosum, sine rhizomatibus repentibus. Culmi 75–90 cm longi, plerumque partibus inferioribus puberulis, interdum omnino pilosi. Filiorum vaginæ glabrae, puberulae vel pilosae, eciliatae vel raro partim ciliatae; laminae 20 cm longae et 2–3 cm latae, convolutae vel interdum involutae, supra pilosae, subtus vix pubescentes. Spicae (6–)9(–15) cm longae, erectae; rachides ± rectae; internodiis 10–14 mm longis, marginibus scabris. Spiculae 10–14 mm longae, 4–8-florae. Glumae inaequales, inferior 6–8 mm et superior 8–10 mm longae, oblongae vel truncatae vel rotundatae, marginibus anguste membranaceis, apicibus viridibus, glabrae, 5–7-nervatae. Lemma 7–10 mm longum, oblongum vel lanceolatum, obtusum, interdum breviter mucronatum, glabrum. Palea lemmati aequilonga vel paulo brevior, carinis ciliatis.

Perennial, caespitose without creeping rhizomes. Culms 75–90 cm, usually puberulent to hairy in the lower part or sometimes totally hairy. Leaf sheaths glabrous or puberulent to hairy, eciliate or, rarely, sparsely ciliate; leaf blades up to 20 cm long and 2–3 mm broad, convolute or sometimes involute at the margin or, rarely, flat, hairy on the upper surface, glabrate to pubescent beneath. Spikes (6–)9(–15) cm long, erect; rachis ± straight; internodes 10–14 mm long,

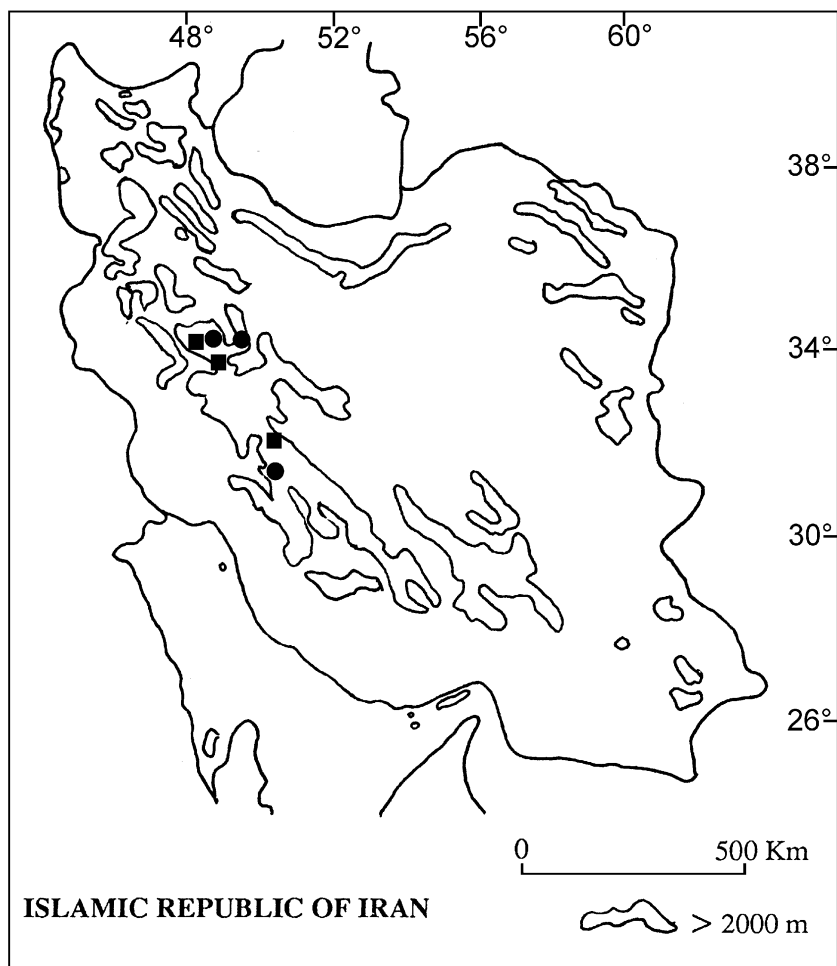


Fig. 4. Distribution of *Elymus tauri* var. *kosaninii* (circle) and *E. nodosus* subsp. *dorudicus* (square) in Iran.

longer in the lower part of the spike and shorter in the upper part, scabrous along the edges. Spikelets 10–14 mm long, not or slightly imbricate, with 4–8 florets. Glumes unequal, the lower 6–8 mm and the upper 8–10 mm long, oblong, truncate or rounded, narrowly membranous at the margin, green at the tip, glabrous, with 5–7 veins. Lemma 7–10 mm long, oblong or lanceolate, obtuse, sometimes shortly mucronate, glabrous. Palea as long as or a little shorter than the lemma, ciliate on the keels. – $2n = 28$; genomic constitution: SJ in subsp. *caespitosus*.

Flowering in 6–7. Mountain slopes, 2000–2900 m.

Additional specimens seen

LORESTAN: Between Nzna and Doroud, Darband, mountains above the village Bidestaneh, 2000 m, *Assadi* 70735; mountains S of Doaoud on the road to Lake Gahar, 2000 m, *Assadi* 70744; 55 km on the road from Aligoodarz to Shulabad, the pass N. of Ghalikuh, 2900 m, *Runemark & Lazari* 26295. — BAKHTIARI: Shahrekord, Noghan, Kuhe Kase-Kase, 2350–2950 m, *Mozaffarian* 54870.

Distribution: W Iran (Fig. 4).

Note: The new subspecies differs from subsp. *caespitosus* (C. Koch) Melderis in having a much more robust habit, a height of up to 90 cm, eciliate leaf sheaths, and longer glumes up to 6–10 mm. In subsp. *caespitosus* the culms are c. 50 cm high, the leaf sheaths ciliate and the glumes 4.5–7 mm long. The new subspecies resembles *E. gentryi* (Melderis) Melderis, but differs in the characters mentioned in the key, in the ploidy level, and the habit (*E. gentryi* forms larger tufts, in natural habitats). Subsp. *nodosus* is restricted to the Crimea and differs from the new subspecies in particular in having shorter glumes, a narrower leaf lamina, and a different indumentum.

Jarvie (1992) recorded also subsp. *sinuatus* (Nevski) Melderis from N Iran under the name *Elytrigia caespitosa* subsp. *sinuata* (Nevski) Tzvelev. This taxon was described from the Caucasus, and Bor (1970) mentioned it as to be likely found also in the 'Flora iranica' area. However, Jarvie (1992) reports no specimen and it is quite doubtful if it has ever been recorded from Iran correctly.

5. *Elymus gentryi* (Melderis) Melderis in Notes Roy. Bot. Gard. Edinburgh 42: 82. 1984.

≡ *Agropyron gentryi* Melderis in Rechinger, Fl. Iranica 70: 165. 1970 ≡ *Elytrigia gentryi* (Melderis) Tzvelev in Novosti Sist. Vysš. Rast. 10: 30. 1973 ≡ *Elytrigia intermedia* subsp. *gentryi* (Melderis) Á. Löve in Feddes Repert. 95: 487. 1984 ≡ *Thinopyrum gentryi* (Melderis) D.R. Dewey in Gustafson, Gene Manip. Pl. Improv.: 275. 1984 ≡ *Trichopyrum gentryi* (Melderis) Á. Löve in Veröff. Geobot. Inst. ETH. Stiftung Rübel Zürich 87: 49. 1986. – Holotypus: Iran, Kuhrang, Chaharmahal, 8500 ft., 28.8.1955, *H. S. Gentry 15616* grown in 7.1967 at USDA Plant Protection Station Pullman, Washington, USA (K!).

Perennial, caespitose, without creeping rhizomes. Culms 55–90 cm, glabrous or rarely finely hairy in the lower part. Leaf sheaths glabrous or rarely puberulent, eciliate; leaf bladed 2.5–5.5 mm broad, flat or, rarely, involute at the margin, hairy on the upper surface, glabrous or puberulent beneath. Spikes 5–14 cm long; internodes 10–14 mm long at the middle of spike. Spikelets 10–16 mm long, often distinctly imbricate, with 4–8 florets. Glumes unequal, the lower 5–8 and the upper 6–9 mm long, oblong, truncate or rounded or rarely obtuse or emarginate, often shortly mucronate, broadly membranous at the margin, green at the tip, glabrous or, rarely, ciliate, with 5–7 veins. Lemma (5–)7–9 mm long, oblong or lanceolate, obtuse to truncate and often mucronate or with an awn c. 1–2 mm long, glabrous or rarely ciliate at the margin. Palea as long as the lemma, ciliate on the keels. Anthers c. 4 mm long. – $2n = 42$.

Flowering in 6–7. Mountain slopes, 2500–3000 m.

Key to the varieties of *Elymus gentryi* in Iran

1. Glumes and lemma glabrous var. *gentryi*
- Glumes and lemma ciliate var. *ciliatiglumis*

5.1. *E. gentryi* var. *gentryi* – Fig. 1e.

Selected specimens seen

IRAN: LORESTAN: 20 km to Aligoodarz from Khomein, 2560 m, *Assadi 70727 & 70728*. — ESFAHAN: Semirom, Kuhe Aiineh-Ghari, 300 m, *Mozaffarian 62173*. — KOHGILOUYEH-BOIRAHMAD: Dilegoon, Kuhe Sawerz, 2200–3200 m, *Assadi & Abouhamzeh 46426*. — BAKHTIARI: Boroujen, Boldaji, Kuhe Chiro, 2200–2600 m, *Mozaffarian 57321*; Barrage de Kuhrang, 2500 m, *Pabot 2162*.

Distribution: Turkey(?) and W Iran (Fig. 5).

Note: *Elymus gentryi* was recorded by Melderis (1985) from Turkey, Hakkari province. This record was based on the collection *Davis 45553*, which was not possible to trace in the Edinburgh herbarium (E).

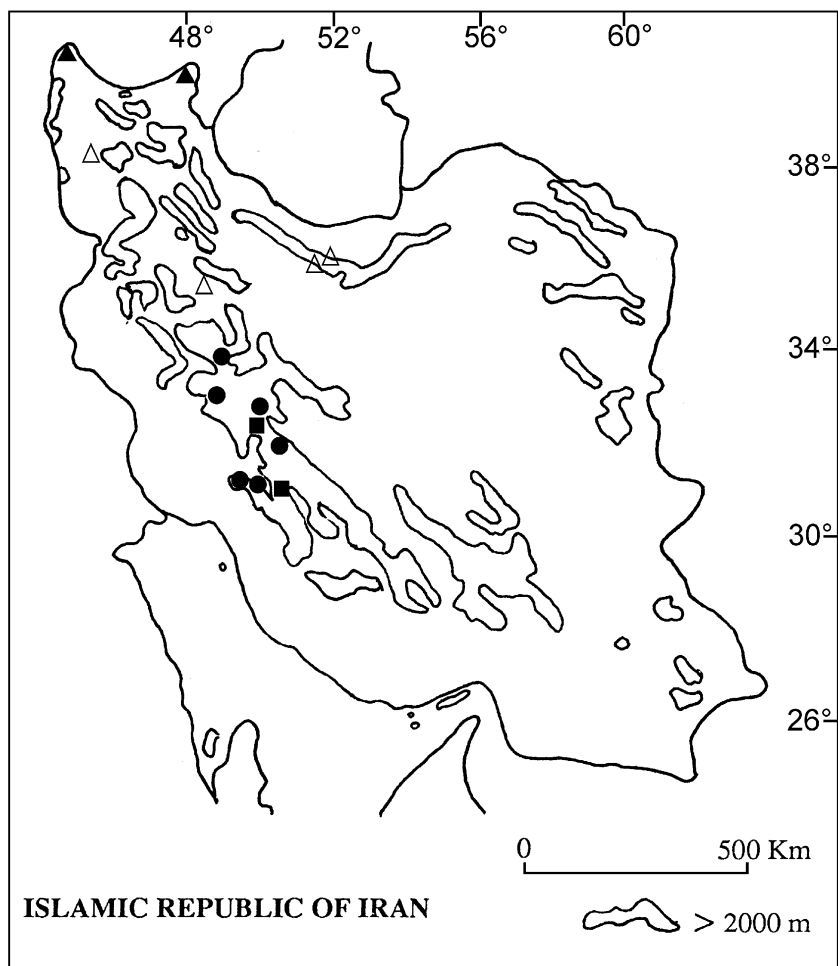


Fig. 5. Distribution of *Elymus genryi* var. *genryi* (circle), *E. genryi* var. *ciliatiglumis* (square) and *E. elongatus* subsp. *ponticus* (triangle; empty triangle cultivated or naturalized) in Iran.

5.2. *E. genryi* var. *ciliatiglumis* Assadi, var. nova – Fig. 1f.

Holotypus: Iran, Kohgiluyeh-Boirahmad, Kuhe Dena, S side of Gardane Bijan, 2700 m, 16.7.1983, Assadi & Abouhamzeh 46190 (TARI).

Differt ab varietate typica glumis et lemmatibus ciliatis.

Additional specimen seen

IRAN: BAKHTIARI: Brojen to Dorahan, after Godare Kabk, Kuhe Dodelou, 2300–2700 m, *Mozafarian* 57237.

Distribution: W Iran (Fig. 5).

6. *Elymus elongatus* (Host) Runemark subsp. *ponticus* (Podp.) Melderis in Bot. J. Linn. Soc. 76: 377. 1978. – Fig. 1g.

≡ *Triticum ponticum* Podp. in Verh. Zool.-Bot. Ges. Wien 52: 681. 1902 ≡ *Elytrigia pontica*

(Podp.) Holub in Folia Geobot. Phytotax. 8: 171. 1973 $\equiv$ *Thinopyrum ponticum* (Podp.) Barkworth & D.R. Dewey in Great Basin Naturalist 43: 570. 1983 $\equiv$ *Lophopyrum ponticum* (Podp.) Á. Löve in Feddes Repert. 95: 487. 1984. – Typus: Bulgaria, auf dünnen steinigen Hügeln gegen Gerdem bei Kavakli, *Podpěra* (BRNM?).

Perennial, caespitose, without creeping rhizomes. Culms 70–150 cm (in cultivation up to 300 cm!), glabrous or rarely puberulent below the nodes. Leaf sheaths glabrous, often ciliate at the margin; leaf blades up to 8 mm broad, convolute, with stiff hairs on the upper surface and sometimes beneath. Spikes 10–40 cm long; internodes 10–20 mm long. Spikelets 14–20 mm long, not or slightly imbricate, with 5–10 florets. Glumes subequal, 7–9 mm long, oblong, truncate or truncate-emarginate, very narrowly membranous at the margin, glabrous, with 5–8 veins. Lemma (7–)8–9.5 mm long, oblong, truncate or truncate-emarginate, rarely obtuse, glabrous. Palea as long as or a little shorter than the lemma, ciliate on the keels. Anthers c. 5 mm long. – $2n = 70$, genomic constitution: jbjbjbeje.

Flowering in 7–9. In saline places, 0–1000 m; in cultivation up to 2600 m.

Selected specimens seen

IRAN: AZARBAYEJAN: Parsabadm, sea level, *Assadi & Akhani 61621*; 17.6 km E of Makou, 1020 m, *Pabot 5377*. — HAMADAN: 18 km to Razan, from Hamadan, cultivated, 1800 m, *Assadi 70778*. — TEHRAN: Dizin, probably naturalized, 2620 m, *Assadi 70875b*; Karaj Valley, 5 km N of Karaj, 1350 m, *Runemark & al. 21702*.

Distribution: S and SE Europe, Turkey, Caucasus and Iran (Fig. 5).

Note: Jarvie (1992) mentioned *E. elongatus* subsp. *turcicus* (McGuire) Melderis under the name *Elytrigia pontica* subsp. *turcica* (McGuire) Jarvie & Barkworth as to occur in N Iran. He recognized this taxon as an octoploid and subsp. *pontica* as a decaploid. However, Iranian material even from the area mentioned by Jarvie (1992) matches morphologically and cytologically clearly subsp. *ponticus* (Assadi 1995).

The report of *Elymus elongatus* subsp. *elongatus* from Iran (Jarvie 1992) is not verified by a herbarium specimen and seems doubtful. This taxon is found mainly around the Mediterranean Sea and differs from subsp. *ponticus*, apart from the ploidy level (diploid or tetraploid), in its eciliate leaf sheath, shorter culm and in spike characters.

Elymus* sect. *Elytrigia (Desv.) Melderis in Bot. J. Linn. Soc. 76: 377. 1978.

$\equiv$ *Elytrigia* Desv. in Nouv. Bull. Sci. Soc. Philom. Paris 2: 191. 1810 $\equiv$ *Agropyron* sect. *Elytrigia* (Desv.) Dumort., Fl. Belg.: 95. 1823.

$\equiv$ *Agropyron* sect. *Holopyron* Holmb., Scand. Fl. 2: 273. 1926.

Plants not caespitose, with long, creeping rhizomes.

7. *Elymus hispidus* (Opiz) Melderis in Bot. J. Linn. Soc. 76: 380. 1978.

$\equiv$ *Agropyron hispidum* Opiz in Berchtold & Opiz, Oekon.-Techn. Fl. Böhm. 1: 413. 1836. – Holotypus: [Česka Republiká], Prag, *Opiz 413* (PR!).

Perennial, with long, creeping rhizomes, sometimes glaucous. Culms (30–)70(–120) cm, glabrous or rarely hairy, sometimes hairy only on the nodes. Leaf sheath ciliate, rarely densely hairy; leaf blades (3–)5(–10) mm broad, usually flat, hairy on the upper surface, less densely hairy or glabrous beneath. Spikes (5–)10–15(–23) cm long; internodes c. 10 mm long at the middle of spike, shortly ciliate at the margin. Spikelets 7–20 cm long, not or slightly imbricate, with 3–8 florets. Glumes unequal, lower 5–9, upper 6–10 mm long, oblong or lanceolate, obtuse, rounded or truncate, usually shortly mucronate, membranous at the margin, glabrous, ciliate or hairy, with 5–7 veins; veins sometimes scabrid towards the apex. Lemma 7–13 mm long, usually

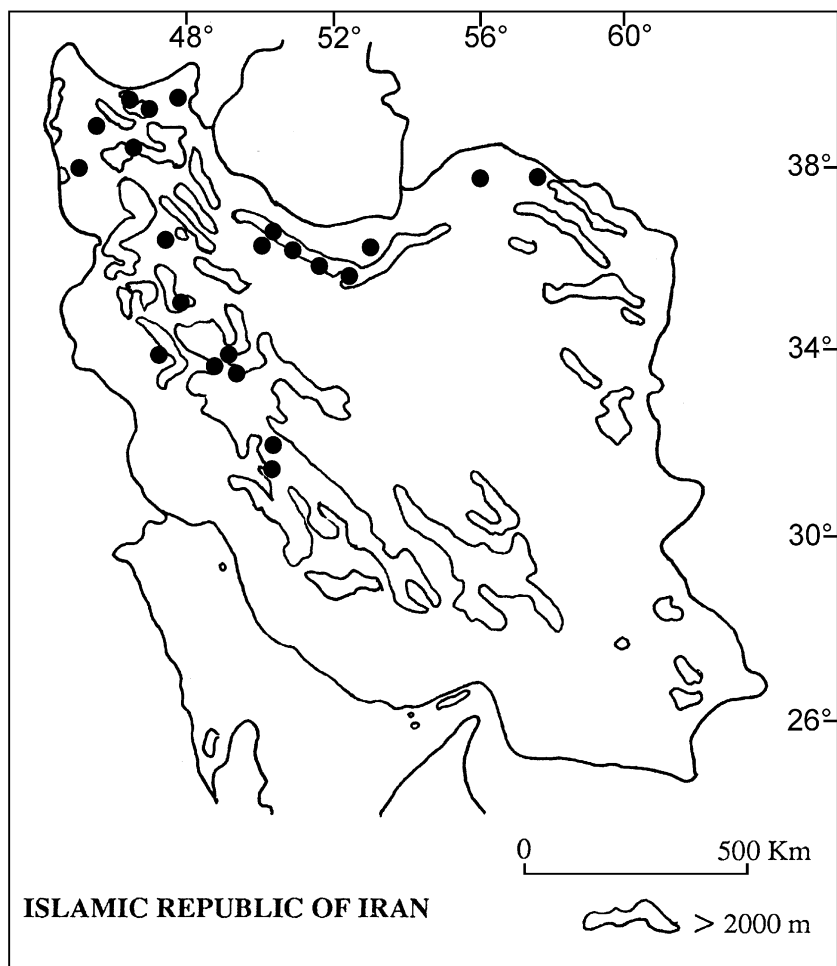


Fig. 6. Distribution of *Elymus hispidus* var. *hispidus* in Iran.

lanceolate, obtuse or rounded, rarely with an awn of up to 8 mm long at the tip. Palea as long as the lemma, ciliate on the keels. Anthers 5–7 mm long. – $2n = 42$; genomic constitution: SJJ.

Flowering in 6–7. Mountain slopes, field margins and wet places, c. 1200–2700 m.

Note: *Elymus hispidus* is a polymorphic species which shows great variation in size and vigour, colour (green or glabrous), occurrence and distribution of indumentum on glumes and lemma as well as presence or absence of an awn at the tip of the glumes and lemma. The different character states show little correlation. *E. hispidus* has usually been split into 3 to 5 species or subspecies, based on indumentum differences and presence or absence of an awn. The author grew different morphological variants from wild-collected seeds in glasshouses and in the open. Even if the majority of the cultivated plants resembled the maternal parent, there was often segregation of other morphological variants. Crossing experiments showed that hybrids between different morphological variants were fertile and normally had a regular meiotic metaphase I (Assadi 1996). Even if different variants grow together in the field under favourable conditions, they show different habitat preferences and are therefore treated as varieties: var. *hispidus* is

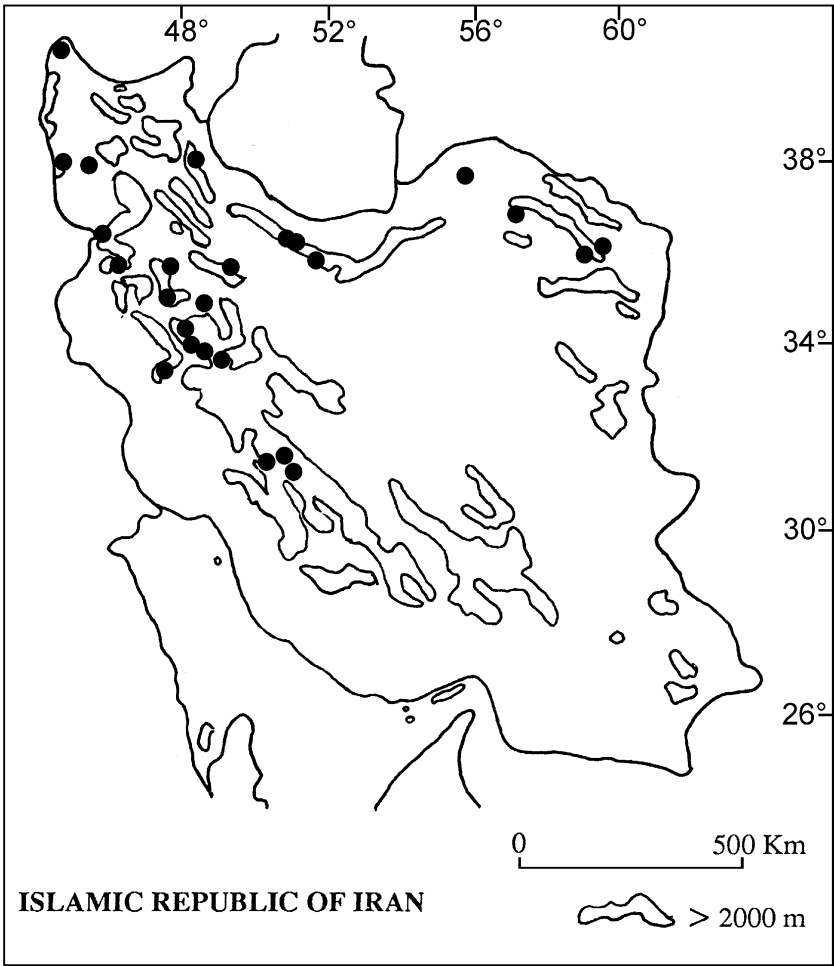


Fig. 7. Distribution of *Elymus hispidus* var. *podperae* in Iran.

mainly found in mesic habitats, var. *villosus* in dry slopes and var. *podperae* in field margins and wet places.

Key to the varieties of *Elymus hispidus* in Iran

- 1. Glumes and lemma glabrous var. *hispidus*
- Glumes and lemma ciliate or totally hairy 2
- 2. Glumes and lemma ciliate var. *podperae*
- Glumes and lemma hairy var. *villosus*

7.1. *E. hispidus* var. *hispidus* – Fig. 1h.
= *Triticum intermedium* Host, Icon. Descr. Gram. Austriac. 3: 23, t. 22. 1805 [non *Elymus intermedius* M. Bieb., Fl. Taur. Cauc. 1: 82. 1808] ≡ *Agropyron intermedium* (Host) P. Beauv., Ess. Agrostogr.: 102, 146. 1812 ≡ *Elytrigia intermedia* (Host) Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 1: 14. 1933 ≡ *Thinopyrum intermedium* (Host) Bark-

worth & D.R. Dewey in Gustafson, Gene Manip. Pl. Improv.: 275. 1984 = *Trichopyrum intermedium* (Host) Á. Löve in Veröff. Geobot. ETH Stiftung Rübel Zürich 87: 49. 1986. – Holotypus: Istria, Dalmatia, in insulis maris Adriatici, *Host* (W).

Selected specimens seen

IRAN: MAZANDARAN: Polsefid, Sangdeh, 1400 m, *Domanchik* 31325. — AZARBAYEJAN: Haris, Akuzdaghi, 2350 m, *Olfat & Fathi* 416; Arasbaran protected area, Doghroon mt., 2300 m, *Runemark & Assadi* 21863. — KORDESTAN: Bijar area, margin of Telvar river, c. 1800 m, *Assadi* 61009. — HAMADAN: Kuhe Alvand near Ganjnameh, 2250 m, *Assadi* 70776. — LORESTAN: 24 km to Aligoodarz on the road from Khomein, 2290 m, *Assadi* 70723. — BAKHTIARI: Boroujen, Boldaji, Kuhe Chiro, 2200–2600 m, *Mozaffarian* 57322. — KHORASAN: C. 25 km SW of Darreh-Gaz, Tandooreh National Park, Chehelmehr, 1200 m, *Assadi & Maassoumi* 56744. — TEHRAN: Between Polour and Gazanak, 2150 m, *Assadi* 70884.

Distribution: S and Central Europe, Russia, Turkey, Caucasus, Iraq, Iran (Fig. 6), Pakistan and Central Asia.

7.2. *E. hispidus* var. *podperae* (Nábělek) Assadi, **comb. & stat. nov.** – Fig. 1i.

= *Agropyron podperae* Nábělek in Spisy Přír. Fak. Masarykovy Univ. 111: 24. 1929 = *Elytrigia podperae* (Nábělek) Holub in Folia Geobot. Phytotax. 12: 426. 1977 = *Elytrigia intermedia* subsp. *podperae* (Nábělek) Á. Löve in Feddes Repert. 95: 487. 1984 = *Thinopyrum podperae* (Nábělek) D.R. Dewey in Gustafson, Gene Manip. Pl. Improv.: 275. 1984 = *Elymus hispidus* subsp. *podperae* (Nábělek) Melderis in Roy. Bot. Gard. Edinburgh 42: 78. 1984 = *Trichopyrum intermedium* subsp. *podperae* (Nábělek) Á. Löve in Veröff. Geobot. ETH Stiftung Rübel Zürich 87: 49. 1986. – Holotypus: Kurdistan Turc. ad distr. Berwari, mons Mirgamira ad orient ab urbe Seert, 1500 m, 24. 7. 1910, *Nábělek* 3313 (BRA!).

= *Agropyron ciliatiflorum* Roshev. in Kõie, Beitr. Fl. SW Iran 1: 52. 1945. – Holotypus: [Iran], Kharon [50 km E of Khoramabad], 1800 m, 1.6.1937, *Kõie* 737 (C!).

= *Agropyron afghanicum* Melderis in Bor, Grass. Burma, Ceylon, India Pakistan: 689. 1960 = *Elytrigia afghanica* (Melderis) Holub in Folia Geobot. Phytotax. 12: 426. 1977. – Typus: [Iran], Khorasan, common at altitudes above 500 ft., *Aitchison* 1145 (BM!, C!).

= *Agropyron podperae* var. *velutinum* Melderis in Taxon 16: 467. 1967. – Holotypus: Iraq, Distr. Mosul (Kordistan), ad confines Turciae prov. Hackari, in ditone pagi Sharanish, in montibus a Zakho septentrionem versus, in saosis (Tonschiefer) montis Zawita, c. 1600 m, 4.–9.7.1957, *Rechinger* 10915 (W!).

Selected specimens seen

IRAN: GORGAN: Parke Golestan, 1750 m, *Wendelbo & Forounghi* 12615. — MAZANDARAN: 37 km W of Baladeh, on the road to Kandavan, 2600 m, *Assadi* 70888. — AZARBAYEJAN: 40 km from Razi to Germi, 1700 m, *Mozaffarian & Nowrouzi* 34768. — KORDESTAN: Sanandaj, mt. above the village Narran, 2200–2600 m, *Assadi* 60447. — LORESTAN: Azna, village Darreh-Takht, 1860 m, *Assadi* 70732. — ESFAHAN: N of Kuhe Dena, near Noghol, 2500 m, *Assadi & Abouhamzeh* 46059. — FARS: Kuhu Dena, Sichani to Sisakht, *Behboudi* 919 p. p. (IRAN). — KHORASAN: mountains NW of Neyshabour, above Mirabad, 1600–1900 m, *Assadi & Mozaffarian* 36031. — TEHRAN: Boroujerd to Arak, Zalian pass, 2300 m, *Assadi* 70763.

Distribution: Turkey, Iraq, and Iran (Fig. 7).

Note: The leaf sheaths are mostly glabrous, but rarely hairy. The type specimens of *E. hispidus* var. *podperae* and *Agropyron podperae* var. *velutinum* were examined. They both have hairy leaf sheaths, and these names are therefore treated as being synonymous.

The type specimen of *A. afghanicum* was examined. It differs from the type specimen of *E. hispidus* var. *podperae* in having shorter marginal hairs, c. 0.2 mm long on the glumes and

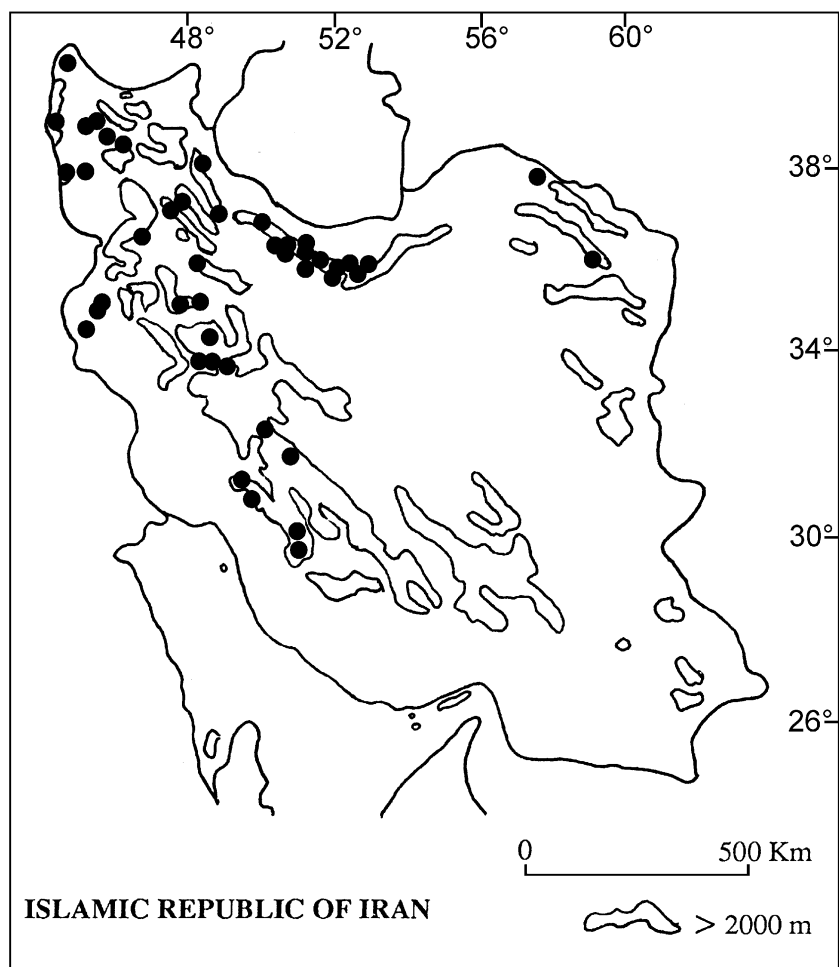


Fig. 8. Distribution of *Elymus hispidus* var. *villosus* in Iran.

lemma. Marginal hairs of the glumes and lemma in the type specimen of *E. hispidus* var. *podperae* are c. 0.4 mm long. However, the length of these hairs varies continuously from c. 0.2 to 0.4 mm in different plants, and is therefore of no taxonomic value.

7.3. *E. hispidus* var. *villosus* (Hack.) Assadi, *comb. nova* – Fig. 1j.

≡ *Triticum intermedium* var. *villosum* Hack. in Halácsy & Braun, Nachtr. Fl. Nieder-Oesterr.: 43. 1882. – Typus: [Austria], St. Pölten in N. Oest., 7.7.1879, *Hackel*, Dr. Baenitz, Herbarium Europaeum (LD!).

= *Triticum trichophorum* Link in Linnaea 17: 395. 1843 = *Agropyron trichophorum* (Link) K. Richt., Pl. Eur. 1: 124. 1890 = *Agropyron intermedium* subsp. *trichophorum* (Link) Asch. & Graebn., Syn. Fl. Mitteleur. 2: 658. 1901 = *Elytrigia trichophora* (Link) Nevski in Trudy Sredne-Asiatsk. Gosud. Univ., Ser. 8b, Bot. 17: 61. 1934 = *Elytrigia intermedia* subsp. *trichophora* (Link) Á. & D. Löve in Bot. Not. 114: 50. 1961. – Described from the salines “prope Tergestum”.

= *Agropyron aucheri* Boiss., Diagn. Pl. Orient., ser. 1, 5: 75. 1844. – Typus: [Iran], prope

Schiras Perezend [= Pirezan], *Aucher-Eloy 5424* (W!).

= *Agropyron barbulatum* Schur in Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt 4: 91. 1853 = *Elymus hispidus* subsp. *barbulatus* (Schur) Melderis in Bot. J. Linn. Soc. 76: 381. 1978 = *Elytrigia intermedia* subsp. *barbulata* (Schur) Á. Löve in Taxon 29: 350. 1980. – Typus: [Romania], Transylvania (W).

= *Agropyron pulcherrimum* Grossh. in Věstn. Tiflissk. Bot. Sada 13/14: 42. 1919 = *Elytrigia pulcherrima* (Grossh.) Nevski in Trudy Sredne-Asiatsk. Gosud. Univ., Ser. 8b, Bot. 17: 61. 1934 = *Elytrigia intermedia* subsp. *pulcherrima* (Grossh.) Tzvelev in Novosti Sist. Vysš. Rast. 10: 31. 1973 = *Trichopyrum intermedium* subsp. *pulcherrimum* (Grossh.) Á. Löve in Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich 87: 49. 1986. – Typus: [Turkey], prov. Kars, distr. Ardachan, prope Guljabert, in locus stepposus, 14.7.1925, *Grossheim* (LE!).

Selected specimens seen

IRAN: MAZANDARAN: 37 km W of Baladeh, 2600 m, *Assadi 70890*; Elburz mts., Firouzkuh area, 6500 ft. *Furse & Singe 476* (IRAN); *ibid.*, *Gaduk, Behboudi & Aellen 8027* (IRAN); Kamarband, 2400–2600 m, *Rechinger 6433*. — AZARBAYEJAN: Tabriz to Marand, 1500 m, *Assadi & Mozaffarian 29791*. — KORDESTAN: 47 km W of Bijar towards Divandarreh, 2000 m, *Rechinger 42660*, p. p. (W). — HAMADAN: c. 8 km E of Ganjnameh, 2750 m, *Assadi & Mozaffarian 36882*. — BAKHTARAN: 14 km N of Kerend, 1800–2000 m, *Assadi 60893*. — LORESTAN: Doroud, Oshtorankuh, 2400–2700 m, *Assadi 70747*. — KONGILOUYEH-BOIRAHMAD: near Dilegoon, 2300 m, *Assadi & Abouhamzeh 46371*. — TEHRAN: Gachsar, 2270 m, *Assadi 70862*.

Distribution: S and Central Europe, Russia, Turkey, Caucasus, Iraq, Iran (Fig. 8), Afghanistan, Pakistan and Central Asia.

8. *Elymus repens* (L.) Gould in Madrono 9: 127. 1947. – Fig. 1k.

= *Triticum repens* L., Sp. Pl.: 86. 1753 = *Agropyron repens* (L.) P. Beauv., Ess. Agrostogr.: 102. 1812 = *Elytrigia repens* (L.) Nevski in Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. 1: 18. 1933. – Lectotypus: Herb. Linnaeus No. 104/7 (LINN).

Perennial, with long, creeping rhizomes. Culms 50–110 cm, glabrous. Leaf sheaths glabrous, eciliate; leaf blades 3–9 mm broad, flat, rarely involute at the margin, glabrous or, rarely, sparsely hairy on the upper surface. Spikes 7–15 cm long, dense; internodes 4–6 mm long in the middle of spike, spinulose-ciliate on the edges, rarely totally hairy. Spikelets 11–14 mm long, imbricate, overlapping for more than half their length, with 4–6 florets. Glumes subequal, including awn 7–10 mm long, lanceolate or, rarely, lanceolate-ovate, acuminate, mucronate or awned at the apex, narrowly membranous at the margin, glabrous, with 3–7 veins, oblique; awn up to 3 mm long. Lemma, including awn, 7.5–13 mm long, lanceolate, acute, mucronate or shortly awned, glabrous. Palea as long as or a little shorter than the lemma, ciliate all along the keels. Anthers 4–4.5 mm long. – $2n = 42$; genomic constitution: SSH.

Flowering in 5–8. In field margins, wet places around lakes and along rivers, 100–2600 m.

Selected specimens seen

IRAN: MAZANDARAN: 37 km W of Baladeh, 2600 m, *Assadi 70892*; Elborz, Gadouk, Chashm to Nizva, *Behboudi & Aellen 9036* (IRAN). — GILAN: Astara, Heyran pass, *Mirkamali 10025*. — AZARBAYEJAN: Bandare Sharafkhaneh, 1320 m, *Assadi & al. 68458*; Khoy, Toreh, 2600 m, *Akbarzadeh 23*; near Bazargan, c. 1500 m, *Assadi 70824 & 70814*. — TEHRAN: Firouzkuh, Lazour, Karis, 2500 m, *Mozaffarian 54174*; Dizin, 2620 m, *Assadi 70877*.

Distribution: Europe, Russia, Turkey, Caucasus, Iraq, Iran (Fig. 9), Afghanistan, Pakistan, and Central Asia; furthermore introduced to many temperate areas of the world.

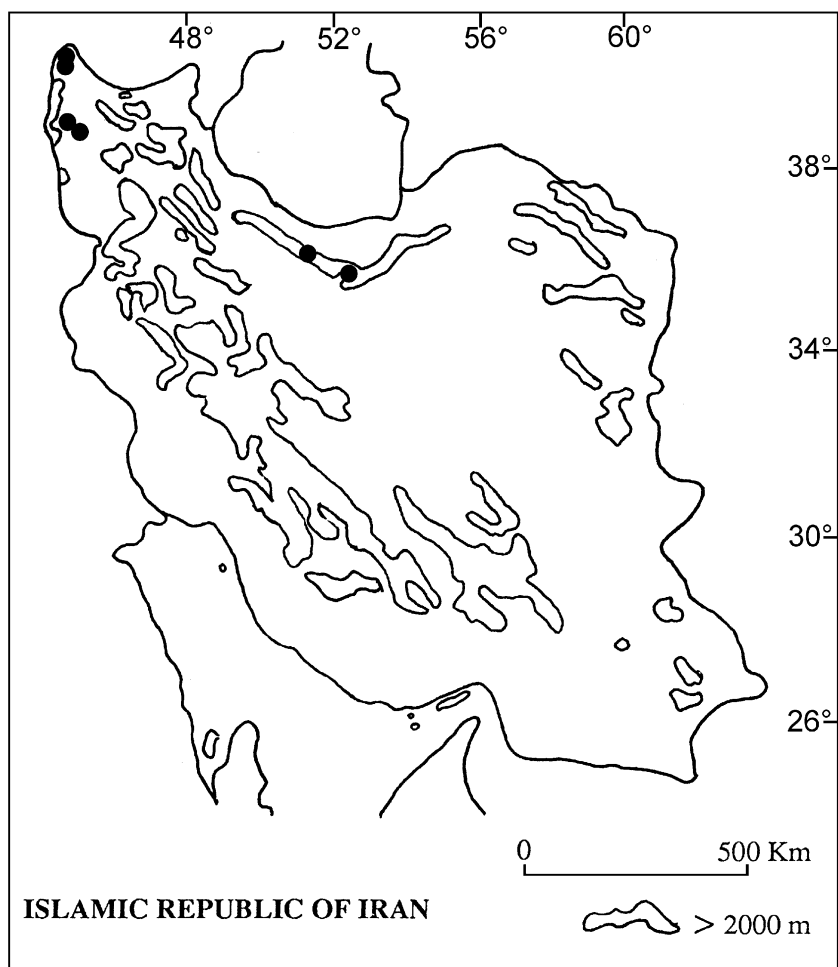


Fig. 9. Distribution of *Elymus repens* in Iran.

9. *Elymus elongatiformis* (Drobow) Assadi, *comb. nova* – Fig. 11.

≡ *Agropyron elongatiforme* Drobow in Vvedenskij & al., *Opredelitel' Rast. Taškenta* 1: 42. 1923 [& Feddes Repert. 21: 44. 1925] ≡ *Elytrigia elongatiformis* (Drobow) Nevski in *Trudy Sredne-Asiatsk. Gosud. Univ., Ser. 8b, Bot.* 17: 61. 1934 ≡ *Elytrigia repens* subsp. *elongatiformis* (Drobow) Tzvelev in *Novosti Sist. Vysš. Rast.* 10: 31. 1973 ≡ *Elymus repens* subsp. *elongatiformis* (Drobow) Melderis in *Bot. J. Linn. Soc.* 76: 379. 1978. – Holotypus: Distr. Taschent circa urb. Taschent, *Drobov 1919* (LE [few spikelets]!).

Perennial, with long, creeping rhizomes. Culms 60–110 cm, glabrous. Leaf sheaths glabrous, sometimes ciliate; leaf blades 4–11 mm broad, glabrous or scabrous, rarely sparsely hairy on the upper surface. Spikes (4–)10–15(–17) cm long; internodes 6–10 mm long in the middle of spike, spinulose-ciliate on the angles. Spikelets 10–16 mm long, overlapping up to half their length, with 3–8 florets. Glumes subequal, 5–8 mm long, lanceolate, acute or mucronate at the apex, narrowly membranous at the margin, with 5–7 veins, glabrous or the middle vein scabrous toward the apex, oblique. Lemma 6.5–8 mm long, lanceolate, obtuse or rounded or truncate-

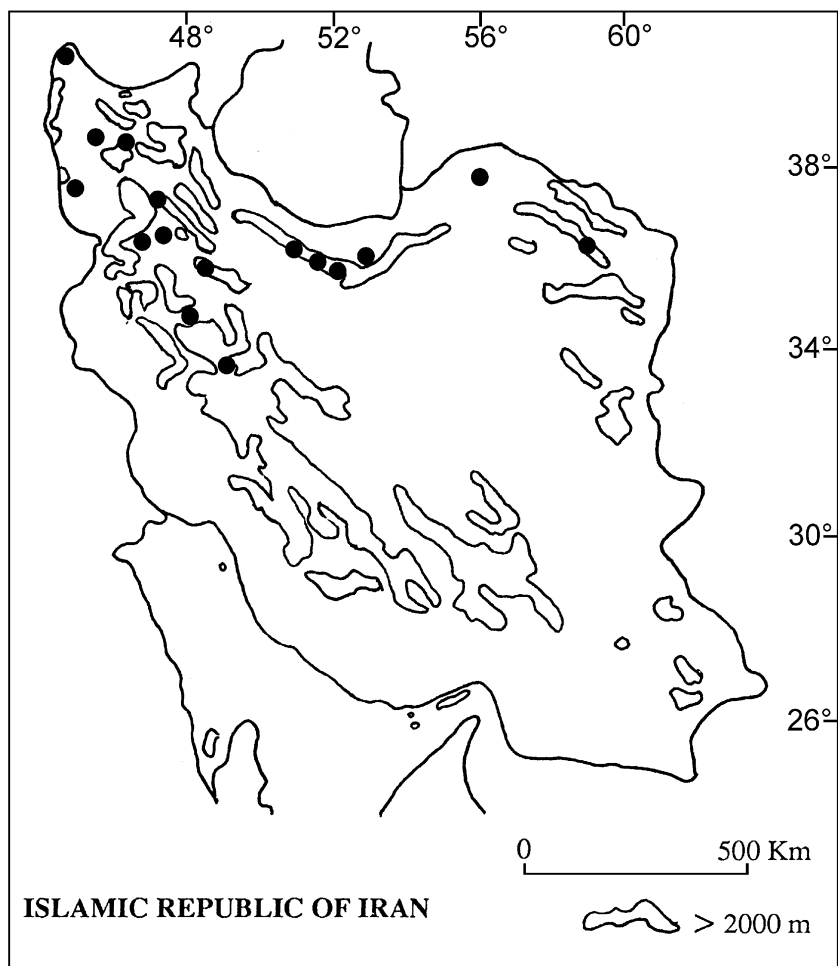


Fig. 10. Distribution of *Elymus elongatiformis* in Iran.

emarginate or sometimes shortly mucronate, glabrous. Palea as long as or a little shorter than the lemma, scabrous or $\pm$ ciliate along the upper half of the keels. Anthers 4–4.5 mm long. – $2n = 56$; genomic constitution: SSHX.

Flowering in 6–8. In fields and in wet places, 100–2600 m.

Selected specimens seen

IRAN: GORGAN: Golestan forest, Almehr, 1650 m, *Foroughi* 7107. — MAZANDARAN: 37 km W of Baladeh, 2600 m, *Assadi* 70889. — AZARBAYEJAN: Near Bazargan, c. 1500 m, *Assadi* 70823; c. 10 km S of Shabastar, 1450 m, *Assadi & Akhani* 61487. — KORDESTAN: Beginning of the road Divandarreh to Bijar, *Assadi* 70854. — HAMADAN: 17 km to Tuyserkan, from Malayer, 1930–2050 m, *Assadi* 70766. — LORESTAN: Azna, village Darreh-Takht; 1860 m, *Assadi* 70733. — KHORASAN: Zoshk, mountains N of Binaloud, 1600–1900 m, *Saghafi & Beizai* 39. — TEHRAN: Gatschar, Azadbar, 2520 m, *Assadi* 70867; Abali, 220 m, *Dewey* 23189 (UTC); Karaj, Azadbar, *Gaub* 1714 (IRAN); Karaj, Mardabad, *Gaub* 1720 (IRAN).

Distribution: SE Russia, Ukraine, Turkey, Caucasus, Iraq, Iran (Fig. 10), Afghanistan and Central Asia.

Doubtful record from Iran

Agropyron cognatum Hack.

A. cognatum was recorded from the Doroud area, Iran, by Bor (1970). Tzvelev (1976) identified this species with the Central Asiatic *Elytrigia geniculata* subsp. *ferganensis* (Drobow) Tzvelev but he excluded Iran from the distribution area of this taxon. The specimen cited by Bor (1970) was not traceable but, at its collection locality, an *Elymus* species was found which morphologically approaches the description of Bor's *Agropyron cognatum*. However, the new collections are not assignable to *A. cognatum*. They proved to represent a new taxon described as *Elymus transhyrcanus* subsp. *lorestanicus* Assadi, belonging to *E.* sect. *Goulardia* (Husnot) Tzvelev (Assadi 1994a).

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References

- Assadi, M. 1994a: Crossing experiments in *Elymus transhyrcanus* group, a new subspecies and a new species. – Iranian J. Bot. **6**: 185–195.
- 1994b: Experimental hybridization and genome analysis in *Elymus* L. sect. *Caespitosae* and sect. *Elytrigia* (*Poaceae: Triticeae*). – Pp. 22–28 in: Proceedings of the 2nd International *Triticeae* Symposium, Logan, Utah, USA. – Logan.
- 1995: Meiotic configuration and chromosome number in some Iranian species of *Elymus* L. and *Agropyron* Gaertner (*Poaceae: Triticeae*). – Bot. J. Linn. Soc. **117**: 159–168.
- & Runemark 1995: Hybridisation, genomic constitution and generic delimitation in *Elymus* s.l. (*Poaceae: Triticeae*). – Pl. Syst. Evol. **194**: 189–205.
- 1996: Biosystematic studies of the *Elymus hispidus* group (*Poaceae: Triticeae*). – Nordic J. Bot. [submitted].
- Bor, N. L. 1970: *Gramineae*. – In: Rechinger, K. H. (ed.), Flora iranica **70**. – Graz.
- Dewey, D. R. 1972: The origin of *Agropyron leptorum*. – Amer. J. Bot. **59**: 836–842.
- 1978: Intermediate wheatgrasses of Iran. – Crop. Sci. (Madison) **18**: 43–48.
- 1980: Morphological, cytological, and taxonomical relationships between *Agropyron repens* and *A. elongatiforme* (*Gramineae*). – Syst. Bot. **5**: 61–70.
- 1984: The genomic system of classification as a guide to intergeneric hybridization with the perennial *Triticeae*. – Pp. 209–279 in: Gustafson, J. P. (ed.), Gene manipulation in plant improvement. Proceedings 16th Stadler Genetics Symposium, Columbia, 1984. – New York.
- Jarvie, J. K. 1992: Taxonomy of *Elytrigia* sect. *Caespitosae* and sect. *Junceae* (*Gramineae: Triticeae*). – Nordic J. Bot. **12**: 155–169.
- Liu, Z.-W. & Wang R. R.-C. 1989: Genome analysis of *Thinopyrum caespitosum*. – Genome **32**: 141–145.
- Löve, Å. 1984: Conspectus of the *Triticeae*. – Feddes Repert. **95**: 425–521.
- 1986: Some taxonomical adjustments in Eurasian wheatgrasses. – Veröff. Geobot. Inst. ETH Stiftung Rübel Zürich **87**.

- Lu, B.-R. 1993: Biosystematic investigations of Asiatic wheatgrasses – *Elymus* L. (*Triticeae*, *Poaceae*). – Svalöv.
- Melderis, A. 1978: Taxonomic notes on the tribe *Triticeae* (*Gramineae*) with special references to the genera *Elymus* L. sensu lato and *Agropyron* Gaertner sensu lato. – Bot. J. Linn. Soc. **76**: 369–384.
- 1985: *Elymus* L. – Pp. 206–227 in: Davis, P. H. (ed.), Flora of Turkey **9**. – Edinburgh.
- Moustakas, M. 1993: Genome relationships between octoploid and decaploid *Thinopyrum ponticum*. – Bot. J. Linn. Soc. **112**: 149–157.
- Nevski, S. A. 1933: Agrostologische Studie über das System der Tribe *Horeae* Benth. – Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vysš. Rast. **1**: 9–32.
- Runemark, H. & Heneen, W. K. 1961: *Elymus* and *Agropyron*, a problem of generic delimitation – Bot. Not. **121**: 51–79.
- Tzvelev, N. N. 1976: Zlaki SSSR. – Leningrad [English edition: 1983 (transl.: Sharma, B. R.; ed.: Kothekar, V. S.), Grasses of the Soviet Union, New Delhi].
- Wang, R. R.-C., Dewey, D. R. & Hsiao, C. 1986: Genome analysis of the tetraploid *Pseudoroegneria tauri*. – Crop. Sci. (Madison) **26**: 723–727.

Address of the author:

M. Assadi, Research Institute of Forests and Rangelands, P. O. Box 13185–116, Tehran, Iran.