

NEW RECORDS TO THE VASCULAR FLORA OF KAZAKHSTAN (CENTRAL ASIA)

ALEKSANDR L. EBEL, ANDREY N. KUPRIYANOV,
IRINA A. KHRUSTALEVA, ANDREY I. PYAK,
POLINA D. GUDKOVA & MARCIN NOBIS¹

Abstract. The paper presents distributional data for seven species new for the flora of Kazakhstan: *Atriplex gardneri* var. *aptera* (A. Nelson) S. L. Welsh. & Crompton, *Cardamine hirsuta* L., *Carduus acanthoides* L., *Galega orientalis* Lam., *Silene cserei* Baumg., *Didymophysa fedtschenkoana* Regel and *Acinos arvensis* (Lam.) Dandy. *Didymophysa fedtschenkoana* is a native element in the Kazakh flora; the other species should be treated as alien, expansively spreading or invasive in this part of Asia. A list of localities of the species in Kazakhstan and their habitat preferences are presented.

Key words: alien plants, Central Asia, distribution, native plants, taxonomy

Aleksandr L. Ebel, Laboratory of Plant Taxonomy and Phylogeny, Tomsk State University, 36 Lenin Prospekt, Tomsk, 634050, Russia
Andrey N. Kupriyanov, Institute of Human Ecology, Siberian Branch of the Russian Academy of Sciences, 10 Leningradsky Prospekt, Kemerovo, 650065, Russia; JSC International Research and Production Holding Fitokhimiya, 12 Botanicheskaya St., 100009, Karaganda, Kazakhstan

Irina A. Khrustaleva, Institute of Human Ecology, Siberian Branch of the Russian Academy of Sciences, 10 Leningradsky Prospekt, Kemerovo, 650065, Russia

Andrey I. Pyak, Botany Department, Tomsk State University, 36 Lenin Prospekt, Tomsk, 634050, Russia

Polina D. Gudkova, Laboratory of Plant Taxonomy and Phylogeny, Tomsk State University, 36 Lenin Prospekt, Tomsk, 634050, Russia; Department of Botany, Altay State University, 61 Lenin Prospekt, Barnaul, 656049, Russia

Marcin Nobis, Department of Plant Taxonomy, Phytogeography and Herbarium, Institute of Botany, Jagiellonian University, Kopernika 27, 31-501 Kraków, Poland; Laboratory of Plant Taxonomy and Phylogeny, Tomsk State University, 36 Lenin Prospekt, Tomsk, 634050, Russia; e-mail: m.nobis@uj.edu.pl

INTRODUCTION

Kazakhstan is one of the largest Eurasian countries. With an area of 2.725 million km², it is the world's ninth-largest country. According to a nine-volume study of the flora of Kazakhstan, completed by a large team of authors (Pavlov 1956–1966) and supplemented by the work of other researchers (e.g., Karamysheva & Rachkovskaya 1973; Abdulina 1999; Baitenov 2001), ca 6000 vascular plant species are known from the country. This number is not final, as new species have been described recently from Kazakhstan (e.g., Sytin 2000; Kotukhov 2003; Nobis 2010, 2013; Perezhogin 2013; Pimenov & Kljuykov

2014), and new records for its flora have been published (e.g., Kotukhov 2002; Suchorukov 2003; German 2006; Nobis *et al.* 2014). In this paper we present seven vascular plant species new for the country.

MATERIAL AND METHODS

Specimens were collected mostly between 2006 and 2014 in many different localities in following regions of Kazakhstan: the Kazakh Melkosopochnik, Kokshetau Upland, Altai Mts (Kazakhstansky Altai), Western Tian-Shan Mts, and Trans-Ili Alatau range in North Tian-Shan. Herbarium materials of the newly discovered species were revised in AA, ALTB, KUZ, NS and TK. Plant material of the taxa listed below is deposited in KUZ and TK.

¹ Corresponding author

RESULTS AND DISCUSSION

***Acinos arvensis* (Lam.) Dandy (Lamiaceae)**

GENERAL DISTRIBUTION. *Acinos arvensis* is distributed in Europe and Western Asia (Hultén & Fries 1986). It is known as an alien plant from Siberia and the Far East (Probatova 1995; Doronkin 1997, 2012; Ebel 2012). In Altayskiy Krai the species was recorded at the beginning of the 20th century (Krylov 1937), and nowadays it is treated as an invasive plant.

OCCURENCE IN KAZAKHSTAN. *Acinos arvensis* is an alien species new for the flora of Kazakhstan. It was found on a slightly eroded slope on the edge of a meadow near a river. There were ca 30 blooming plants in that population. It is difficult to estimate the current invasive status of *Acinos arvensis* in Kazakhstan because of the lack of long-term observations. Following Pyšek *et al.* (2004) it can be classed as ‘not harmful’.

SPECIMENS SEEN: KAZAKH MELKOSOPOCHNIK. Akmolinsk Region, Ereymentau district, surroundings of Karatal village, Ereymentau Mts (southern part), edge of meadow near river, 51°03'20"N, 73°03'28"E, 28 June 2014, A.L. Ebel (TK).

***Atriplex gardneri* var. *aptera* (A. Nelson) S. L. Welsh. & Crompton (Chenopodiaceae)**

Atriplex aptera A. Nelson

GENERAL DISTRIBUTION. *Atriplex gardneri* is native to western North America (Reed 1993). It occurs commonly in fine-textured saline substrates in much of the western Great Plains and in the Intermountain Region. No information about previous records of this species as an alien plant in Eurasia was found (Zhu *et al.* 2003; Suchorukov 2007; Uotila 2011).

Atriplex gardneri is currently considered to be a complex of several varieties. The varieties show different ploidy levels, with diploid, triploid, tetraploid, hexaploid and other levels known (Welsh 2003). Diploid and polyploid individuals may occupy different types of habitat (Reed 1993).

OCCURENCE IN KAZAKHSTAN. *Atriplex gardneri* is an alien species new for the flora of Kazakhstan.

In 1995, seeds of the species together with 24 other taxa were planted for recultivation purposes on dumps of the Ekibastuzsky coal field. During research in 2006 we confirmed that *A. gardneri* was established and was spreading in this region. This alien plant has sustained a self-replacing population for more than 10 years, and according to Pyšek *et al.* (2004) it can be classed as ‘not harmful’.

SPECIMENS SEEN: KAZAKH MELKOSOPOCHNIK. Pavlodar region, surroundings of Ekibastuz town, east dump, meadow near bushes, 51°42'20"N, 75°32'21"E, 7 Aug. 2006, A.N. Kupriyanov & Yu.A. Manakov (KAZ 04203, KUZ).

***Cardamine hirsuta* L. (Brassicaceae)**

GENERAL DISTRIBUTION. The species is widespread in Europe and Southwest Asia and was introduced into Southern Africa, Australia, and North and South America (Hultén & Fries 1986). In many regions the plant is introduced unintentionally in the soil of plants brought from garden centers. It grows best in consistently damp, recently disturbed soils.

OCCURENCE IN KAZAKHSTAN. *Cardamine hirsuta* is an alien species new for the flora of Kazakhstan. It grows in disturbed soils along paths and in pots with ornamental plants in a garden near Almaty. According to oral information from Vladimir Epiktetov (Almaty), this species appeared first in a nursery in the garden in 2010. Following Pyšek *et al.* (2004), it can be classed as a ‘weed’.

SPECIMENS SEEN. NORTHERN TIEN-SHAN. Along paths and in pots with ornamental plants in a garden, ca. 6 km SW of Zhanaturmys village (15 km SW of Almaty), 8 June 2013, A.L. Ebel (TK); the same location, 43°07'33"N, 76°45'08"E, 17 May 2014, M. Nobis & P.D. Gudkova (observation).

***Carduus acanthoides* L. (Asteraceae)**

GENERAL DISTRIBUTION. The species is widespread in Southern Europe and in Asia Minor. In Russia it occurs in the European part, in the Caucasus, and in the Upper Tobolsk region of Western Siberia (Tamamshyan 1963; Tzvelev 2000), Perm Territory (Ovesnov 2007), Chelyabinsk Region (Kulikov 2010) and the Russian Far East (Barkalov

1992). Currently the species is relatively widespread in forest-steppe areas of Siberia, from the Kurgan Region and Omsk Region in the west to low-mountain regions of the Russian Altai and Kuzbass in the east (Naumenko 2008; Ebel *et al.* 2009; Ebel 2012). In Siberia the species occurs sporadically on roadsides and railway areas, on intensively used pastures, and in settlements. As an alien plant it was recorded also in China (Shi & Greuter 2011), Kyrgyzstan (Laz'kov *et al.* 2011) and Tajikistan (Nobis *et al.* unpubl.).

OCCURENCE IN KAZAKHSTAN. *Carduus acanthoides* is an alien (probably spreading) species new for Kazakhstan. It grows in anthropogenic habitats and is recorded mostly on roadsides and footpaths in towns. Following Pyšek *et al.* (2004) it can be classed as 'not harmful'.

SPECIMENS SEEN: ALTAI MTS. East-Kazakhstan Region, surroundings of Leninogorsk [currently Ridder] town, 13 Sept. 1998, A.N. Kupriyanov, Yu.A. Kotukhov (KAZ 04202, KUZ). KAZAKH MELKOSOPOCHNIK. Akmolinsk Region, Arshaly district, Anar village, roadside, 50°39'45"N, 72°24'09"E, 28 June 2014, A.L. Ebel (TK). TRANS-ILI ALA TAU RANGE. Almaty, near a footpath in Roshha Bauma Park, 43°18'36"N, 76°57'08"E, 5 July 2014, A.L. Ebel (observation).

***Didymophysa fedtschenkoana* Regel**
(Brassicaceae)

GENERAL DISTRIBUTION. The species is widespread in western Tien-Shan and in the Pamir Alai Mts. It occurs in Afghanistan, Kyrgyzstan, Pakistan, Tajikistan and Uzbekistan (Jafri 1973; Vinogradova 1974) in the upper mountain belt on scree, rocks and glacial moraines.

OCCURENCE IN KAZAKHSTAN. *Didymophysa fedtschenkoana* is a native species new for the flora of Kazakhstan. The new record is one of the northernmost locations of the species within its natural distribution range. Its occurrence in other similar habitats in remote and poorly investigated regions of Western Tien-Shan within Kazakhstan is highly probable.

SPECIMENS SEEN. WESTERN TIEN-SHAN MTS. Chimkent Region, Talassky Alatau, Maydantal River, Kurumbel glacier, moraine, 10 Aug. 1982, A.I. Pyak (TK).

***Galega orientalis* Lam. (Fabaceae)**

GENERAL DISTRIBUTION. The species is widespread in the Caucasus, where it grows in forests, scrub and meadows (Gorshkova 1945). In the territory of Russia the plant is cultivated as an ornamental and for fodder. It has become a wild-growing plant and has rapidly entered the forest-steppe zone of Eurasia (Majorov *et al.* 2012). The species was also recorded as an alien plant in the Leningrad Region (Tzvelev 2000), in the territory of Perm (Ovesnov 2007), in the Chelyabinsk Region (Kulikov 2010) and in Western Siberia (Pyak *et al.* 2000; Naumenko 2008; Ebel 2012; Silantyeva 2013). Outside its natural area it grows also on the outskirts of cultivated fields and on roadsides.

OCCURENCE IN KAZAKHSTAN. *Galega orientalis* is an alien species new for the flora of Kazakhstan. It was found in young forest in a dried channel between lakes. Following Pyšek *et al.* (2004) it can be classed as 'not harmful'.

SPECIMENS SEEN. Kokshetau Upland: Akmolinsk Region, Burabay National Nature Park, boggy coast of Karasye lake, birch forest, N 53°01'42"N, 70°12'47"E, 20 June 2012, I.A. Khrustaleva & O.A. Artemova (KAZ 02686, KUZ).

***Silene cserei* Baumg. (Caryophyllaceae)**

Oberna cserei (Baumg.) Ikonn.; *Oberna schottiana* (Schur) Tzvel.

GENERAL DISTRIBUTION. The species is widespread in Southeastern Europe, Asia Minor and the Caucasus (Marhold 2011; Laz'kov 2012). It was recorded as an alien plant in Finland (Marhold 2011), in some places in European Russia (Tzvelev 2004) and in the Ural Mts (Chelyabinsk Region in the Boundary-Kazakhstan steppe), where it occurs on grassy dumps of gravel and also on disturbed stony slopes (Kulikov 2010). The species is also recorded as an alien plant in many states of the USA and provinces of Canada (Morton 2005).

OCCURENCE IN KAZAKHSTAN. *Silene cserei* is an alien species new for the flora of Kazakhstan. It grows in anthropogenic habitats on disturbed soils. Following Pyšek *et al.* (2004) it should be classed as 'not harmful'.

SPECIMENS SEEN. KOKSHETAU UPLAND. Akmolinsk Region, Burabay National Nature Park, quarter no. 101 of the Borovskoe forest area, northern coast of lake Bolshoe Chebachye, 53°04'36"N, 70°10'32"E, 22 June 2012, I.A. Khrustaleva & O.A. Artemova (KAZ 02765, KUZ). KARAGANDA REGION, Osakarovka district, surroundings of Osakarovka village, several specimens on a dump, 50°32'58"N, 72°30'30"E, 29 June 2014, A.L. Ebel (TK, KUZ).

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REFERENCES

- ABDULINA S. A. 1999. *Checklist of vascular plants of Kazakhstan*. Ministry of Science Academy of Sciences of the Republic of Kazakhstan Institute of Botany and Phytointroduction, Almaty.
- BAITENOV M. S. 2001. *Flora of Kazakhstan. Genus complex of flora*. 2. Gylm, Almaty.
- BARKALOV V. JU. 1992. Asteraceae Dumort. (Compositae Giseke). In: S. S. KHARKEVICH (ed.), *Sosudistye rasteniya sovetskogo Dalnego Vostoka*. 6: 9–413. Nauka, St.-Petersburg.
- DORONKIN V. M. 1997. *Acinos* Miller. In: L. I. MALYSHEV (ed.), *Flora Siberiae*. 11: 204. Nauka, Novosibirsk (in Russian).
- DORONKIN V. M. 2012. Lamiaceae Martinov or Labiatae Juss. In: K. S. BAYKOV (ed.), *Conspectus florum Rossiae Asiaticae: plantae vasculares*, pp. 413–429. Publishing House of the Siberian Branch of the Russian Academy of Sciences, Novosibirsk.
- EBEL A. L. 2012. *Konspekt flory severo-zapadnoy chasti Altae-Sayanskoy provincii*. Irbis, Kemerovo.
- EBEL A. L., SHEREMETOVA S. A. & BUKO T. V. 2009. Floristic findings in Tom river basin (West Siberia). *Byull. Moskovsk. Obshch. Isp. Prir. Otd. Biol.* 114(3): 65–67 (in Russian with English summary).
- GERMAN D. A. 2006. Additions to Cruciferae of the flora of Kazakhstan. *Bot. Zhurn.* 91(8): 1198–1211 (in Russian with English summary).
- GORSHKOVA S. G. 1945. *Galega* L. In: B. K. SCHISCHKIN (ed.), *Flora USSR*. 11: 303–304. Editio Academiae Scientiarum URSS, Mosqua – Leningrad.
- HULTÉN E. & FRIES M. 1986. *Atlas of north European vascular plants. North of the Tropic of Cancer*. 2. Koeltz Scientific Books, Königstein.
- JAFRI S. M. H. 1973. *Flora of Pakistan*. 55. *Brassicaceae* Burnett. [8 Sept. 2014]. <http://www.tropicos.org/Name/42000136?projectid=32>.
- KARAMYSHEVA Z. V. & RACHKOVSKAYA E. I. 1973. *Botanical geography of steppe part of Central Kazakhstan*. Nauka, Leningrad (in Russian).
- KOTUKHOV YU. 2002. Konspekt kovylei (*Stipa* L.) i kovylechkov (*Ptilagrostis* Griseb.) vostochnogo Kazakhstana (Kazakhstanskii Altai, Zaisanskaya Kotlovina i Prialtaiskie Khreby). *Botanicheskie Issledovaniya Sibiri i Kazakhstana* 8: 3–16.
- KOTUKHOV YU. 2003. New species of the genus *Allium* L. (Alliaceae J. Agardh) from East Kazakhstan. *Turczaninowia* 6(1): 5–10 (in Russian with English summary).
- KRYLOV P. 1937. *Flora Zapadnoy Sibiri*. 9. Izdanie Botanicheskoy Sektzii Tomskogo Obshchestva Ispytateley Prirrody Tomskoy Gosudarstvennyy Universitet imeni V. V. Kuybysheva, Tomsk.
- KULIKOV P. V. 2010. *Opredelitel' sosudistyykh rasteniy Chelyabinskoy Oblasti*. Rossiyskaya Akademiya Nauk, Uralskoe Otdelenie, Botanicheskiy Sad, Ekaterinburg.
- LAZ'KOV G. A. 2012. *Silene* L. In: A. L. TAKHTAJAN (ed.), *Caucasian flora conspectus* 3(2): 198–213. KMK Scientific Press, Saint-Petersburg – Moscow (in Russian).
- LAZ'KOV G. A., SENNIKOV A. N., TOZHIBAIEV K. S. & SULTANOVA B. A. 2011. New and rare adventive plants from Kyrgyzstan and Uzbekistan. *Novosti Sist. Vyssh. Rast.* 42: 226–231 (in Russian with English summary).
- MAJOROV S. R., BOCHKIN V. D., NASIMOVICH YU. A. & SHCHERBAKOV A. V. 2012. *Adventivnaya flora Moskvy i Moskovskoy oblasti*. Tovarishchestvo Nauchnykh Izdaniy KMK, Moskva.
- MARHOLD K. 2011. *Caryophyllaceae*. In: *Euro+Med Plantbase – the information resource for Euro-Mediterranean plant diversity*. [18 June 2015]. <http://www2.bgbm.org/EuroPlusMed/PTaxonDetail.asp?NameId=100811&PTRefFk=7200000>.
- MORTON J. K. 2005. *Silene* L. In: FLORA OF NORTH AMERICA EDITORIAL COMMITTEE (eds), *Flora of North America North of Mexico*. 5: 166–214. Oxford University Press, New York – Oxford.
- NAUMENKO N. I. 2008. *Flora i rastitelnost' Yuzhnogo Zauralya*. Kurgan State University Press, Kurgan (in Russian with English summary).
- NOBIS M. 2010. *Stipa adamii* sp. nov. (Poaceae) from the western Tian-Shan and some remarks on the taxa of the

- section *Smirnovia* occurring in Kazakhstan. *Nord. J. Bot.* **28**(6): 728–733.
- NOBIS M. 2013. Taxonomic revision of the *Stipa lipskyi* group (Poaceae: *Stipa* section *Smirnovia*) in the Pamir Alai and Tian-Shan Mountains. *Plant Syst. Evol.* **299**: 1307–1354.
- NOBIS M., EBEL A. L., NOWAK A., TURGINOV O. T., KUPRIYANOV A. N., NOBIS A., OLONOVA M. V., PASZKO B., PIWOWARCZYK R., CHEN W. L., GUDKOVA P. D., KLICHOWSKA E., NOWAK S. & PUJADAS-SALVÀ A. J. 2014. Contribution to the flora of Asian and European countries: new national and regional vascular plant records, 2. *Acta Bot. Gallica* **161**(2): 209–221.
- OVESNOV S. A. (ed.) 2007. *Illustrirovannyi opredelitel' rastenii Permskogo Kraya*. Knizhnyj Mir, Perm (in Russian with English summary).
- PAVLOV N. V. (ed.) 1956–1966. *Flora of Kazakhstan, 1–9*. Academy of Sciences of Kazakh SSR, Alma-Ata.
- PEREZHOGIN YU. V. 2013. New species of the genus *Tulipa* from Northern Kazakhstan. *Bot. Zhurn.* **98**(12): 1558–1563 (in Russian with English summary).
- PIMENOV M. G. & KLJUYKOV E. V. 2014. New species of the Umbelliferae from Middle Asia and Southern Kazakhstan. *Bot. Zhurn.* **99**(5): 594–609 (in Russian with English summary).
- PROBATOVA N. S. 1995. Lamiaceae Lindl. (Labiatae Juss.). In: S. S. KHARKEVICH (ed.), *Sosudistye rasteniya sovetskogo Dalnego Vostoka*. **7**: 294–379. Nauka, St.-Petersburg.
- PYAK A. I., EBEL A. L. & EBEL T. V. 2000. New and rare plants for flora of Altai Region and Republic of Altai. *Krylovia* **2**(1): 67–72 (in Russian).
- PYŠEK P., RICHARDSON D., REJMÁNEK M., WEBSTER G., WILLIAMSON M. & KIRSCHNER J. 2004. Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. *Taxon* **53**(1): 131–143.
- REED W. R. 1993. *Atriplex gardneri*. In: *Fire Effects Information System (FEIS)* [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. [8 Sept. 2014]. <http://www.fs.fed.us/database/feis>.
- SHI Z. & GREUTER W. 2011. *Carduus* L. In: Z. Y. WU, P. H. RAVEN & D. Y. HONG (eds), *Flora of China*. **20–21**: 175–176. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis.
- SILANTYEVA M. M. 2013. *Conspectus of the flora of Altay Territory*. Izdatel'stvo Altaiskogo Gosudarstvennogo Universiteta, Barnaul (in Russian).
- SUCHORUKOV A. P. 2003. Floristische Beiträge zur Flora von Kasachstan. *Ann. Naturhist. Mus. Wien, B* **104**: 705–711.
- SUCHORUKOV A. P. 2007. Zur Systematik und Chorologie der in Russland und den benachbarten Staaten (in den Grenzen der ehemaligen USSR) vorkommenden *Atriplex*-Arten (Chenopodiaceae). *Ann. Naturhist. Mus. Wien, B* **108**: 307–420.
- SYTIN A. K. 2000. Generis *Astragalus* L. (Fabaceae) species nova e Kazachstania occidental. *Novosti Sist. Vyssh. Rast.* **32**: 92–96 (in Russian).
- TAMAMSHYAN S. G. 1963. *Carduus* L. emend. Gaerth. In: E. G. BOBROV & S. K. CHEREPANOV (eds), *Flora URSS*. **28**: 4–39. Editio Academiae Scientiarum URSS, Mosqua – Leningrad (in Russian).
- TZVELEV N. N. 2000. *Manual of the vascular plants of north-west Russia (Leningrad, Pskov and Novgorod provinces)*. St.-Petersburg State Chemical-Pharmaceutical Academy Press, St.-Petersburg (in Russian).
- TZVELEV N. N. 2004. *Oberna Adans*. In: N. N. TZVELEV (ed.), *Flora Europae Orientalis*. **11**: 229–233. Oficina Editoria KMK, Moscuca – Petropoli (in Russian).
- UOTILA P. 2011. *Chenopodiaceae (pro parte majore)*. In: *Euro+Med Plantbase – the information resource for Euro-Mediterranean plant diversity*. [18 June 2015]. <http://ww2.bgbm.org/EuroPlusMed/PTaxonDetail.asp?NameId=17702&PTRefFk=7300000>.
- VINOGRADOVA R. M. 1974. *Didymophysa* Boiss. In: M. G. PACHOMOVA (ed.), *Opredelitel' rastenii Srednei Azii. Kriticheskii konspekt flory*. **4**: 210–211. Fan, Tashkent (in Russian).
- WELSH S. L. 2003. *Atriplex* L. In: FLORA OF NORTH AMERICA EDITORIAL COMMITTEE (eds), *Flora of North America North of Mexico*. **4**: 322–381. Oxford University Press, New York – Oxford.
- ZHU G. L., MOSYAKIN S. L. & CLEMANTS S. E. 2003. *Chenopodiaceae* Vent. In: Z. Y. WU & P. H. RAVEN (eds), *Flora of China*. **5**: 351–414. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis.