

NEW ALIEN PLANT SPECIES RECORDED IN THE SOUTHERN REGIONS OF LATVIA

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Abstract

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Alien plants are one of the most dynamic and rapidly changing components of flora. Many intentionally introduced plants, which formerly were in cultivation only, now are increasingly found escaped and occur in anthropogenic or seminatural habitats. During field investigations in the southern districts of Latvia in 2014–2016, six new alien plant species were recorded: *Allium nutans*, *Hylotelephium spectabile*, *Solidago ×niederederi*, *Symphyotrichum dumosum*, *S. lanceolatum* and *S. novae-angliae*. To date, four species, *Allium nutans*, *Hylotelephium spectabile*, *Symphyotrichum dumosum* and *S. novae-angliae*, occur as casual aliens in Latvia. *Solidago ×niederederi* should be ascribed to the group of established species, whereas *Symphyotrichum lanceolatum* has naturalized and is potentially invasive. Notes on morphology and identification of species as well as characteristics of the recorded populations are discussed. A note on 20 other alien plant species recorded in wastelands, abandoned meadows and unused arable fields in the south-western part of Daugavpils city is also provided.

Keywords: anthropogenic habitats, invasive species, naturalization, populations.

INTRODUCTION

Alien plant species are one of the most dynamic and rapidly changing components of flora, and studies on their immigration, naturalization and spread are essential to diminish potential negative consequences (KOWARIK, 2008). Nowadays, large numbers of intentionally introduced plants, formerly being only in cultivation, are increasingly found escaped and occur in various human-made, disturbed or seminatural habitats (PERGL et al., 2016).

Alien plant species comprise 33% of the vascular plant flora of Latvia (GAVRILOVA & ŠULCS, 1999; PRIEDE, 2009). Though the diversity of vascular plants in Latvia is well studied, the diversity of alien plants constantly increases, and further increase should be expected in the future. The strengthening impact of urbanization and development of transport infrastructure, changes in land use and transformation of landscape and climate changes promote the

degradation of natural habitats and transformation of native vegetation, thus facilitating the spread of alien plant species.

Reduction of negative impact of invasive alien plant species on ecosystems and biodiversity is a task of the uttermost importance. The first step to achieve this task is prevention or early eradication of alien species before they became widespread and caused significant changes in ecosystems (LEVINE et al., 2003; ANDREU & VILÁ, 2011). Thus, constant survey and detection of newly arrived alien plants is the main source of information to reveal potentially dangerous species and make decisions for their control.

MATERIALS AND METHODS

Field studies were conducted in the southern districts of Latvia (Tērvete, Vecumnieki, Daugavpils municipalities) in September 2014 and 2016. Herbarium specimens of the described and other collected

alien plant species were deposited at the Herbarium of the Institute of Botany of the Nature Research Centre (BILAS) in Vilnius. The nomenclature of plant taxa is presented after BROUILLET et al. (2006), JIEMEI & KAMELIN (2000), FU & OHBA (2001) and PLISZKO (2015). The most frequently used synonyms are also provided. Alien plant species are arranged in alphabetical order. The text of the herbarium specimen labels is provided. Geographical co-ordinates are indicated according to *WGS 1984* standard.

RESULTS AND DISCUSSION

***Allium nutans* L.** This species is native to East Russia (West and East Siberia), Kazakhstan, Mongolia and North-West China (VVEDENSKII, 1968; JIEMEI & KAMELIN, 2000). In the native range, *A. nutans* grows in steppes, dry and damp meadows, on stony slopes. In Europe, this species is frequently cultivated for ornamental purposes and as a vegetable (KAMENETSKY & FRITSCH, 2002). In Lithuania and Estonia, *A. nutans* has not been reported so far.

A group of plants occupying a total of 0.3 m² area were recorded in an abandoned mesic cultivated meadow. Four clearly defined dense clumps of *A. nutans* were separated by 0.5–1 m distance. One of the clumps was with five inflorescences. At the end of September, the seeds were already ripe and a part of capsules were opened and shed the seeds. This species should be ascribed to the group of casual aliens in Latvia, however, it has a potential to become locally established. *Allium nutans* is cultivated quite often, it also can be found in other localities escaped from cultivation with garden wastes.

Allium nutans is a perennial plant with solitary or paired conical bulbs, attached to a horizontal or slightly ascending stout rhizome. Scape is 30–60 cm long, with two usually winged ribs in upper part. The number of leaves is 6–8, they are flat, glaucous, 8–15 mm broad. Umbel spherical, rarely sub-spherical, drooping before flowering. Perianth is pale red or pale purple (VVEDENSKII, 1968; JIEMEI & KAMELIN, 2000).

Examined specimen. Daugavpils, the southwestern part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow, four clumps occupying the area of 0.3 m²; 55.866334 N, 26.485798 E; 24 September 2016, leg. et det. Z. Gudžinskas and L. Petrulaitis.

***Hylotelephium spectabile* (Boreau) H. Ohba** (*Sedum spectabile* Boreau). This species is native to China and Korea (FU & OHBA, 2001). In the native range, it grows on rocky slopes of low mountains and at forest margins. *Hylotelephium spectabile* is widely cultivated as an ornamental plant (EGGLI, 2003). In Lithuania, it was recorded for the first time in 1999 as escaped from cultivation and was considered as casual (GUDŽINSKAS, 2000). Data on the occurrence of this species in the region of Daugavpils (FATARE, 1989; RUTKOVSKA & ZEĪĻA, 2009) as well as in other regions of Latvia (GAVRILOVA & ŠULCS, 1999; PRIEDĪTIS, 2014) are absent.

Three clumps of *H. spectabile* were found in an abandoned cultivated meadow and in a rubbish heap in the southern part of Daugavpils.

Hylotelephium spectabile in Latvia should be ascribed to the group of casual aliens, however, as many other species of the *Crassulaceae* family (GUDŽINSKAS, 1999; RUTKOVSKA & ZEĪĻA, 2009; GEDERAAS et al., 2012) it can easily become established, but its invasion is hardly possible.

Examined specimen. Daugavpils, the southwestern part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow, three small clumps; 55.867298 N, 26.491540 E; 24 September 2016, leg. et det. Z. Gudžinskas.

***Solidago ×niederederi* Khék.** This is a natural hybrid between the alien *S. canadensis* L. s. l. and the native *S. virgaurea* L. s. str. In recent years, it has been increasingly found in several European countries (NILSSON, 1976; STACE, 1991; OTTO et al., 2005; PLISZKO, 2013, 2015; GUDŽINSKAS & ŽALNERAVIČIUS, 2016; KARPAVIČIENĖ & RADUŠIENĖ, 2016; PLISZKO & ZALEWSKA-GAŁOZ, 2016, etc.). In Lithuania, *S. ×niederederi* is quite frequent in mixed populations of *S. canadensis* and *S. virgaurea* (GUDŽINSKAS & ŽALNERAVIČIUS, 2016; KARPAVIČIENĖ & RADUŠIENĖ, 2016).

Two stands of *S. ×niederederi* were recorded on the southern edge of Daugavpils. The distance between these stands was about 0.5 km. The first stand of *S. ×niederederi* included three mature generative individuals. Two clumps were quite small, having three and four generative shoots, respectively, whereas the third clump was larger, with 17 generative and three vegetative shoots. The second stand consisted

of seven individuals that had from one to three generative shoots and only one individual was with one vegetative shoot. Thus, we suppose that the plants in the second stand were younger than the plants in the first one, and both stands were a result of separate events of hybridization.

This hybrid can be easily distinguished from the parental species by the shape of the synflorescence, shape, size and density of leaves on the stem, the size of capitula as well as by the size and number of ray and disc flowers in a capitulum. The synflorescence of *S. ×niederederi* is paniculate, with branches diverging at an acute angle (Fig. 1), whereas the synflorescence of *S. canadensis* usually is pyramidal with branches diverging at a wide angle. Capitula of *S. ×niederederi* are three to four times larger than those of *S. canadensis*, and are approximately one-third or half the size of the capitula of *S. virgaurea*. Another characteristic feature of the hybrid plants is



Fig. 1. *Solidago ×niederederi* in an abandoned meadow in the south-western part of Daugavpils (photo by Z. Gudžinskas)

the shape of vegetative shoots. At the anthesis or later, an individual of *S. ×niederederi* frequently forms one or several vegetative shoots that have at the apex densely crowded leaves in the form of pseudo-rosette (GUDŽINSKAS & ŽALNERAVIČIUS, 2016).

Because *S. ×niederederi* is a result of hybridization between native and alien species, according to the concept by PYŠEK et al. (2004), it should be treated as an alien species in Latvia as well as in other regions of Europe. Considering distribution and size of populations of *S. ×niederederi* in Lithuania, in Latvia it should be treated as an established alien. It is expected that the hybrid is more widely distributed in Latvia and may occur in the areas, where the parental species grow together or in nearby areas.

Examined specimens. 1. Daugavpils, the south-western part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow, three clumps; 55.866932 N, 26.489586 E; 24 September 2016, leg. et det. Z. Gudžinskas; 2. Daugavpils, the south-western part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow, seven clumps; 55.866334 N, 26.485798 E; 24 September 2016, leg. et det. Z. Gudžinskas.

***Symphotrichum dumosum* (L.) G. L. Nesom** (*Aster dumosus* L.). *Symphotrichum dumosum* is native to North America and is distributed throughout the most of the continent (BROUILLET et al., 2006). In North America, in its primary distribution range, *S. dumosum* occupies moist or wet soils, sedge meadows, marshes, swamps, flood plains, sandy or calcareous flats, loamy prairies, old fields, sandy to muddy shores of lakes and ponds and interdunal hollows. Sometimes it is also found in dry, sandy, well-drained and nutrient-poor soils (BROUILLET et al., 2006; KARBERG, 2009).

This species is quite easily distinguished from other species of the genus *Symphotrichum* by the thick stem leaves and peduncles that are densely covered with small bract-like leaves. Ray flowers are usually white to pale blue, but this species is widely cultivated as an ornamental plant and, therefore, many cultivars with various colours of ray flowers were developed (HETTERSCHIED & VAN DEN BERG, 1996; BROUILLET et al., 2006). In Latvia, the collected plants were with blue ray flowers, whereas plants with white ray flowers, which prevail in Lithuania, were not found in the

investigated area. Individuals of *Symphyotrichum dumosum* recorded in Daugavpils were up to 0.5 m high and tended to be significantly lower than plants occurring in Lithuania.

In Daugavpils, *Symphyotrichum dumosum* most likely survived after the abandonment of small garden plots or were dumped with garden wastes. To date, this species should be considered as casual alien in Latvia, however, its establishment and further spread is expected.

Examined specimen. Daugavpils, the south-western part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow and wasteland, four groups of plants occupying the areas of 0.5–4 m²; 55.866333 N, 26.485795 E; 24 September 2016, leg. et det. Z. Gudžinskas and L. Petrulaitis.

***Symphyotrichum lanceolatum* (Willd.) G. L. Nesom** (*Aster lanceolatus* Willd.). This species is native to North America and has nearly a transcontinental distribution, extending across southern Canada from Nova Scotia, south to central Georgia and northern Florida (SEMPLE & CHMIELEWSKI, 1987). *Symphyotrichum lanceolatum* is one of the most widespread alien species in Europe (LAMBTON et al., 2008). It is a naturalized species in Estonia (KUKK, 1999; ÖÖPIK et al., 2008), whereas in Lithuania, it is a potentially invasive species (GUDŽINSKAS, PETRULAITIS, 2016).

In the period of investigations, we recorded three populations of this species in Latvia. First population of *S. lanceolatum* was found in Lāči village (Tērvete district) in 2014. It occupied about 100 m² area in an abandoned meadow on the edge of forest, in a ditch of the road and adjacent areas. Extensive areas occupied by this species were registered on the banks of the River Mēmele (in Lithuania, the River Nemunėlis) east of Skaistkalne (Vecumnieki district). It grows in riparian tall herb fringe communities, along edges of riparian forests and in mesic meadows. In 2016, it was recorded in a ditch along the road north of Medumi. It occupied about 30 m long and 2–6 m wide belt along the road and the forest edge (Fig. 2).

Symphyotrichum lanceolatum is a highly polymorphic species and is often easily confused with several other species of this genus (CHMIELEWSKI & SEMPLE, 2001). Ray flowers vary in colour from white to pale pink or pale blue or blue-violet (CHMIELEWSKI & SEMPLE, 2001; MEINERT et al., 2009). Populations of



Fig. 2. *Symphyotrichum lanceolatum* on the edge of forest in the vicinities of Medumi (photo by Z. Gudžinskas)

S. lanceolatum in Latvia were formed by plants with white ray flowers. It should be noted that at the beginning of flowering usually white flowers turn to pale bluish or pinkish at the end of anthesis. The colour of ray flowers can change at herbarium specimen drying time.

It should be noted that in Latvia only *S. ×salignum* has been reported (GAVRILOVA & ULCS, 1999; PRIEDE, 2009; PRIEDĪTIS, 2014). In Latvia, *S. ×salignum* has been registered in 159 grid squares (5 × 5 km) and considered as invasive (PRIEDE, 2009). We suppose that *S. lanceolatum* is not distinguished from *S. ×salignum* and a significant part of its records in Latvia should be referred to *S. lanceolatum*. Revision of herbarium specimens is necessary to confirm our presumption.

Symphyotrichum lanceolatum should be treated as a naturalized and potentially invasive alien species in Latvia. Although we have not investigated the development of seeds in Latvian populations, we have observed that in North Lithuania *S. lanceolatum* produces viable seeds (GUDŽINSKAS, PETRULAITIS, 2016).

Thus, generative reproduction of this species in Latvia is highly probable. Seeds of *S. lanceolatum* can be easily dispersed both by wind and water. Having in mind that the size of populations increases by vigorous rhizomes, it is expected that this species will become even more abundant in the areas of current occurrence.

Examined specimens. 1. Tērvete district, Lāči village, at the cross of roads Žagarē–Augstkalne and Bukaiši–Lāči, in a meadow and on the edge of forest, very abundant; 56.375708 N, 23.281069 E; 16 September 2014, leg. et det. Z. Gudžinskas and L. Petrulaitis; 2. Daugavpils district, 2 km north-east of Medumi, on the left side of the road Zarasai–Daugavpils, in a ditch and on the edge of forest, very abundant; 55.794339 N, 26.376488 E; 24 September 2016, leg. et det. Z. Gudžinskas and L. Petrulaitis.

***Symphotrichum novae-angliae* (L.) Nesom** (*Aster novae-angliae* L.). This species is native to North America and occurs commonly throughout the eastern deciduous forest region, the Great Plains, and its isolated populations are known from South Dakota to New Mexico (SEMPLÉ & BROUILLET, 1980; SEMPLÉ, 1984). *Symphotrichum novae-angliae* is a quite commonly naturalized alien in South and Central Europe (YAVORSKA, 2009; LAKUŠIĆ & JOVANOVIĆ, 2012; MEDVECKÁ et al., 2012; PYŠEK et al., 2012). In Estonia, it has not been reported (KUKK, 1999). In Lithuania, *S. novae-angliae* is a quite rare established alien species (GUDŽINSKAS, 1997; GUDŽINSKAS, PETRULAITIS, 2016).

In Latvia, *S. novae-angliae* was recorded for the first time in Daugavpils in an abandoned wasteland. A total of three groups of plants were registered forming almost pure stands, which occupy the areas of 4 m², 2 m² and 1.5 m², respectively. Currently, this species should be ascribed to the group of casual aliens, however, its establishment is expected. Rhizomes of *S. novae-angliae* are short, thus it forms dense stands and its vegetative spread is quite slow.

Examined specimens. 1. Daugavpils, the south-western part of the city, to the southwest from Gulbju Str., in an abandoned cultivated meadow, on the edge of shrub grove, 4 m²; 55.865410 N, 26.488332 E; 24 September 2016, leg. et det. Z. Gudžinskas and L. Petrulaitis; 2. Daugavpils, the south-western part of the city, to the southwest from Gulbju Str., between the shrubs, 2 m²; 55.867027 N, 26.489815 E;

24 September 2016, leg. et det. Z. Gudžinskas and L. Petrulaitis.

Twenty other alien plant species previously registered in Daugavpils (FATARE, 1989; RUTKOVSKA et al., 2008, 2011, 2013, etc.) or in other regions of Latvia (GAVRILOVA & ŠULCS, 1999; PRIEDITIS, 2014, etc.) were also recorded in the south-western part of Daugavpils city in September 2016. The most abundant alien species in abandoned meadows, wastelands and unused arable fields were: *Erigeron annuus* (L.) Pers., *E. canadensis* L., *Galinsoga parviflora* Cav., *G. quadriradiata* Ruiz. et Pav., *Helianthus tuberosus* L., *Lupinus polyphyllus* Lindl., *Solidago canadensis* L. s. l. Much less frequent were species such as *Asparagus officinalis* L., *Acer negundo* L., *Dipsacus fullonum* L., *Echinocystis lobata* (Michx.) Torr. et A. Gray, *Heracleum sosnowskyi* Manden., *Parthenocissus quinquefolia* (L.) Planch., *Physalis alkekengi* L., *Prunus cerasifera* Ehrh., *Rosa rugosa* Thunb., *R. spinosissima* L., *Rudbeckia laciniata* L., *Rumex confertus* Willd. and *Ribes uva-crispa* L.

Though the flora of Latvia is well investigated, the results of this short research indicated that immigration of new alien species is quite intense ongoing process. New alien species appear both in heavily disturbed urban areas and in seminatural or even natural habitats. Attention should be paid to the escaped plant species even if they at present cannot survive for a long time outside areas of cultivation. Each record can provide valuable information in the future on the intricate process of establishment, spread and invasion of certain alien plant species.

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PIETINIULOSE LATVIJOS RAJONUOSE APTIKTOS NAUJOS SVETIMŽEMĖS AUGALŲ RŪŠYS

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Santrauka

Svetimžemiai augalai yra labai dinamiška ir sparčiai kintanti bet kurio regiono floros dalis. Daug tikslingai įveistų ir anksčiau tik želdynuose arba soduose augintų augalų dabar vis dažniau aptinkami sulaukėję ir augantys antropogeninėse arba pusiau natūraliose buveinėse.

Pietiniuose Latvijos rajonuose 2014–2016 m. vykdant tyrimus buvo aptikti šešių svetimžemių rūšių augalai, kurie šioje šalyje anksčiau nebuvo užregistruoti: *Allium nutans*, *Hylotelephium spectabile*, *Solidago ×niederederi*, *Symphyotrichum dumosum*, *S. lanceolatum* ir *S. novae-angliae*. Keturių rūšių svetimžemiai augalai – *Allium nutans*, *Hylotelep-*

hium spectabile, *Symphyotrichum dumosum* ir *S. novae-angliae* – šiuo metu turėtų būti priskirti prie neįsitvirtinusių rūšių grupės. *Solidago ×niederederi* yra įsitvirtinusi ir ateityje galinti plisti, o *Symphyotrichum lanceolatum* yra natūralizavusi ir potencialiai invazinė rūšis.

Straipsnyje trumpai aprašomi rūšių morfologiniai ir svarbiausi skiriamieji požymiai, pateikiama duomenų apie aptiktų populiacijų dydį. Pateikta trumpa informacija apie dar 20 svetimžemių augalų rūšių, aptiktų pietvakariniame Daugpilio miesto pakraštyje esančiame dykviečių, apleistų kultūrinių pievų ir nenaudojamų dirbamų laukų masyve.