

# About the Finding of *Lobelia inflata* L. (Lobeliaceae) and New Locations of Alien Plant Species in Primorsky Krai

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**Abstract**—Information on the locations of alien plant species in the places of their primary naturalization or from new localities in Primorsky krai (Far Eastern Federal District) is provided. For the first time, the data are presented on an alien species new to the alien flora of Primorsky krai and the Russian Far East—*Lobelia inflata* L. (Lobeliaceae), which is actively settling in the exposition areas of the arboretum of the Komarov Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences (Primorsky krai, Ussuriysky city district). Currently, *Lobelia inflata* is beginning to penetrate into the natural cenoses adjacent to the introduced areas of the arboretum. New locations of 12 alien species of vascular plants have been established, including invasive species included in the *Black Book of Flora of the Far East* (2021): *Berteroa incana* (L.) DC., *Centaurium pulchellum* (Sw.) Druce, *Impatiens parviflora* DC., *Lotus corniculatus* L., *Leontodon autumnalis* L., *Velarum officinale* (L.) Reichenb.

**Keywords:** alien flora, floral findings, Black Book, Far East of Russia, Primorsky krai

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## INTRODUCTION

The study and monitoring of the spread of alien species due to anthropogenic transformation of the composition of regional floras are becoming increasingly relevant areas of research (Zykova and Shauro, 2020; Mikhailova et al., 2022; Li et al., 2022; Prokopenko and Kudryavtseva, 2023; Pringle, 2023). Primorsky krai is the most densely populated, industrially developed region of the Far Eastern Federal District (FEFD), as a result of which this territory is distinguished by a high level of flora adventitization, reaching 24.7% (Kozhevnikov and Kozhevnikova, 2014a). The alien flora of Primorsky krai is dominated by species that have successfully naturalized in these natural and climatic conditions: agriophytes, epecophytes, colonophytes (73.8% of the total number of alien species). Ephemerophytes (species that grow in one place for a short time) account for 26.2%. In terms of geographic origin, the majority of alien plants in Primorsky krai are Eurasian-Mediterranean and American species with wide ranges (Kozhevnikov and Kozhevnikova, 2014b).

For systematic composition of the alien complex of the flora of Primorsky krai, the largest number of specific species (compared to the flora of the Far East as a whole) found only within this region is characteristic. Of the 648 alien species, 205 specific plant species

grow in Primorsky krai, among which are *Cakile edentula* Bigelow, *Coronilla varia* L., *Centunculus minimus* L., *Strigosella africana* (L.) Botsch., and others; some families are also noted only in Primorsky krai, for example, Phytolaccaceae (*Phytolacca acinosa* Roxb.), Verbenaceae (*Verbena bracteosa* Michx.), and Zygophyllaceae (*Tribulus terrestris* L.) (Kozhevnikov and Kozhevnikova, 2011).

In recent years, researchers have continued to find new species of alien flora in Primorsky krai. Most of them are ergasiophytes (species that have “escaped from culture”): *Atriplex oblongifolia* Waldst. et Kit., *Dicentra spectabilis* (L.) Lem., *Digitalis grandiflora* Mill., *Lavatera trimestris* L., *Pulmonaria mollis* Wulfen ex Hornem., *Salvia nemorosa* L., *Viola sororia* Willd., and others (Kozhevnikova and Kozhevnikov, 2016; Kozhevnikova, 2021; Prokopenko, 2021; Fedina and Malysheva, 2024).

The aim of the research is to identify new alien species and new locations of previously known species in the flora of the southern Far East (Primorsky krai).

## MATERIALS AND METHODS

Studies of alien species have been carried out with 2019 to 2023 in the south of Primorsky krai: Vladivostok City District (VCD), Ussuriysky City District

(UCD), Nadezhdinsky and Khasansky districts. The main objects in the UUO are the arboretum of the Komarov Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences (MTS FEB RAS) and populated areas of this district. Identification of alien species was carried out using route-descriptive and stationary methods. The basis for this work was our own research and published data (Nikitin, 1979; Kozhevnikov and Kozhevnikova, 2014a; Kozhevnikova and Kozhevnikov, 2016, 2017; Kozhevnikova, 2021; etc.) and herbarium collections of the Federal Scientific Center for Biodiversity of Terrestrial Biota of East Asia of the Far Eastern Branch of the Russian Academy of Sciences (VLA), Botanical Garden Institute of the Far Eastern Branch of the Russian Academy of Sciences (VBGI), Komarov Botanical Institute of the Russian Academy of Sciences (LE), Moscow State University (MW), and electronic resources (Plantarium..., 2024; iNaturalist..., 2024).

The invasive status is given according to the scale published in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021): (1) alien species that are actively penetrating into natural and seminatural communities, forming large monodominant thickets, and displacing species of natural flora; (2) alien species that are actively spreading and naturalizing in disturbed, seminatural, and natural habitats; (3) alien species that are currently spreading and naturalizing in disturbed habitats; in the course of further naturalization, some of them will apparently be able to penetrate into seminatural and natural communities. The degree of naturalization of alien plants was assessed according to the classification proposed in the work of Vinogradova et al. (2010). Information on the primary ranges of alien species is provided in the summary *Vascular Plants of the Soviet Far East* (Sosudistye..., 1985–1996) and the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

The names of plants are given according to the summary *Vascular Plants of the Soviet Far East* (Sosudistye..., 1985–1996), taking into account the data of IPNI (International Plant Names Index, 2024). Identification of *Lobelia inflata* L. was conducted by D.A. Bochkov (Department of Ecology and Geography of Plants, Moscow State University) on the iNaturalist platform. Morphological description and range of *L. inflata* taken from the Agricultural Electronic Library of Knowledge (Agricultural Electronic Library of Knowledge..., 2024). Herbarium samples of collected plants were transferred to regional herbariums: Federal Scientific Center for Biodiversity of Terrestrial Biota of East Asia, Far Eastern Branch of the Russian Academy of Sciences (VLA); Botanical Garden Institute, Far Eastern Branch of the Russian Academy of Sciences (VBGI).

## RESULTS AND DISCUSSION

Floristic research has revealed a new alien species for the flora of the Far Eastern Federal District *Lobelia inflata* L. (Lobeliaceae Burnett), growing in Primorsky krai on exhibition areas of the arboretum of MTS FEB RAS.

### *A New Alien Species for the Flora of the Russian Far East*

#### *Lobelia inflata* L. (Lobeliaceae)

Annual plant with height of 40–90 cm, with a fine fibrous root system.

Natural range: North America, Canada.

Invasive status in Primorsky krai: 2–3.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

First observation of *L. inflata* on the iNaturalist platform for the Russian Far East (Primorsky krai) was recorded by T.G. Repina (September 17, 2019) at the “East Asian” section of the arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences on the northern slope, closer to the natural forest (oak forest with shrubs and herbs). There is no reliable information that this species was bred on purpose. Apparently, an accidental introduction occurred.

Since the largest number of specimens of *L. inflata* grows on the American section of arboretum (the section was founded in 1965), then, probably, the seeds of this species got here with the seeds other North American plants from countries where *L. inflata* grows in its natural range (United States and Canada).

In the arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences, this is an annual plant; it blooms from July to October (Fig. 1), bears fruit abundantly (fruit set up to 90%), and forms high-quality seeds (seed germination rate of 75–80%).

*L. inflata* grows in the following exhibition areas of the arboretum:

(1) American section (43°41'19" N, 132°09'25" E), lower part of the southern slope (Fig. 2). An open space near the plantings of *Padus virginiana* L. The soil is gritty, periodically dry. Up to a hundred flowering plants of *L. inflata* have been discovered (July–September 2023), as well as more numerous vegetative specimens. It is possible that this population is the initial one, from where the species began to spread to other parts of the arboretum. The projective cover of the herbaceous layer is 70%. The main background is created by cereals and *Digitalis grandiflora* Mill.

(2) Central section (43°41'29" N, 132°09'13" E). The middle part of the northern slope with a slope of 3°–5°. The soil is quite fertile and moist. *L. inflata* here has been found in a small number of specimens under the canopy of plantings of *Pinus strobus* L.,

crown density of 0.8. The grass cover is sparse, the coverage is 50%, and no dominant species have been identified: *Vicia unijuga* A.Br., *Geranium wilfordii* Maxim., *Commelina communis* L., *Phryma asiatica* (Hara) O. et J. Degener, *Adenocaulon adhaerescens* Maxim., *Persicaria hydropiper* (L.) Spach, *Podocarpium mandshuricum* (Maxim.) Czer.

(3) East Asian section (43°41'28" N, 132°09'10" E). The middle part of the northern slope is 8°–10° steep. Several single plants of *L. inflata* have been found under the canopy of *Abies sachalinensis* (F. Schmidt) Mast., crown density of 0.8. The soil is quite fertile and moist. The total grass cover is 60%. The herbage is dominated by *Adenocaulon adhaerescens*, *Oxalis acetosella* L., and *Sanicula rubriflora* Fr. Schmidt ex Maxim.; rare is *Geranium wilfordii*; isolated is *Athyrium filix-femina* (L.) Roth.

(4) European section. The lower part of the southern slope with a steepness of 3°–5° (43°41'21" N, 132°09'09" E). The soil is quite fertile, moist with periodic waterlogging after precipitation. There is a low-traffic forest road along the border of the site, as well as an open clearing. Numerous plants of *L. inflata* have been discovered of different ages, including flowering ones. The total grass cover is 100%. The main background is formed by cereals: *Milium effusum* L., *Elytrigia repens* (L.) Nevski, and *Festuca ovina* L.; isolated are *Bidens frondosa* L., *Plantago depressa* Willd., and *P. major* L.

(5) The section of mineralized firebreak between the European and North American sections (43°41'20" N, 132°09'18" E). The foot of the southern slope, the place is horizontal and level. The fertile soil layer has been removed; moisture is sufficient. The tree canopy density is 0.7. *L. inflata* grows here in three separate clumps of 15–20 individuals. The grass cover is sparse, with a coverage of about 50%. The base of the grass stand is made up of sedges: *Carex ussuriensis* Com., *C. xyphium* Com., *C. siderosticta* Hance, *Adenocaulon adhaerescens*, and *Plantago major*; isolated are *Artemisia stolonifera* (Maxim.) Com. and *Agrimonia pilosa* Ledeb.

(6) European section, middle part of the southern slope (43°41'24" N, 132°09'13" E). A walking trail along the border of the site and natural forest. Open location, shaded only in the afternoon. The soil is gritty, periodically dry. Two flowering plants of *L. inflata* and several vegetative specimens have been found. Grass cover with a total coverage of 90%. The main background is created by cereals, rare is *Trifolium pratense* L.; isolated is *Vicia unijuga*.

(7) Kotlovan section, near the plantings of *Pinus funebris* Kom., open space (43°41'33" N, 132°09'53" E). The soil is gritty, periodically dry. Two clumps of *L. inflata* 10–15 individuals and several separately growing plants have been discovered. Grass cover with a total coverage of 100%. The main background is



**Fig. 1.** *Lobelia inflata* in the arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences.

formed by grasses and *Digitalis grandiflora* Mill., which aggressively displaces native plant species.

Herbarium collection: UCD, arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences, American section, open area, flowering, (43°41'19" N, 132°09'25" E). September 1, 2023. L.A. Fedina and S.K. Malysheva (VLA, VBG).

#### *New Locations of Alien Plants in Primorsky Krai*

##### *Trigonella caerulea* (L.) Ser. (Fabaceae)

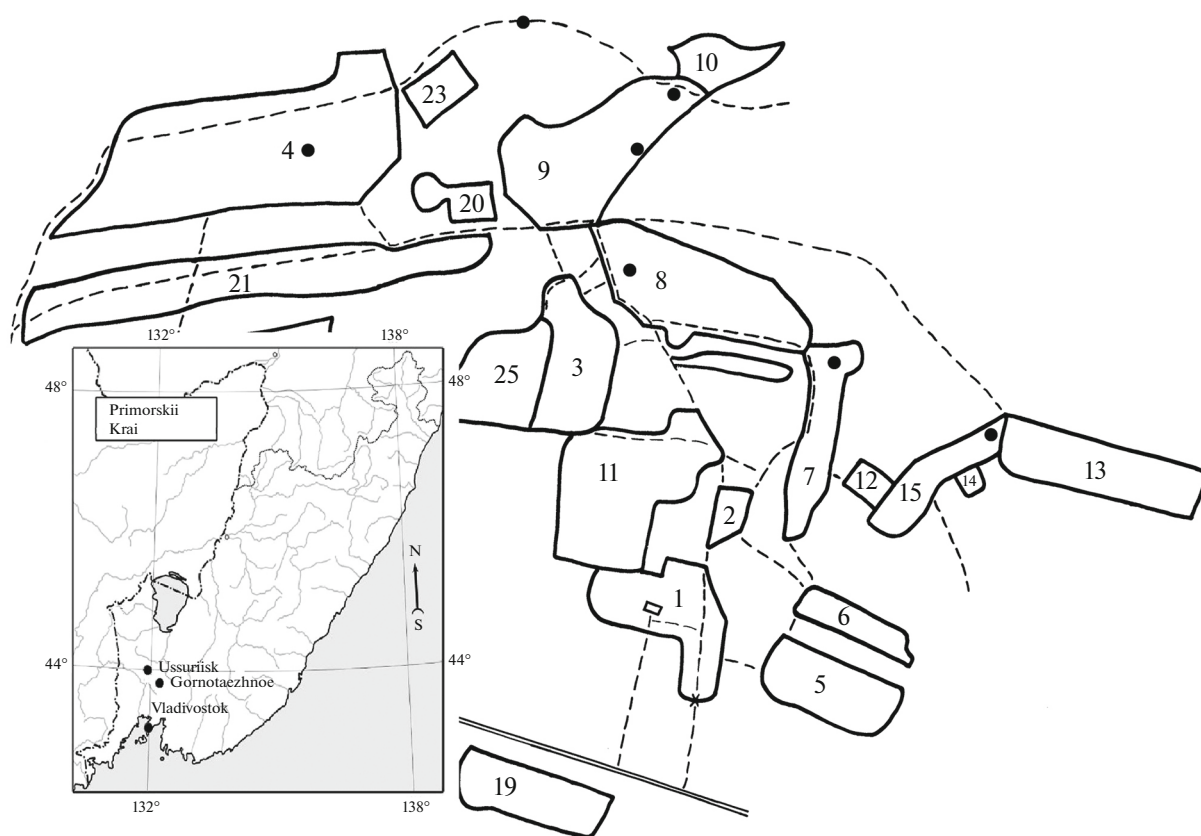
An annual or biennial herbaceous plant up to 60 (100) cm tall, taproot monocarpic.

Natural range: Mediterranean.

Invasive status in Primorsky krai: 3.

According to the degree of naturalization, it is a colonophyte, the vector of invasion is unintentional introduction.

It occurs very rarely in Primorsky krai. The species is widespread in the European part of Russia and in the Caucasus, and it grows in meadows, along roads, and in wastelands. It is cultivated as a fodder, spice, and nectariferous plant (Sachivko and Bosak, 2017;



**Fig. 2.** Locations of *Lobelia inflata* in the arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences (exhibition areas): (4) American, (7) East Asian, (8) Central, (9) European, (15) Kotlovan. (●) Places of growth of *Lobelia inflata*.

Bobos, 2021). It is noted to grow in Rostov oblast and Krasnodar krai. (Plantarium..., 2024; iNaturalist..., 2024). In the collection *Vascular Plants of the Soviet Far East* (Sosudistye..., 1985–1996), several growing points in Primorsky krai are indicated. We discovered the population of *T. caerulea* in a new microdistrict of Vladivostok.

Herbarium collection: Primorsky krai, Vladivostok, Snegovaya Pad microdistrict, Anna Shchetinina street, near the Samberi supermarket, on a slope in bloom, a small coenopopulation (up to 30 plants) (43°9'43" N, 131°57'9" E). June 27, 2023. L.A. Fedina (VBGI).

#### *Lotus corniculatus* L. (Fabaceae)

A perennial herbaceous plant up to 30 (40) cm tall, taproot polycarpic.

Natural range: Europe, Mediterranean, Asia Minor, India.

Invasive status in Primorsky krai: 2.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

*L. corniculatus* occurs frequently in Primorsky krai. For the first time in this region, the species was discovered in 1920 in the vicinity of the city of Ussuriysk. Until the 1990s, it was considered a rare alien species, after which it began to actively spread in the southern part of Primorsky krai. It grows in Mikhailovsky, Lazovsky, Nadezhdinsky, Partizansky, Khankaysky, Khasansky, Shkotovsky, and Yakovlevsky districts; VCD, Artyom City District (ACD), and UCD; and Arsenyev and Nakhodka. Currently, in the ACD and in the Shkotovsky district, the numerous flowering plants on the railway embankments form an aspect in July (Vinogradova et al., 2021). We also noted *L. corniculatus* as an aspect species in the UCD along the sides of the Ussuriysk–Kamenushka road (over a distance of 10 km).

It is included in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collections: Primorsky krai, UCD, in the southeastern part of the outskirts of Ussuriysk, opposite the cardboard factory, flowering (43°46'36" N, 132°3'2" E). July 12, 2023. L.A. Fedina (VBGI); Primorsky krai, UCD, Ussuriysk–Kamenushka roadside, flowering (43°41'12" N, 132°5'26" E). July 29, 2023. S.K. Malysheva (VBGI).



***Persicaria hydropiperoides* (Michx.) Small**  
(Polygonaceae)

An annual or biennial herbaceous plant up to 50 (80) cm tall, taproot monocarpic.

Natural range: North and South America.

Invasive status in Primorsky krai: 3.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, it occurs very rarely. In the summary *Vascular Plants of the Soviet Far East* (Tsvelev, 1989), two locations are indicated: Vladivostok and Ussuriysk.

Herbarium collection: Primorsky krai, UCD, village of Kaimanovka, Komarova st., in a roadside ditch, flowering (43°37'57" N, 132°13'51" E). September 10, 2023. L.A. Fedina (VBGI).

***Impatiens parviflora* DC. (Balsaminaceae)**

An annual or biennial herbaceous plant up to 60 cm tall, taproot monocarpic.

Natural range: Central Asia.

Invasive status in Primorsky krai: 2.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is encountered fairly often. It began to spread in the region in the 2000s. The first collections in the area were made in 2002 in the city of Vladivostok (Pervaya Rechka district) (Prokopenko and Kudryavtseva, 2023). In recent years, this alien species has been spreading widely in Vladivostok and its suburbs (iNaturalist, 2024). Habitats have been discovered in the city of Nakhodka, as well as in Nadezhdinsky (settlement of Razdolnoye) and Mikhaylovsky (settlement of Novoshakhtinsky) districts. Its encroachment into secondary shrub communities has been noted (Vinogradova et al., 2021). For the first time, we report *I. parviflora* in the UCD.

The species is included in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collection: Primorsky krai, Ussuriysk, Kozhzhavod, ditch along the road, large population (up to 100 plants), flowering (43°45'52" N, 132°0'24" E). August 26, 2023. S.K. Malysheva (VBGI).

***Leontodon autumnalis* L. (Asteraceae)**

Perennial herbaceous plant up to 40–(60) cm tall, taproot polycarpic.

Natural range: Europe, Mediterranean, Scandinavia, European part of Russia, Caucasus, Western Siberia.

Invasive status in Primorsky krai: 2–3.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is encountered fairly often. The first recorded occurrence was in 1919 in the area of what is now the city of Ussuriysk. Since the 1980s, the species has spread widely throughout Vladivostok and its suburbs, and it can also be found on islands such as Russky, Askold, and Reineke. Most collections have been made in the southern districts of the region, Khasansky, Nadezhdinsky, Mikhaylovsky, Chernigovsky, Pogranichny, Anuchinsky, and Partizansky, and in the city districts of Vladivostok, Ussuriysk, and Artyom (Vinogradova et al., 2021).

It grows in the Kedrovaya Pad and Ussuriysk nature reserves (Korkishko, 2000; Flora, 2006). We have also noted the species along the A-360 highway (Ussuriysk–Vladivostok), often near gas stations, roadside cafes, and shops; in Lazurnaya Bay (VCD), numerous *L. autumnalis* plants grow near the camping cottages.

The species is included in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collections: Primorsky krai, UCD, village of Gornotaezhnoye, clearing near an office building, mass flowering (43°41'44" N, 132°9'26" E). September 15, 2023. L.A. Fedina and S.K. Malysheva (VBGI; VLA); Primorsky krai, UCD, southeastern outskirts of Ussuriysk, opposite the cardboard factory, flowering (43°46'34" N, 132°3'2" E). July 12, 2023. L.A. Fedina (VBGI); Primorsky krai, Nadezhdinsky district, village of Alekseyevka, gas station area, flowering (43°33'25" N, 131°57'42" E). August 26, 2023. S.K. Malysheva (VBGI).

***Xanthoxalis stricta* (L.) Small (Oxalidaceae)**

A perennial herbaceous plant up to 30 (40) cm in height, thin-long-rhizome stoloniferous polycarpic.

Natural range: North America.

Invasive status in Primorsky krai: 2.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is rare. Its occurrence has been noted in Khasansky district (gravel beds of the Ryzanovka and Poyma rivers), in the village of Vityaz; in Shkotovsky district (village of Shkotovo); in Kavalersky district (gravel beds of the Zerkalnaya River, MW0112527), village of Kavalerovo; and in Vladivostok City District, Artyom City District, Ussuriysk City District, and the city of Nakhodka (Pospelova et al., 2019; Dmitrieva and Chernomyrdina, 2020; iNaturalist..., 2024). We collected specimens from the introduction of nursery beds of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences (UCD).

The species is listed in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collection: Primorsky krai, UCD, village of Gornotayozhnoye, nursery of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences, flowering (43°41'42" N, 132°9'16" E). September 1, 2023. S.K. Malysheva (VBGI).

***Symphytum caucasicum* M. Bieb. (Boraginaceae)**

Perennial herbaceous plant up to 100–150 cm tall, short-rhizome polycarpic.

Natural range: Caucasus.

Invasive status in Primorsky krai: 1–2.

According to the degree of naturalization, it is an epiphyte; the invasion vector is ergasiophyte.

In Primorsky krai, this species is quite abundant. It is often used in cultivation, frequently escapes into the wild, and forms monodominant thickets. In recent years, it has spread widely throughout Vladivostok and its suburbs, and it is found in the Khasansky, Terneysky, and Nadezhdinsky districts, as well as in Artyom City District and the cities of Spassk-Dalny, Dalnerechensk, Dalnegorsk, and Ussuriysk. In the vicinity of Nakhodka, naturalization of *S. caucasicum* into roadside meadow and shrub communities has been observed (iNaturalist..., 2024).

We noted it in Khasansky district, where it grows along 50 Let Oktyabrya street in the village of Slavyanka (42°51'51" N, 131°23'54" E). The species was also found in Vladivostok on the slopes of 2 Kirov street (43°10'5" N, 131°54'43" E), and was quite abundant on the slope leading to Steklyanukha Bay (Vladivostok City District, 43°8'44" N, 132°3'17" E). In UUO (village of Gornotayozhnoye), a large population of *S. caucasicum* (over 50 m<sup>2</sup>) grows on fallow land.

The species is listed in the *Black Book of Flora of the Far East* as one of the most dangerous invasive species (Vinogradova et al., 2021).

Herbarium collection: Primorsky krai, UCD, village of Gornotayozhnoye, abandoned garden, fruiting (43°41'39" N, 132°9'21" E). September 2, 2023. S.K. Malysheva (VBGI).

***Neslia paniculata* (L.) Desv. (Brassicaceae)**

An annual or biennial herbaceous plant up to 80 cm tall, taproot monocarpic.

Natural range: Europe, Mediterranean.

Invasive status in Primorsky krai: 3.

According to the degree of naturalization, it is an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is rare. It has been recorded in the vicinity of Vladivostok (1967,

VBGI117478), in Shkotovsky district (1967, VBGI117475; 1947, MW0960150), Mikhaylovsky district (1983, VBGI117474), Nadezhdinsky district (2014, VBGI89471), Khasansky district (2014, VBGI88634), and Kavalersky district (1973, MW0080816), as well as in the city districts of Artyom (2004, VBGI117470) and Ussuriysk and in the villages of Kaimanovka (2010, VBGI89890) and Kamenushka (2013, VBGI32254). It occurs as isolated specimens in the Ussuriysk Nature Reserve (*Flora...*, 2006) and in the Lazovsky Nature Reserve, where it has been found in crops near a ranger station (1945, MW0080815).

We identified it in UCD in the village of Kaimanovka, along a field road, with a few plants (43°38'2" N, 132°13'52" E, flowering, July 7, 2023) and at the nursery in the village of Gornotayozhnoye. In Vladivostok, it grows on slopes near new buildings in the Snegovaya Pad residential area (43°9'37" N, 131°57'15" E, near a playground on Anna Shchetinina street).

Herbarium collection: Primorsky krai, UCD, village of Gornotayozhnoye, among weeds in the nursery of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences, isolated plants, late flowering (43°41'42" N, 132°9'17" E). July 23, 2023. S.K. Malysheva (VBGI).

***Cichorium intybus* L. (Asteraceae)**

An annual or biennial herbaceous plant up to 100 cm tall, taproot monocarpic.

Natural range: Mediterranean, Eurasia, North Africa.

Invasive status in Primorsky krai: 2–3.

In terms of naturalization, it is classified as an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is now commonly encountered. Numerous populations have been observed in Mikhaylovsky, Chernigovsky, Shkotovsky, and Spassky districts, as well as in the city districts of Vladivostok, Ussuriysk, Dalnegorsk, Partizansk, and Nakhodka and on Reineke and Russky islands (iNaturalist..., 2024).

We discovered the species in Vladivostok, Snegovaya Pad residential area, near the Samberi supermarket, in a flowering state (43°9'43" N, 131°57'11" E, September 16, 2023). It has spread widely along the road near Patrokl Bay (Vladivostok City District). In UCD it grows along roads leading to the villages of Gornotayozhnoye, Kondratenovka, and Glukhovka and to the city of Ussuriysk. It is also found as individual specimens in Nadezhdinsky district along the A-370 federal highway (Vladivostok–Khabarovsk). In recent years, *C. intybus* has shown a tendency toward widespread dispersal in the region.

Herbarium collection: Primorsky krai, Vladivostok, slope across from the house at 15 Anna Shche-

tinina street, numerous population, flowering (43°9'43" N, 131°57'10" E). October 22, 2023. L.A. Fedina (VLA, VBG1).

***Centaurium pulchellum* (Sw.) Druce (Gentianaceae)**

Annual plant 5–15 cm tall, taproot monocarpic.

Natural range: Europe.

Invasive status in Primorsky krai: 2.

In terms of naturalization, it is classified as an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is rare. It was first discovered in 1964 in the village of Mramorny in the Khasansky district. In 1979, it was found in a weedy meadow in the Rakovka River delta near Ussuriysk and in the vicinity of Vladivostok (Ugolnaya Station) in a coastal meadow (Nechaeva, 1981). Currently, its occurrence has been recorded in Khasansky, Nadezhdinsky, Chernigovsky, Partizansky, and Shkotovsky districts, as well as in the urban districts of Vladivostok, Artyom, Ussuriysk, Nakhodka, and Dalnegorsk and on Russky and Popov islands (Vinogradova et al., 2021). Despite its rare occurrence, *C. pulchellum* shows a tendency to spread.

It is listed in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collection: Primorsky krai, UCD, southeastern outskirts of Ussuriysk, opposite the cardboard plant, a few specimens in flowering condition (43°46'42" N, 132°2'57" E). July 12, 2023. L.A. Fedina (VBGI).

***Berteroa incana* (L.) DC. (Brassicaceae)**

Biennial plant, 25–70 cm tall, taproot polycarpic.

Natural range: Eurasia, Mediterranean.

Invasive status in Primorsky krai: 2–3.

In terms of naturalization, it is classified as an epiphyte; the invasion vector is unintentional introduction.

In Primorsky krai, the species is common but occurs in small numbers. It was first collected in 1920 on a railway embankment near Ussuriysk. By the 1990s, the species had spread fairly widely across the region. Currently, it is found in Dalnerechensky, Nadezhdinsky, Khasansky, Spassky, Chernigovsky, Khorolsky, Mikhaylovsky, Lazovsky, Shkotovsky, Partizansky, Dalnegorsky, Khankaysky, Kavalerovsky, and Chuguyevsky Districts; in the city districts of Nakhodka, Ussuriysk, and Vladivostok; and in Dalnerechensk. In 2022, it was discovered on Russky Island (Vinogradova et al., 2021; iNaturalist..., 2024), and it also grows in the Ussuriysk Nature Reserve (Flora..., 2006).

It is listed in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collection: Primorsky krai, UCD, village of Kaimanovka, wasteland near a dried-up pond on Komarov street, flowering (43°37'58" N, 132°13'41" E). July 4, 2023. L.A. Fedina (VBGI).

***Velarum officinale* (L.) Reichenb. (Brassicaceae)**

An annual herbaceous plant 25–50 cm tall, taproot monocarpic.

Natural range: Eurasia, Mediterranean.

Invasive status in Primorsky krai: 2–3.

In terms of naturalization, it is classified as an epiphyte; the invasion vector is unintentional introduction.

This species is abundant in Primorsky krai and was first collected in 1911 near Vladivostok. It grows in the districts of Dalnerechensky, Krasnoarmeysky, Dalnegorsky, Khasansky, Lazovsky, Chernigovsky, Shkotovsky, Nadezhdinsky, Partizansky, Kavalerovsky, and Terneysky, as well as in the city districts of Ussuriysk, Nakhodka, Vladivostok, and Artyom. It is also found on the Russky, Reineke, and Falshiviy islands and in the Ussuriysk and Lazovsky nature reserves (Flora..., 2006; Vinogradova et al., 2021; iNaturalist..., 2024).

We recorded *V. officinale* in the Snegovaya Pad new residential area in Vladivostok, as well as in the villages of Gornotaezhnoye and Kaimanovka in UCD.

It is listed in the *Black Book of Flora of the Far East* (Vinogradova et al., 2021).

Herbarium collections: Primorsky krai, UCD, village of Kaimanovka, wasteland near a dried-up pond on Komarov street, flowering (43°37'55" N, 132°13'57" E). June 25, 2023. L.A. Fedina (VBGI); Primorsky krai, UCD, village of Kaimanovka, roadside of a field road, fruiting (43°38'23" N, 132°14'36" E). July 8, 2023. L.A. Fedina (VBGI).

## CONCLUSIONS

*Lobelia inflata* is a new alien species for the flora of the Far Eastern Federal District as a whole. Five-year observations (2019–2023) showed that plants of *L. inflata* go through a full development cycle during the growing season and form full-fledged seeds. The characteristics of generative development indicate good potential for further naturalization of this species. Plants of *L. inflata* grow in open clearings along the border of natural forests and in the exhibition areas of the arboretum of the Mountain Taiga Station of the Far Eastern Branch of the Russian Academy of Sciences.

Identified new locations of alien plants on the territory Primorsky krai show that the area of their growth has increased. Also, alien species were discovered in places where they had not been previously noted. Thus, for the first time in the Ussuriysk City District, the alien species *Impatiens parviflora* is indicated. The incidence of *Cichorium intybus* has

increased significantly in recent years in the south of Primorsky krai, which, on the basis of the speed of its spread, is a contender to be included in the next edition of the *Black Book of Flora of the Far East*. In the future, monitoring of newly identified populations of alien species is necessary.

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#### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This work does not contain any studies involving human and animal subjects.

#### CONFLICT OF INTEREST

The authors of this work declare that they have no conflicts of interest.

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