

STATUS OF SOME ESCAPED ORNAMENT PERENNIALS IN THE FLORA OF LATVIA

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Abstract

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This paper introduces eight ornamental perennial garden escapees that were recorded by the authors of this article on Lucavsala Island, Riga (Latvia) in 2016. Our data on *Achillea ptarmica* cv. ‘Boule de Neige’, *Artemisia ludoviciana*, *Asclepias syriaca*, *Campanula lactiflora*, *Heliopsis helianthoides*, *Lathyrus latifolius*, *Phlox paniculata* and *Rudbeckia hirta* contribute to the knowledge about the occurrence of these taxa in wild. All these species are also growing in the collection of ornamental perennials in the Botanical Garden of the University of Latvia. A review of these species in Latvian herbarium collections has been conducted. Five species, *Heliopsis helianthoides*, *Artemisia ludoviciana*, *Campanula lactiflora*, *Lathyrus latifolius*, *Phlox paniculata*, were observed for the first time outside cultivation forming relatively stable, reproducing populations. Two species, *Achillea ptarmica* multiplex cultivar and *Rudbeckia hirta*, were previously observed in seminatural habitats and, thus, considered as casual aliens at the naturalization stage. One of the species, *Asclepias syriaca*, was considered a new to Latvia casual alien species with high potential of invasiveness.

Keywords: adaptation, casual aliens, cultivars, naturalization, ornamental perennials.

INTRODUCTION

The role of ornamental horticulture in alien plant invasion has been intensively investigated during the last three decades. Ornamental plants comprise nearly 40% of all naturalized species in Europe (LAMBTON et al., 2008). For example, in alien flora of Belgium, 33.52% of taxa are exclusively horticultural aliens, and 28% of these are naturalized (VERLOOVE, 2006). In Czech Republic (PYŠEK et al., 2012), alien taxa comprise 29.7–33.1% of the total number of the countries’ vascular plant species; in Poland – 42.7% (TOKARSKA-GUZIŃSKA, 2003); in Lithuania – 30% (GUDZINSKAS, 2009); in Estonia – 35% (ÕÕPIK et al., 2008). The number of alien plants escaping from cultivation is steadily increasing. The number of casuals

and garden escapees has dramatically increased during the last decades, although only small proportion of these is considered invasive (VERLOOVE, 2006).

Increasing variety in assortment and import of new ornamental perennial taxa to nurseries in Latvia poses a risk of new alien plant escape cases (ANON., 2014). Among them, there are invasive species, which have already spread across Central Europe and some other countries, e.g. *Asclepias syriaca* L. and *Clematis vitalba* L. (DAISIE, 2018).

In many cases, alien plant species have escaped from collections of botanical gardens. In early invasion stage, they have first established in the garden territories and in human-created habitats, later becoming widespread across larger areas and variety of habitats (VINOGRADOVA et al., 2010, 2016; HEYWOOD, 2011;

HULME, 2011; NOBANIS, 2018; VAN KLEUNEN et al., 2018). Diversity and composition of species in the cultivated ornamental flora, especially in private gardens, are poorly studied; no studies were found in literature, although these gardens are primary sources of propagules of alien species (PERGL et al., 2016).

In the Checklist of Vascular Plant Flora of Latvia, compiled by GAVRILOVA & ŠULCS (1999), 293 taxa (15.1%) are considered as escaped cultivated aliens. These include 61 (21% of alien flora in Latvia) escaped ornamental perennial species. The Checklist of Alien Plant Species in Latvia (EVARTS-BUNDERS et al., 2016; ANON., 2018) includes 35 species, which are introduced as perennial ornamentals, six of these are classified as invasive (SVILĀNS et al., 2007; ANON., 2018). Five species (*Lupinus polyphyllus* Lindl., *Reynoutria japonica* Houtt., *R. sachalinensis* (F.Schmidt) Nakai, *Solidago canadensis* L., *S. gigantea* Aiton) are included in the national monitoring programme (EVARTS-BUNDERS et al., 2015) that is aimed at collecting statistically verified data about the distribution patterns and spreading rate of species, their impact on natural and seminatural habitats. The differences in checklists of escaped alien ornamentals are caused by insufficient herbaria materials and published records. There are some publications about the *Sedum* genus (LAIVIŅŠ & JERMĀCĀNE, 1999; RUTKOVSKA & ZEILA, 2009), about alien flora in southern Latvia (EVARTS-BUNDERS et al., 2012; RUTKOVSKA et al., 2011; GUDŽINSKAS & PETRULAITIS, 2016; RUTKOVSKA et al., 2017). The distribution and dynamics of invasive neophytes in Latvia and two model areas have been studied by PRIEDE (2009a). Still, these studies do not provide sufficient amount of data to compile comprehensive checklists.

Throughout the world, tools for assessing invasiveness potential and invasion risks of newly introduced species are increasingly used, modified and adapted to specific needs of the particular country or region (DEHNEN-SCHMUTZ et al., 2007; ANDREU & VILÁ, 2009; CONSER et al., 2015). One of the aims of botanical gardens is to identify potentially invasive taxa among the recently introduced species, to warn about their potential invasiveness to prevent their introduction and cultivation. This requires development of methods that allow to identify the invasive and potentially invasive species and to prevent their further spread outside cultivation and becoming

invasive at regional and national level (NĀBURGA-JERMAKOVA, 2010a, b).

The aim of our study was to identify some of new potentially invasive escaped ornamentals with a tendency of spreading outside cultivation in desolated garden areas and to assess their spreading potential.

MATERIALS AND METHODS

To find out new cases of escaped cultivated ornamental perennials and to collect herbaria, a family garden colony area in Riga (Latvia) was examined in July 2016. The study area was located on Lucavsala Island (56°55' N, 24°07' E), about 17 km upstream from the mouth of the Daugava River near the centre of Riga. The garden colony was established in 1907 and actively used until the 1990s. The entire allotment area is composed of many small plots and some old private houses. Currently, the plots are partly abandoned. Due to spring floods and unstable sandy ground, construction in this area is prohibited.

In the study area, we collected herbaria of ornamental plants, which were propagating (had seedlings or self-sowing was observed) or reproduced vegetatively across areas, which had been abandoned for longer time. The collected specimens were deposited at the Herbarium of Daugavpils University and registered in the Herbarium database (db.biology.lv). The locations of herbaria specimens were linked to the coordinates of the Latvian Biological Inventory Square Network (BISN), where each grid unit is identified by a combination of two numbers, e.g. 14 – 27 (TABAKA et al., 1977; KRAMPIS, 2012).

Additionally, several herbaria collections in Latvia were examined to check previous records of the species, which had been found in our study area in Lucavsala. We explored the herbaria collections of the Institute of Biology, the University of Latvia (LATV), the herbarium by A. Rasiņš (RAS), Daugavpils University (DAU), the Herbarium Balticum (RIG I), the Herbarium Latvicum (RIG II). We used these data to estimate the frequency and character of the habitats of species that we recorded during our field study.

The data on growth, flowering, start and lasting of fruiting phases were acquired from the collections of ornamental perennials in the Botanical Garden of the University of Latvia (archive of phenological

data was observed from 1995 to 2016). Multi-annual archive data on time of first introduction, vegetative expansion speed and self-sowing cases of collection plant in different garden habitats were used. The data were collected for recently introduced herbaceous ornamental plants to investigate the adaptation degree using the framework by BYLOV & KARPISOVA (1978).

The approach of assessing invasiveness follows the terminology by RICHARDSON et al. (2000) and PYŠEK et al. (2004). Casual alien plants are species that may flourish and even reproduce occasionally in an area, but which do not form self-replacing populations, and which rely on repeated introductions for their persistence. Casual plants may be classified into different groups that are based on individuals surviving and ability to form populations (BLACKBURN et al., 2011; PYŠEK et al., 2012). Casuals that start forming self-replacing populations enter naturalization and dispersal stage.

The nomenclature of plant taxa and geographic distribution follows Zander dictionary (ERHARDT et al., 2002), the abbreviations of author names – BRUMMITT & POWELL (1992).

RESULTS AND DISCUSSION

Eight ornamental perennial taxa escaped from cultivation were recorded during our field studies on Lucavsala Island (Riga, Latvia): *Achillea ptarmica* cv. Boule de Neige, *Artemisia ludoviciana* Nutt., *Asclepias syriaca* L., *Campanula lactiflora* M. Bieb., *Heliopsis helianthoides* (L.) Sweet, *Lathyrus latifolius* L., *Phlox paniculata* L. and *Rudbeckia hirta* L. In herbaria collections, 18 specimens of these eight species collected previously were found (Fig. 1, Appendix 1). In Latvia, all alien species recorded on Lucavsala Island within our study have been rarely recorded in wild (except for *Heliopsis helianthoides*, which was first recorded in wild only during our field surveys in 2016).

Achillea ptarmica cv. Boule de Neige

Achillea ptarmica is native to Europe – the northern part of Spain and Italy, southwestern Romania and southern Russia, where it grows mainly in damp meadows (TUTIN et al., 1976). Their forms with double or semi-double flowers are common in gardens. The cultivar Boule de Neige (synonym: 'Schnee-

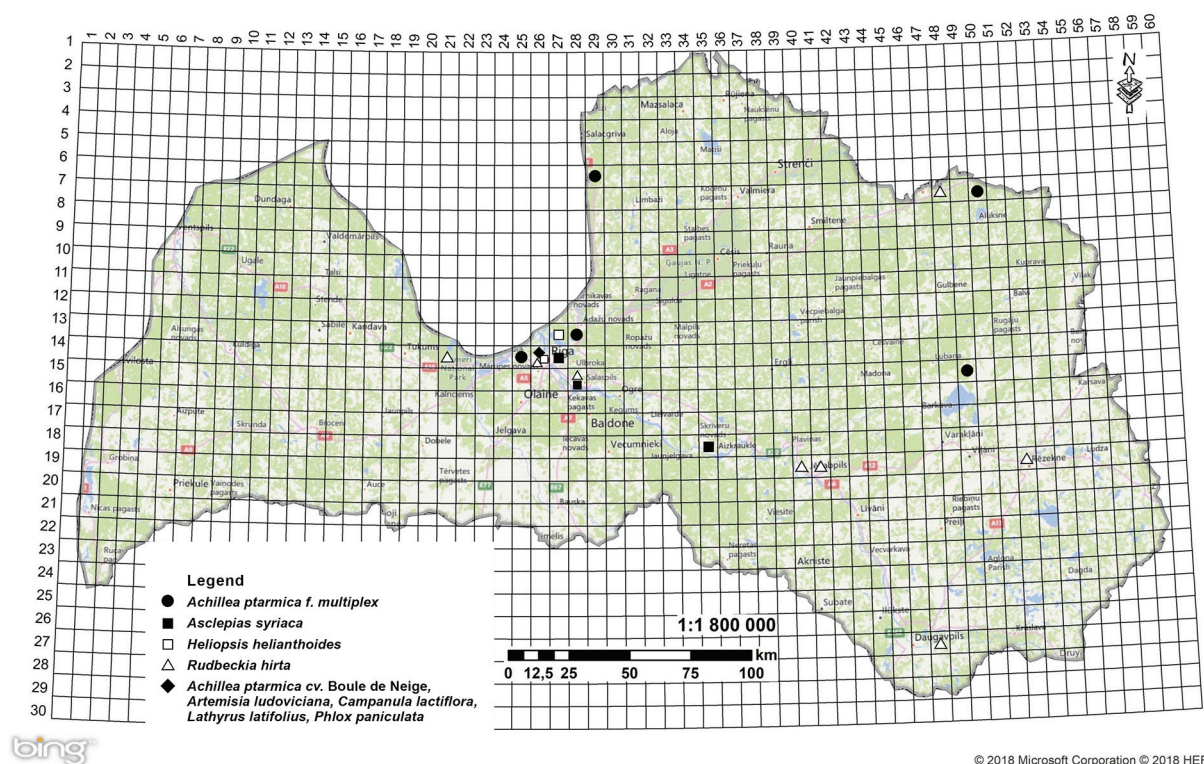


Fig. 1. Location of herbarium specimens in Latvia. Symbols indicate the locality of each of the studied taxa or the group of taxa

ball') has large, vigorous 60–90 cm tall stems and basal leaf rosette. Length of leaves reaches 9 cm; leaves are glabrous, narrowly lanceolate. Perianth is white, double or semi-double (RICE, 2006). In Latvia, since 1869 the C.W. Schoch Seed Trading Company (SCHOCH, 1869) has been offering *A. ptarmica* with double flowers (flora plena) for customers, whereas the cultivar Boule de Neuge has been available since 1934 (IEVIŅA, 1964). According to the Checklist of Latvian Vascular Plant Flora (GAVRILOVA & ŠULCS, 1999), *A. ptarmica* is defined as cultivated plant, sometimes found in disturbed habitats. The taxon commonly crossbreeds to double or semi-double forms. In Lithuania, the species has been used as ornamental in rural manors, flower gardens and cemeteries since ancient times (VILKONIS, 2001), whilst in Belarus, it is used in greenery (LUNINA, 2010).

Since the 1980s, the cultivar has been growing in the collection of the Botanical Garden of the University of Latvia. During that period, only flowering has been observed (June 3–August 3), but fruits have not been set. It is spreading vegetatively by rhizomes (rate 4–11 cm per year).

On Lucavsala Island, a thicket-like group of plants was found in a desolated family garden outside cultivation (Fig. 1, Appendix 1). Vegetative clonal flourishing thicket grew in an area of 1 m² in size. This specimen demonstrates that the old cultivar is stable, when growing out of cultivation as double form of native species, and it has a potential of local spread. The older five herbarium specimens were collected in 1937, 1986, 1987 and 1989 in different natural, seminatural and disturbed habitats (Appendix 1). It is possible that these multiplex form plants have escaped from cultivation, too.

***Artemisia ludoviciana* Nutt.**

Rhizomatous perennial, up to 1 m tall, unbranched below the inflorescence; leaves densely white-tomentose beneath, lanceolate or lance-elliptic, entire or the lower leaves with irregularly toothed or lobed margins; inflorescence compact and elongate; involucre 2.5–3.5 mm long; corollas yellow, glabrous (RHOADS & BLOCK, 2000). This species is native in Alaska, Western Canada, the USA, and Mexico. In its native range, *A. ludoviciana* grows on roadsides and wastelands. On the British Isles, it has been recorded as garden escapee or oilseed weed; in

Belgium – has been recorded since 1902, accidentally imported with wool, but later deliberately as ornamental plant (VERLOOVE, 2006). In Lithuania, it has been recorded as a cultivated and adventive plant (GUDŽINSKAS, 1999).

In Latvia, use of *A. ludoviciana* in greeneries is rare, although it is suitable for sandy soils in the coastal area of Latvia (NĀBURGA-JERMAKOVA, 2008, 2017). The Latvian nurseries have been offering *A. ludoviciana* to customers since 1975 (ANON., 1975). Since 1992, *A. ludoviciana* has been growing in the collection of the Botanical Garden of the University of Latvia. In this period, only florescence has been observed (August – end of October), but fruits have not been set. Clonal growth is around 12 cm per year. Clonal thicket-like groups are able to outcompete grasses, but do not tolerate mowing.

On the central part of Lucavsala Island, *A. ludoviciana* was found on desolated family garden (Appendix 1). A thicket-like group with large quantity of inflorescences occupying a 1 m² area was recorded.

In Latvia, Lucavsala case is the first record of *A. ludoviciana* growing either outside botanical garden or outside cultivation. The species has potential for the establishment in seminatural habitats and should be defined as a new casual alien in Latvia.

***Asclepias syriaca* L.**

Rhizomatous perennial, 1–2 m tall, colonial. Stems erect, simple; leaves opposite, oblong-lanceolate to oval; umbels several, terminal and in the upper axils, many-flowered; flowers purple to greenish. Leaves pubescent beneath. Corolla lobes pubescent outside; umbels usually four or more (RHOADS & BLOCK, 2000). Common in fields, roadsides, and wastelands. This species is native in Canada and the USA. It had been formerly cultivated for fibre and as food plant for bees; naturalized in cultivated ground dry grassland in various parts of Europe (TUTIN et al., 1972). The species has naturalized and is considered as invasive in Central Europe and in part of East Europe (DAISIE, 2018). Since 1978, *A. syriaca* has been growing in the collection of the National Botanic Garden of Latvia (CINOVSKIS, 1981), but since 1991 – in Botanical Garden of the University of Latvia. The Latvian nurseries have been offering the specimens to customers since 2003 (ANON., 2003). It regularly freezes solid in the coldest winters, but recovers from

the survived parts of rhizomes. The plants regularly flower in July and produce seeds, self-sowing cases have been observed.

In Lucavsala, a large thicket-like group of flourishing plants occupying a 30 m² area was found in a desolated family garden (Appendix 1). A large quantity of generative flourished shoots was observed. No evidence of new seedlings on neighbouring area was found. A previous locality of *A. syriaca* near Dole railway station (Appendix 1) was revisited in 2016, but the plants were not found.

This species has a potential to become locally established and, thus, should be included in the group of new casual alien species in Latvia. In the floras of some other European countries, it is considered as invasive (NOBANIS, 2018). In the neighbouring countries, only in Lithuania, *A. syriaca* has been recorded as an escapee from cultivation in botanical gardens (JEBB, 2009), but in Russia, it runs wild in southern regions (VINOGRADOVA, pers. convers., 2019). Based on the experience with *A. syriaca* ramet persistence in the Botanical Garden of the University of Latvia, it has high invasiveness potential in Latvia.

***Campanula lactiflora* M. Bieb.**

Campanula lactiflora is a perennial up to 150 cm tall, with large, lax inflorescence and numerous white or pale blue wide-campaniform flowers. Leaves ovoid-oblong. In the native range, it grows on edges of forests to the subalpine mountain zone (GROSSGEYM, 1949). This species is native in Europe, the Caucasus, Turkey, it has naturalized in British Isles (TUTIN et al., 1976). In Russia and Belarus, it is rarely used in greenery (LUNINA, 2010; KHALIPOVA, 2011). It has formed local naturalized populations outside the cultivation in the Main Botanical Garden, Moscow (VINOGRADOVA et al., 2016). Latvian nurseries have been offering the species to customers since 2011. *C. lactiflora* has been growing in the collection of the Botanical Garden of the University of Latvia since 1980s, in an overgrown area. The species regularly flowers and produces fruits (VIII), self-sowing has been observed.

On the Lucavsala Island, three clumps of *C. lactiflora*, each with one to three inflorescences, close to each other, have been found in overgrown gardens (Appendix 1). Lucavsala case is the first record of *C. lactiflora* growing outside botanical garden and

outside cultivation in Latvia. The species has potential for the establishment and propagation in semi-natural habitats.

***Heliopsis helianthoides* (L.) Sweet**

Stems are 30–150 cm tall, simple or branched. Leaves lanceolate, smooth or scabrid, coarsely serrate or dentate, petiolate. Peduncles 10–25 cm, involucre bracts ovate-lanceolate, the outer usually leaf-like (TUTIN et al., 1976).

H. helianthoides has two varieties that are widespread in Europe (BĚLOHLÁVKOVÁ, 2004):

(1) Leaf blades ovate, 8–12(–15) × 4–8(–12) cm, abaxial faces glabrous or sparsely pubescent, adaxial faces glabrous or minutely scabrellous, stems smooth glaucous, the seed without hairs (*Heliopsis helianthoides* var. *helianthoides*).

(2) Leaves lanceolate to ovate-lanceolate, petioles 2–25 cm. Leaf blades deltate to narrowly ovate-lanceolate, 6–12 × 2–5 cm, faces moderately to densely scabrellous to scabrous, stem often scabrous, not glaucous, seeds with fine hairs (*Heliopsis helianthoides* var. *scabra*).

H. helianthoides is native in Canada and the USA (SMITH, 2006). It is cultivated for ornamental purposes and has locally naturalized in Europe (TUTIN et al., 1976). In Lithuania, *Heliopsis helianthoides* var. *scabra* escape from cultivation was first recorded in 1983 (GUDŽINSKAS, 1997) and it is classified as an adventive plant (GUDŽINSKAS, 1999). In Estonia and Belarus, it is not common in culture, rarely going wild in Estonia (LUNINA, 2010; KUKK, 1999).

In Latvia, *H. helianthoides* var. *scabra* has been offered for gardening by Schoch Seed Trading Company since 1939 (ANON., 1939). In the National Botanic Garden of Latvia, the cultivars have been growing since 1934 (IEVIŅA, 1964). Since 2005, *H. helianthoides* var. *helianthoides* has been growing in the collection of the Botanical Garden of the University of Latvia, and *H. helianthoides* var. *scabra* – since 1995. Plants regularly flower (July–October) and produce fruits (August–October), possess self-sowing in overgrown areas of the Botanical Garden of the University of Latvia. The Latvian nurseries offer *H. helianthoides* var. *scabra* and cultivars.

In Lucavsala, *H. helianthoides* was collected in a desolated family garden (Appendix 1). A large clump-like group occupied an area of 2 m² in a rasp-

berry thicket and one individual with one generative shoot near them (Fig. 2). This species was widespread in a family garden colony. During field study, it encountered regularly as planted specimens and also as self-seedlings in the unbranched areas of the fence, in the bushes and other unmowed areas (Fig. 2). The populations consisted of both juvenile and generative plants.

In RAS herbarium, two specimens of *H. helianthoides* were found (in herbarium registered with synonym *Heliopsis scabra* Dunal collected in planting in Mežaparks, Riga). Since the middle of the 20th century, the species has been planted in ornamental gardens of rural farmsteads and in urban greeneries. In earlier years, this species had been observed by I. Nāburga in grasslands and under bushes nearby ornamental gardens in Priekuļi and Pļaviņas districts. Currently, *H. helianthoides* can be considered as casual alien at naturalization stage.

Lathyrus latifolius L.

Trailing or climbing rhizomatous perennial; stems up to 2 m tall; broadly winged; two leaflets on a winged petiole; raceme with 4–10 flowers; corolla purple, pink or white, 1.5–1 cm; fruit 6–10 cm (RHOADS & BLOCK, 2000). Native to Central and Southern Europe and Northern Africa. This species has become naturalized in Britain and North America and in most parts of Europe. In the native range, it grows in light forests, meadows, prefers alkaline soils with sufficient amount of humus (CHRTKOVÁ & BĚLOHLÁVKOVÁ, 1995). There is no data on the prevalence of this taxon in neighbouring countries; it is cultivated in Lithuania only (GUDŽINSKAS, 1999).

In Latvia, *Lathyrus latifolius* seeds and plants were offered for gardeners by Schoch Seed Trading Company in the period from 1876 to 1940 (SCHOCH, 1876; ANON., 1939). Since the 1990s, *L. latifolius* has been growing in the collection of the Botani-



Fig. 2. Specimens of *Helianthus helianthoides* in unmowed territory on Lucavsala Island (photo by I. Nāburga)

cal Garden of the University of Latvia. Plants are about 180 cm tall, have vertical rhizome-roots with regular adventitious sprouts; regularly flower (July–August), though seeds and self-sowing cases are not observed.

Two stands of *L. latifolius* were recorded on Lucavsala Island (Appendix 1). Distance between the stands was 0.5 km. One of the stands was located on the bank of a ditch with vegetation composed of *Filipendula ulmaria*, *Lathyrus latifolius*, *Vicia* sp. (Fig. 3). The clump was formed of three generative stems with flowers. The other stand was found in an overgrown, abandoned garden in vegetation composed of *Solidago canadensis*. There were approximately ten different-age clumps with flowering stems, located at 1–2 m distance from each other. Some of the specimens were recorded in the flowerbeds in nearby gardens.

In Latvia, *L. latifolius* growing outside botanical garden and outside cultivation is known since 2015. It was found in undisturbed meadow in 2015

(Latvian Society of Botanists, personal communication). Based on the experience with *L. latifolius* in the Botanical Garden of the University of Latvia, it has large potential of naturalization in Latvia. This species is able to establish locally, thus, should be considered as a casual alien new to Latvia at naturalized and dispersal stage.

***Phlox paniculata* L.**

Up to 2 m tall rhizomatous perennial; leaves oppositely arranged, length 5–15 cm, broadly lanceolate, slightly toothed. Corolla deep pink to white, tube hairy, calyx puberulent or glabrous. Fragrant, tubular, pink-purple to white flowers 2.0–2.5 cm are packed in large, tiered, domed terminal clusters. In native range, it is frequent in thickets, hillsides, and stream banks, floodplains, roadsides, often in calcareous soils. Native in North America from New York to Arkansas, naturalized elsewhere in the USA (RHOADS & BLOCK, 2000; RICE, 2006) and Europe. It



Fig. 3. *Lathyrus latifolius* on the bank of a ditch on Lucavsala Island (photo by I. Nāburga)

is rare, usually ephemeral garden escapee in Belgium (VERLOOVE, 2018). It is cultivated in Lithuania and classified as an adventive plant (GUDŽINSKAS, 1999). In south-western Belarus, individual specimens have been observed over the last 20 years escaped from culture, where they remain at vegetative stage (MYALIK, 2016).

In Latvia, the introduction of *Phlox paniculata* began in the first half of the 19th century (IEVIŅA, 1964), when Zigra Plant and Seed Trading Company started to sell the first *Phlox* species. In the second half of 19th century, the company offered more than 40 cultivars of *P. paniculata* (SCHOCH, 1869). *P. paniculata* and its cultivars have been established in the collection of the Botanical Garden of the University of Latvia. Rarely, young plants possess the parent characters and may also have the attributes of wild examples: leaves with distinct ciliate margins and lateral, distinctly hairy corolla tubes, small flowers.

On Lucavsala Island, *P. paniculata* was found in a desolated family garden (Appendix 1). The five clump-like flowered plants at different age were scattered and occupied in total area of 1 m² in size in the vegetation dominated by *Solidago canadensis* and *Aegopodium podagraria*. Flowers were light purple, up to 2.0–2.5 cm in diameter, with ciliate margins.

In Latvia, Lucavsala case is the first record of *P. paniculata* growing outside botanical garden and outside cultivation. The taxon has a potential for the establishment in seminatural habitats and should be defined as a casual alien new to Latvia.

***Rudbeckia hirta* L.**

Biennial or short-lived perennial up to 1 m tall; stems hairy throughout, leaves lanceolate to oblong, 3–5 nerved, mostly sessile; heads solitary on long peduncles, 5–8 cm wide; disk florets numerous on a conical receptacle, dark purple-brown; petals 8–21, orange to orange-yellow; achenes without pappus. It is native in Central and eastern North America, naturalized alien in Europe (BĚLOHLÁVKOVÁ, 2004). In native range, the species is common in old fields, meadows and roadsides (RHOADS & BLOCK, 2000).

The species is cultivated for ornamental purposes and naturalized in wastelands, in woodlands and on river banks, mainly in Central Europe (TUTIN et al., 1976), where it was imported in the second half of the 19th century (BĚLOHLÁVKOVÁ, 2004). In Belgium,

R. hirta is classified as rare, very variable, usually ephemeral alien, recorded in ruderalized grasslands since 1926, usually in dry, sun-exposed locations (VERLOOVE, 2018). In Lithuania, the species was first recorded outside cultivation in 1988, occurring diffusely throughout the country (GUDŽINSKAS, 1997). In Estonia, it rarely goes to wild (KUKK, 1999). In Russia, it has escaped out of cultivation in the Main Botanical Garden and has naturalized in Moscow Region (VINOGRADOVA et al., 2016, pers. convers., 2019). Herbaria specimens indicate that *R. hirta* was cultivated already in the last quarter of the 19th century. However, in seed catalogues published in Latvia, it is reported to have appeared only in the early 20th century as *Rudbeckia bicolor superba hybrida* (SCHOCH, 1912).

On Lucavsala Island, more than 30 flowering *R. hirta* individuals were found, accompanied by *Achillea millefolium*, *Calamagrostis* sp., *Lathyrus pratensis*, *Ononis arvensis*, *Trifolium pratense* (Fig. 4). Colour and shape of rays were similar to the popular cultivars ‘Indian Summer’ and ‘Cappuccino’. Plants were scattered and did not form stands.

In Latvia, *R. hirta* has frequently been collected in herbaria since 1888 (Appendix 1). The first records are from plantings, later from obviously ruderalized areas (roadside, meadow, lawn, clover fields). According to the Checklist of the Latvian Vascular Plant Flora (GAVRILOVA & ŠULCS, 1999), *R. hirta* is defined as a cultivated plant, sometimes found in disturbed areas. During the last years, its escaping cases have been increasing not only because of its popularity among gardeners, but also due to vitality and larger parameters of habitus. This species has been recorded in seminatural habitats and, thus, should be defined as a casual alien in the phase of naturalization.

CONCLUSIONS

Four species, *Achillea ptarmica* multiplex cultivar, *Artemisia ludoviciana*, *Campanula lactiflora* and *Phlox paniculata*, were observed for the first time outside cultivation in Latvia, probably as established, reproducing populations. Three species, *Heliopsis helianthoides*, *Lathyrus latifolius* and *Rudbeckia hirta*, were observed in seminatural habitats and defined as casual aliens, which have entered the phase of naturalization. One species, *Asclepias syriaca*, is



Fig. 4. *Rudbeckia hirta* in an overgrown meadow-like habitat on Lucavsala Island (photo by I. Nāburga)

defined as a casual alien species new to Latvia, with high potential of invasiveness.

In Latvia, the cultivation period of the studied species varies from more than 100 years (*Achillea ptarmica* multiplex cultivars, *Lathyrus latifolius*, *Phlox paniculata*, *Rudbeckia hirta* (SCHOCH, 1869, 1876; IEVIŅA, 1964) to 40–50 years (*Asclepias syriaca* (CINOVSKIS, 1981), *Artemisia ludoviciana*, *Campanula lactiflora* (ANON., 1975). That is a long enough time for adaptation after their first introduction and escaping outside cultivation (WEBER, 1998; DEHNEN-SCHMUTZ et al., 2007; SEEBENS et al., 2017). Our results and some other studies from the neighbouring countries (KUKK, 1999; GUDŽINSKAS & PETRULAITIS, 2016; MYALIK, 2016; VINOGRADOVA et al., 2015, 2016;) suggest that careful investigation of overgrown former cultivation sites and their surroundings might help to reveal new garden escapees, including potentially invasive alien plant species.

The most important traits of perennial herbaceous

alien plants for full adaptation in new agro-climatic conditions are winter hardiness, presence of active vegetative distributions and/or abundant fruiting, self-sowing (HANSPACH et al., 2008; ANDERSON et al., 2006; VAN KLEUNEN, 2018). Recording of these data during the field survey is impossible; therefore, the investigation on adaptation in botanical gardens allows making more reliable conclusions to estimate the potential invasiveness status of new alien plant species in Latvia. Timely assessment of the invasiveness status and immediate actions would prevent spreading of potentially invasive alien plants at early stages and limiting their further spreading and use in gardening.

REFERENCES

- ANDERSON N.O., GOMEZ N., GALATOWITSCH S.M., 2006: A non-invasive crop ideotype to reduce invasive potential. – *Euphytica*, 148: 185–202.

- ANDREU J., VILÀ M., 2009: Risk analysis of potential invasive plants in Spain. – *Journal for Nature Conservation*. doi:10.1016/j.jnc.2009.02.002
- ANONYMOUS, 1939: C.V. Šohs. Kokaudzētavas katalogs, 289. – Rīga.
- ANONYMOUS, 1975: Krāšņumaugu un augļu koku un ogulāju stādu asortiments Latvijas PSRS kokaudzētavās 1975. gadam. – Rīga.
- ANONYMOUS, 2003: Apstādījumu veidotāju ceļvedis 2003–2004. – IU “Omorika”.
- ANONYMOUS, 2014: Apstādījumu veidotāju ceļvedis 2014–2016. – SIA “Labie koki”.
- ANONYMOUS, 2018: Latvijā konstatēto invazīvo svešzemju sugu faktu lapas.
- BĚLOHLÁVKOVÁ R., 2004: Rudbeckia L. – In: SLAVÍK B., ŠTĚPÁNKOVÁ J., ŠTĚPÁNEK J. (eds), Květena České Republiky, 7: 316–320. – Praha.
- BLACKBURN T.M., PYŠEK P., BACHER S., CARLTON J.T., DUNCAN R.P., JAROŠÍK V., WILSON J.R.U., RICHARDSON D.M., 2011: A proposed united framework for biological invasions. – *Trends in Ecology and Evolution*, 26(7): 333–339.
- BRUMMITT R.K., POWELL C.E., 1992: Authors of Plant Names. – Kew.
- BYLOV V., KARPISOVA R., 1978: Principy sozdanija i izučeniya kolekcii malorasprostrannyyx dekorativnyx mnogoletnikov. – In: *Bjul. Gl. Bot. Sada AN SSSR* (107) M.: 77–83. – Nauka.
- CINOVSKIS R. (ed.), 1983: The botanical garden of the Latvian SSR Academy of sciences 1956–1981. – Rīga.
- CHRTKOVÁ R.M., BĚLOHLÁVKOVÁ R., 1995: *Lathyrus* L. – In: SLAVÍK B. (ed.), Květena České Republiky, 4: 416–437. – Praha.
- CONSER C., SEEBACHER L., FUJINO D.W., REICHARD S., DI TOMASO J.M., 2015: The development of a plant risk evaluation (PRE) tool for assessing the invasive potential of ornamental plant. *PLoS ONE* 10 (3), e0121053. doi:10.1371/journal.pone.0121053
- DAISIE 2018. DAISIE – Delivering Alien Species Inventories for Europe. <http://www.europe-alien.org> [Accessed 21 February, 2018]
- DEHNEN-SCHMUTZ K., TOUZA J., PERRINGS C., WILLIAMSON M., 2007: The horticultural trade and ornamental plant invasions in Britain. – *Conservation Biology*, 21(1): 224–231.
- ERHARDT W., GÖTZ E., BÖDEKER N., SEYBOLD S., 2002: Der Grosse Zander Enzyklopädie der Pflanzennamen. – Stuttgart.
- EVARTS-BUNDERS P., EVARTE-BUNDERE G., ROMANCEVIČA N., BRUTĀNE K., NOVICKA I., NITCIS M., 2012: Retās antropofītu sugas Daugavpils pilsētas florā. – *Latvijas Veģetācija*, 22: 29–43.
- EVARTS-BUNDERS P., PILĀTE D., BALALAIKINS M., PAIDERE J., 2015: Invazīvo svešzemju sugu monitoringa programmas izstrāde. https://www.daba.gov.lv/public/lat/dati1/valsts_monitoringa_dati/#invaz [Accessed 5 March, 2018]
- EVARTS-BUNDERS P., EVARTE-BUNDERE G., KAVRIGA N., BOJARE A., NITCIS M., 2016: Prioritisation of alien plant species list for invasive plant monitoring in Latvia. – In: RIES C., KRIPPEL Y. (eds), Neobiota 2016. Biological Invasions. Book of Abstracts: 120. – Luxembourg.
- GAVRILOVA G., ŠULCS V., 1999: Latvijas vaskulāro augu flora: Taksonu saraksts. – Rīga.
- GROSSGEYM A.A., 1949: *Opredelitel' rastenij Kavkaza*. – Moskva.
- GUDŽINSKAS Z., 1997: Conspectus of alien plant species of Lithuania 4. Asteraceae. – *Botanica Lithuanica*, 3(4): 335–366.
- GUDŽINSKAS Z., 1999: Lietuvos induočiai augalai. – Vilnius.
- GUDŽINSKAS Z., PETRULAITIS L. 2016: New alien plant species recorded in the southern regions of Latvia. – *Botanica Lithuanica*, 22(2): 153–160.
- HANSBACH J., KÜHN I., PYŠEK P., BOOS E., KLOTZ S., 2008: Correlates of naturalization and occupancy of introduced ornamentals in Germany. – *Perspectives in Plant Ecology, Evolution and Systematics*, 10: 241–259.
- Herbarium Universitatis Daugavpiliensis Herbarium database. www.db.biology.lv [Accessed 5 March, 2018]
- HEYWOOD V.H., 2011: The role of Botanic gardens as resource and introduction centres in the face of global change. – *Biodiversity Conservation*, 20: 221–239.
- HULME P.E., 2011: Addressing the threat to biodiversity from botanic gardens. – *Trends in Ecology & Evolution*, 26(4): 168–174.
- IEVIŅA S., 1964: Ziemeļu puķu asortimenta dinamika Latvijas PSRS teritorijā laikā no 1805. līdz 1940. gadam. – In: *Daiļdarzniecība. Augu introdukcija un zaļā celtniecība Latvijas PSR.*, 5: 129–146. – Rīga.

- JEBB M., 2009: Managing the invasive alien plants problem. In: Eurogard V Botanic Gardens in the age climate change. By material of conference. Helsinki, 7–9 June: 62.
- KHALIPOVA G.I., 2011: Campanula. – In: DEMIDOV A.S. (ed.), Cultivated perennials of Middle Russia. An illustrated guide: 126–133. – Moscow.
- KRAMPIS I., 2012: Sugu izplatības kartēšana Latvijā, metodes un rezultāti. – Geomatics, 8: 43–48.
- KUKK T., 1999: Eesti taimeistik. – Tartu–Tallinn.
- LAIVIŅŠ M., JERMACAĒNE S., 1999: Neofitās laimiņu (*Sedum* L.) un dievkrēsliņu (*Euphorbia* L.) sabiedrības Latvijā. – Latvijas Veģetācija, 2: 7–27.
- LAMBTON P.W., PYŠEK P., BASNOU C., HEJDA M., ARIANOUTSOU M., ESSL F., JAROŠÍK V., PERGL J., WINTER M., ANASTASIU P., ANDRIOPOULOS P., BAZOS I., BRUNDU G., CELESTI-GRAPOW L., CHASOT P., DELIPETROU P., JOSEFSSON M., KARK S., KLOTZ S., KOKKORIS Y., KÜHN I., MARCHANTE H., PERGLOVÁ I., PINO J., VILÀ M., ZIKOS A., ROY D., HULME P.E., 2008: Alien flora of Europe: species diversity, temporal trends, geographical patterns and research needs. – Preslia, 80: 101–149.
- LUNINA N.M., 2010: Dekorativnye travjanistye rastenija kul'turnoj flory Belarusi. – Minsk.
- MYALIK A.N., 2016: Osobennosti naturalizacii nekotoryx kul'tiviruemyx vidov rastenij v uslovijax jugo-zapadnoj časti Belarusi. – Vesnik Paleskaga Dzyarzhaynaga Universiteta. Serija pryrodaznaučyx navuk, 2: 24–28.
- NĀBURGA-JERMAKOVA I., 2008: Perennial plants and their usage in the sand soil. – In: Material of the International Scientific-Practical Conference, 10–11 April, 2008, Klaipēda: 60–65.
- NĀBURGA-JERMAKOVA I., 2010a: The influence of green plantings on biodiversity of environment. – In: NEKROŠIENĒ R. (ed.), Formation of Urban Green Areas. Scientific articles 1(7): 119–124. – Klaipēda.
- NĀBURGA-JERMAKOVA I., 2010b: The botanical garden introduction works influence on local flora. – In: XXIII Conference-Expedition of the Baltic Botanists. Abstracts & Excursion Guide. – Tartu: 39–40.
- NĀBURGA-JERMAKOVA I., 2017: Dekoratīvie kserofīti apstādījumos. – In: SEGLIŅŠ V. (ed.) Starptautiskais simpozijs “Smilts un stikls”. Zinātnisko rakstu krājums: 53–55. – Rīga.
- NOBANIS – European Network on Invasive alien Species. <https://www.nobanis.org> [Accessed 21 February 2018]
- ÖÖPIK M., KUKK T., KULL K., KULL T., 2008: The importance of human meditation in species establishment: analysis of the alien flora of Estonia. – Boreal Environment Research, 13: 53–67.
- PERGL J., SÁDLO J., PETŘÍK, DANIHELKA J., CHRTEK J. R., HEJDA M., MORAVCOVA L., PERGLOVÁ I., ŠTAJEROVA K., PYŠEK P., 2016: Dark side of the fence: ornamental plants as a source of wild-growing flora in the Czech Republic. – Preslia, 88: 163–184.
- PRIEDE A., 2009a: Invazīvo svešzemju augu sugu izplatība Latvijā. – Latvijas Veģetācija, 17: 1–149.
- PRIEDE A., 2009b: Invasive neophytes in the flora of Latvia: distribution and dynamics. Summary of doctoral thesis. – Rīga.
- PYŠEK P., RICHARDSON D.M., REJMANEK M., WEBSTER G.L., WILLIAMSON M., KIRSCHNER J., 2004: Alien plants in checklists and floras: towards better communication between taxonomists and ecologists. – Taxon, 53(1): 131–143.
- Pyšek P., DANIHELKA J., SÁDLO J., CHRTEK J.J., CHYTRÝ M., JAROŠÍK Y., KAPLAN Z., KRAHULEC F., MORAVCOVÁ L., PERGL J., ŠTAJEROVÁ K., TICHÝ L., 2012: Catalogue of alien plants of the Czech Republic (2nd edition): checklist update, taxonomic diversity and invasion patterns. – Preslia, 84: 155–255.
- RHOADS A.F., BLOCK T.A., 2000: The Plants of Pennsylvania. – Philadelphia.
- RICHARDSON D.M., PYŠEK P., REJMANEK M., BARBOUR M.G., PANETTA F.D., WEST C.J., 2000: Naturalization and invasion of alien plants: concepts and definitions. – Diversity and Distributions, 6: 93–107.
- RICE G. (eds), 2006: RHS Encyclopedia of Perennials. – DK.
- RUTKOVSKA S., ZEĪĻA I., 2009: Invazīvo biezlapju dzimtas sugu izplatība Daugavpils pilsētas teritorijā (Latvija). Distribution of invasive species (*Crassulaceae*) in the Daugavpils city (Latvia). – In: Environment. Technology. Resources. Proceedings of the 7th International Scientific and practical Conference, 2: 30–34. – Rezekne.
- RUTKOVSKA S., PUČKA I., NOVICKA I., EVARTS-BUNDERS P., 2011: Relationship of geographic distri-

- tribution of the most characteristical invasive plant species in habitats adjacent to the River Daugava within the territory of Daugavpils city. – In: Acta Biol. Univ. Daugavp., 11(2): 163–175.
- RUTKOVSKA S., PUČKINA I., FROLOVA O., 2017: Inventory of the most invasive alien plant species of Latvia in the ‘Daugavas loki’ Nature Park. – In: Environment. Technology. Resources. Proceedings of the 11th International Scientific and practical Conference, 1: 246–252. – Rzekne.
- SCHOCH C.W., 1869: Katalog von C.W. Schoch in Riga, 73. – Riga.
- SCHOCH C.W., 1876: Katalog von C.W. Schoch in Riga, 98. – Riga.
- SCHOCH C.W., 1912: Samen-Catalog von C.W. Schoch in Riga, 91. – Riga.
- SEEBENS H., BLACKBURN T.M., DYER E.E., GENOVESI P., HULME P.E., JESCHKE J.M., PAGAD S., PYŠEK P., WINTER M., ARIANOUTSOU M., BACHER S., BLASIUS B., BRUNDU G., CAPINHA C., CELESTI-GRAPOW L., DAWSON W., DULLINGER S., FUENTES N., JÄGER H., KARTESZ J., KENIS M., KREFT H., KÜHN I., LENZNER B., LIEBHOLD A., MOSENA A., MOSER D., NISHINO M., PEARMAN D., PERGL J., RABITSCH W., ROJAS-SANDOVAL J., ROQUES A., RORKE S., ROSSINELLI S., ROY H.E., SCALERA R., SCHINDLER S., ŠTAJEROVÁ K., TOKARSKA-GUZIŁ B., VAN KLEUNEN M., WALKER K., WEIGELT P., YAMANAKA T., ESSL F., 2017: No saturation in the accumulation of alien species worldwide. – Nature Communications, 8: 14435.
- SMITH A.R., 2006: *Heliopsis*. – In: Flora of North America, 21: 67–70. – Oxford.
- SVILĀNS A., CELMIŅŠ A., ĀBOLIŅA A., TEĻNOVS D., VIMBA E., GAVRILOVA Ģ., STRĀĶE S., PILĀTS V., 2007: List of alien species in Latvia. At: http://biodiv.daba.gov.lv/cooperation/invaz/i-netam_invazivie.xls [accessed 13/11/2018]
- TABAKA L.V., KLYAVINYA G.B., PLOTNIEKS M.R., 1977: Nekotorye metodičeskie voprosy izučenija vidovogo sostava flory zapadnoj Latvii. – In: Flora i rastitel’nost’ Latvijskoj SSR. Kurzemskij geobotaničeskij rajon: 86–120. – Riga.
- TOKARSKA-GUZIŁ B., 2003: The expansion of some alien plant species (neophytes) in Poland. – In: CHILD L.E., BROCK J., BRUNDU G., PRACH K., PYŠEK P., WADE P.M., WILLIAMSON M. (eds), Plant invasions: ecological threats and management solutions: 147–164. – Leiden.
- TUTIN T.G., HEYWOOD V.H., BURGESS N.A., MOORE D.M., VALENTINE D.H., WALTERS S.M., WEBB D.A. (eds), 1972: Flora Europae Diapeniaceae to Myoporaceae, 3. – Cambridge.
- TUTIN T.G., HEYWOOD V.H., BURGESS N.A., MOORE D.M., VALENTINE D.H. (eds), 1976: Flora Europae Plantaginaceae to Compositae, 4. – Cambridge.
- VAN KLEUNEN M., ESSL F., PERGL J., BRUNDU G., GARBONI M., DULLINGER S., EARLY R., GONZÁLEZ-MORENO P., GROOM Q.J., HULME P.E. et al., 2018: The changing role of ornamental horticulture in alien plant invasions. – Biological Reviews, 93(3):1421–1437.
- VERLOOVE F., 2006: Categorise of neophytes in Belgium (1800–2005). – Scripta Botanica Belgica, 39: 1–89.
- VERLOOVE F., 2018: Phlox paniculata. – In: Manual of the Alien Plants of Belgium. Botanic Garden of Meise, Belgium. At: alienplantsbelgium.be [accessed 13/11/2018]
- VERLOOVE F., 2018: Rudbeckia hirta. – In: Manual of the Alien Plants of Belgium. Botanic Garden of Meise, Belgium. At: alienplantsbelgium.be [accessed 14/11/2018]
- VILKONIS K.K., 2001: Lietuvos žaliasis rūbas. – Kaunas.
- VINOGRADOVA YU.K., MAYOROV S.R., HORUN L.V., 2010: Černaja kniga flory Srednej Rossii. – Moskva.
- VINOGRADOVA YU.K., MAYOROV S.R., BOCHKIN V.D., 2015: Changes in the spontaneous flora of the Main Botanic Garden, Moscow over 65 years. – Skvortsovia, 2(1): 45–95.
- VINOGRADOVA YU.K., MAYOROV S.R., BOCHKIN V.D., 2016: Effect of alien plant species on flora dynamics in the Main Botanical Garden of the Russian Academy of Sciences. – Russian Journal of Biological Invasions, 7(1): 12–25.
- WEBER E., 1998: The dynamics of plant invasions: a case study of three exotic goldenrod species (*Solidago* L.) in Europe. – Journal of Biogeography, 25: 147–154.

KAI KURIŲ PLINTANČIŲ DEKORATYVINIŲ DAUGIAMEČIŲ AUGALŲ STATUSAS LATVIJOS FLOROJE

Inese NĀBURGA, Pēteris EVARTS-BUNDERS

Santrauka

Straipsnys pristatomi aštuoni sulaukėję daugiamečiai dekoratyviniai augalai, kurie buvo registruoti Lucavsalo saloje, Rygoje (Latvija) 2016 metais. Tyrimų rezultatai pateikia žinias apie *Achillea ptarmica* 'Boule de Neige', *Artemisia ludoviciana*, *Asclepias syriaca*, *Campanula lactiflora*, *Heliopsis helianthoides*, *Lathyrus latifolius*, *Phlox paniculata* ir *Rudbeckia hirta* paplitimą natūraliose augavietėse. Visos šios rūšys yra auginamos Latvijos universiteto Botanikos sodo daugiamečių dekoratyvinių augalų kolekcijoje. Buvo atlikta šių rūšių peržiūra

Latvijos herbariumo kolekcijose. Penkios rūšys: *Heliopsis helianthoides*, *Artemisia ludoviciana*, *Campanula lactiflora*, *Lathyrus latifolius* ir *Phlox paniculata* pirmą kartą buvo aptiktos už kultūrinių augaviečių ribų, kur sudarė stabilias, atsinaujinančias populiacijas. *Achillea ptarmica* ir *Rudbeckia hirta* anksčiau buvo stebėtos pusiau natūraliose augavietėse, todėl priskiriamos atsitiktinių invazinių rūšių grupei. *Asclepias syriaca* yra nauja, neįsitvirtinusi svetimžemė rūšis, turinti didelį invazyvumo potencialą.

Appendix 1. Locality properties of the herbarium specimens collected in Latvia

Species	Herbaria collection	No. of herbarium specimen	Location/ BISN*	Habitat type	Year, collector
<i>Achillea ptarmica</i> L. f. <i>multiplex</i>	LATV	109323	Baltezers Lake, 13–28	Alluvial meadow with <i>Festuca pratensis</i> and <i>Rumex acetosella</i>	1996, Ģ. Gavrilova
	LATV	98827	Mouth of Vitrupe River, 06–29	Alluvial meadow	1989, I. Kabucis
	LATV	87783	Near Babīte railway station, 14–25	Semi-natural dry grassland	1987, H. Zariņa
	LATV	85064	Near the border with Estonia, 5–6 km from Vecilaicene, 07–50	Semi-natural dry grassland with <i>Dactylis glomerata</i> , <i>Alchemilla</i> sp., <i>Plantago lanceolata</i>	1986, Ģ. Gavrilova
	RAS	579	Vestiena, Madona district, 15–42	Lakeshore	1937, A. Rasiņš
<i>Achillea ptarmica</i> cv. <i>Boule de Neige</i>	DAU	100002299	Rīga, Lucavsala, 14–26	Family garden colony in an abandoned garden	2016, I. Nāburga-Jermakova
<i>Artemisia ludoviciana</i> Nutt.	DAU	100002297	Rīga, Lucavsala, 14–26	Family garden colony in an abandoned garden	2016, I. Nāburga-Jermakova
<i>Asclepias syriaca</i> L.	RAS	5386	Skrīveri arboretum, 18–35	In cultivation	1952, A. Rasiņš, K. Starks
	LATV	117288	Dole, 15–28	Railway, outside cultivation	2012, A. Roze
	LATV	117426	Dole 15–28	Railway, outside cultivation	2014, A. Roze
	DAU	100002291	Rīga, Lucavsala, 14–27	Abandoned garden, in a plant community with <i>Solidago canadensis</i>	2016, I. Nāburga-Jermakova

Species	Herbaria collection	No. of herbarium specimen	Location/ BISN*	Habitat type	Year, collector
<i>Campanula lactiflora</i> M.Bieb.	DAU	100002298	Rīga, Lucavsala, 14–26	Abandoned garden	2016, I. Nāburga-Jermakova
<i>Heliopsis helianthoides</i> (L.) Sweet. (in RAS herbarium as <i>Heliopsis scabra</i> , syn.)	RAS	2034	Mežaparks (Riga), 13–27	Planting (in cultivation)	1940, A. Rasiņš
	RAS	2216	Mežaparks (Riga), 13–27	Planting (in cultivation)	1941, A. Rasiņš
	DAU	100002302	Rīga, Lucavsala, 14–26	Abandoned garden	2016, I. Nāburga-Jermakova, P. Evarts-Bunders
<i>Lathyrus latifolius</i> L.	DAU	10000229, 100002294	Rīga, Lucavsala, 14–26	Abandoned garden, in association with <i>Solidago canadensis</i>	2016, I. Nāburga-Jermakova, P. Evarts-Bunders
	DAU	100002295	Rīga, Lucavsala, Bebrišu path 15, 14–26	Bank of Biekengravis river arm	2016, I. Nāburga-Jermakova, P. Evarts-Bunders
<i>Phlox paniculata</i> L.	DAU	100002300	Rīga, Lucavsala, 14–26	Abandoned garden, in association with <i>Solidago canadensis</i> , <i>Aegopodium podagraria</i>	2016, I. Nāburga-Jermakova
<i>Rudbeckia hirta</i> L.	RIG I	I in 1755a	Grīva, 27–46	School yard	1888, K. R. Kupffer
	RIG I	599/600	Rēzekne, 19–52	Farm	1896, E. Lehmann
	RIG II	371/72	Road stretch between Sloka and Ķemeri, 14–21	Meadow	1889, F. Bahse
	RIG II	9606	Jaunlaicene Lake, Jaunlaicene parish, 07–48	Clover fields	1909, P. Lackschewitz
	RAS	7885	Salaspils selection station, 15–28	Lawn	1955, A. Rasiņš
	DAU	93160001	Jēkabpils, 19–40	Waste dump	2010, Dementjeva
	DAU	93160002	Jēkabpils, 19–40	Abandoned garden	2011, N. Romanceviča
	DAU	93160003	Jēkabpils, 19–41	Roadside	2011, N. Romanceviča
	DAU	100002303	Rīga, Lucavsala, 14–26	Abandoned garden	2016, I. Nāburga-Jermakova

* identification code of Biological Inventory Square Network.