Chromosome numbers in some alien plant species of Novosibirsk Region: post II

E. Yu. Zykova1, 2*, T. V. Pankova (An’kova)1, 3

1 Federal State Institution of Science Central Siberian Botanical Garden of Siberian Branch of RAS, Zolotodolinskaya str., 101, Novosibirsk, 630090, Russian Federation
2 E-mail: elena.yu.zykova@gmail.com; ORCID iD: https://orcid.org/0000-0002-1847-5835
3 ORCID iD: https://orcid.org/0000-0003-3661-0719

* Corresponding author

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Summary. Chromosome numbers (2n) for 12 alien species (Apiaceae, Asteraceae, Brassicaceae, Campanulaceae, Fabaceae, Lamiaceae, Malvaceae, Onagraceae, Poaceae, Polygonaceae) from the Novosibirsk Region are given. For the first time for Russia, the number of chromosomes of Xanthogalum purpurascens (2n = 22) is given, for Siberia – Nepeta cataria (2n = 34), Malva pusilla (2n = 42) and Koenigia weyrichii subsp. weyrichii (2n = 20). For all studied species, short information on the general distribution and dispersal in the Novosibirsk Region, literature data on the number of chromosomes from the territory of Russia are presented.

We continue the karyological study of invasive and potentially invasive species in the flora of the Novosibirsk Region (An’kova, Zykova, 2020, 2021). The article presents the results of studying 12 species found in the Novosibirsk Region. These are widespread in the area: Brassica rapa subsp. oleifera, Vicia hirsuta, Elsholtzia ciliata, Malva pusilla and Echinochloa crus-galli; very active in newly discovered habitats: Xanthogalum purpurascens, Campanula rapunculoides, Epilobium pseudorubescens and Koenigia weyrichii; rarely found in most areas of the region:
Galeopsis ladanum and recently discovered and rare in the city of Novosibirsk: Senecio viscosus and Nepeta cataria. The chromosome numbers were determined by direct counting in metaphase on root meristem squash preparations. Seeds were germinated on sterile sand. The root tips were pretreated for two hours with 0.2 % colchicine water solution, fixed in 3 : 1 absolute ethanol glacial acetic acid and stained with 1 % acetic hematoxylin. Metaphase plates were observed under 100 × magnification by the Axioscope 40 (Karl Zeiss, Axio Lab) and photographed by the AxiCam MRc 5 digital camera.

For all species, the references on chromosome numbers revealed from the samples collected in Russia are given as well, as relevant information in the international database “The Chromosome Counts Database” (Rice et al., 2015) is reflected incompletely. Latin names of plants are given according to the “Catalog of Life” (Hassler, 2020). The herbarium samples will be transferred at the Herbarium of the Central Siberian Botanical Garden of Siberian Branch of the Russian Academy Sciences (NS, Novosibirsk).

APIACEAE

Xanthogalum purpurascens Avé-Lall. (Angelica purpurascens (Ave-Lall.) Gilli), 2n = 22

“Novosibirsk Region, Novosibirsk city, Akademgorodok, territory of the Central Siberian Botanical Garden, old overgrown sites. 8 IX 2018. E. Zykova”, 3718-Z684 (Fig. 1A).

Distribution: native to Caucasus, Turkey and Iran. Species is cultivated in botanical gardens, goes wild. It is preserved on the old fallows of the Central Siberian Botanical Garden, actively spreads in the nearby forests (Zykova, Shaulo, 2019).

The chromosome number was determined in Russia for the first time. The same chromosome number was reported for the Georgia (Vasilyeva et al., 1981; Vasilyeva, Pimenov, 1991), the Turkey (Pimenov et al., 1998).

Diploid (2x), x = 11.

ASTERACEAE

Senecio viscosus L., 2n = 40

“Novosibirsk Region, Novosibirsk city, Soviet microdistrict, surroundings of the “Seyatel” station, in the yards, outside the flower beds. 30 VIII 2019. E. Zykova”, 1119-Z767.

Distribution: S. viscosus is native Western and Central Europe, and the Caucasus. The location of the species has been recorded since the 1980s in Siberia. For the Novosibirsk Region, it was recorded for the first time in 2019 (Ebel, Zykova, 2021).

The chromosome number is given for Western Siberia for the first time. The same chromosome number was determined for the Irkutsk Region (Chepinoga, 2014, and references therein) and the Primorye Territory (Probatova, 2014, and references therein); 2n = 20 was defined for the Primorye Territory (Probatova, 2014, and references therein). Tetraploid (4x), x = 10.

BRASSICACEAE

Brassica rapa subsp. oleifera (DC.) Metzg. (B. campestris L.), 2n = 20

“Novosibirsk Region, Novosibirsk city, Soviet microdistrict, Kirov village, wasteland. 19 IX 2017. E. Zykova, T. Shemetova”, 7417-Z372.

Distribution: Eurasian species, common in all regions of Siberia. At the beginning of the 20th century the species was known in most of the Tomsk province (which included the Novosibirsk Region) in the fields, near houses and roads, sometimes in meadows (Krylov, 1901). To date, it has been registered in 18 districts of the region (Zykova, 2019).

The same number of chromosomes was counted for the Novosibirsk Academgorodok (Krasnikov, Lomonosova, 1990), the Irkutsk Region (Chepinoga, 2014, and references therein) and the Primorye Territory (Probatova, 2014, and references therein). Diploid (2x), x = 10.

CAMPANULACEAE

Campanula rapunculoides L., 2n = 102

“Novosibirsk Region, Novosibirsk city, Akademgorodok, territory of the Central Siberian Botanical Garden, old overgrown sites. 15 IX 2018. E. Zykova”, 4018-Z777, 4018-Z778.

Distribution: native to Europe and North Africa. It is widely cultivated as an ornamental plant, including in Siberia, and often goes wild. In the Novosibirsk Region, it was noted to become naturalized in 2014 (Zykova et al., 2014); it is abundant in the discovered habitats (Zykova, 2019).

For the Novosibirsk Region, the chromosome number is given for the first time. 2n = 102 was also determined for the Tomsk Region (Malakhova, 1990): 2n = 68 was counted for the Irkutsk Region (Chepinoga, 2014, and references therein). The number 2n = 102 may have arisen by chromosome doubling of a triploid: 3 X 17 → 51; 2 X 51 → 102 (Gadella, 1964).

Hexaploid (6x), x = 17.
**FABACEAE**

*Vicia hirsuta* (L.) Gray, \(2n = 14\)

“Novosibirsk Region, Novosibirsk city, Akademgorodok, territory of the Central Siberian Botanical Garden, Bonsai Park, weed along the paths. 24 VII 2012. E. Korolyuk, E. Zykova”, 1812-Z522 (Fig. 1B).

Distribution: the European-Mediterranean species, which has spread throughout the globe. It is one of the active invasive species in Siberia (Ebel et al., 2014). Species was introduced to the Novosibirsk Region in the 1960s (Krylov, Sergievska-ya, 1964), it is known in ten districts of the region (Zykova, 2019).

The chromosome number is given for the Novosibirsk Region for the first time. The same chromosome number was counted from the Irkutsk Region (Chepinoga, 2014, and references therein), the Primorye Territory (Probatova et al., 2011), the Republic of Ingushetia (Efimov, 1987), and the Republic of Altai (Zykova et al., 2020).

Diploid (2\(x\)), \(x = 7\).

**LAMIACEAE**

*Elsholtzia ciliata* (Thunb.) Hyl., \(2n = 16\)

“Novosibirsk Region, Novosibirsk city, Soviet microdistrict, Geroev Truda street, in yards 54°51′37.73″N, 83°04′45.54″E. 10 IX 2018. T. An’kova”, Z650.

Distribution: the East-Asian species that has spread to Europe and North America. It belongs to the invasive plants in Central Russia (Vinogradova et al., 2010) and Siberia (Ebel et al., 2014). In the Novosibirsk Region, it is noted as common in all inhabited districts (Shaulo, 2000), however, specimens in herbarium are only from the Novosibirsk city (Zykova, 2019).

The chromosome number is given for the Novosibirsk Region for the first time. The same chromosome number was counted from the Irkutsk Region (Chepinoga, 2014, and references therein), the Primorye Territory (Probatova, 2014, and references therein), the Khabarovsk Territory (Probatova et al., 2011), the Republic of Ingushetia (Efimov, 1987), and the Republic of Altai (Zykova et al., 2020).

Diploid (2\(x\)), \(x = 17\).

**MALVACEAE**

*Malva pusilla* Sm., \(2n = 42\)

“Novosibirsk Region, Novosibirsk city, Soviet microdistrict, Geroev Truda street, in yards 54°51′37.73″N, 83°04′45.54″E. 10 IX 2018. T. An’kova”, Z650.

Distribution: Holarctic species. In Siberia, including the Novosibirsk Region, it is a widespread ruderal weed.

The chromosome number was determined on the Siberian material for the first time. The same number was determined for the Primorye Territory (Probatova, 2014, and references therein).

Hexaploid (6\(x\)), \(x = 7\).

**ONAGRACEAE**

*Epilobium pseudorubescens* A. K. Skvortsov, \(2n = 36\)

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Morskoy prospect, in the court-yards. 05 IX 2018. E. Zykova”, 3418-Z814; “Novosibirsk Region, Novosibirsk city, Akademgorodok, Nikolaev street, wasteland. 07 IX 2018. E. Zykova”, 3618-Z815.

Distribution: North American species spreading throughout the Holarctic. In the European part of Russia, it is one of the most aggressive invasive species, rarely found in most areas of the region (Zykova, 2019).
species (Vinogradova et al., 2010). It spreads actively across Siberia (Ebel, 2013; Buko, 2016). In the Novosibirsk Region, it was found in the Ust-Tarksk district (Ebel, 2008) and in the city of Novosibirsk (Zykova, 2015).

The chromosome number is given from the Novosibirsk Region for the first time. The same number was determined for the Tomsk Region (Probatova et al., 2016). Tetraploid (4x), x = 9.

POACEAE

*Echinochloa crus-galli* (L.) P. Beauv., 2n = 54

“Novosibirsk Region, Novosibirsk city, Soviet microdistrict, Akademgorodok, Nikolaev street, by the roads. 01 VIII 2017. E. Zykova”, 3917-Z379 (Fig. 1C).

Distribution: the South Asian species with a cosmopolitan secondary range that has settled in the regions of Southern Siberia. It is included in the list of invasive and potentially invasive species of Siberia (Ebel et al., 2014) and the Black Book of Siberian Flora (Sheremetova, 2016). The species has been noted since the early 20th century in the Novosibirsk Region (Krylov, 1928), now it is quite common here.

The chromosome number is given for the Novosibirsk Region for the first time. The same one was

Fig. 1. Mitotic metaphases: A – *Xanthogalum purpurascens*, 2n = 22; B – *Vicia hirsuta*, 2n = 14; C – *Echinochloa crus-galli*, 2n = 54; D – *Koenigia weyrichii* subsp. *weyrichii*, 2n = 20.
counted for the Irkutsk Region (Chepinoga, 2014, and references therein), the Amur Region (Probatova, Sokolovskaya, 1983), the Primorye Territory (Probatova, 2014, and references therein) and the Kamchatka Territory (Probatova et al., 2017). Tetraploid level (2n = 36) was determined for the Krasnoyarsk Territory (Stepanov, Muratova, 1992).

Hexaploid (6x), x = 9.

**POLYGONACEAE**

*Koenigia weyrichii* (F. Schmidt) T. M. Schust. et Reveal subsp. *weyrichii* (*Polygonum weyrichii* F. Schmidt), 2n = 20

“Novosibirsk Region, Novosibirsk district, Akademgorodok, mixed forest across the road from the old exhibition areas of the Central Siberian Botanical Garden. 02 X 2019. E. Zykova”, 2319-Z812 (Fig. 1D).

Distribution: the far-eastern species grows on Sakhalin, the Kuril Islands, Japan, China. Species was growing as an ornamental plant, remains in old fallow expositions of the Central Siberian Botanical Garden, actively spreads in ravines and forests, forming extensive thickets in glades (Zykova, 2019).

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