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

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**Summary.** This paper presents the chromosome numbers ( $2n$ ) for 14 alien species from the families Apiaceae, Apocynaceae, Asteraceae, Boraginaceae, Fabaceae, Lamiaceae, Poaceae, Plantaginaceae, Violaceae collected in the Novosibirsk Region. For *Apocynum cannabinum* ( $2n = 16$ ), *Clinopodium acinos* ( $2n = 18$ ), *Veronica agrestis* ( $2n = 14$ ), *V. verna* ( $2n = 16$ ), *Viola* × *wittrockiana* ( $2n = 46$ ), chromosome numbers were determined for the first time on the material from Russia; for *Daucus carota* ( $2n = 18$ ), *Heracleum sosnowskyi* ( $2n = 22$ ), *Arrhenatherum elatius* ( $2n = 28$ ) – from Asian Russia; for *Kalimeris incisa* ( $2n = 18$ ) – from Siberia. Chromosome numbers on the material from the Novosibirsk Region were revealed for the first time for *Myosotis sparsiflora* ( $2n = 18$ ), *Lupinus polyphyllus* ( $2n = 48$ ), *Hordeum jubatum* ( $2n = 28$ ), *Veronica persica* ( $2n = 28$ ). 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 VI

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**Ключевые слова:** адвентивные виды, диплоиды, Западная Сибирь, инвазивные виды, Новосибирская область, полиплоиды.

**Аннотация.** Приводятся числа хромосом ( $2n$ ) для 14 чужеродных видов из семейств Апиáceе, Аросунасеае, Астерасеае, Ворагинасеае, Фабасеае, Ламиасеае, Роасеае, Плантагинасеае, Виоласеае на материале из Новосибирской области. Впервые для России приводится число хромосом для *Аросуnum cannabinum* ( $2n = 16$ ), *Clinopodium acinos* ( $2n = 18$ ), *Veronica agrestis* ( $2n = 14$ ), *V. verna* ( $2n = 16$ ), *Viola* × *wittrockiana* ( $2n = 46$ ), для Азиатской части России – *Daucus carota* ( $2n = 18$ ), *Heracleum sosnowskyi* ( $2n = 22$ ), *Arrhenatherum elatius* ( $2n = 28$ ), для Сибири – *Kalimeris incisa* ( $2n = 18$ ), для Новосибирской области – *Myosotis sparsiflora* ( $2n = 18$ ), *Lupinus polyphyllus* ( $2n = 48$ ), *Hordeum jubatum* ( $2n = 28$ ), *Veronica persica* ( $2n = 28$ ). 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 (Zykova et al., 2023). In this paper, we present the results for 14 species alien to the region. Most of the species were studied for the first time using material from the territory of the Russian Federation. Some species, namely *Heracleum sosnowskyi*, *Lupinus polyphyllus*, *Hordeum jubatum*, *Myosotis sparsiflora*, *Cota tinctoria*, are invasive or potentially invasive in the region. Most of the studied species are found so far in the only locality, some of them – *Apocynum cannabinum*, *Daucus carota*, *Kalimeris incisa*, *Veronica agrestis*, *Viola* × *wittrockiana* – were recently discovered in the Novosibirsk Region. These are mainly species accidentally introduced into the flora of the region, only a few of them are ergasiophytes, species that have disappeared from cultivation: *Apocynum cannabinum*, *Kalimeris incisa*, *Lupinus polyphyllus*, *Viola* × *wittrockiana*. 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, literature references on chromosome numbers known on material collected in Russia are given, except in cases when the chromosome number was first determined on the Russian population. 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” (Banki et al., 2023). Voucher specimens have been deposited to the Herbarium of the Central Siberian Botanical Garden SB RAS (NS, Novosibirsk).

#### APIACEAE

##### *Daucus carota* L., $2n = 18$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Voevodskogo Str., in grassy thickets near the fence, 54°49'49"N, 83°6'22"E. 19 VIII 2022. E. Yu. Zykova, D. I. Zykov”, E17-5122 (NS0053154) (Fig. 1A), E18-5122 (NS0053153).

Distribution: The natural range of the species covers Europe, South-West and Central Asia, and is secondary – cosmopolitan (Pimenov, Ostroumova, 2012). Extremely rare in Siberia. In the Novosibirsk Region, two locations are known – in the vicinity of the village of Egoryevsky, Maslyanino district (Zyko-

va, 2019) and in Novosibirsk city (Zykova, Zykov, 2023).

This is the first report of the chromosome number for Asian Russia. The same chromosome number was determined in material from the Republic of Crimea (Rostovtseva, 1982). Diploid.

##### *Heracleum sosnowskyi* Manden., $2n = 22$

“Novosibirsk Region, Ordynsky district, Nizhnekamenka village, vegetable garden, 54°19'07.17"N, 81°54'49.34"E. 02 VII 2022. T. V. Pankova, S. N. Pankov”, E108 (NS0054047).

Distribution: A Caucasian species that has spread throughout Eurasia. Invasive species in Siberia (Zykova, 2016). In the Novosibirsk Region it is common in Novosibirsk city and in the Novosibirsk district (Zykova, 2019).

This is the first report of the chromosome number for this species in Asian Russia. The same chromosome number was revealed in collection from Kabardino-Balkarian Republic (Zhukova, 1967). Diploid.

#### APOCYNACEAE

##### *Apocynum cannabinum* L., $2n = 16$

“Novosibirsk Region, Novosibirsk district, mixed forest across the road from the old exhibition areas of the Central Siberian Botanical Garden. 16 IX 2020. E. Yu. Zykova, D. I. Zykov”, E14-1320 (NS0053122).

Distribution: North American species, grown as a medicinal plant, rare occurs outside of cultivation. Recently was discovered in the Novosibirsk Region in this locality (Zykova, Zykov, 2023).

This is the first report of the chromosome number for this species in Russia. There are records of  $2n = 16$  (Laan, Arends, 1985) as well as  $n = 11$  (Hill, 1989) for this species. Diploid.

#### ASTERACEAE

##### *Cota tinctoria* (L.) J. Gay ( $\equiv$ *Anthemis tinctoria* L.), $2n = 18$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Nikolaeva Str., wasteland near the Technopark, 2 VIII 2022. E. Yu. Zykova”, E31-5022 (NS0053151) (Fig. 1B).

Distribution: European species was settled in Eurasia; marked in most parts of the Novosibirsk Region (Zykova, 2019).

The same chromosome number was determined in material from the Novosibirsk (An'kova, Zykova, 2020), Tomsk (Malakhova, Markova, 1994) and Leningrad (Agapova et al., 1990, and references

therein) Regions, Karachayevo-Circassian Republic (Magulaev, 1992), Republic of Altai (An'kova, Zykova, 2017). Triploid ( $2n = 27$ ) was determined for the first time for this species based on material from the Republic of Altai (An'kova, Zykova, 2017). Diploid.

***Kalimeris incisa* (Fisch.) DC.,  $2n = 18$**

“Novosibirsk Region, Novosibirsk city, Akademgorodok, territory of the Central Siberian Botanical Garden, old overgrown sites, 54°82'71.76"N, 83°11'57.38"E. 15 IX 2018. E. Yu. Zykova, D. I. Zykov”, Z1023-4018 (NS0050728) (Fig. 1C).

Distribution: East Asian species, grown as an ornamental plant. In the Novosibirsk Region it was found only in one locality in an abandoned exposition of the botanical garden (Zykova, Zykov, 2023).

This is the first report of the chromosome number for this species in Siberia. The same number is known from the Primorye Territory (Volkova, Boyko, 1989). Diploid.

BORAGINACEAE

***Myosotis sparsiflora* J. C. Mikan ex Pohl,  $2n = 18$**

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Voevodskogo Str., by the road, 6 VI 2022. E. Yu. Zykova”, E48-1322 (NS0053152).

Distribution: Species with a primary area in Europe, the Mediterranean, Central and Asia Minor. Since the end of the 20th century it has actively spread throughout the regions of Western and Eastern Siberia, where it can sometimes become an invasive species (Ebel et al., 2014). In the Novosibirsk Region, it was recently discovered in the Novosibirsk city and the Novosibirsk district (Zykova, Shaulo, 2019), now is actively spreading.

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was determined on material from the Republic of Altai (Zykova et al., 2018). Diploid.

FABACEAE

***Lupinus polyphyllus* Lindl.,  $2n = 48$**

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Nikolaeva Str., by the roads, 54°59'N, 83°00'E. 01 VIII 2017. E. Yu. Zykova”, E67-3917 (NS0053156); “Novosibirsk Region, naukograd Koltsovo, gardening association «Crystal», near the roads. 17 VIII 2021. T. V. Pankova, E. Yu. Zykova”, Z983-2021 (NS0053149).

Distribution: North American species, with a secondary Holarctic range. Invasive species in Sibe-

ria (Verkhovina, 2016). Actively settling in the Novosibirsk Region (Zykova, Shemetova, 2023).

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was known for the Republic of Buryatiya (Krivenko et al., 2015) and Krasnoyarsk Territory (Stepanov, 2018). Polyploid.

LAMIACEAE

***Clinopodium acinos* (L.) Kuntze,  $2n = 18$**

“Novosibirsk city, Akademgorodok, on railway embankments. 15 VI 2022. E. Yu. Zykova”, E2-4122 (NS0046992) (Fig. 1D).

Distribution: European-Caucasian-West Asian species spreading throughout the Holarctic. In Siberia it is rare, in the Novosibirsk Region it is singly known in the Suzun, Ordynskoe, Maslyanino and Iskitim districts and in the Novosibirsk city (Zykova, Shaulo, 2023).

This is the first report of the chromosome number for this species in Russia. The same number is known from West European countries (Goldblatt, Jonston, 1979+). Diploid.

POACEAE

***Arrhenatherum elatius* (L.) P. Beauv. ex J. Presl et C. Presl,  $2n = 28$**

“Novosibirsk Region, Novosibirsk city, territory of the Central Siberian Botanical Garden, in old planting collection of *Hemerocallis* spp., 54°49'15"N, 83°06'17"E. 29 VI 2022. D. N. Shaulo», E4 (NS0046994) (Fig. 1E).

Distribution: The natural range of the species covers Europe, Asia Minor, and North Africa. Used in many extratropical countries as a fodder and as a lawn plant, it runs wild. Rare in the Novosibirsk Region, found in the Novosibirsk district and in the Novosibirsk city (Zykova, Shaulo, 2023).

This is the first report of the chromosome number for Asian Russia. The same chromosome number was determined in material from the Republic of Dagestan (Agapova et al., 1993, and references therein), the Leningrad Region (Sorokin, 1991) and the Republic of Crimea (Probatova et al., 2016). Polyploid.

***Hordeum jubatum* L.,  $2n = 28$**

“Novosibirsk Region, Novosibirsk city, Akademgorodok, between the «Obskoe More» stopping platform and Stroiteley Ave., railway embankments. 31 VII 2022. E. Yu. Zykova”, E27-4922 (NS0053150) (Fig. 1F).

Distribution: East Asian-North American species, with a secondary range in temperate regions of the entire globe, actively spreading throughout the regions of Western and Central Siberia (Verkhovina, Ebel, 2016), and in the Novosibirsk Region (Zykova, 2019).

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was known for the Magadan Region, the Republic of Sakha (Yakutia), Chukotka Autonomous Area (Agapova et al., 1993, and references therein), the Amur Region (Probatova et al., 2008), Altai

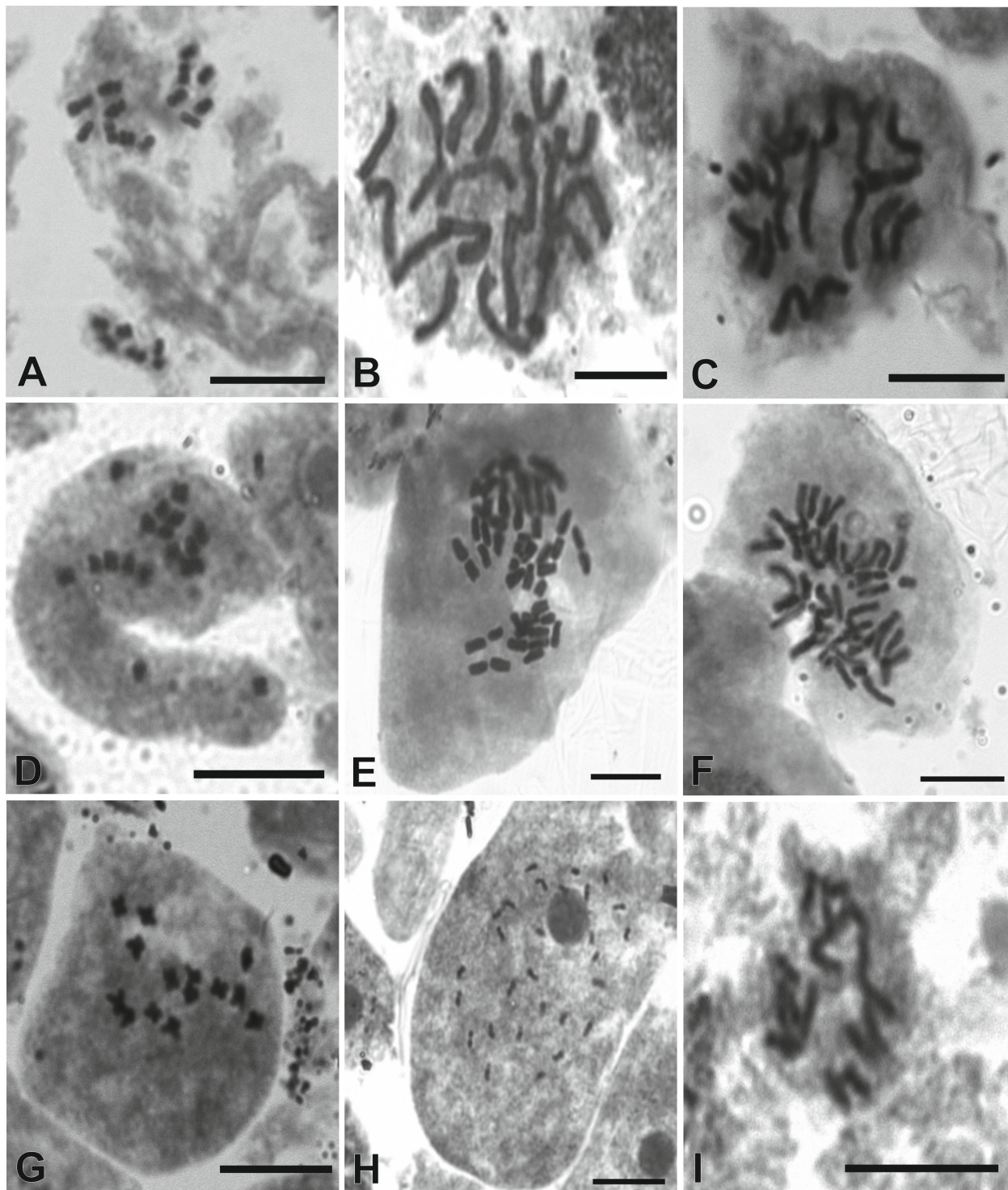


Fig. 1. Mitotic metaphases: A – *Daucus carota*,  $2n = 18$ ; B – *Cota tinctoria*,  $2n = 18$ ; C – *Kalimeris incisa*,  $2n = 18$ ; D – *Clinopodium acinos*,  $2n = 18$ ; E – *Arrhenatherum elatius*,  $2n = 28$ ; F – *Hordeum jubatum*,  $2n = 28$ ; G – *Veronica agrestis*,  $2n = 14$ ; H – *Veronica persica*,  $2n = 28$ ; I – *Veronica verna*,  $2n = 16$ ; Scale = 10  $\mu\text{m}$ .

Territory (Probatova et al., 2013), the Irkutsk Region (Chepinoga, 2014, and references therein), the Primorye Territory (Probatova, 2014, and references therein), the Republic of Buryatia and the Kamchatka Territory (Probatova et al., 2016), the Republic of Altai (Lomonosova et al., 2018). Polyploid.

#### PLANTAGINACEAE

##### *Veronica agrestis* L., $2n = 14$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Zolotodolinskaya Str., on the gravel, 13 V 2021. E. Yu. Zykova”, Z938-0121 (NS0050724) (Fig. 1G).

Distribution: European-Mediterranean species, secondarily cosmopolitan. In the Novosibirsk Region it is known from one locality in Akademgorodok of the Novosibirsk city (Zykova, Zykov, 2023).

This is the first report of the chromosome number for this species in Russia. The same number was found in India; tetraploid ( $2n = 28$ ) is known from Eastern, Central and Western Europe (Goldblatt, Johnston, 1979+). Diploid.

##### *Veronica persica* Poir., $2n = 28$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, Voevodskogo Str., along the fences, 20 VI 2022. E. Yu. Zykova”, E13-3422 (NS) (Fig. 1H).

Distribution: Eurasian species, relatively rare in Siberia. Besides the Novosibirsk city, it settles in the Novosibirsk district of the region (Shaulo, Zykova, 2024).

This is the first report of the chromosome number for the Novosibirsk Region. The same chromosome number was known for the Republic of Altai (Zykova et al., 2021). Polyploid.

##### *Veronica verna* L., $2n = 16$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, on railway embankments, 12 VI 2022. E. Yu. Zykova”, E8-2322 (NS0049986) (Fig. 1I).

Distribution: European species, rare in Siberia. Rare in the Novosibirsk Region, where it was known in three locations (Shaulo, Zykova, 2024).

This is the first report of the chromosome number for this species in Russia. The same number is known in European populations (Goldblatt, Johnston, 1979+). Diploid.

#### VIOLACEAE

##### *Viola × wittrockiana* Gams, $2n = 46$

“Novosibirsk Region, Novosibirsk city, Akademgorodok, surroundings of the «Seyatel» railway station, in the yards, outside the flower beds, 54°59'N, 83°00'E. 30 VIII 2019. E. Yu. Zykova, D. I. Zykov”, Z804-1119 (NS0050727).

Distribution: A popular ornamental plant that occasionally grows wild. Outside of culture, registered in the Novosibirsk city and the Novosibirsk district (Zykova, Zykov, 2023).

This is the first report of the chromosome number for this species in Russia. The current large-flowered garden pansy (*V. × wittrockiana*) is a hybrid originated from a cross between *V. tricolor*, *V. lutea*, and *V. altaica* and has variability in chromosome number. The chromosome number of the majority of pansy varieties is  $2n = 48$  according to Horn (1956), whereas Kroon (1972) reported  $2n = 52$ . Polyploid.

#### Conclusion

The chromosome numbers of 14 alien species in the flora of the Novosibirsk Region were studied. Most of the studied alien species are diploids. In between, *Kalimeris incisa* ( $2n = 18$ ), *Clinopodium acinos* ( $2n = 18$ ), *Daucus carota* ( $2n = 18$ ), *Apocynum cannabinum* ( $2n = 16$ ), *Veronica verna* ( $2n = 16$ ), *V. agrestis* ( $2n = 14$ ) are very rare species, whereas *Cota tinctoria* ( $2n = 18$ ) is one of the most widespread alien species in the Novosibirsk Region. *Heracleum sosnowskyi* ( $2n = 22$ ) is an invasive species, and *Myosotis sparsiflora* ( $2n = 18$ ) is a potentially invasive species in Siberia. Five studied species are polyploids. Two of them are invasive in Siberia: *Lupinus polyphyllus* ( $2n = 48$ ), *Hordeum jubatum* ( $2n = 28$ ). A potentially invasive species is *Veronica persica* ( $2n = 28$ ). *Arrhenatherum elatius* ( $2n = 28$ ) and *Viola × wittrockiana* ( $2n = 46$ ) are casual findings.

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