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RESEARCH ARTICLE

Endemism of the Kazakhstan flora: Poaceae Barnhart

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Endemic plants are a unique category of the flora geographical element, and they serve as the main criterion for distinguishing one flora from other ones. More than 60 years have passed since the last systematic processing of the Poaceae family within the flora of Kazakhstan. Since that time the status of many taxa of Kazakhstan grasses has changed. The paper presents a complete checklist of species of the Poaceae family endemic to Kazakhstan, including references, synonyms, ecological preferences and geographic distributions in Kazakhstan for each species. A total of 57 endemic grass species are found in Kazakhstan: *Stipa* (17), *Elymus* (17), *Elymotrigia* (10), *Leymus* (3), *Agrotrigia* (2) and *Poa* (2), and one species of *Agropyron, Agrostis, Elytrigia, Koeleria, Phleum*, and *Puccinellia* each. Four species have been found in other countries, and 21 species of the Kazakhstan flora have lost their endemic status due to new taxonomic treatment.

Keywords: Poaceae; endemics; Kazakhstan; distribution

Introduction

Endemic plants (endemics) are species, rare families and genera restricted to a specific territory. This is a special category of the flora geographical element, and it serves as the main criterion for distinguishing different types of flora. The confinement of the species exclusively to the territory under study is an absolute criterion of endemism. The presence of endemic plants enables an objective floristic demarcation of the territories (Takhtajan, 2009). The study of the endemic species composition allows us to understand the patterns of flora formation (Tolmachev, 1974).

The flora of Kazakhstan includes 5658 species (Abdulina, 1999), 760 species being endemics (Goloskokov, 1969), which accounts for more than 13.4% of the total species number.

The first volume of Flora of Kazakhstan (1956) included 538 species of grasses, and more than 80 species from this territory were described (Goloskokov, 1963), including 12 species described by N.V. Pavlov and 5 species described by V.P. Goloskokov. When the first volume of Flora of Kazakhstan was published in 1956, 38 endemic forms were noted as representatives of the Poaceae family, which accounted for 7% of the total number of grasses. By 1969, V.P. Goloskokov pointed out 45 endemics species of grasses in the analysis of the species endemism of the Kazakhstan flora, which comprised 8.4% of the total number of species (Goloskokov, 1969).

A major event for the grasses processing was the work of N.N. Tzvelev (1976) "Zlaki SSSR", which included 1011 species. Despite the fact that N.N. Tzvelev understood many species rather widely and many geographical and ecological microspecies were moved to synonyms, 15 species remained endemic.

A major contribution to the study of the Eastern Kazakhstan flora was made by Yu.A. Kotukhov who has described 46 species that belong to the Poaceae family over the past 30 years. Most of these species are endemic and are found on the territory of Kazakhstan Altai, Saur, Monrak and Zaisan depression (Floristic..., 2015). In recent years, M. Nobis has reported several taxa endemic to Kazakhstan (Nobis, 2010; Nobis, Gudkova, 2016).

More than 60 years have passed since the last systematic processing of the Poaceae family within the flora of Kazakhstan. The knowledge of the distribution and systematics of individual taxa of grasses has significantly increased over these decades. Many species were found in cross-border regions (China, Kyrgyzstan), many of them became synonymous to more widespread species. In this regard, it seemed extremely interesting to analyze the present state of endemism in the Poaceae family in Kazakhstan.

Material and methods

The study is based on the revision of herbarium material deposited in the herbaria of AA, ALTB, KUZ, LE, MW, NS, and TK (acronyms are given according to Thiers, 2018), as well as our own material collected during the fieldwork in 1976–2017 years. The checklist of the endemic Poaceae species of Kazakhstan includes references, synonyms, ecological preferences and geographic distributions in Kazakhstan for each species. The distribution is given in the floristic areas developed by I.A. Linchevsky, N.I. Rubtsov and P.P. Polyakov, and detailed and specified M.G. Popov and cited in the "Flora of Kazakhstan" (1956). A total of 35 territorial floristic units (including subdistricts) were established for Kazakhstan (Fig. 1).

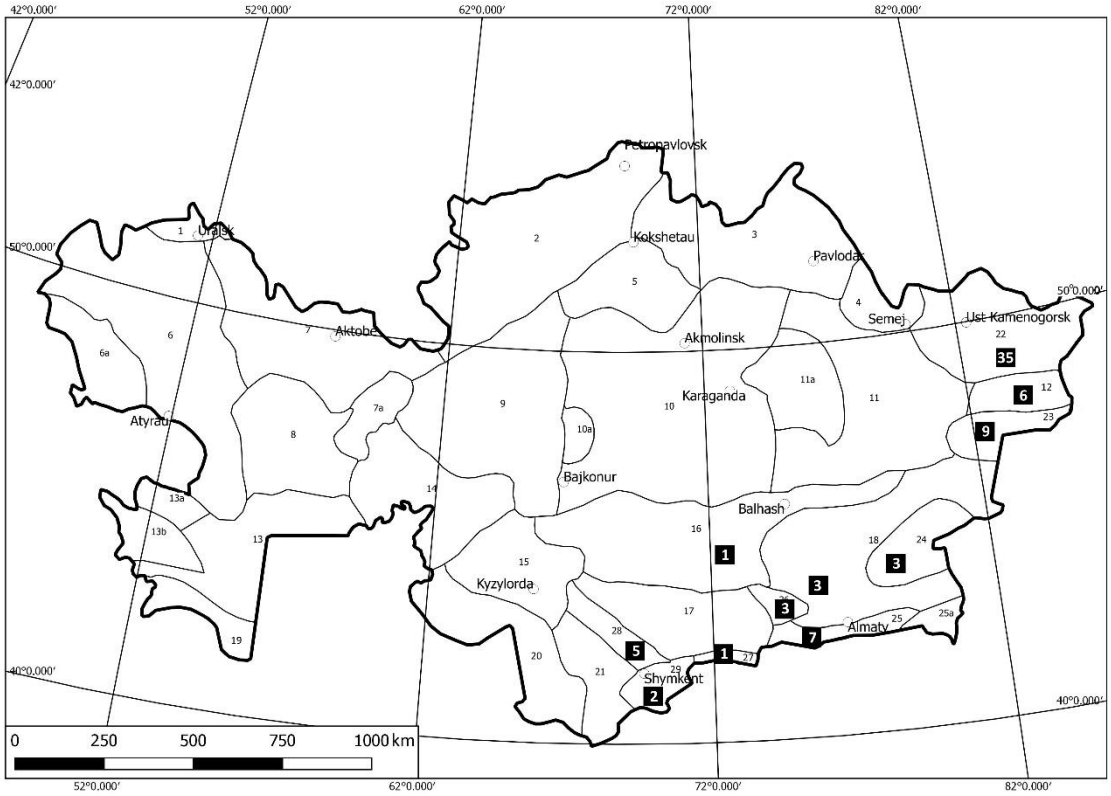

Fig. 1. Floral areas of Kazakhstan (desigin by I.A. Linchevsky, N.I. Rubtsov and P.P. Polyakov, 1956): 1. The spurs of common Syrt (Spurs com. Syrt.); 2.Tobol-Ishim (Tob.-Ishim.); 3. Irtysh (Irt.); 4. Semipalatinsk borovoy (Sem. Bor.); 5. Kokchetav (Kokch.); 6. Prikaspiyskiy (Prikasp.), 6a. Bukey (Buk.); 7. Aktobe (Akt.); 7a. Mugodzhary (Mugodz.); 8. Embensky (Emb.); 9. Turgay (Turg.); 10. Western upland (West. upland); 10a Ulutau; 11. East upland (East upland); 11a. Karkaraly (Kark.); 12. Zaysan (Zays.); 13. North Ust-Urt; 13a. Buzaschi; 13б. Mangyshlak (Mangyshl.); 14. Aral; 15. Kzyl-Ordinsky (Kz.- Ord.); 16. Betpak-Dala (Betpakd.); 17. Muyunkumy (Muyunk.); 18. The Balkhash-Alakol (Balk.- Alak.); 19. South Ust-Urt; 20. Kzyl-kumsky (Kz.-kum.); 21. Turkestan (Turkest.); 22. Altai; 23. Tarbagatai (Tarb.); 24. Dschungarian Alatau (Dschung. Alatau); 25. Zailiyskiy kungey Alatau (Zail. Kung. Alatau); 25a. Ketmen-Terskey Alatau (Ket. Tersk. Alatau); 26. Chu-ili mountains (Chu-ili mount.); 27. The Kirghiz Alatau (Kirg. Alatau); 28. Karatau; 29. Western Tien-Shan (West. Tien-Shan); in black square – the number of endemics in floristic areas

The checklist of endemic grasses of Kazakhstan

1. Agropyron tarbagataicum N. Plotn., 1941–1946, Tr. Omsk. Sel'skohoz. Inst., 20:143, 131; Kuznetsov, 1956, Fl. Kazahst.,1: 292; Kotukhov, Anufrieva, 2016, Bot. issl. Sib. Kaz., 22: 43.

Syn.: A. cristatum subsp. *tarbagataicum* (N. Plotn.) Tzvelev, 1972, Novosti Sist. Vyssh. Rast., 9: 58.

Type: [Kazakhstan] Montes Tarbagatai, prope pag. Urdschar, in declivitatibus siccis et inter frutices, 20 VIII 1936, *N. Plotnikov*. (Type not found, probably can be found in herbarium Omsk State Agrarian University or TK).

N.M. Kuznetsov (1956), Yu.A. Kotukhov and O.A. Anufrieva (2016) consider that the species is endemic to Tarbagatay. *Agropyron tarbagataicum* is morphologically close to *A. pectinatum* (Bieb.) Beauv. but differs in short creeping rhizomes vs. laxly tufted with extravaginal shoots (Kotukhov, Anufrieva, 1976). *A. tarbagataicum* is probably an ancient hybrid species resulted from Pliocene-Pleistocene hybridization: *A. pectinatum* (Bieb.) Beauv. × *Elytrigia repens* (L.) Nevski. B.A. Bykov (1979) considers that *A. tarbagataicum* belongs to the period of the ancient Tarbagatai-Altai speciation associated with shrub-meadow steppes. E.F. Stepanova (1962) refers *A. tarbagataicum* to relics of tertiary mesophilic forests.

Habitat: foothill terraces of the south-eastern and north-eastern slopes, 500–700 m.

Distribution in Kazakhstan: 22. Alt., 23. Tarb.

2. × Agrotrigia berelica Kotukhov, 1998a, Turczaninowia, 1 (1): 15.

Type: [Kazakhstan] Zapadnyi Alyai, khr. Zapadnaya Listvaga, mezhdu selami Yazevka i Dzhambul, 1100 m. nad ur. m., yugo-vost. Sklon, ostepnennye zlakovye luga, 10 VIII 1972, *Yu. Kotukhov* (holotype LE; isotypes LE – 2 sheets).

Hybrid species, partially fertile, apparently originated from hybridization of *Elytrigia geniculata* (Trin.) Nevski. × *Agropyron krylovianut* Schischk. The species is close to *Elytrigia geniculata*, distinguished by creeping rhizomes, longer spikelet and clearly visible keel of glumes (Kotukhov, 1998a).

Habitat: steppe grasslands, shrubs, stony slopes, 1000–1200 m.
Distribution in Kazakhstan: 22. Alt.

3. × Agrotrigia urunchaica Kotukhov, 1998a, Turczaninowia, 1(1): 14.
Type: [Kazakhstan] Yuzhnyi Altai, khr. Azutau, dolina reki Belezek, dolina, r. Belezek, pereval Urunhajskij, 1300 m. nad ur. m., zlakovye luga, 24 VIII 1990, *Yu. Kotukhov* (holotype LE; isotypes LE – 2 sheets).
Hybrid species, originated from hybridization of *Agropyron tarbagataicut* N. Plotn. *× Elytrigia repens* var. *cristatut* Doell. (Kotukhov, 1998a). ***×*** *Agrotrigia urunchaica* is close to *Agropyron krylovianut* Schischk. but differs in gradually acuate, with glabrous or scabrous awn (5–9 mm long) on the top of lemma vs. obtuse or with short pubescent awn (up to 2–4 mm long) on the top of lemma respectively.
Habitat: meadows, 1000–1300 m.
Distribution in Kazakhstan: 22. Alt.

4. Agrostis buchtarmensis Kotukhov, 1998a, Turczaninowia, 1(1): 12.
Type: [Kazakhstan] Yuzhnyi Altai, khr. Yuzhnyi Altai, dolina reki Bukhtorma, v raione poselka Chindogatui, 1800 m. nad ur. m., razrezhennii listvenichii les, 23 VПI 1972, *Yu. Kotukhov* (holotype LE; isotipes: LE – 3 sheets, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 3 sheets).
Hybrid species, originated from hybridization of *Agrostis clavata* Trin. ***×****Agrostis trinii* Turcz, very close to *Agrostis trinii* but has looser panicles and straight awn extended away from the lemma medianum dorsale and shorter anthers.
Habitat: sparse larch forest, spruce-birch forest, 1500–1800 m.
Distribution in Kazakhstan: 22. Alt.

5. × Elymotrigia altaica Kotukhov, 1998a, Turczaninowia, 1 (1): 16.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Azutau, Uspenskaya vpadina, dolina r. Belezek, raznotravnye ostepnennye luga, 24 VII 1984, *Yu. Kotukhov* (holotype LE; isotypes LE – 2 sheets).
The hybrid species, partially fertile, apparently originating from the crossing of *Elytus fedtschenkoi* Tzvelev × *Elytrigia repens* (L.) Nevski. (Kotukhov, 1998a).
Habitat: steppe meadows, 1000–1300 m.
Distribution in Kazakhstan: 22. Alt.

6. × Elymotrigia austroaltaica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1753.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Yuzhnyj Altaj, Bobrovskaya vpadina v okr. s. Sorvenok, zlakovye ostepnennye luga, 29 VIII 1984, *Yu. Kotukhov* (holotype LE; isotypes: LE – 2 sheets, LE – 2 sheets; Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybrid taxon, originated from hybridization of *Elymus gmelinii* (Ledeb.) Tzvelev × *Elytrigia gmelinii* (Trin.) Nevski. (Kotukhov, 1990).
Habitat: steppe meadows, 1000–1300 m.
Distribution in Kazakhstan: 22. Alt.

7. ×Elymotrigia azutavica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1754.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Azutau, Kyzylaschinskaya vpadina, dolina r. Kal'dzhir, ostepnennye raznotravno-zlakovye luga, 22 VII 1985, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, AA – 3 sheets, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybridogenic species, apparently originated from hybridization of *Elytrigia geniculate* (Trin.) Nevski s.l. ***×*** *Elymus mutabilis* (Drob.) Tzvelev s. str. *×Elymotrigia azutavica* is close to *Elymus trachycaulus* (Link) Gould et Shinners s.l. but clearly distinguished by larger plant sizes and longer anthers 3 vs. 1–2.3 mm long (Kotukhov, 1990).
Habitat: steppe meadows, 1200–1300 m.
Distribution in Kazakhstan: 22. Alt.

8. × Elymotrigia bobrovica Kotukhov, 1998a, Turczaninowia, 1 (1): 17.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Yuzhnyj Altaj, Bobrovskaya vpadina, v rajone s. Sorvenok, zlakovye ostepennye luga, 29 VIII 1984, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, Hybrid species, partially fertile, apparently originated from hybridization of *Elytus nevski* Tzvelev ***×*** *Elytrigia repens* (L.) Nevski. *× Elymotrigia bobrovica* is close to *Elytus trachycaulus* (Link) Gould et Shinners. s. 1. but clearly distinguished by wider glumes (1.8–2.2 mm wide) and creeping rhizomes (Kotukhov, 1998a).
Habitat: grasslands, steppe meadows, 1100–1300 m.
Distribution in Kazakhstan: 22. Alt.

9. × Elymotrigia gigantea Kotukhov, 1998a, Turczaninowia, 1 (1): 18.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Azutau, sev.-zap. sklon, okrestnosti sela Uspenka, 24 VIII 1990, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybrid species, widespread in the mountains of the Southern Altai, originated from hybridization of *Elytus mutabilis* (Drob.) *Tzvelev* × *Elytrigia repeps* (L.) Nevski s. 1. (Kotukhov, 1998a).
Habitat: upland grasslands, shrubs, 1200–1300 m.
Distribution in Kazakhstan: 22. Alt.

10. × Elymotrigia kalbica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1754.
Type: [Kazakhstan] Kazahstanskij Altaj, Kalbinskoe nagor'e, gory Vost. Kalby, okr. s Targyn, srednij poyas, 1400 m nad ur. m., yugo-zap. kamenistyj ostepnennyj sklon, kamenistaya pustynya, 26 VII 1977, *Yu. Kotukhov* (holotype LE; isotypes: LE, AA – 2 sheets).

Hybridogenic species, originated from hybridization of *Elymus mutabilis* (Drob.) Tzvelev s. str. × *Elytrigia geniculate* (Trin.) Nevski s.l. × *Elymotrigia kalbica* close to *Elymus praecaespitosa* (Nevski) Tzvelev but differs in glabrous lemma in the lower part and dispersed hairs on the adaxial surface of glumes (Kotukhov, 1990).
Habitat: dry meadows, rocky slopes, 1300–1400 m.
Distribution in Kazakhstan: 22. Alt.
11. × Elymotrigia karakabinica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1755.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Tarbagataj, Karakabinskaya vpadina, 1700 m nad ur. m., zadernennye morennye bugry, suhodol'nye zlakovye luga, 3 VIII 1977, *Yu. Kotukhov* (holotype LE; isotypes: LE, AA, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybrid species, apparently originated from hybridization of *Elytrus fedtschenkoi* Tzvelev × *Elytrigia repens* (L.) Nevski s. 1. (Kotukhov, 1990).
Habitat: dry meadows and grasslands, 1500–1800 m.
Distribution in Kazakhstan: 22. Alt.
12. × Elymotrigia kurtczumica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1756.
Type: [Kazakhstan] Yuzhnyj Altaj, hr. Kurchumskij (vostochnye otrogi), dolina r. Tautekeli, 1800 m nad ur. m., 3 VIII 1985, *Yu. Kotukhov* (holotype LE; isotypes: LE, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybridogenic species, widespread within the Southern Altai, originated from hybridization of *Elytrigia gmelinii* (Trin.) Nevski × *Elytrus fedtschenkoi* Tzvelev (Kotukhov, 1990).
Habitat: high mountain steppe meadows, 1800–1900 m.
Distribution in Kazakhstan: 22. Alt.
13. × Elymotrigia leninogorica Kotukhov, 1990, Bot. Zhurn. (Moscow & Leningrad), 75 (12): 1756.
Type: [Kazakhstan] Zapadnyj Altaj, hr. Ivanovskij, sev.-vost. okraina Leninogorskoj vpadiny, 1000 m nad ur. m., zalezh', sredi sornoj rastitel'nost, 20 VIII 1974, *Yu. Kotukhov* (holotype LE; isotypes: LE, AA – 2 sheets, ALTB – 1 sheets, Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybridogenic species, originated from hybridization of *Elytrus sibiricus* L. × *Elytrigia geniculate* (Trin.) Nevski. (Kotukhov, 1990).
Habitat: meadows, abandon fields, 1000–1100 m.
Distribution iken Kazakhstan: 22. Alt.
14. × Elymotrigia nuraniae Kotukhov, 2004, Turczaninowia, 7 (4): 9.
Type: [Kazakhstan] Zapadnyj Altaj, hr. Linejskij, v rajone Chernoubinskogo kordona Zapadno-Altajskogo zapovednika, srednij poyas, 1500 m nad ur. m., 15 VII 2002, *Yu. Kotukhov* (holotype ALTB; isotypes Herbarium of the Altai Botanical Garden (Ridder, Kazakhstan) – 2 sheets).
Hybridogenic species, apparently originated from hybridization of *Elytrus nevskii* Tzvelev × *Elytrigia jacutorut* (Nevski) Nevski. × *Elymotrigia nuraniae* is widely distributed in the northeastern part of the ridge, often forms pure clonal micropopulations. (Kotukhov, 2004).
Habitat: sparse larch forests, shrubs, 1500 m.
Distribution in Kazakhstan: 22. Alt.
15. Elymus arcuatus (Golosk.) Tzvelev, 1976, Zlaki SSSR, 127.
Syn.: Agropyron arcuatum Golosk., 1950, Bot. mat. (Leningrad), 12: 27; Pavlov, 1956, Fl. Kazahst., 1: 304; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 173
Roegneria arcuata (Golosk.) Golosk., 1969, Ill. Opred. Rast. Kazakhstana, 1: 115, comb. invalid.
Type: [Kazakhstan] Kungej-Alatau, verhov'ya Tau-Chilika, r. Kuganter, yuzhnye stepnye sklony gor, okolo 3150 m, 11 VIII 1944, *V. Goloskokov* (holotype LE; isotypes AA – 3 sheets).
According to V.P. Goloskokov (1950), *Elymus arcuatus* is close to *Elymus caninus* (L.) L. but distinguished by large turf, height, curved calm, veins on the lower glumes and by habitat. N.N. Tzvelev (1976) considers that the species is of hybrid origin, presumably a modern hybrid.
Habitat: stony and rocky grasslands, 3000–3200 m.
Distribution in Kazakhstan: 25. Zail. Kung. Alatau
16. Elymus besczetnovae Kotukhov, 1999, Turczaninowia, 2 (4): 9.
Type: [Kazakhstan] Zapadnyj Altaj, hr. Ivanovskij, dolina r. Gromatuha, 1000 m nad ur. m., pustyr', 5 VII 1997, *Yu. Kotukhov* (holotype LE; isotypes: ALTB – 1 sheet, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).
Hybrid species, apparently originated from hybridization of *E. tacrourus* (Turcz.) Tzvelev s.l. ×*E. sibiricus* L., close to *E. tacrourus* (Turcz.) Tzvelev s.1. but clearly distinguished by curved, dense inflorescence and evenly hairy lemma surface, and by wider leaves (Kotukhov, 1999).
Habitat: wasteland, 1000–1200 m.
Distribution in Kazakhstan: 22. Alt.
17. Elytrus buchtarmensis Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77 (6): 89.
Type: [Kazakhstan] Yuzhnyj Altaj, verhov'e r. Buhtarma, 2100 m nad ur. m., yugo-zapadnyj sklon, razrezhennyj listvennichnyj les, ostepnennye zlakovye luga, 22 VII 1990, *Yu. Kotukhov* (holotype LE; isotypes Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).
Hybridogenic species, apparently originated from hybridization of *E. fedtschenkoi* Tzvelev × *E. tianschanigenus* Czer, close to *E. fedtschenkoi* Tzvelev, but clearly distinguished by shorter glumes (8–11 vs. 10–18 mm long) with 5–7 veins (vs. 5–11) and shorter, almost straight (not extended away from the lemma) awn on the lemma (Kotukhov, 1992).
Habitat: steppe meadows, high mountain steppe meadows, 2000–2200 m.

Distribution in Kazakhstan: 22. Alt.

18. Elymus glaucissimus (M. Pop.) Tzvelev, 1976, Zlaki SSSR, 124.

Syn.: Agropyron glaucissimum M. Pop., 1938, Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s. 47 (1): 84; Pavlov, 1956, Fl. Kazahst., 1: 301.

A. szimgaricum Drob., 1923, Opr. rast. okr. Tashk., 1: 40 (ross.) et in Fedde. Repertsp. nov., 1925, 21: 40; Pavlov, 1956, Fl. Kazahst., 1: 301; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 168.

Type: [Kazakhstan] Zailijskij Alatau, verh. r. Chilik, verh. ruch'ya Chijmujnak, osypi granitnogo schebnya, 1 VIII 1934, *M.G. Popov* (holotype MW; isotype AA – 1 sheet).

O.N. Bondarenko (Bondarenko et al., 1968) considers *E.glaucissimus* a hybrid between *A. szimgamicum* and *Agropyron schrenkianum* (Fisch. & C.A. Mey.) P. Candargy.

Habitat: stony and rocky grasslands, pebbles, 2400–2600 m.

Distribution in Kazakhstan: 25. Zail. Kung. Alatau.

19. Elymus goloskokovii Kotukhov, 2004, Turczaninowia, 7 (4): 8.

Type: [Kazakhstan] Zapadnyj Altaj, hr. Ivanovskij, yugo.-zap. mikrosklon, uroch. Bol'shaya Poperechka, pihtovo-berezovyj les, vysokotravnyj lug, 24 VII 1999, *Yu. Kotukhov* (holotype Herbarium of the Altai botanical garden (Ridder, Kazakhstan); isotypes Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 4 sheets).

This species is close to *Elytis fibrosus* (Schrenk) Tzvelev, clearly distinguished by larger plant size, long hairs on the adaxial surface of leaf blade (vs. scabrous), straight awns of lemma (not awnless). *E. goloskokovii* is noticeably close to *E. trachicaulis* (Link) Gouldet Shinners, distinguished by wider spikes, wider glumes, and spinous lemma. Apparently, *E. goloskokovii* is a stable fertile hybrid species originated from hybridization of *E. fibrosis* × *E. trachicaulus*. However, the species may be originated from *E. mutabilis* (Drob.) Tzvelev s. 1. (Kotukhov, 2004).

Habitat: fir-birch forests, tall grass meadows, 1300–1500 m.

Distribution in Kazakhstan: 22. Alt.

20. Elymus karakabinicus Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77 (6): 1756.

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Tarbagataj, Karakabinskaya vpadina, 1800 m nad ur. m., zarastayuschie morennye bugry, ostepnennye zlakovye luga, 25 VIII 1984, *Yu. Kotukhov* (holotype LE; isotypes Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 3 sheets).

Elymus karakabinicus is close to *E. kotarovi* (Nevski) Tzvelev and *E. tiapschapicus* Czer. but differs from both species in almost glabrous lemma surface and very short-haired awn of the glumes (Kotukhov, 1992).

Habitat: meadow steppes, high mountain steppes, 1700–1900 m.

Distribution in Kazakhstan: 22. Alt.

21. Elymus kasteki (M. Pop.) Tzvelev, 1976, Zlaki SSSR, 137.

Syn.: Agropyron kasteki M. Pop., 1938, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., 47, (1): 84; Pavlov, 1956, Fl. Kazahst., 1: 296; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 175.

A. subalpinum Golosk., 1950, Bot. mat. (Leningrad), 12: 26; Pavlov, 1956, Fl. Kazahst., 1: 296.

Type: [Kazakhstan] Alatau transiliensis, ad fl. Kastwk, in saxosis montis Suuk-tjube, 2 VIII 1936, *M. Popov* (holotype AA; isotypes: MW?, TAK).

N.N. Tzvelev (1976) considers that *A. subalpinum* can be referred to the independent high-altitude subspecies *E. kastaki*. *Agropyron subalpinum* is described from the northern Tien-Shan: Zailijskij Alatau, verhov'ya reki Turgen', na vodorazdele Chin-Turgen' i Ul'kun-Turgen', okolo 2800 m, 28 VIII 1938, *V. Goloskokov* (holotype LE; isotype LE – 1 sheet).

Habitat: meadows, stony slopes, 2200–2800 m.

Distribution in Kazakhstan: 25. Zail. Kung. Alatau.

22. Elymus lineicus Kotukhov, 1999, Turczaninowia, 2(4): 8.

Type: [Kazakhstan] Zapadnyj Altaj, hr. Linejskij, 1700 m nad ur. m., dolina r. Chernaya Uba (v rajone vpadeniya r. Linejchiha), po obochinam dorog, 24 VII 1998, *Yu. Kotukhov* (holotype LE; isotypes: LE – 2 sheets, ALTB – 1 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elymus lineicus is similar to *E. transbaicalensis* (Nevski) Tzvelev in habitus but differs from it in longer drooped inflorescence and longer awns of the lemma (5–7 vs. 1–3 mm long). It is apparently a stabilized hybrid species originated from hybridization between *E. transbaicalensis* (Nevski) Tzvelev and *E. sibiricis* L. (Kotukhov, 1999).

Habitat: meadows, roadsides, 1600–1800 m.

Distribution in Kazakhstan: 22. Alt.

23. Elymus longespicatus Kotukhov, 1999, Turczaninowia, 2(4): 7.

Type: [Kazakhstan] Zapadnyj Altaj, hr. Ivanovskij, dolina r. Bystruha, v okr. gory Chaschevitaya, opushki ivnyakov, sredi kustarnika, 1 IX 1993, *Yu. Kotukhov* (holotype LE; isotypes: LE – 2 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Hybrid species, apparently originated from hybridization between *E. caninus* (L.) L. and *E. sibiricus* L., since other species of the genus *Elytus* L. are not found in the habitat. *E. longespicatus* is similar in habitus to *E. caninès* (L.) L., but differs in culm puberulent below the nodes, looser inflorescence and lemma, scabrous over the entire surface due to short hairs.

Habitat: shrubs, 1200–1400 m.

Distribution in Kazakhstan: 22. Alt.

24. Elytus tartoreus Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77(6): 92.

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Azutau, gora Mramornaya, vostochnyj sklon, 1100 m nad ur. m., sredi kustarnika *(Daphne altaica* Pall., *Astragalus veresczaginii* Kryl. et Sumn., *A. tajevskianus* Kryl. and other), 20 VIII 1988, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elytrus tartorevs apparently originated from hybridization between *E. cappius* (L.) L. and *E. mutabilis* (Drob.) Tzvelev, differs from *E. mutabilis* (Drob.) Tzvelev in longer (12–24 vs. 10–20 cm long) curved inflorescence and lemma, slightly scabrous or almost glabrous on the back (Kotukhov, 1992).

Habitat: shrubs, 1100–1300 m.

Distribution in Kazakhstan: 22. Alt.

25. Elytrus occidentali-altaicus Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77(6): 89.

Type: [Kazakhstan] Zapadnyj Altaj, hr. Ivanovskij, urochische Kedrovaya Yama, 1900 m nad ur. m., izrezhennyj kedrach, ostepnennye uchastki, 13 VIII 1977, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, ALTB – 1 sheet, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 3 sheets).

Yu.A. Kotukhov (1992) considers that this species originated from hybridization between *E. nevskii* and *E. mutabilis* (Drob.) Tzvelev, close to *E. abolinii* (Drob.) Tzvelev and *E. nevskii* Tzvelev. but differs from *E. abolinii* in the spikelet awn, scabrous along the ribs only, and from *E. nevskii* in less dense spikelets.

Habitat: dry meadows, community with *Pinus sibirica*, 1800–2000 m.

Distribution in Kazakhstan: 22. Alt.

26. Elymus sarymsactensis Kotukhov, 1999, Turczaninowia, 2(4): 6.

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Sarymsakty, dolina r. Buhtarma, v okr. s. Chingistaj, razrezhennyj bereznyak, 28 VII 1990, *Yu. Kotukhov* (holotype LE; isotypes: LE – 2 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elymus sarymsactensis is apparently stabilized hybrid species originated from hybridization between *E. caninès* (L.) L. and *E. gtelinii* (Ledeb.) Tzvelev, close to *E. gtelinii* (Ledeb.) Tzvelev, but differs in smaller spikelets, shorter lemma (8–9 vs. 9–11 mm long) and shorter (up to 20, not 20–40 mm) awns (Kotukhov 1999).

Habitat: high grass meadows, 1700–1800 m.

Distribution in Kazakhstan: 22. Alt.

27. Elymus sauricus Kotukhov, 1988a, Turczaninowia, 1(1): 19.

Type: [Kazakhstan] Saur-Tarbagataj, hr. Saur, verhov'e reki Kyzylkiya, 1700–1800 m nad ur. m., cev.-zapadnyj kamenistyj sklon, okraina podvizhnoj osypi, 15 VII 1992, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elymus sauricus differs from *Elytus abolipii* var. *divaricate* (Nevski) Tzvelev in distinctly drooped spike and scabrous along the ribs rachis, differs from *Elymus fedtschenkoko* Tzvelev in more loose and not one-sided spikelets and anthers 3 mm long (Kotukhov, 1998).

Habitat: rocky slopes, slides, 1700–1800 m.

Distribution in Kazakhstan: 23. Tarb.

28. Elymus sibinicus Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77(6): 92.

Type: [Kazakhstan] Kalbinskoe nagor'e, hr. Vostochnaya Kalba, Sibinskaya vpadina, 14 VIII 1988, *Yu. Kotukhov* (holotype LE; isotypes: LE – 1 sheet, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elymus sibinicus is close to *E. cappius* (L.) L., but it is distinctly differs in erect spikelets (vs. slightly drooped), shorter anthers (1.5–1.8 vs. 2.5–2.8 mm long) and lemma, dispersed scabrous on the back (vs. glabrous) (Kotukhov, 1992).

Habitat: steppe shrub meadows, 1200–1400 m.

Distribution in Kazakhstan: 22. Alt.

29. Elymus tarbagataicus Kotukhov, 1998a Turczaninowia, 1 (1): 20

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Tarbagataj, pereval Burhat, 1600 m nad ur. m., sev.-zapadnyj sklon, razrezhennyj listvennichnyj les, ostepnennye kustarnikovye luga, 04 VIII 1985, *Yu. Kotukhov* (holotype LE; isotypes: LE – 3 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 1 sheet).

Elymus tarbagataicus is hybrid species apparently originated from hybridization of *Elymus gtelipii* (Ledeb.) Tzvelev × *Elymus praecaespitosus* (Nevski) Tzvelev. Position of veins of spikelet glume can be the evidence that its ancestors were *Elytus gtelinii* (Ledeb.) Tzvelev ***×*** *Elytus ugaricus* Drob. (Kotukhov, 1998a).

Habitat: steppe shrub meadows, 1500–1700 m.

Distribution in Kazakhstan: 22. Alt.

30. Elytrus tzvelevii Kotukhov, 1992, Bot. Zhurn. (Moscow & Leningrad), 77 (6): 90.

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Yuzhnyj Altaj, 2500 m nad ur. m., verhov'e r. Buhtarma, morennye bugry, ostepnennye zlakovye luga, 18 VII 1990, *Yu. Kotukhov* (holotype LE; isotypes: LE – 2 sheets, ALTB – 1 sheet, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elytrus tzvelevii is hybrid species apparently originated from hybridization between *E. schrenkianus* (Fisch. et Meow.) Tzvelev and *E. praecaespitosus* (Nevski) Tzvelev. The species is similar to *E. schreppkiapus* (Fisch. Meow.) Tzvelev in habitus, but differs in thick leaf sheath, two-sided spikelets, and shorter lemma (7–9 vs. 4–11 mm long), shorter awn of the lemma (12–15, not 15–22 mm long) and shorter anthers (1.5 mm vs. 1.5–1.8 mm long.) (Kotukhov, 1992).

Habitat: overgrown moraine hills, 2300–2500 m.

Distribution in Kazakhstan: 22. Alt.

31. Elymus ubinica Kotukhov, 1999, Turczaninowia, 2 (4): 5.

Type: [Kazakhstan] Zapadnyj Altaj, hr. Linejskij, 1500 m nad ur. m., dolina r. Chernaya Uba, v rajone urochischa Sidyashiha, pojmennye raznotravno-zlakovye luga, 19 VIII 1993, *Yu. Kotukhov* (holotype LE; isotype: LE – 1 sheet, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 2 sheets).

Elymus ubinica is hybrid species apparently originated from hybridization of *E. praecaespitosus* (Nevski) Tzvelev × *E. sibiricus* L. *Elymus ubinica* close to *E. tarmorevs* Kotukhov, but distinctly differs in scabrous or almost smooth (vs. dispersed hairy) glumes on the adaxial surfase, longer lemma (10–12 vs. 8–10 mm long) and longer (8 vs. 2–4 mm long) excurved (vs. erect) awn of the lemma.

Habitat: lands along rivers, meadows, 1300–1500 m.

Distribution in Kazakhstan: 22. Alt.

32. Elytrigia czindogatuica Kotukhov, 1998a, Turczaninowia, 1 (1):13.

Type: [Kazakhstan] Yuzhnyj Altaj, gory Chindogatujskie, v rajone pos. Chindogatuj, yugo-vost. schebnisto-glinistyj sklon, 20 VI 1990, *Yu. Kotukhov* (holotype LE; isotypes LE – 3 sheets, Herbarium of the Altai botanical garden (Ridder, Kazakhstan) – 1 sheet).

Elytrigia czindogatuica is microspecies from the affinity *Elytrigia gтelipii* (Trin.) Nevski, differs in large plant size (up to 100 cm tall), multiflorets spikelets (up to 10 florets) and scabrous (vs. short pubscent) leaf blade on the ribs.

Habitat: pebbles, clay slopes, 1600–1800 m.

Distribution in Kazakhstan: 22. Alt.

33. Koeleria transiliensis Reverd. ex Gamajun., 1964, Bot. Mat. (Alma-Ata), 2: 10; Gamayunova, 1956, Fl. Kazahst., 1: 212, descr. ross.

Syn.: K. cristata subsp. *transiliensis* (Reverd. ex Gamajun.) Tzvelev, 1971, Bot. Zhurn. (Moscow & Leningrad), 56, 9: 71; Tzvelev, 1976, Zlaki SSSR, 275.

Type: [Kazakhstan] Sev. Sklon Zail. Alatau, na glinistyh sklonah u reki Aksaj, 29 V 1941, *P. Polyakov* (holotype AA).

Habitat: forest glades, mountain slopes, 1800–2000 m.

Distribution in Kazakhstan: 25. Zail. Kung. Alatau.

34. Leymus aemulans (Nevski) Tzvelev, 1960, Bot. mat. (Leningrad), 20: 430; Tzvelev, 1976, Zlaki SSSR, 188.

Syn.: *Agropyron aemulans* (Nevski) N. Kuzn., 1948, Opr. zlakov Kazahst., 87; Kuznetsov, 1956, Fl. Kazahst., 1: 300.

Elymus aemulans (Nevski) Nikif., 1968, Opred. Rast. Srednei Azii, 1: 197.

Type: [Kazakhstan] Syrdar'inskaya obl., Aulie-Atinskij u., gory Ichkeletau, 16 V 1909, n° 114, *O. Knorring* (holotipe LE).

Habitat: mountain slopes, 500–800 m.

Distribution in Kazakhstan: 28. Karat.

35. Leymus fasciculatus (Roschev.) Tzvelev, 1960, Bot. mat (Leningrad), 20: 429.

Syn.: *L. divaricatus* subsp. *fasciculatus* (Roschev.) Tzvelev, 1972, Novosti Sist. Vyssh. Rast., 9: 63; Tzvelev, 1976, Zlaki SSSR, 187.

Elymus fasciculatus Roschev., 1932, Izv. Bot. Sada Akad. Nauk SSSR, 30: 780; Pavlov, 1956, Fl. Kazahst., 1: 325; Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 195.

Type: [Kazakhstan] Turgajskaya obl. i u., Kizil-Dzhingil'skaya volost', r. Syrasu v svoih nizov'yah, okr. uroch. Ir, vzbugrennye peski, 26 V 1914, n° 5165, *I. Krasheninnikov* (lectotype LE, designated by Tzvelev, 1960, 20: 429).

Habitat: riverside sands, pebbles and rocks, abandon field, 300–400 m.

Distribution in Kazakhstan: 25. Zail. Kung. Alatau, 28. Karat.

36. Leymus petraeus (Nevski) Tzvelev, 1960, Bot. mat. (Leningrad), 20: 429; Tzvelev, 1976, Zlaki SSSR, 185.

Syn.: Elymus petraeus (Nevski) Pavlov, 1956, Fl. Kazahst., 1: 325.

Leymus alaicus subsp. *petraeus* (Nevski) Tzvelev, 1973, Novosti Sist. Vyssh. Rast., 10: 50; Tzvelev, 1976, Zlaki SSSR, 185.

Type: [Kazakhstan] Semipalatinskaya obl., Zajsanskij uezd, u goroda Zajsan, kamenistyj sklon, 17 VI 1908, *B. Keller* (holotype LE; isotype LE).

Habitat: pebbles and rocks slopes, 800–1000 m.

Distribution in Kazakhstan: 12. Zais.

37. Phleum roshevitzii Pavlov, 1932, Izv. Bot. Sada Akad. Nauk SSSR, XXX, 5–6: 743; Gamayunova, 1956, Fl. Kazahst., 1: 168; Nabiev, 1968, Opred. Rast. Sred. Azii. 1: 91.

Syn.: Ph. pratense subsp. *roshevitzii* (Pavlov) Tzvelev, 1971, Novosti Sist. Vissh. Rast., 8: 71; Tzvelev, 1976, Zlaki SSSR, 367.

Type: [Kazakhstan] Gory Karatau, lugovye sklony po beregu r. Bel'-Bulak, 2–4 VII 1932, *H. Pavlov* (holotype MW).

Phleum roshevitzii differs from *Ph. pratense* in tuberiform thickened shoot base, does not form tussocks.

Habitat: mountain slopes, 500–800 m.

Distribution in Kazakhstan: 28. Karat.

38. Poa korschunensis Golosk., 1955, Vestn. Akad. Nauk KazSSR, 1: 72; Gamayunova, 1956, Fl. Kazahst., 1: 235.

Syn.: P. nemoralis L. auct. non. Pazij, 1968, Opred. Rast. Srednei Azii, 1: 134;

P. eligulata Pavlov, 1949, Vestn. Akad. Nauk KazSSR, 1: 26; Gamayunova, 1956, Fl. Kazahst., 1: 231.

P. nemoralis subsp. *korschunensis* (Golosk.) Tzvelev, 1974, Novosti Sist. Vyssh. Rast., 11: 31.

Type: [Kazakhstan] Dzhungarskogo Alatau. Bass. Reki Koksu, pravoberezh'e nizhn. techeniya r. Korzhun, na dne rodnikovogo otschelka, 22 VIII 1948, *V. Goloskokov* (holotype AA; isotypes: AA, MW).

N.N. Tzvelev considers that *P. eligulata* specimens are close to typical *P. korschunensis* specimens. V.K. Pazij (1968) states that *P. korschunensis* is a hybrid of *P. nemoralis* × *P. relaxa.*

Habitat: forested slopes, glades, grassy places among shrubs, 1500–1800 m.

Distribution in Kazakhstan: 22. Alt., 23. Tarb., 24. Dschung. Alatau, 25. Zail. Kung. Alatau, 29. West. Tien-Shan.

39. Poa koksuensis Golosk. 1951, Bot. mat. (Leningrad), 14: 72; Gamayunova, 1956, Fl. Kazahst., 1: 226; Tzvelev, 1976, Zlaki SSSR, 463.
Type: [Kazakhstan] Dzhungarskij Alatau, bassejn r. Koksu, lednikovye istoki r. Korzhun, na uvlazhnennyh mestah sredi mhov, vblizi sovremennyh moren, 3300 m, 24 VIII 1948, *V. Goloskokov* (holotype AA; isotypes LE – 2 sheets).
Poa koksuensis is close to *P. sibirica* Roschevitz, distinguished by the absence of tussocks, has thicker panicle bearing few spikelets, panicle branches and glume veins glabrous, smooth (Goloskokov, 1951).
Habitat: alpine meadows, alpine swamps, 3200–3300 m.
Distribution in Kazakhstan: 24. Dschung. Alatau.
40. Puccinellia macropus V.I. Krecz. 1934, Fl. URSS, 2: 765, 490; Pavlov, Gamayunova, 1956, Fl. Kazahst., 1: 243; Tzvelev, 1976, Zlaki SSSR, 502.
Syn.: P. dolicholepis auct. non Krecz. [1934, Fl. URSS, 2: 763, 488]; Pazij, 1968, Opred. Rast. Sred. Azii, 1: 143, p. p.
Type: [Kazakhstan] Nizov'ya Karatala, Takyr-Izgar, peski u ozera, 30 VI 1928, n° 292, *I. Smirnov* (holotipe LE).
Habitat: saline sandy loams, 200–300 m.
Distribution in Kazakhstan: 16. Betpakd., 18. Balch.-Alak., 26.Tschu-Ill.
41. Stipa adamii M.Nobis, 2010, Nordic J. Bot., 28(6): 734.
Type: Kazakhstan, Western Tian-Shan, Karatau Mts, upper part of the Kara-sai valley, Kara-sai plateau, northeast of Algabas village near Chayan, 1105 m, 12 VI 1936, *A. Pyataeva* (holotype LE; isotypes: LE, KRA 382216).
Stipa adamii is morphologically similar to *S. karataviensis* Roshev. and *S. caucasica* Schmalh. and probably of hybrid origin from the two species (*S. karataviensis* × *S. caucasica*). *Stipa adamii* differs from *S. caucasica* in awn in the lower part glabrous or somewhat scabrous vs. awn in the lower part pilose, in anthecium (9.6)10.0–11.5 long, callus (1.3)1.4–1.7 mm long, acute and densely bearded vs. 1.0(–1.2) mm long, foot-like expanded and glabrous or rarely with only single hairs on the seam (Nobis, 2010, 2013)
Habitat: mountain steppes, 800–1200 m.
Distribution in Kazakhstan: 28. Karat. (Nobis, 2010, 2013).
42. Stipa argillosa Kotukhov, 1998a, Turczaninowia, 1(1): 8–10.
Type: [Kazakhstan] Altaj australis, praemontium jugi Azutau, locus Bulgartabaty, desertum praemontanum, denudatio argillarum tertiarium, in argilloso-schistosis, 22 V 1991, *Yu. Kotukhov* (lectotype KUZ (designated by Nobis, Gudkova, 2016); isolectotypes: KRA436051–KRA436052, KUZ 4 – sheets).
Yu.A. Kotukhov (1998a) considers that *Stipa argillosa* originated from hybridization of *S. sczerbakovii* Kotukhov **×** *S. lessingiana* Trin. Et Rupr. *Stipa argillosa* is morphologicaly close to the putative parental species. *Stipa argillosa* and *S. sczerbakovii* differ in the length of ligules of vegetative leaves (up to 0.2 mm long in *S. argillosa* vs. 0.3–2.7 mm long, respectively). *Stipa argillosa* differs from *S. lessingiana*but in hairs on the seta 0.9–1.3 vs. 1.8–3.5 mm long, respectively (Nobis, Gudkova 2016).
Habitat: steppe grasslands, tertiary clay, 1000–1200 m.
Distribution in Kazakhstan: 12. Zais., 22. Alt.
43. Stipa austroaltaica Kotukhov, 1987, Bot. Zhurn. (Moscow & Leningrad), 72(9): 1254.; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 34.
Type: Altai Australis, jugu Azutau brachia orientalia in regione montis Mramornaja, 900–1000 m. s. m., declivitas occidentalis, prata substepposa variiherbosa, 4 IX 1984, *Yu.Kotukhov* (holotype LE; isotypes LE – 4 sheets).
Stipa austroaltaica is very close to *S. capillata*. Kotukhov (1987) distinguished *S. austroaltaica* from the close species *S. capillata* by shorter anthecia (7.5–8.2 vs. 10–13 mm long), shorter awns (8.1–9.6 vs. 11–20 cm long), and by sheaths of culm leaves shorter vs. longer than internodes (Kotukhov, 1987; Nobis, Gudkova, 2016).
Habitat: steppe meadows, 900–1000 m.
Distribution in Kazakhstan: 22.Alt.
44. Stipa ×czerepanovii Kotukhov, 1998b, Turczaninowia, 1(2): 13; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 34;
Type: [Kazakhstan] Zaisanskaya kotlovina, obnazheniya tretichnykh glin Akseir (vostochnaya okraina), yugo-zapadnyi galechno-glinistyi sklon gryady, 17 VII 1993, *Yu. Kotukhov* (lectotype LE (designated by Nobis, Gudkova 2011: 199); isolectotypes: KUZ – 9 sheets, KRA – 2 sheets, LE).
Stipa ×czerepanovii is probably originated from hybridization between *S. richteriana* Karelin & Kirilov and *S. orientalis* Trin. (Nobis, Gudkova, 2016). Yu.A. Kotukhov (1998b) considers that this species is close to *S. heptapotamica* Golosk., but differs in shorter lemma (7–7.5 mm long), awn 60–75 mm long and ligules of vegetative shoot 0.5–1.1 mm long.
Habitat: steppe grasslands, tertiary clay, 800–1200 m.
Distribution in Kazakhstan: 12. Zais., 18. Balch.- Alak. (Nobis et al. 2015, Nobis, Gudkova, 2016),
45. Stipa heptapotamica Golosk., 1959, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR, 19: 46.
Type: Yugo-zapadnye otrogi Dzhungarskogo Alatau, gory Chulak, Mongasai, po sev. ostepnennym sklonam, 29 V 1955, *V. Goloskokov* (holotype LE; isotypes LE – 3 sheets).
Habitat: steppe grasslands, tertiary clay, 800–1200 m.
Distribution in Kazakhstan: 12 Zays., 22 Alt., 23 Tarb. (Kotukhov, 2002), 24 Dschung. Alatau, 26 Chu-ili mount., 27 Kirg. Alatau (Gudkova, Nobis, 2015).
46. Stipa × kamelinii Kotukhov, 1998a, Turczaninowia, 1(1): 10; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 35.
Type: [Kazakhstan] Saur-Tarbagataj, sev.-zap. predgor'ek hr. Sajkan, na obnazheniyah tretichnyh glin Akseir, yugo-vost. razmytyj sklon gryady, galechno-glinistye uchastki, 9 VI 1992, *Yu. Kotukhov* (holotype LE; isotypes: KUZ – 9 sheets, KRA – 2 sheets).

Stipa × kamelinii is close to *S. zaissanica* Kotukhov, but differs from the latter in shorter callus (1.4–1.6 vs. 1.5–2 mm long), longer anthers (4–5 vs. 3.5–4 mm long) and longer hairs on awn seta (hairs 3.5–4 mm long, column – 0.3–1 mm long vs. 2–2.5 mm).

Hybrid species, apparently originated from hybridization of *S. orientalis* Trin. x *S. zaissanica* Kotukhov, widespread in the southeast of the Zaisan depression, where it is confined to outcrops of tertiary clays only (Kotukhov, 1998b, Nobis, Gudkova, 2016).

Habitat: steppe grasslands, outcrops of tertiary clays, 1000–1200 m.

Distribution in Kazakhstan: 12. Zais.

47. Stipa karakabinica Kotukhov, 1994, Bot. Zhurn. (Moscow & Leningrad), 79 (7): 105; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 35.

Type: [Kazakhstan] Yuzhnyj Altaj, hr. Tarbagataj, Karakabinskaya vpadina, 1800 m nad ur. m., zakrytye moreny, yuro-vostochnyj ostepnennyj sklon s *Sibiraea altaiensis* (Laxm.) Schneider, 18 VIII 1986, *Yu. Kotukhov* (lectotype KRA (Nobis, Gudkova, 2016); isolectotypes: KRA – 4 sheets, KUZ – 4 sheets).

According to Yu.A. Kotukhov (1994), this species is close to *S. capillata* L., but differs in dense panicles and shorter awns (7–10 cm long), lemma (9–11 mm long) and glume (18–20 mm long), and culms with nodes projecting from the sheaths (Nobis, Gudkova 2016).

Habitat: steppe grasslands, steppe slopes in the upper mountain belt, 1700–1800 m.

Distribution in Kazakhstan: 22. Alt.

48. Stipa karataviensis Roshevitz, 1909, Trudy Pochv.-Botan. Eksped. po Izsled. Kolon. Raion. Aziatsk. Rossii, Chast II, Botan. Izsledov., 6: 186, tab. 29; Pavlov, Fl. Kazahst., 1: 146; Tzvelev, 1976, Zlaki SSSR, 594.

Type: [Kazakhstan] Syrdar'inskaya obl., Aulie-Atinskij uezd, Karatau, verhnyaya chast' sklona odnoj iz vershin ushchel'ya Berkkara, 23 V 1909, *Z. Minkwitz, n° 310* (lectotype LE (designated by Nobis, 2013: 1329), isolectotypes: LE, W 35652).

Habitat: mountin sloupe, rock, steppe grasslands, 700–1300 m.

Distribution in Kazakhstan: 26. Tschu-Ill., 28. Karat., 29. West. Tien-Shan (Nobis, 2013).

49. Stipa kempirica Kotukhov, 1994, Bot. Zhurn. (Moscow & Leningrad), 79 (7): 101; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 35

Type: [Kazakhstan] *Stipa rupestris* Kotuch. (Sect. Stipa), Saur-Tarbagatai, yugo-zap. otrogi khr. Manrak, 600 m. nad ur. m., urochishche Kempirbulak, vost. kamenistyi mikrosklon, 11 VI 1992, *Yu. Kotukhov* (lectotype LE (designated by Nobis, Gudkova, 2016: 34); isolectotypes: KRA, KUZ, LE).

Yu.A. Kotukhov (1994) considers that this species is close to *S. macroglossa* P. Smirn. but differs in longer (14–16 mm long) lemma and shorter (3–3.5 mm long) hairs on seta (Nobis, Gudkova, 2016).

Habitat: gravel and rocky slopes in the middle mountain belt, steppe grasslands, 600–700 m.

Distribution in Kazakhstan: 23.Tarb.

50. Stipa kotuchovii Nobis, 2011, Ann. Bot. Fenn., 48: 494; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 36.

Typonym: S. monticola Kotukhov [Turczaninowia, 1998a, 1(1): 11] hom. illeg., non *S. monticola* H. Scholz, 1993, Griech. Willden. 23: 117.

Type: [Kazakhstan] Vostochnyi Kazakhstan, khr. Saur, v raione zimovki Kyzyl-Kiya, yugo-vost. shchebnistyi sklon, 1700 m. n. ur. m., No. 19, 18 VIII 1992, *Yu. A. Kotukhov* (holotype LE; isotypes: KRA – 4 sheets, KUZ – 2 sheets).

Since *S. monticola* is a homonym of the species published by G. Scholz (Scholz, 1993), a new taxon name was proposed by M. Nobis (Nobis, 2011).

According to Yu.A. Kotukhov (1998b) and M. Nobis (2011), this species is morphologically close to *S. sczerbakovii* Kotukhov, but differs in the longer lemma (9.5–11.5 vs. 8.5–9 mm long), shorter awns (7–9 vs. 9–10 cm long) and the leaves scabrous on the abaxial surfase and short pubescent with an admixture of longer hairs on the adaxial surfase. These two taxa need a careful revision and a field study (Nobis, Gudkova, 2016).

Habitat: gravel and rocky slopes in the middle mountain belt, steppe grasslands, 1600–1700 m.

Distribution in Kazakhstan: 23. Tarb.

51. Stipa kungeica Golosk., 1954, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR, 16: 40; Pavlov, Fl. Kazahst., 1: 152; Tzvelev, 1976, Zlaki SSSR, 586.

Type: [Kazakhstan] Severnye otrogi Kungej Alatau, Tau-Chilik, v 1 km nizhe vpadeniya Kaindy, po yuzhnomu kamenistomu sklonu pestrotsvetnyh tolschi, 9 VI 1953, *V. Goloskokov* (holotype LE; isotype LE – 2 sheets).

According to V.P. Goloskokov (1954), the species is close to *S. paradoxa* (Junge) P. Smirn. and S. *anomala* P. Smirn, occupies an intermediate position between them in the length of glume, lemma and hairs on seta.

Habitat: rocky slopes, 1000–1200 m.

Distribution in Kazakhstan: 25. Zail. Kung. Alatau

52. Stipa pavlovii Kotukhov, 1998a, Turczaninowia, 1(1):7; Nobis & P. Gudkova, 2016, Phytotaxa, 245 (1): 37.

Type: [Kazakhstan] Saur-Tarbagataj, yugo-zan. otrogi hr. Saur, 1800 m nad ur. m., v rajone zim. Kyzylkiya, yugo-vost. skalistyj sklon, 04 VII 1991, *Yu. Kotukhov* (Type: not found, Nobis, Gudkova, 2016).

The type specimen placement is not identified. As reported by Yu. A. Kotukhov, the type material was sent to the Herbarium Russian Academy of Sciences - V. L. Komarov Botanical Institute (LE), but the examination by M. Nobis and P. Gudkova (Nobis, Gudkova, 2016) do not confirm its presence in LE. No type specimens were found in the Herbarium of the Altai botanical garden (Ridder, Kazakhstan)

Yu. A. Kotukhov (1998a) considers that *Stipa pavlovii* differs from the closest species*, S. sczerbakovii* Kotukhov in seta whith hairs 0.4–0.6 mm long, column scabrous and almost glabrous to the base vs. short pubescent through the awn. Revision by M. Nobis and P. Gudkova show that the variability of morphological characteristics in *S. sczerbakovii* is somewhat greater than that presented in the protologue of the taxon.
Hybrid resistant species, probably originated from hybridization of *S. sczerbakovii* × *S. krylovii* Roshev.
Habitat: gravel and rocky slopes, 1200–1400 m.
Distribution in Kazakhstan: 23.Tarb.
53. Stipa pseudocapillata Roshev., 1916, Fl. Asiat. Ross., 12; 172; Pavlov, Fl. Kazahst., 1: 155; Tzvelev, 1976, Zlaki SSSR, 579.
Syn.: *S. spiridonovii* Roshev., 1931, Izv. Bot. Sada Akad. Nauk SSSR, 30: 302
Type: [Kazakhstan] *Stipa consanguinea* Trin. Songoria, *A. Schrenk* (holotype LE).
Stipa pseudocapillata is morphologically close to *S. consanguinea* but differs in clearly bi-geniculate awn 15–20 cm long.
Habitat: sandy and clay semideserts, 400–700 m.
Distribution in Kazakhstan: 18. Balch.-Alak.
54. Stipa saikanica Kotukhov, 1998b, Turczaninowia, 1 (2): 10; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 38.
Type: [Kazakhstan] Saur-Tarbagataj, sev.-zap. predgor'yahr. Sajkan, urochische Akseir, 9 VI 1992, *Yu. Kotukhov* (lectotype LE (designated by Nobis, Gudkova, 2016); isolectotypes: KRA, KUZ – 2 sheets, LE – 2 sheets).
According to Yu.A. Kotukhov (1998b), the species is close to *S. lessingiana* Trin. et Rupr. but differs in the slightly scabrous (almost glabrous) on the abaxial surfase of leaf blade, rather short lemma (7–8 mm vs. 9–11 mm long) and shorter awn (12–14 vs. 20–26 mm long).
M. Nobis and P. Gudkov (Nobis, Gudkova, 2016) consider that the size of lemma and awns in the widespread and polymorphic *S. lessingiana* varies widely. In their opinion, specimens of *S. saikanica* look like young *S. lessingiana*. To prove the species independence, additional collections and field studies are necessary.
Habitat: outcrops of tertiary clays (variegated flowers), pebble-clay areas, 1200–1400 m.
Distribution in Kazakhstan: 23.Tarb.
55. Stipa sczerbakovii Kotukhov, 1991, Bot. Zhurn. (Moscow & Leningrad), 76 (6): 872; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 39.
Type: [Kazakhstan] Yuzhnyj Altaj, yugo-vostochnye otrogi hr. Azutau, gory Bulgartabaty, 600 m nad ur. m., urochische Sargalym, kamenistaya kustarnikovo-zlakovaya step', 16 VI 1988, *Yu. Kotukhov* (holotype LE, isotypes: KRA, KUZ – 13 sheets).
The species is close to *S. korshinskyi* Roshev. and *S. daghestanica* Grossh but differs in the longer ligule, short hairs (vs. pricles) on the adaxial surface of the leave blades, and from *S. daghestanica* – in the shoter (8.5–9 vs. 10–12 mm long) lemma.
Considering that Yu.A. Kotukhov has described three species close to *S. sczerbakovii*, namely *S. pavlovii, S. kyzylkensis, S. kotuchovii (= S. monticola)*, this group of taxa requires a deeper analysis (Nobis, Gudkova, 2016).
Habitat: gravel and rocky slopes in the middle mountain belt, 500–700 m.
Distribution in Kazakhstan: 22. Alt.
56. Stipa ×tzveleviana Kotukhov, 1994, Bot. Zhurn. (Moscow & Leningrad), 79 (7): 102; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 39.
Type: [Kazakhstan] Saur-Tarbagatai, yugo-zap. otrogi khr. Manrak, 600 m nad ur. m., urochishche Kempirbulak, sev.-zap. skalistyi mikrosklon, 11 VI 1992, *Yu. Kotukhov* (holotype LE; isotypes LE – 3 sheets).
Stipa tzveleviana is close to *S. saissanica* Kotukhov but distinguished by longer glume (2.8–3.5 vs. 2–2.5 cm long), callus (1.8–2.4 vs. 1.5 –2 mm long), anthers (5.5–6.0 vs. 3.5–4.0 mm long), seta with longer hairs (4.5–5.5 vs. 2– 2.5 mm long.), columna scabrous (vs. pubescent), and the absence of crown at the awn base. Hybrid species, apparently originated from hybridization between *S. orientalis* and *S. tacroglossa* subsp. *kazachstanica* (Kotukhov, 1994b, Nobis, Gudkova, 2016).
Habitat: gravel and rocky slopes in the middle mountain belt, steppe grasslands, 600–1400 m.
Distribution in Kazakhstan: 23.Tarb.
57. Stipa ×zaissanica Kotukhov, 1991, Bot. Zhurn. (Moscow & Leningrad), 76(6): 873; Nobis, Gudkova, 2016, Phytotaxa, 245 (1): 40.
Type: [Kazakhstan] Yuzhnyj Altaj, yugo-vostochnye otrogi hr. Azutau, gory Bulgartabaty, 600 m nad ur. m., yugo-zapadnyj skalistyj sklon, 16 VI 1988, *Yu. Kotukhov* (holotype LE; isotypes: KRA, KUZ – 2 sheets).
The species is close to *S. orientalis* but differs in longer awns (9–11 cm long) with shorter hairs (2–2.5 mm long) on seta and with very short hairs on columna. Hybrid species, apparently originated from hybridization of *S. orientalis x S. hohenackeriana* Trin. et Rupr. s. 1. (Kotukhov, 1991).
Habitat: gravel and rocky slopes, 600 m.
Distribution in Kazakhstan: 12. Zais., 22. Alt.

Species changed their geographical status:
Stipa talassica Pazij, 1949, Not. Syst. Herb. Inst. Bot. & Zool. Acad. Sci. Uzbekistan., 11: 33; Pavlov, Fl. Kazahst., 1: 147; Tzvelev, 1976, Zlaki SSSR, 594.
N.V. Pavlov (1956) considers that the species is endemic to Kazakhstan (Western Tien Shan). However, V.K. Pazij (1968) indicates that it is not restricted to Kazakhstan. M. Nobis, the researcher Central Asian feather grasses also reports that its habitat is Kyrgyzstan only (Nobis, 2013).
Festuca amblioides subsp. ***erectiflora*** (Pavlov) Tzvelev, 1971, Bot. Zhurn., 56 (9): 1254; Tzvelev, 1976, Zlaki SSSR, 402.
Syn: F. erectiflora Pavlov, 1938, Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s., 47, 1: 89; Gamayunova, 1956, Fl. Kazakhst., 1: 264.

F. amblioides Krecz. et Bobr., 1934, Fl. SSSR, 2: 771 et 529; Pazij, 1968, Opred. Rast. Srednei Azii, 1:146.
Species is given for Eastern Kazakhstan, Kyrgyzstan, Tajikistan, China (Lu, Chen, Aiken, 2006)
Stipa kazachstanica Kotukhov, 1994, Bot. Zhurn., 79 (7): 104 = ***Stipa macroglossa*** subsp. ***kazachstanica*** (Kotukhov) Nobis, 2013, Pl. Syst. and Evol., 299: 1055; Nobis, Gudkova, 2016, Phytotaxa, 245 (1):36.
In 2016, the subspecies was found not only in Eastern Kazakhstan, but in eastern China and Kyrgyzstan as well (Kotukhov, 2002; Nobis et al., 2016a, 2016b).
Stipa × manrakica Kotukhov, 1989, Bot. Zhurn. (Moscow & Leningrad), 74(3): 414.
Apart from Kazakhstan, the species was found in Kyrgyzstan (Nobis et al., 2015).

Species changed their taxonomic status:
Agropyron atbasaricum Golosk., 1951, Bot. mat (Leningrad), 14: 73; Pavlov, 1956, Fl. Kazahst., 1: 308 = ***Elymus trachycaulus*** **subsp.** ***novae-angliae*** (Scribn.) Tzvelev, 1973, Novosti Sist. Vyssh. Rast., 10: 23; Tzvelev, 1976, Zlaki SSSR, 119.
Agropyron dshungaricum Nevski, 1934, Fl. URSS, 2: 641; Pavlov, 1956, Fl. Kazahst., 1: 299; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 175 = ***Elytrigia geniculata*** subsp. ***ferganensis*** (Drob.) Tzvelev, 1973, Novosti Sist. Vyssh. Rast., 10: 29; Tzvelev, 1976, Zlaki SSSR, 134.
Syn.: Agropyron ferganense Drob., 1916, Tr. bot. muzeya Akad. nauk, 16: 138;
Elytrigia dshungaricum Nevski, IV, 1934, Fl. URSS, 2: 61.
Agropyron karataviense Pavlov, 1938, Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s., 47 (1): 80; Pavlov, 1956, Fl. Kazahst., 1: 293; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 177 = ***Agropyron pectinatum*** (Bieb.) Beauv., 1812, Ess. Agrost., 146; Peshkova, 1990, Fl. Sibir., 2: 40.
Syn.: A. cristatum subsp. *pectinatum* (Bieb.) Tzvelev, 1970, Spisok Rastenij Gerbarija Flory SSSR, 18: 25.
A. pectinniforme Roem. et Schult., 1817, Syst., II: 758; Pavlov, 1956, Fl. Kazahst., 1: 292.
A. cristatum (L.) Beauv., 1812, Ess. Agrost., 146; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 178.
Agropyron transiliensis M. Pop., 1938, Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s., 47, 1: 85; Pavlov, 1956, Fl. Kazahst., 1: 307 = ***Elymus mutabilis*** (Drob.) Tzvelev, 1968, Novosti Sist. Vyssh. Rast., 10: 217; Tzvelev, 1976, Zlaki SSSR, 114; Peshkova, 1990, Fl. Sibir., 2: 26.
Syn.: Agropyron mutabilis Drob., 1916, Trudy Bot. Muz. Imp. Akad. Nauk, 1: 88, s. str. (emend. Vestergren, 1926, in Holmb. Scand. Fl., 2: 271).
A. angustiglume Ntvski, 1932, Izv. Bot. Sada Akad. Nauk SSSR, 30: 615; Pavlov, 1956, Fl. Kazahst., 1: 306; Bondarenko, Nabiev, Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 173.
Calamagrostis gigantea Roschevitz, 1932, Izv. Bot. Sada Akad. Nauk SSSR, 30: 294; Gamayunova, 1956, Fl. Kazahst., 1: 82. = ***Calamagrostis macrolepis*** Litv., 1921, Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR., 2: 125; Kovalevskaya, 1968, Opred. Rast. Srednei Azii, 1: 100.
Syn.: C. epigeios subsp. *macrolepis* (Litv.) Tzvelev, 1976, Zlaki SSSR, 317.
Calamagrostis karataviensis P. Smirn., 1940, Bull. Moskovsk. Obshch. Isp. Prir., Otd. Biol., n.s., 49, 1: 91 = ***Calamagrostis macrolepis*** Litv.
Bromopsis pskemensis Pavlov, 1949, Vestn. Akad. Nauk KazSSR, 1: 26 = ***Bromopsis inermis*** (Leyss.) Holub, 1761, Fl. Hal., ed. 1: 16; Tzvelev, 1976, Zlaki SSSR, 221.
Syn.: Bromus inermis Leyss., 1761, Fl. Hal., 16; Gamayunova, 1956, Fl. Kazahst., 1: 275; Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 185.
Cinna karataviensis Pavlov, 1949, Vestn. Akad. Nauk KazSSR, 1: 24, fig. 1; Gamayunova, 1956, Fl. Kazahst., 1: 177 = ***Agrostis gigantea*** Roth, 1788, Fl. Germ., 1: 31; Kovalevskaya, 1968, Opred. Rast. Srednei Azii, 1: 98; Tzvelev, 1976, Zlaki SSSR, 329.
Syn.: Agrostis alba L., 1753, Sp. pl., 63; Gamayunova, 1956, Fl. Kazahst., 1: 179.
Elymus divaricatus Drob., 1925, Fedde. Repert, 21: 45; Pavlov, 1956, Fl. Kazahst., 1: 327; Nikiforova, 1968, Opred. Rast. Srednei Azii, 1: 197 = ***Leymus divaricatus*** (Drob.) Tzvelev, 1976, Zlaki SSSR, 187.
Eremopoa glareosa Gamajun., 1964, Bot. Mat. (Alma-Ata), 2: 11; Gamayunova, 1956, Fl. Kazahst., 1: 250, desc. ross **=** ***Eremopoa soongorica*** (Schrenk) Roschevitz, 1934, Fl. URSS, 2: 431, 756; Gamayunova, 1956, Fl. Kazahst., 1: 249.
Syn.: Eremopoa altaica subsp. *soongorica* (Schrenk) Tzvelev, 1966, Bot. Zhurn. (Moscow & Leningrad), 51(8): 1104; Tzvelev, 1976, Zlaki SSSR, 479.
Poa diaphora auct. non Trin.: [1836, in Bull. Sc. Acad. Petersb. 1: 69], Pazij, 1968, Opred. Rast. Srednei Azii, 1: 131, p.max.p.
Elymus angustiformis Pavlov, 1952, Vestn. Akad. Nauk KazSSR, 5: 86, non Drob., 1941 = ***Leymus karelinii*** (Turcz.) Tzvelev, 1972, Novosti Sist. Vyssh. Rast., 9: 59.
Elymus kuznetsovii Pavlov, 1956, Fl. Kazahst., 1: 322 = ***Leymus karelinii*** (Turcz.) Tzvelev, 1972, Novosti Sist. Vyssh. Rast., 9: 59; Tzvelev, 1976, Zlaki SSSR, 182.
Piptatherum karataviense Roschev., 1951, Bot. Mat. (Leningrad), 14: 110; Gamaunova, 1956, Fl. Kazahst., 1:162 = ***P. holciforme*** (Bieb.) Roem. et Schul., 1917, Syst. Veg., 2: 328; Pazij, 1968, Opred. Rast. Srednei Azii, 1:86.
Poa roshevitzii Golosk., 1950, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR, 12: 25; Gamaunova, 1956, Fl. Kazakh., 1: 236 = ***Poa litvinoviana*** Ovcz., 1933, Izv. Tadzh. Bazy Akad. Nauk. SSSR, 1(1): 22; Gamaunova, 1956, Fl. Kazakh., 1: 236; Pazij, 1968, Opred. Rast. Srednei Azii, 1: 135; Olonova, 1990, Fl. Sibiri, 2: 184.
Syn.: Poa glauca subsp. *litvinoviana* (Ovcz). Tzvelev, 1974, Novosti Sist. Vyssh. Rast., 11: 32; Tzvelev, 1976, Zlaki SSSR, 476.
Poa kungeica Golosk., 1955, Vest. Akad. Nauk KazSSR, 1: 73; Gamaunova, 1956, Fl. Kazakh., 1: 237 = ***Poa lipskyi*** Roshev., 1932, Izv. Bot. Sada Akad. Nauk SSSR, 30: 303; Gamaunova, 1956, Fl. Kazakh., 1: 237; Pazij, 1968, Opred. Rast. Srednei Azii, 1: 135.

Stipa akseirica Kotukhov, 1998, Turczaninowia, 1 (2): 11 = ***S. sareptana*** A.K. Becker, 1882, Bull. Soc. Imp. Naturalistes Moscou, 57: 52.
Stipa krascheninnikowii Roschevitz, 1928, Mat. Komiss. Eksped. Issl. AN, ser. Kazahst., 5: 253; Pavlov, Fl. Kazahst., 1: 152. = ***Stipa ucrainica*** P. Smirn., 1926, Feddes repert., 22: 374; Pavlov, 1956, Fl. Kazahst., 1: 152.
Syn.: Stipa zalesskii subsp*. ucrainica* (P. Smirn.) Tzvelev, 1974, Novosti Sist. Vyssh. Rast., 11: 17; Tzvelev, 1976, Zlaki SSSR, 588.
Stipa kyzylkiensis Kotukhov, 1998, Turczaninowia*,* 1(2): 12 = ***S. ×sczerbakovii*** Kotukhov.
Stipa monticola Kotukhov, 1998, Turczaninowia*,* 1(1): 11, hom. illeg. non *S. monticola* H.Scholz, Willdenowia, 23(1–2): 117, 1993 = ***S. kotuchovii*** M.Nobis
Stipa azutavica Kotukhov*,* 1998, Turczaninowia, 1(2): 9 = ***S. orientalis*** Trin. ex Ledeb. var*.* ***azutavica*** (Kotukhov) M.Nobis & P.D.Gudkova.
Type: [Stipa azutavica Kotuch. sp. nov.] Yuzhnyi Altai, yugo-vost. Predgor'ya khr. Azutau, gory Bulgartabaty, kamenistaya pustynya, 22 V 1991, *Yu. Kotukhov* (lectotype: LE (designated by Nobis, Gudkova, 2016: 36); isolectotypes: KRA 436050, KUZ, LE).
Habitat: rock crevices and ledges, steppes, 1000–1500 m.
Distribution in Kazakhstan: 22. Alt., 23. Tarb.
Stipa saurica Kotukhov, 1994, Bot. Zhurn. (Moscow & Leningrad), 79: 102 = **S. × manrakica** Kotukhov (Nobis, P. Gudkova, 2016, Phytotaxa, 245 (1): 39).

Conclusion

Currently, 57 endemic grasses species are found on the territory of Kazakhstan: *Stipa* (16), *Elymus* (17), *Elymotrigia* (10), *Leymus* (3), *Agrotrigia* (2) and *Poa* (2) and one species of *Agropyron, Agrostis, Elytrigia, Koeleria, Phleum, Puccinellia* each.
Four species has found in other countries: S. talassica, *S. kazachstanica, S. × manrakica*, *Festuca amblioides* subsp. *erectiflora* and 21 species of the Kazakhstan flora have lost their endemic status due to new taxonomic treatment. (*Agropyron atbasaricum, A. dshungaricum, A. karataviense, Agropyron transiliensis, Calamagrostis gigantea, C. karataviensis, Bromopsis pskemensis, Cinna karataviensis, Elymus divaricatus, E. angustiformis, E. kuznetsovii, Eremopoa glareosa, Piptatherum karataviense*, *Poa roshevitzii, P. kungeica, Stipa akseirica*, *S. krascheninnikowii, S. kyzylkiensis, S. monticola, S. azutavica,* and *S. saurica*).
Endemic plants are found in 11 floristic regions: Zaysan – 6; Betpak-Dala – 1; The Balkhash-Alakol – 3; Altai – 35; Tarbagatai (Saur) – 9;Dschungarian Alatau – 3, Zailiyskiy kungey Alatau – 7; Chu-ili mountains – 2; Kirg-Alatau – 1,Karatau – 5; Western Tien-Shan – 2 species

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