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

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Summary. This paper presents chromosome numbers (2*n*) for 11 alien species from the families Asteraceae, Boraginaceae, Brassicaceae, Cannabaceae, Fabaceae, Iridaceae, Onagraceae, Poaceae, collected in the Novosibirsk Region. For *Astragalus contortuplicatus* (2*n* = 16), *Chamaecytisus ruthenicus* (2*n* = 48), chromosome numbers were determined for the first time on the material from Russia; for *Cerinthe minor* (2*n* = 18) – from Asian Russia; for *Solidago gigantea* (2*n* = 36) and *Iris pseudacorus* (2*n* = 34) – from Siberia. Chromosome numbers on the material from the Novosibirsk Region were revealed for the first time for *Senecio vulgaris* (2*n* = 40), *Epilobium adenocaulon* (2*n* = 36), *Lolium perenne* (2*n* = 14). The mitotic metaphase plates' photos of 8 species are given. For all the species studied, brief notes on their general distribution and dispersal in the Novosibirsk Region are provided. The literature data on chromosome numbers from Russia are given. In cases, when the chromosome number was first determined on the Russian specimens, the corresponding references from other regions of the World where presented.

Числа хромосом некоторых чужеродных видов растений Новосибирской области: сообщение VII

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

Аннотация. Приводятся числа хромосом (2*n*) для 11 чужеродных видов из семейств Asteraceae, Boraginaceae, Brassicaceae, Cannabaceae, Fabaceae, Iridaceae, Onagraceae, Poaceae на материале из Новосибирской области. Впервые для России приводятся числа хромосом *Astragalus contortuplicatus* (2*n* = 16), *Chamaecytisus ruthenicus* (2*n* = 48), для Азиатской части России – *Cerinthe minor* (2*n* = 18), для Сибири – *Solidago gigantea* (2*n* = 36), *Iris pseudacorus* (2*n* = 34), для Новосибирской области – *Senecio vulgaris* (2*n* = 40), *Epilobium adenocaulon* (2*n* = 36), *Lolium perenne* (2*n* = 14). Приводятся фото метафазных пластинок 8 видов. Для всех исследованных видов приводятся краткие сведения по общему распространению и расселению в Новосибирской области, литературные данные по числам хромосом с территории России и, в ряде случаев, для других регионов мира.

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We continue the karyological study of alien species in the flora of the Novosibirsk Region (Zykova et al., 2024c). In this paper, we present the results for 11 species alien to the region. Most of the species were studied for the first time using material from the territories of the Russian Federation. Between them, *Senecio vulgaris* and *Epilobium adenocaulon* are invasive in Siberia. *Solidago gigantea, Lepidium ruderale, Iris pseudacorus, Lolium perenne* are relatively inactive but are considered potentially invasive species. Most of the discussed species were casually introduced to the Novosibirsk Region. *Solidago gigantea, Iris pseudacorus, Chamaecytisus ruthenicus* are being grown as an ornamental plant and can spread out of cultivated areas. 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. When specifying ploidy level, we follow the data on basic chromosome numbers (x or x_2) in "Chromosome atlas of flowering plants" (Darlington, Wylie, 1955). The Latin names of species are given in according with 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

Senecio vulgaris L., **2*n* = 40**

"Novosibirsk Region, Novosibirsk city, Serebrennikovskaya street, in the courtyards. 28 IX 2021. E. Yu. Zykova", Z976-3021 (NS0053126); "Novosibirsk Region, Novosibirsk city, Akademgorodok, between the «Obskoe More» stopping platform and Stroiteley Ave., railway embankments. 31 VII 2022. E. Yu. Zykova", E32-4922 (NS0053125) (Fig. 1A); "Novosibirsk Region, Barabinsk district, Chany lake, Lazurnaya Bay recreation center, on the lawn, 55°06'27"N, 77°47'04"E. 15 VIII 2023. D. N. Shaulo", E322 (NS0059770).

Distribution: Mediterranean-West Asian species with a secondary cosmopolitan range. Invasive species in Siberia (Antipova, 2016), widespread 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 Republic of Altai, Altai (An'kova, Zykova, 2017), Krasnoyarsk (Probatova, Krivenko, 2022) and Primorye (Probatova, 2014, and references therein) Territories, the Irkutsk Region and the Trans-Baikal Territory (Chepinoga, 2014, and references therein), th Komi Republic (Lavrenko, Serditov, 1991), the Sverdlovsk Region (Krivenko et al., 2013). Polyploid (4x).

Solidago gigantea Aiton, **2*n* = 36**

"Novosibirsk Region, Novosibirsk district, Barышevo village, horticultural association «Niva», by the road. 21 IX 2023. E. Yu. Zykova", E208-6523 (NS0059789) (Fig. 1B).

Distribution: A North American species distributed throughout the Holarctic. Potentially invasive species in Siberia (Ebel et al., 2014). Rare in the Novosibirsk city, Novosibirsk and Iskitim districts of the Novosibirsk Region (Shaulo, Zykova, 2024).

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

BORAGINACEAE

Cerinthe minor L., **2*n* = 18**

"Novosibirsk Region, Novosibirsk district, 3.5 km N Morozovo village, meadow on the side of the field road, 54°48'02" N, 83°13'41"E. 27 VIII 2021. O. E. Kosterin, T. D. Kolesnikova", E216 (NS0050564).

Distribution: Mediterranean species, very rare in Siberia. In the Novosibirsk Region, one location of the species is known in the Novosibirsk district, where the species has successfully naturalized and is spreading (Zykova et al., 2024a).

This is the first report on the chromosome number for the Asian Russia. The same chromosome number was determined in material from the Stavropol Territory (Agapova et al., 1990, and references therein). Diploid (2x).

BRASSICACEAE

Lepidium ruderale L., **2*n* = 32**

"Novosibirsk Region, Novosibirsk city, Serebrennikovskaya street, in overgrown flower beds. 19 IX 2019. E. Yu. Zykova", Z801-1919 (NS0053138);

"Novosibirsk Region, Berdsk city, Komsomolskaya street, wasteland along the narrow gauge railway. 16 VI 2022. E. Yu. Zykova", E35-2522 (NS0053137).

Distribution: Eurasian species, with a cosmopolitan secondary range. Potentially invasive species in Siberia (Ebel et al., 2014), widespread in the Novosibirsk Region (Zykova, 2019).

The same chromosome number was known for the Republic of Altai (Zykova et al., 2024b), Novosibirsk (Krasnikov, Lomonosova, 1990), Irkutsk (Chepinoga, 2014, and references therein), Sakhalin (Probatova et al., 2007, and references therein) Regions, and for Stavropol Territory (Agapova et al., 1990, and references therein). Chromosome number $2n = 16$ was mentioned for Irkutsk (Chepinoga, 2014, and references therein) and Sakhalin (Probatova et al., 2017a) Regions, Primorye (Probatova, 2014, and references therein) and Stavropol (Agapova et al., 1990, and references therein) Territories. Polyploid ($4x$).

CANNABACEAE

Cannabis sativa L., **$2n = 20$**

"Novosibirsk Region, Novosibirsk district, Verkh-Tula village, wasteland. 30 IX 2023. E. Yu. Zykova", E306-6623 (NS0059779) (Fig. 1C).

Distribution: Asian species settled in the Novosibirsk Region (Zykova, 2019).

The same chromosome number was determined in material from Altai (Probatova et al., 2019), Krasnoyarsk (Stepanov, Muratova, 1995), Trans-Baikal (Chepinoga, 2014, and references therein) Territories; Novosibirsk (Krasnikov, Shaulo, 1990), Irkutsk (Probatova et al., 2015), Amur (Probatova et al., 2005), Moscow, Saratov, Voronezh (Agapova et al., 1990, and references therein) Regions. Diploid ($2x$).

FABACEAE

Astragalus contortuplicatus L., **$2n = 16$**

"Novosibirsk Region, Novosibirsk city, sandy shore of the Novosibirsk water reservoir. 55°05' с. ш. 82°48' в. д. 12 IX 2021. T. V. Pankova", E215 (NS0050967).

Distribution: A European-Central Asian species, rare in the Novosibirsk Region. Recorded in the city of Novosibirsk, Tatarsk and Kolyvan district (Zykova et al., 2024a).

This is the third report on the chromosome number for this species. The same chromosome numbers were previously recorded by Chekhov (1935) on the material received from Saratov's Institute of Drought collected in unknown locality; and by Pavlova (1995) from Bulgaria. Diploid ($2x$).

Chamaecytisus ruthenicus (Fisch. ex Wol.) Klask. (≡ *Cytisus ruthenicus* Fisch. ex Wol.), **$2n = 48$**

"Novosibirsk Region, Novosibirsk district, the vicinity of the ski resort named after A. Tulsky, mixed forest. 7 X 2023. E. Yu. Zykova", E189-7023 (NS0059777).

Distribution: East European-Central Asian species. Occasionally grown in the Novosibirsk Region, outside cultivation noted in Novosibirsk city and the Novosibirsk district (Zykova et al., 2024a).

This is the first report of the chromosome number for this species in Russia. The same chromosome number was recorded from Poland (Zielinski, 1975). $2n = 50$ was published from SE Europe (Darlington, Wylie, 1955). Diploidized polyploid ($x_2 = 24$).

IRIDACEAE

Iris pseudacorus L., **$2n = 34$**

"Novosibirsk Region, Novosibirsk city, Kuchino swamp between the Levoberezhny and Ballastny microdistricts, the edge of a reed swamp. 7 IX 2019. O. E. Kosterin", Z824 (NS0059781) (Fig. 1D).

Distribution: Euro-Mediterranean species, with a secondary cosmopolitan range. Potentially invasive species in Siberia (Ebel et al., 2014), rare in the Novosibirsk Region (Kosterin et al., 2019).

This is the first report of the chromosome number for this species in Siberia. The same chromosome number was determined in material from Sakhalin and Leningrad Regions (Agapova et al., 1990, and references therein). Diploidized polyploid ($x_2 = 17$).

ONAGRACEAE

Epilobium adenocaulon Hausskn., **$2n = 36$**

"Novosibirsk Region, naukograd Koltsovo, gardening partnership ««Kolos», near the roads. 17 VIII 2021. T. V. Pankova, E. Yu. Zykova", E274-1821 (NS0059787); "Novosibirsk Region, Novosibirsk city, Akademgorodok, at the «Obskoe More» stopping platform, on railway embankments. 28 VII 2022. E. Yu. Zykova", E273-4622 (NS0059786).

Distribution: An American species that settled in Eurasia and Australia. Invasive species in Siberia (Buko, 2016), common in the Novosibirsk Region (Zykova, 2019).

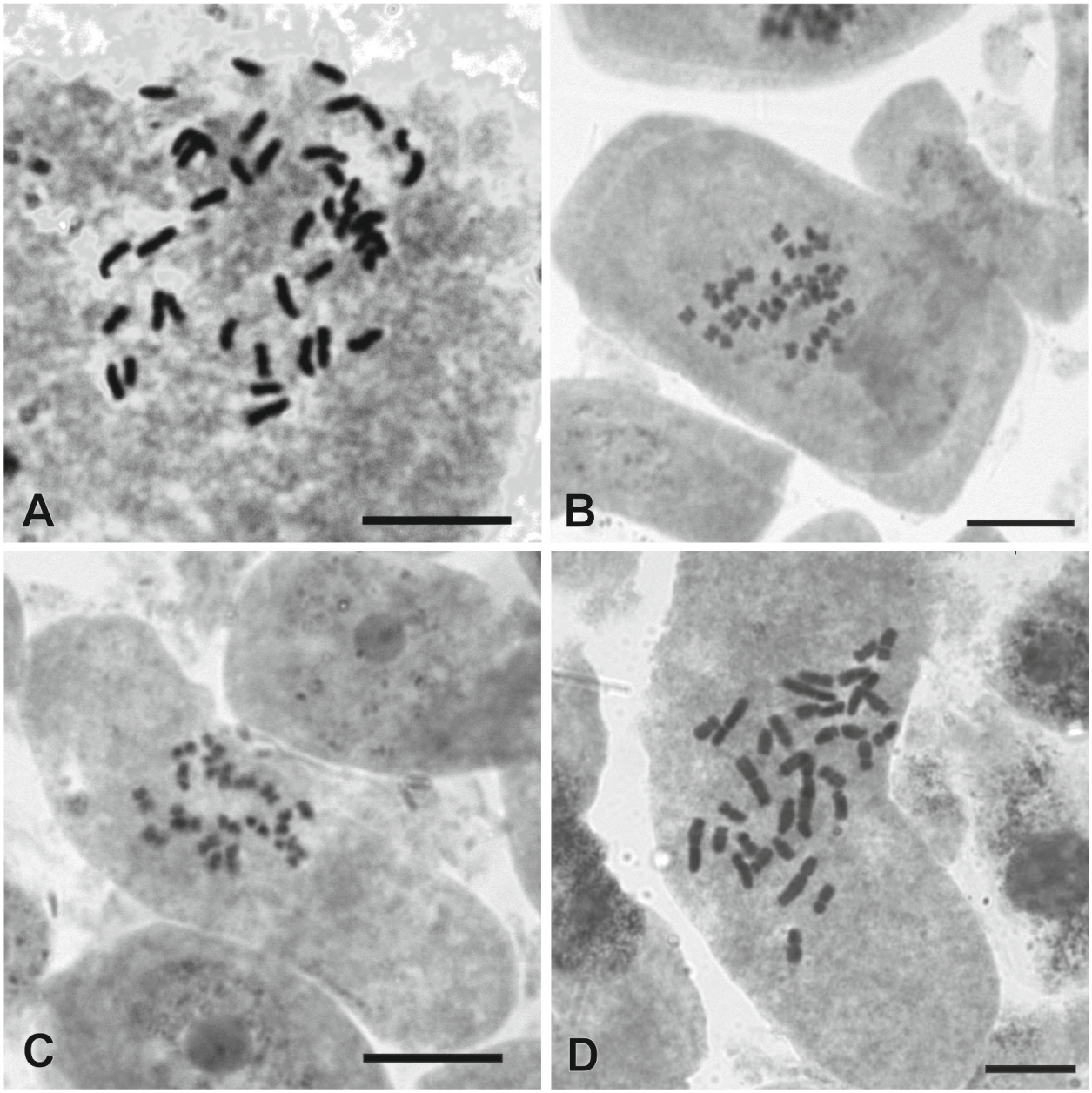

Fig. 1. Mitotic metaphases: A – *Senecio vulgaris*, 2*n* = 40; B – *Solidago gigantea*, 2*n* = 36; C – *Cannabis sativa*, 2*n* = 20; D – *Iris pseudacorus*, 2*n* = 34. Scale = 10 μm.

The chromosome number is given for the first time for the Novosibirsk Region. The same number was determined from the Republic of Altai (Zykova et al., 2021b), the Krasnoyarsk Territory (Stepanov, Muratova, 1992); Irkutsk (Chepinoga, 2014, and references therein) and Sakhalin (Probatova et al., 2006) Regions. Polyploid (4*x*).

POACEAE

Lolium perenne L., **2*n* = 14**

"Novosibirsk Region, Novosibirsk city, Akademgorodok, Nikolaeva street, wasteland, 54°85'83.75"N, 83°11'31.26"E. 07 IX 2018. E. Yu. Zykova", Z657-3618 (NS0049058).

Distribution: An Euro-Mediterranean-West Asian species. Potentially invasive species in Siberia (Ebel et al., 2014). Occasionally found in Novosibirsk city (Zykova, 2019; Zykova, Shaulo, 2021).

The chromosome number is given for the first time for the Novosibirsk Region. The same number was determined from the Republic of Altai (Zykova et al., 2021a), the Irkutsk Region (Chepinoga, 2014, and references therein), the Republic of Crimea (Agapova et al., 1993), the Krasnodar Territory (Probatova et al., 2009). Diploid (2*x*).

Panicum ruderale (Kitag.) D. M. Chang, **2*n* = 36**

"Novosibirsk Region, Novosibirsk district, Verkh-Tula village, wasteland. 30 IX 2023. E. Yu. Zykova", E269-6623 (NS0059784).

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

The same number was determined from Altai (Gnutikov et al., 2017), Krasnoyarsk (Pankova et al., 2022) and Primorye (Probatova et al., 2014, and references therein) Territories; the Novosibirsk Region (Pankova, Zykova, 2024), the Irkutsk Region, the Republic of Buryatia and the Trans-Baikal Territory (Chepinoga, 2014, and references therein). 2*n* = 18 was previously obtained on the material from the Republic of Altai (Lomonosova et al., 2018) and the Irkutsk Region (Chepinoga, 2014, and references therein). Polyploid (4*x*).

Conclusion

The chromosome numbers of 11 alien species in the flora of the Novosibirsk Region were counted: seven of them are polyploids, four are diploids. Among the invasive and potentially invasive species in the Novosibirsk Region occur tetraploids: *Lepidium ruderale* (2*n* = 4*x* = 32), *Senecio vulgaris* (2*n* = 4*x* = 40), *Epilobium adenocaulon* (2*n* = 4*x* = 36), *Panicum ruderale* (2*n* = 4*x* = 36) and diploids: *Cannabis sativa* (2*n* = 2*x* = 20), *Lolium perenne* (2*n* = 2*x* = 14). So far, rare in Novosibirsk Region are: polyploid *Solidago gigantea* (2*n* = 4*x* = 36); diploidized polyploids *Iris pseudacorus* (2*n* = 2*x* = 34) and *Chamaecytisus ruthenicus* (2*n* = 2*x* = 48) and diploids *Cerinthe minor* (2*n* = 2*x* = 18) and *Astragalus contortuplicatus* (2*n* = 2*x* = 16).

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