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

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Аннотация. This paper presents the chromosome numbers ($2n$) for 13 alien species from the families Amaranthaceae, Asteraceae, Brassicaceae, Caryophyllaceae, Malvaceae, Poaceae, Polygonaceae, Rosaceae collected in the Novosibirsk Region. For *Echinops sphaerocephalus* L. ($2n = 30$), *Silphium perfoliatum* L. ($2n = 14$) and *Brassica napus* L. ($2n = 38$), chromosome numbers were determined for the first time on the material from Russia; for *Arenaria serpyllifolia* L. ($2n = 40$) – from Siberia; for *Avena sativa* L. ($2n = 42$), *Secale cereale* L. ($2n = 14$) – from West Siberia. Chromosome numbers on the material from the Novosibirsk Region were revealed for the first time for *Axyris amaranthoides* L. ($2n = 18$), *Psammophiliella muralis* (L.) Ikonn. ($2n = 34$), *Fagopyrum tataricum* (L.) Gaertn. ($2n = 16$), *Triticum aestivum* L. ($2n = 42$), *Malva verticillata* L. ($2n \approx 84$). For all the species studied, brief notes on their general distribution and dispersal in the Novosibirsk Region are provided, along with literature data on chromosome numbers from other regions of Russia.

Числа хромосом некоторых чужеродных видов растений Новосибирской области: сообщение V

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Summary. Приводятся числа хромосом ($2n$) для 13 адвентивных видов из семейств Amaranthaceae, Asteraceae, Brassicaceae, Caryophyllaceae, Malvaceae, Poaceae, Polygonaceae, Rosaceae на материале из Новосибирской области. Впервые для России приводится число хромосом для *Echinops sphaerocephalus* L. ($2n = 30$), *Silphium perfoliatum* L. ($2n = 14$), *Brassica napus* L. ($2n = 38$), для Сибири – *Arenaria serpyllifolia* L. ($2n = 40$), для Западной Сибири – *Avena sativa* L. ($2n = 42$), *Secale cereale* L. ($2n = 14$), для Новосибирской области – *Axyris amaranthoides* L. ($2n = 18$), *Psammophiliella muralis* (L.) Ikonn. ($2n = 34$), *Fagopyrum tataricum* (L.) Gaertn. ($2n = 16$), *Triticum aestivum* L. ($2n = 42$), *Malva verticillata* L. ($2n \approx 84$). Для всех исследованных видов приводятся краткие сведения по общему распространению и расселению в Новосибирской области, литературные данные по числам хромосом с территории России.

We continue the karyological study of adventive species in the flora of the Novosibirsk Region (An'kova, Zykova, 2020, 2021; Zykova, Pankova, 2021; Zykova et al., 2022). In this paper, we present the results for 13 species found in the Novosibirsk Region. Among them, *Axyris amaranthoides* and *Potentilla norvegica* are invasive species in the region, *Malva verticillata* are potentially invasive (very active in other regions). Part of the species – *Echinops sphaerocephalus*, *Silphium perfoliatum*, *Brassica napus*, *Avena sativa*, *Secale cereale*, *Triticum aestivum* – have left the culture; others are accidentally introduced species of *Arenaria serpyllifolia*, *Axyris amaranthoides*, *Psammophiliella muralis*, *Spergula arvensis*, *Fagopyrum tataricum*, *Malva verticillata*, *Potentilla norvegica*.

Chromosome numbers were counted by direct observation in metaphase in root meristem squash preparations according to the method used by Zykova and Pankova (2021). Metaphase plates were observed under 100× magnification of the Axioscope 40 (Karl Zeiss, Axio Lab) microscope and photographed with an AxioCam MRc 5 digital camera. For all species, literature references on chromosome numbers known on material collected in Russia are given. In accordance with Goldblatt (1980) and Masterson (1994), we refer to polyploid plants with a chromosome number $n \geq 11$. Latin names of plants are provided according to the “Catalogue of Life” (Bánki, 2023). Voucher specimens have been deposited to the “Herbarium of higher vascular plants, lichens and fungi (NS, NSK)”, the scientific bioresource collection UNU No. USU 440537 of the Central Siberian Botanical Garden SB RAS (Novosibirsk).

AMARANTHACEAE

Axyris amaranthoides L., $2n = 18$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Tereshkova Street, wasteland. 07 IX 2021. E. Zykova” Z978-2621 (NS0046832) (Fig. 1A).

Distribution: Asian species with a secondary Holarctic range. Included in the Black Book of Siberian Flora (Antipova, 2016). In the Novosibirsk Region, as invasive species, found in disturbed habitats in most districts (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. The same number was recorded from the Altai Territory (Lomonosova, Krasnikov, 1993), Republic of Sakha (Yakutia) (Lomonosova, Nikolin, 2013), Irkutsk Region (Chepinoga, 2014, and references therein). Diploid.

ASTERACEAE

Echinops sphaerocephalus L., $2n = 30$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, territory of the Central Siberian Botanical Garden, old overgrown sites. 15 IX 2018. E. Zykova”, Z667-4018 (NS0049041) (Fig. 1B).

Distribution: European-West Asian species. Rare in the Novosibirsk Region, found in the city of Novosibirsk, and in three neighboring regions (Zykova, Shaulo, 2021).

This is the first report of the chromosome number for this species in Russia. The same chromosome number is noted in populations of Europe and Kazakhstan (Rice et al., 2015). Polyploid.

Silphium perfoliatum L., $2n = 14$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, territory of the Central Siberian Botanical Garden, old overgrown sites. 15 IX 2018. E. Zykova”, Z681-4018 (NS0049040) (Fig. 1C).

Distribution: North American species, grown as a fodder and ornamental crop. Rare in Siberia, singly noted in the Kurgan Region and in the city of Novosibirsk (Zykova, Shaulo, 2019).

This is the first report of the chromosome number for this species in Russia. The same chromosome number is noted in populations of Europe, Southeast Asia and USA (Rice et al., 2015). Diploid.

BRASSICACEAE

Brassica napus L., $2n = 38$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, between the stopping platform «Obskoye More» and «Stroiteley» avenue, railway embankments. 31 VII 2022. E. Zykova” E33-4922 (NS0049039).

Distribution: This species has an almost cosmopolitan area cultivated as an oilseed and fodder plant. Rare in the Novosibirsk Region, recorded on railway embankments in the city of Novosibirsk (Zykova, 2019).

This is the first report of the chromosome number for this species outside of culture in Russia. Polyploid.

CARYOPHYLLACEAE

Arenaria serpyllifolia L. (*A. uralensis* Pall. ex Spreng.), $2n = 40$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Central Siberian Botanical Garden, weeds in greenhouses. 25 V 2017. E. Zykova, T. Shemetova”, Z481-0317 (NS0046834).

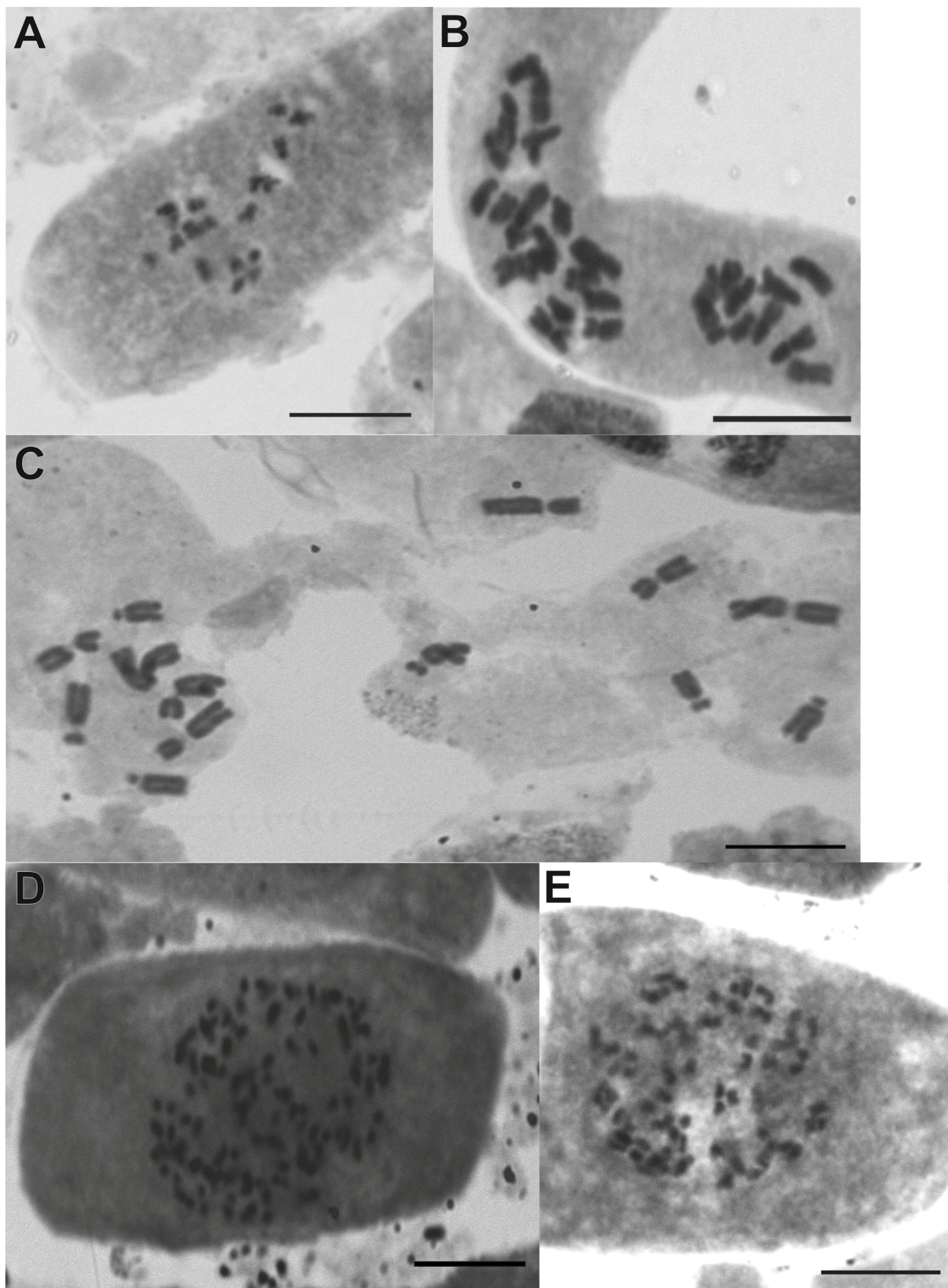


Fig. 1. Mitotic metaphases: A – *Axyris amaranthoides*, $2n = 18$; B – *Echinops sphaerocephalus*, $2n = 30$; C – *Silphium perfoliatum*, $2n = 14$; D – *Malva verticillata*, $2n \approx 84$; E – *Potentilla norvegica*, $2n = 56$; Scale = 10 μm .

Distribution: A species with a Holarctic range. Rare in the Novosibirsk Region, recorded in Novosibirsk and five administrative districts (Zykova, 2019).

This is the first report of the chromosome number for Siberia. The number $2n = 20$ was registered in material from the Primorye Territory (Probatova et al., 2019), $2n = 30$ – from the Stavropol Territory (Agapova et al., 1990). Polyploid.

***Psammophiliella muralis* (L.) Ikonn., $2n = 34$**

“Novosibirsk Region, Novosibirsk City, Zaeltsovsky microdistrict, Arboretum, in the flower beds. 19 IX 2019. E. Zykova”, Z811-2019 (NS0049053).

Distribution: Eurasian species. Found throughout the Novosibirsk Region (Krasnoborov, 2000).

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was known for the Amur Region (Probatova et al., 2005), Primorye Territory (Probatova et al., 2017) and the Republic of Altai (Zykova et al., 2021a). Polyploid.

***Spergula arvensis* L., $2n = 18$**

“Novosibirsk Region, Novosibirsk City, Zaeltsovsky microdistrict, Arboretum, in the flower beds. 19 IX 2019. E. Zykova”, Z810-2019 (NS0046836).

Distribution: Holarctic species. Quite rare in the Novosibirsk Region, recorded in 10 administrative districts (Zykova, 2019).

The same chromosome number was revealed in collections from the Khabarovsk (Probatova et al., 1996), Primorye (Probatova, 2014, and references therein), Kamchatka (Probatova et al., 2022) Territories, Amur (Probatova, Sokolovskaya, 1989), Novosibirsk (Krasnikov, Shaulo, 1990), Sakhalin (Probatova et al., 2007, and references therein), Irkutsk (Chepinoga, 2014, and references therein) Regions, the Republic of Karelia (Probatova et al., 2009), the Republic of Altai (An'kova, Zykova, 2018), the Republic of Khakassia (Pankova et al., 2022). Diploid.

MALVACEAE

***Malva verticillata* L. (*M. mohileviensis* Down.), $2n \approx 84$**

“Novosibirsk Region, Berdsk City, Pervomaiskaya Street, in a wasteland near the market, 54°45'51.15"N, 83°06'07.35"E. 26 IX 2018. D. N. Shaulo”, Z647 (NS0049042) (Fig. 1D).

Distribution: An Asian species, settled in temperate and subtropical regions of the globe,

including the most regions of Southern Siberia (Mikhaylova, Ebel, 2016). Rare in the Novosibirsk Region, found in the cities of Novosibirsk and Berdsk (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. To this species chromosome number $2n = 42$ are indicated for the Trans-Baikal Territory, Amur Region (Probatova et al., 2012), Irkutsk Region (Probatova et al., 2014), from the Republic of Altai (Zykova et al., 2021a); $2n = 56$ – for the Irkutsk Region (Chepinoga, 2014, and references therein); $2n = 84$ – for the Primorye Territory (Probatova, 2014, and references therein) and the Republic of Khakassia (Stepanov, 2018). Polyploid.

POACEAE

***Avena sativa* L., $2n = 42$**

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Zolotodolinskaya Street, pond bank. 17 IX 2020. E. Zykova”, Z892-1620 (NS0049055).

Distribution: Mediterranean cultigen species. One of the most popular grain and fodder crops in Siberia. Rarely found outside of crops in the Novosibirsk Region (Zykova, Shaulo, 2021).

This is the first report of the chromosome number on the material collected outside of crops for Western Siberia. The number $2n = 48$ was registered in material from the Irkutsk Region (Chepinoga, 2014, and references therein). Polyploid.

***Secale cereale* L., $2n = 14$**

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Morskoy Prospect, in the courtyards, 54°83'98.07"N, 83°11'03.79"E. 05 IX 2018. E. Zykova”, Z658-3418 (NS0049057).

Distribution: Eurasian cultigen species. A grain crop popular in Siberia. Rarely found outside of crops in the Novosibirsk Region (Zykova, 2019).

This is the first report of the chromosome number on the material collected outside of crops for Western Siberia. The same number was revealed for collections from the Irkutsk Region (Chepinoga, 2014, and references therein). Diploid.

***Triticum aestivum* L., $2n = 42$**

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Morskoy Prospect, in the courtyards, 54°83'98.07"N, 83°11'03.79"E. 05 IX 2018. E. Zykova”, E73-3418 (NS0049038).

Distribution: Cultivated all over the globe. Rare found as alien species in the Novosibirsk Region, recorded in the city of Novosibirsk, Krasnoozersky

(Zykova, 2019) and Maslyaninsky (Zykova, Shauro, 2021) districts.

This is the first report of the chromosome number for the Novosibirsk Region. The number of chromosomes $2n = 42$ outside the culture in Siberia was determined from the Republic of Altai (Zykova et al., 2021b). Polyploid.

POLYGONACEAE

Fagopyrum tataricum (L.) Gaertn., $2n = 16$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, surroundings of the «Seyatel» station, in the yards, outside the flower beds. 30 VIII 2019. E. Zykova”, Z886-1119 (NS0049056).

Distribution: Eurasian species with a secondary Holarctic range. Rare in the Novosibirsk Region, recorded for 10 administrative districts (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. The same number was recorded from the Primorye Territory (Probatova, 2014, and references therein) and the Republic of Altai (An'kova, Zykova, 2018). Diploid.

ROSACEAE

Potentilla norvegica L., $2n = 56$

“Novosibirsk Region, Novosibirsk City, Akademgorodok, Akademicheskaya Street, in the yards. 28 VII 2017. E. Zykova”, Z404-3717 (NS0046833) (Fig. 1E).

Distribution: species with Holarctic range, secondary cosmopolitan. Active in the Novosibirsk Region, recorded in most administrative districts (Zykova, 2019).

This species is very variable in terms of ploidy. Chromosome number $2n = 56$ was mentioned for the Irkutsk Region, the Republic of Buryatia, Trans-Baikal Territory (Chepinoga, 2014, and references therein), Republic of Sakha (Yakutia), Khabarovsk Territory (Agapova et al., 1993), Primorye (Probatova, 2014, and references therein) and Krasnoyarsk

(Chepinoga et al., 2012) Territories, Magadan (Probatova et al., 2012), Sakhalin (Probatova et al., 2007, and references therein) and Amur (Probatova et al., 2013) Regions; $2n = 42$ was determined for the Republic of Altai (Zykova et al., 2021b); $2n = 63$ was determined for the Republic of Buryatia (Chepinoga, 2014, and references therein); $2n = 70$ was reported for the Irkutsk Region, Republic of Buryatia (Chepinoga, 2014, and references therein), Novosibirsk and Leningrad Regions (Agapova et al., 1993). Polyploid.

Conclusion

The study provides the first records of chromosome numbers for 13 alien species based on the material from the Novosibirsk Region, three of them are invasive species on the territory of the Novosibirsk Region: *Axyris amaranthoides* ($2n = 18$), *Psammodaphniella muralis* ($2n = 34$) and *Potentilla norvegica* ($2n = 56$). Of the studied species, 5 are diploids, 8 – polyploids. Our data agree with previously published information on the chromosome numbers of populations of Eastern Siberia, the Far East, and European Russia.

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