Turczaninowia 28, 4: 16–21 (2025)
https://www.doi.org/10.14258/turczaninowia.28.4.2
http://turczaninowia.asu.ru

ISSN 1560–7259 (print edition)
TURCZANINOWIA
ISSN 1560–7267 (online edition)

УДК 581.527.7:576.316(571.14)

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

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Keywords: adventive species, diploid, invasive species, Novosibirsk Region, polyploid, West Siberia.

Summary. This paper presents the chromosome numbers (2*n*) for 11 alien species from the families Asteraceae, Brassicaceae, Caryophyllaceae, Euphorbiaceae, Fabaceae, Poaceae, Polygonaceae, Portulacaceae, Rosaceae, Solanaceae, collected in the Novosibirsk Region. For *Euphorbia platyphyllos* (2*n* = 28), chromosome number was determined for the first time on the material from Russia; for *Alkekengi officinarum* (2*n* = 24) – from Asian Russia; for *Armoracia rusticana* (2*n* = 32), *Aruncus dioicus* (2n = 18) and *Scleranthus annuus* (2*n* = 44) – from Siberia. Chromosome numbers on the material from the Novosibirsk Region were revealed for the first time for *Medicago sativa* (2*n* = 32), *Avena fatua* (2*n* = 42), *Rumex acetosella* (2*n* = 14) and *Portulaca oleracea* (2*n* = 36). 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 VIII

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Ключевые слова: адвентивные виды, диплоид, Западная Сибирь, инвазивные виды, Новосибирская область, полиплоид.

Аннотация. Приводятся числа хромосом (2*n*) для 11 чужеродных видов из семейств Asteraceae, Brassicaceae, Caryophyllaceae, Euphorbiaceae, Fabaceae, Poaceae, Polygonaceae, Portulacaceae, Rosaceae, Solanaceae на материале из Новосибирской области. Впервые для России приводится число хромосом для *Euphorbia platyphyllos* (2*n* = 28); для Азиатской части России – *Alkekengi officinarum* (2*n* = 24); для Сибири – *Armoracia rusticana* (2*n* = 32), *Aruncus dioicus* (2*n* = 18) и *Scleranthus annuus* (2*n* = 44); для Новосибирской области – *Medicago sativa* (2*n* = 32), *Avena fatua* (2*n* = 42), *Rumex acetosella* (2*n* = 14) и *Portulaca oleracea* (2*n* = 36). Из них ушедшими из культуры являются *Armoracia rusticana*, *Aruncus dioicus*, *Alkekengi officinarum*, остальные случайно проникли на территорию области. Для всех исследованных видов приводятся краткие сведения по общему распространению и расселению в Новосибирской области, а также литературные данные по числам хромосом с территории России.

Поступило в редакцию 30.01.2025
Принято к публикации 27.10.2025

Submitted 30.01.2025
Accepted 27.10.2025

We continue the karyological study of alien species in the flora of the Novosibirsk Region (An'kova, Zykova, 2020; Zykova et al., 2024b). In this paper, we present the results for 11 alien species in the region. Three species, *Armoracia rusticana*, *Medicago sativa*, *Melilotus officinalis*, are invasive or potentially invasive in Siberia (Ebel et al., 2014). Most species accidentally entered the territory of the Novosibirsk Region, among them are rare species *Euphorbia platyphyllos*, *Portulaca oleracea*, *Scleranthus annuus*, *Avena fatua*, and widespread species *Medicago sativa*, *Melilotus officinalis*, *Rumex acetosella*, *Sonchus asper*. The remaining species are extinct from cultivation: *Armoracia rusticana* is grown as a spicy food plant and quite often goes out of cultivation; *Aruncus dioicus* and *Alkekengi officinarum* are ornamental plants, extremely rare outside plantings. 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 AxioCamMRc 5 digital camera. For the most species, the literature references on chromosome numbers known on material collected in Russia are given. In cases when the chromosome number was first determined on the Russian population, the corresponding references from CCDB (Rice et al., 2015) were presented. Latin names of plants are provided according to the "Catalogue of Life" (Banki et al., 2024). Voucher specimens have been deposited to the Herbarium of the Central Siberian Botanical Garden SB RAS (NS, Novosibirsk).

ASTERACEAE

Sonchus asper (L.) Hill, **$2n = 18$**

"Novosibirsk Region, Novosibirsk district, Verkh-Tula village, wasteland. 30 IX 2023. E. Yu. Zykova. E188-6623" (NS0050964) (Fig. 1A).

Distribution: Eurasian species, distributed throughout Siberia. In the Novosibirsk Region it is known in Novosibirsk city and the Novosibirsk district (Zykova, 2019).

The same chromosome number was known for Republic of Altai (An'kova, Zykova, 2017), Novosibirsk Region (An'kova, Zykova, 2020), Primorye (Probatova, 2014, and references therein) and Krasnodar (Probatova et al., 2009) Territories, Sakhalin (Probatova et al., 2007), Amur (Shatokhina, Kotenko, 2012), Sverdlovsk (Krivenko et al., 2013) Regions. Chromosome number $2n = 32$ was mentioned for Republic of Altai (An'kova, Zykova 2017), $2n = 36$ – for Republic of Buryatia (Chepinoga, 2014, and references therein). Diploid ($2x$).

BRASSICACEAE

Armoracia rusticana (Lam.) P. Gaertn., B. Mey. et Scherb., **$2n = 32$**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, garden partnership «Niva», near the roads along the plots. 2 IX 2021. E. Yu. Zykova. Z980-2221" (NS0053133).

Distribution: European-Mediterranean species, widely grown as a spice and food, disappearing from cultivation; common in the Novosibirsk Region (Zykova, 2019).

This is the first report of the chromosome number for this species in Siberia. The same number is known from Primorye Territory (Probatova, 2014, and references therein). Polyploid ($4x$).

CARYOPHYLLACEAE

Scleranthus annuus L., **$2n = 44$**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, along the edge of the forest behind the NSU, on railway embankments. 12 VI 2022. E. Yu. Zykova. E12-2322" (NS0050962) (Fig. 1B).

Distribution: European-Mediterranean species, rare in Siberia. In the Novosibirsk Region, isolated locations are known in five administrative districts (Zykova et al., 2024c).

This is the first report of the chromosome number for this species in Siberia. The same chromosome number was determined in material from the Amur Region (Probatova et al., 2006). $2n = 22$ was known for the Primorye Territory (Probatova, 2014, and references therein). Polyploid ($4x$).

EUPHORBIACEAE

Euphorbia platyphyllos L., **$2n = 28$**

"Novosibirsk Region, Novosibirsk district, CSBG territory, on the garbage near the greenhouses. 29 VIII 2023. D. N. Shaulo. E212" (NS0059793).

Distribution: Euro-Mediterranean species, rare in Siberia, known only from the Novosibirsk Region, where it is occasionally found on the territory of the Central Siberian Botanical Garden (Zykova, 2019).

This is the first report of the chromosome number for this species in Russia. Several chromosome numbers, among them prevails $2n = 28$, are known from European populations (Rice et al., 2015). Polyploid ($4x$).

FABACEAE

Medicago sativa L., **2*n* = 32**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, Nikolaeva Street, wasteland, 54°85'83.75"N, 83°11'31.26"E. 07 IX 2018. E. Yu. Zykova. E341-3618" (NS0059769) (Fig. 1C).

Distribution: West Asian species with a cosmopolitan secondary range. Widely settled in the Novosibirsk Region (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. The number 2*n* = 16 was revealed in collections from the Stavropol Territory (Agapova et al., 1990, and references therein), 2*n* = 32 was determined from the Republic of Altai (Zykova et al., 2025) and from the Irkutsk Region (Chepinoga, 2014, and references therein). Polyploid (4*x*).

Melilotus officinalis (L.) Pall., **2*n* = 16**

"Novosibirsk Region, Novosibirsk district, vicinity of the Verkh-Tula village, in buckwheat crops. 30 IX 2023. E. Yu. Zykova. E297-6723" (NS0059780) (Fig. 1D).

Distribution: Species with a cosmopolitan area, invasive in certain regions of Siberia, common in the Novosibirsk Region (Khrustaleva, 2016).

The same number was identified for Novosibirsk (Pankova et al., 2023) and Irkutsk (Chepinoga, 2014, and references therein) Regions, Republic of Altai (Zykova et al., 2025), Primorye Territory (Probatova, 2014, and references therein), Sakhalin Region (Probatova et al., 2017b), and from Krasnodar and Stavropol Territories, Kabardino-Balkarian and Chechen Republics, Republic of Daghestan, Republic of North Ossetia – Alania (Agapova et al., 1990, and references therein). Diploid (2*x*).

POACEAE

Avena fatua L., **2*n* = 42**

"Novosibirsk Region, naukograd Koltsovo, edge of a wheat field. 17 VIII 2021. T. V. Pankova, E. Yu. Zykova. E57-1721" (NS0053143); "Novosibirsk Region, Novosibirsk city, Akademgorodok, at the «Obskoe More» stopping platform, on railway embankments. 28 VII 2022. E. Yu. Zykova. E26-4622" (NS0053139).

Distribution: Widespread Eurasian weed species. Rare in the Novosibirsk Region (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was revealed in collections from the Republic of Altai (An'kova et al., 2019) and the Primorye Territory (Probatova, 2014, and references therein). 2*n* = 28 was identified for the Republic of Altai (An'kova et al., 2019). Polyploid (6*x*).

POLYGONACEAE

Rumex acetosella L., **2*n* = 14**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, a vacant lot along a narrow-gauge road. 2 VIII 2017. E. Yu. Zykova, T. A. Shemetova. Z477-4417" (NS0050936).

Distribution: Holarctic species, widespread in the Novosibirsk Region.

This is the first report of the chromosome number for the Novosibirsk Region. 2*n* = 14 was revealed in collections from the Sakhalin Region (Probatova et al., 2007, and references therein). 2*n* = 15 was known from the Republic of Buryatia (Chepinoga, 2014, and references therein). 2*n* = 28 was reported from Republic of Altai (Zykova et al., 2024a), Republic of Buryatia (Probatova et al., 2017a). 2*n* = 42 was known in collections from Irkutsk Region, Republic of Buryatia, Trans-Baikal Territory (Chepinoga, 2014, and references therein), Leningrad Region and Kamchatka Territory (Agapova et al., 1993, and references therein). Diploid (2*x*).

PORTULACACEAE

Portulaca oleracea L., **2*n* = 36**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, the railway embankment opposite the upper zone of Akademgorodok. 17 IX 2020. E. Yu. Zykova. Z860-1420" (NS0059782).

Distribution: This Mediterranean-Asian species is almost cosmopolitan as an adventive one. Rare in the Novosibirsk Region, known only from Novosibirsk Akademgorodok (Zykova, 2019).

The chromosome number is given for the first time for the Novosibirsk Region. The same number was determined from Republic of Altai (Zykova et al., 2021), Primorye Territory (Probatova, 2014, and references therein), and Amur Region (Probatova et al., 2006); 2*n* = 18 was known for Amur Region (Probatova et al., 2008b) and Primorye Territory (Probatova, 2014, and references therein); 2*n* = 54 was counted for Khabarovsk (Probatova et al., 2006) and Altai (An'kova, Zykova, 2017) Territories. Polyploid (4*x*).

ROSACEAE

Aruncus dioicus (Walter) Fernald., **2*n* = 18**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, surroundings of CSBG, mixed forest. 3 X 2023. E. Yu. Zykova. E210-6923" (NS0059785) (Fig. 1E).

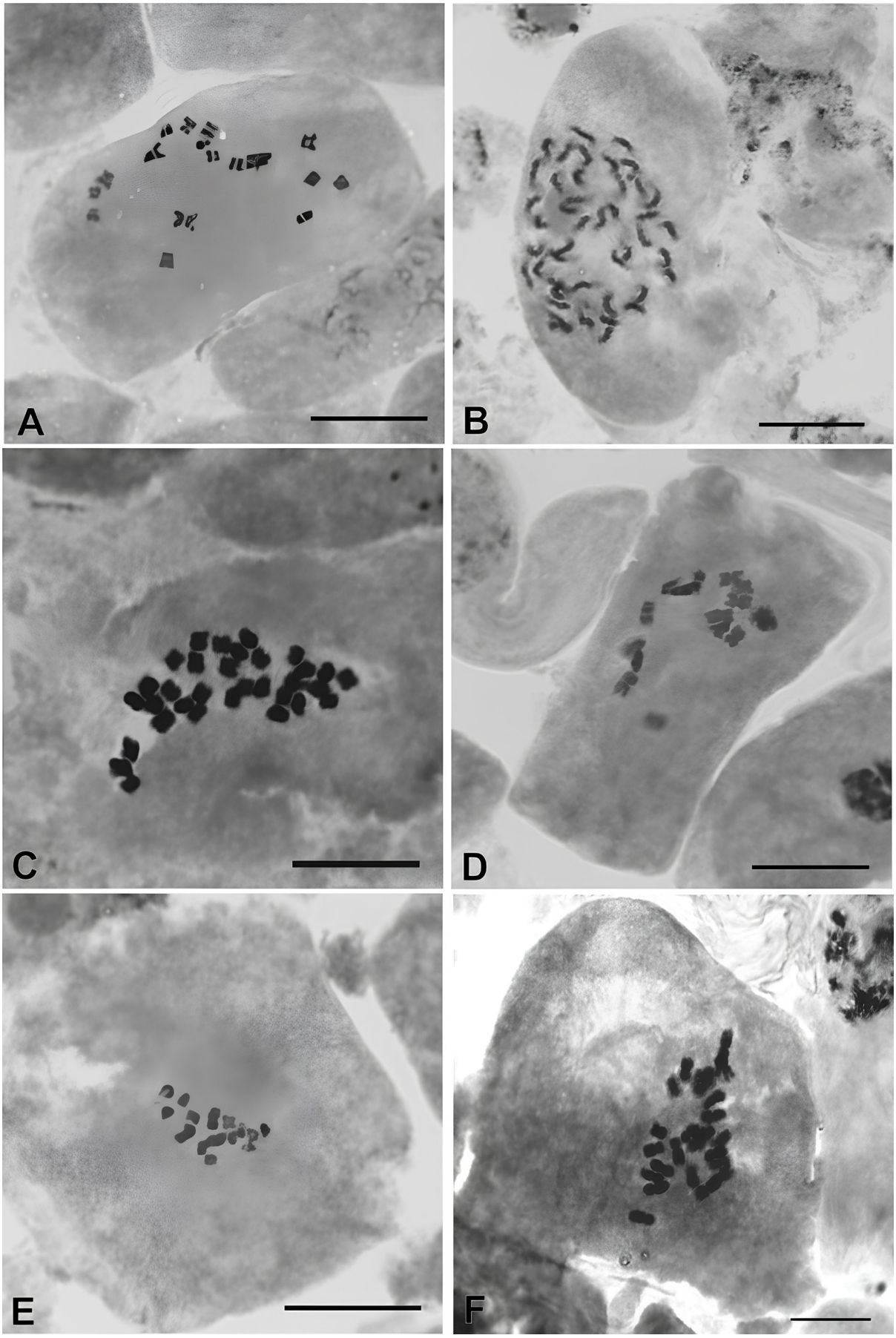

Fig. 1. Mitotic metaphases: A – *Sonchus asper*, 2*n* = 18; B – *Scleranthus annuus*, 2*n* = 44; C – *Medicago sativa*, 2*n* = 32; D – *Melilotus officinalis*, 2*n* = 16; E – *Aruncus dioicus*, 2*n* = 18; F – *Alkekengi officinarum*, 2*n* = 24; Scale = 10 μm.

Distribution: European species, widely used in landscaping in many countries. In the Novosibirsk Region, outside of culture, it is extremely rare, isolated localities are known (Shaulo, Zykova, 2024). The same data was published for the Primorye Territory (Probatova et al., 2008a).

This is the first report of the chromosome number for this species in Siberia. Diploid (2*x*).

SOLANACEAE

Alkekengi officinarum Moench (≡*Physalis alkekengi* L.), **2*n* = 24**

"Novosibirsk Region, Novosibirsk district, Baryshevo village, garden society «Niva», by the road. 21 IX 2023. E. Yu. Zykova. E213-6523" (NS0059773) (Fig. 1F).

Distribution: Mediterranean species, secondarily cosmopolitan. In the Novosibirsk Region it is grown as an ornamental plant, very rare outside cultivation, noted for Novosibirsk city (Zykova, 2019).

This is the first report of the chromosome number for this species in Asian Russia. The same chromosome number was known for Chechen Republic (Agapova et al., 1993, and references therein) and Krasnodar Territory (Probatova et al., 2012). Diploid (2*x*).

Conclusion

The chromosome numbers of 11 alien species in the flora of the Novosibirsk Region were studied. Six of them, *Portulaca oleracea*, *Scleranthus annuus*, *Avena fatua*, *Medicago sativa*, *Armoracia rusticana*, *Euphorbia platyphyllos*, are polyploids. *Rumex acetosella*, *Alkekengi officinarum*, *Aruncus dioicus*, *Melilotus officinalis*, *Sonchus asper* are diploids.

Acknowledgements

The study was carried out within the framework of the State Assignment of the Central Siberian Botanical Garden SB RAS (AAAA-A21-121011290024-5).

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