DISTRIBUTION OF *SPERGULA MORISONII* BOREAU (CARYOPHYLLACEAE) IN LATVIA

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Abstract
The genus *Spergula* L. belongs to the family Caryophyllaceae Juss. Two species in this genus are known in Latvia: *Spergula arvensis* L. and *Spergula morisonii* Boreau. Three localities of the last one have been found in Latvia till now. It was collected in the surroundings of Daugavpils city and in the protected area "Garkalnes meži". Current distribution results indicate that the species can be found throughout Latvia. The aim of this research was to explore the current distribution, habitat preferences and requirements for the conservation of this species.

Keywords: *Spergula morisonii*, distribution, Latvia.

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INTRODUCTION

Spergula L. is a genus of the Caryophyllaceae Juss. Family. Native to temperate Eurasia, chiefly in Europe and the Mediterranean containing five species in the genus (Kubitzki et al. 1993, Gavrilova 1999, Hartman & Rabeler 2005). Genus *Spergula* comprises only two taxa: *Spergula arvensis* L. and *Spergula morisonii* Boreau (Jankevičiene et al. 1993, Gavrilova & Šulcs 1999) in Latvia. *S. arvensis* is native throughout Europe, occurs as a weed of cornfields and other cultivated grounds, especially on sandy soils. *S. morisonii* is distributed in central Europe and northern Africa, introduced in Australia; it is a calcifuge, occurs in sandy open places and pine forests, in lowland and upland zones (Bojnanský & Fargašová 2007). In Estonia during last decades has not been found. The last time it was recorded in 1957 from Liiva cemetery (Kukk et al. 2020). In Lithuania it is distributed in areas southeast of Ignalina to Kapčiamiesčio. It is also found in the vicinity of Kaunas and Klaipeda. In Latvia, according to old literature data, it was recorded in the surroundings of Liepāja city (Starcs 1934, Pētersone 1955, Tabaka 1974, Gavrilova 1999), but 100 years later in 2019 the species was found in the protected area "Garkalnes meži" (unpublished data).

In central Europe the species is related to the *Spergulo morisonii-Corynephoretum canescentis* plant community, which is the most common plant association formed on those poor and acidic sands. They are composed of pioneer plant species with wide and low specialized environmental requirements. The most characteristic species of this association are *Achillea millefolium* L., *Corynephorus canescens* (L.) P. Beauv., *Helichrysum arenarium* (L.) Moench, *Pilosella officinarum* Vaill. (syn.

Hieracium pilosella L.), *Hypochaeris radicata* L., *Jasione montana* L., *Rumex acetosella* L., *Scleranthus perennis* L., *Spergula morisonii* Boreau, *Teesdalia nudicaulis* (L.) W. T. Aiton and *Veronica dillenii* Crantz. (Juśkiewicz-Swaczyna 2009). *Spergulo morisonii-Corynephoretum canescentis* plant community is highly light-demanding and disappears in a consequence of succession. Dry grassland vascular plants depend on regular disruption of their germination (Leuschner & Ellenberg 2017).

MATERIALS AND METHODS

Revision of the proposed localities of the *S. morisonii* was carried out from 2020 to 2022. Attention was paid to species from the *Spergulo morisonii-Corynephoretum canescentis* plant association, mainly to *Corynephorus canescens* distribution in the territory of Latvia (Nature Data Management System "OZOLS" data). Attention was also given to European Union Habitats 2130* *Fixed dunes with herbaceous vegetation (grey dunes),* 2320 *Dry sand heaths with Calluna and Empetrum nigrum* and 2330 *Open grassland with Corynephorus and Agrostis of continental dunes* and adjacent dry habitats (Nature Data Management System "OZOLS" data). Relevant habitats were studied on the territory of Ķemeri National Park, protected areas "Garkalnes meži", "Sventājas ieleja", "Pāvilostas pelēkā kāpa", "Ziemupe", surroundings of protected area "Ādaži" and vicinity of Rīga, Daugavpils and Liepāja city (see Fig. 1.). Species distribution maps were provided by using the square method, which is related to the geographical coordinates, where one square corresponds approximately to 7.6 × 9.3 km (Tabaka et al. 1980).

All collected herbarium material of *S. morisonii* is deposited at the Institute of Life Sciences and Technology, Laboratory of Botany, Daugavpils University (DAU).

RESULTS

Spergula morisonii Boreau, Rev. Bot. Recueil Mens. 2: 424. 1847. (syn. *Spergula vernalis* auct.)

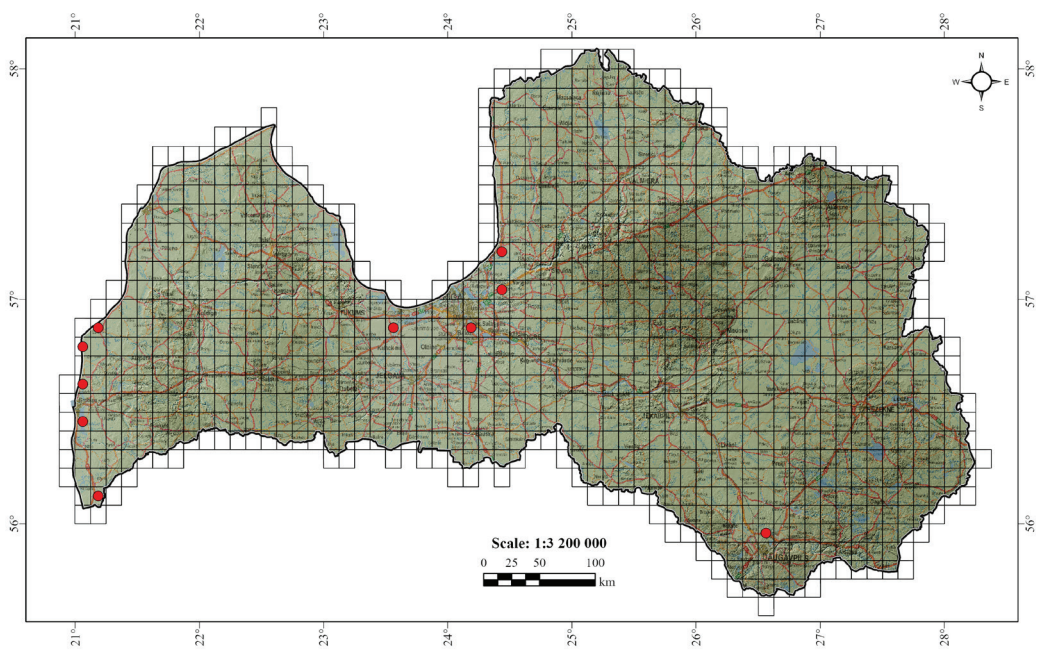

Figure 1. Locations where the survey of the relevant habitats was carried out.

Figure 2. *Spergula morisonii* Boreau in a newly discovered locality in Augšdaugava municipality, Laucesa parish, about 2,8 km NE of Liepziedi.

MORPHOLOGY. Is an ephemeral plant which survives long time of the year as seeds in the soil (Partzsch 2009), annual, glabrous or moderately pubescent, with ascending stems 5–30 cm high. Leaves are 1–2 cm long, linear, not channeled beneath. Pedicels erect to ascending, spreading or sometimes reflexed in fruit. Sepals are 3–4 mm, ovate, acuminate. Petals are approximately equal to the sepals, ovate, obtuse, overlapping at the margins. Stamens are 10. Capsule are 5 mm, slightly exceeding the sepals. Seeds are 1–1,5 mm, laterally compressed, brown. Surface is smooth, lusterless, except for minute, club-shaped white marginal papillae, striate wing narrower than the seed, wings light brown to brownish black, 0,2–0,3 mm wide. Flowering occurs in spring-early summer (Tutin 1993, Bojnanský & Fargašová 2007) (see Fig. 2).

DISTRIBUTION. During the research species has been found in three localities (see Fig. 3) – in vicinity of Daugavpils city: the species was first collected on 7 May 2020, Augšdaugava municipality, Laucesa parish, about 600 m NEE of Liepziedi, below the high voltage line, in a sandy place, with dominance of *Calluna vulgaris* (L.) Hull, *Racomitrium canescens* (Hedw.) Brid. and *Cladonia* spp. [Lat, lon: 55.920488; 26.495182] (DAU102507) (see Fig. 4); on 8 May 2022, Augšdaugava municipality, Laucesa parish, about 2,8 km NE of Liepziedi, below the high voltage line, in a sandy place, with dominance of *Racomitrium canescens* and *Cladonia* spp. [Lat, lon: 55.937999, 26.515390] (DAU106801) and on 12 May 2022, Ropažu municipality, Garkalne parish, protected area "Garkalnes meži", about 2,8 km NE of Garkalne, in European Union Habitat 2320 Dry sand heaths with Calluna and Empetrum nigrum (see Fig. 5) [Lat, lon: 57.061085, 24.458458] (DAU106802).

ECOLOGY. The largest number of *S. morisonii* was found in surroundings of Daugavpils city, one of the populations has about 500 specimens

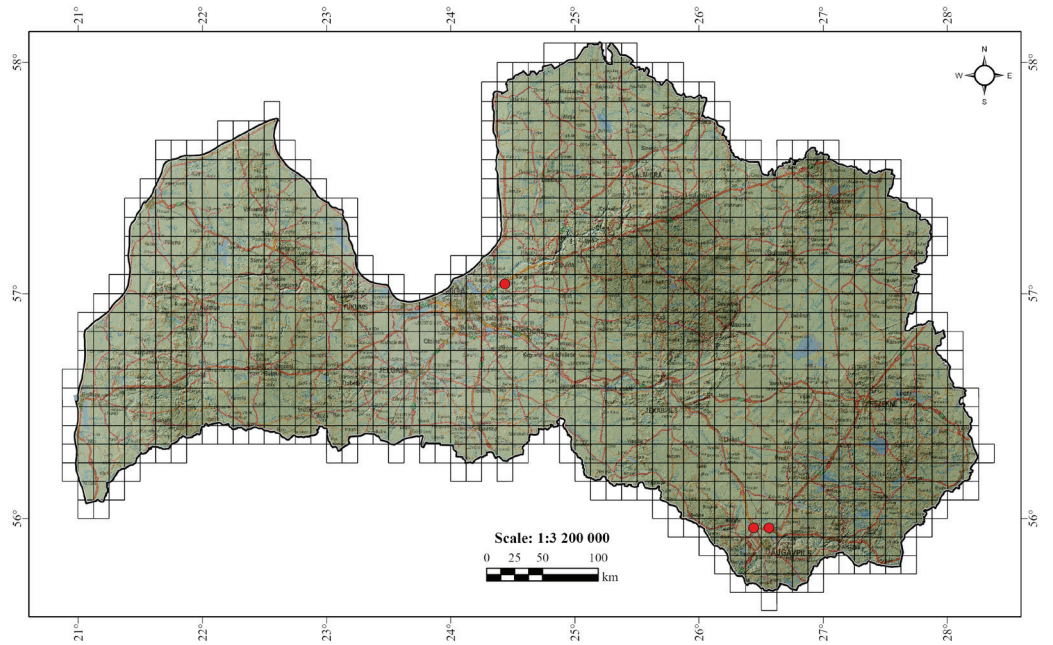

Figure 3. Distribution of *Spergula morisonii* Boreau.

Figure 4. Habitat of *Spergula morisonii* Boreau in Augšdaugava Municipality, Laucesa parish.

Figure 5. Habitat of *Spergula morisonii* Boreau in protected area "Garkalnes meži".

and covers an area of 90x30 meters. The second population, located approximately 2 kilometers northwest, has about 700 specimens and covers an area of 340x40 meters. At the same time, the population in the protected area "Garkalnes meži" is small and has only about 15 individuals and covers an area of 10 square meters

DISCUSSION

Spergula morisonii is very similar to *S. arvensis*, which grows almost all over the territory of Latvia. S. *morisonii* blooms earlier than *S. arvensis*. Leaves of *S. morisonii* are always shorter than its internodes (0,5–1 cm), there is no groove at the bottom of the leaves, while *S. arvensis* leaves have the same length as its internodes (1–3 cm), the bottom of the leaves has a groove (Tutin 1993, Bojnanský & Fargašová 2007).

In the open dune habitats, as the frequency and intensity of disturbances caused by nature or humans gradually decreases, transformation takes place through natural succession – the dunes overgrow and become a forest or heath (Laime 2017). Thereby overgrowing of natural habitats affects the growth and further distribution of the species. A large number of individuals in the surroundings of Daugavpils city can be explained by the fact that the populations are located under power lines and are periodically plowed up. Thus, periodic plowing does not allow the area to overgrow and forms open areas required for *S. morisonii*. At the same time, the population in the protected area "Garkalnes meži" is small. At the moment, due to the processes of succession, the territory is overgrown with pines, which limits the growth and distribution of *S. morisonii*. In order to keep and preserve the population and dune habitat

from succession processes, it is necessary to introduce management measures that imitate natural disturbances.

In Latvia, according to old literature data, *S.morisonii* was recorded in the surroundings of Liepāja city. It was first identified and collected in the herbarium in 1917 (collected by A. Ludwig), but there is no herbarium specimen of *S. morisonii* (Gavrilova 1999). Although the species was not found again, but there is a high probability of finding this species in the future. At the moment it is difficult to give an exact conclusion on the distribution of the species on the territory of Latvia, since the species has only been found in three places, two of which are located close to each other. It can be concluded that new findings of the locality of the species in the territory of Latvia are possible. Therefore, it is recommended to include this species in the Red Data Books.

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