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CAREX DISPERMA – NOT YET EXTINCT SPECIES IN OLD-GROWTH SWAMPY FORESTS OF LITHUANIA

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Abstract

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The paper describes the locality of *Carex disperma* reaffirmed after a century; the locality is situated in the present territory of the Viešvilė State Strict Nature Reserve. Plants were found in an old swampy spruce forest, which, according to the geobotanical description, corresponds to the *Sphagno girgensohnii-Piceetum* Polak. 1962 association. The stand is rich in indicator species of an old-growth forest. Twelve *Carex disperma* individuals, growing in the area of 3 m^2, were recorded in 2009. One more locality has recently been found in Utena region, but it has not been published in scientific references yet. Information on other localities of this species in Lithuania is either very old (mid-19th century) or not confirmed by the herbarium specimens.

Keywords: distribution, Viešvilė State Strict Nature Reserve, Abromeit J.

INTRODUCTION

Carex disperma Dewey (syn. *C. tenella* Schkuhr) is a circumboreal species of the taiga zone (Meusel et al., 1965), growing in swampy forests. The southwestern border of the European range crosses Kaliningrad region, the northeastern parts of Poland and Belarus. Towards the border of the distribution area, the species becomes more demanding for the environmental conditions and, therefore, rarely found. In Latvia, about 30 localities of *C. disperma* are known, mostly in central and eastern parts (Andrušaitis, 2003); it is rarely found in almost the whole Belarus (Parfenov, 1999). According to the old data (Abromeit et al., 1931–1940), two localities are indicated in Kaliningrad region – Chernyakhovsk (formerly Insterburg) environs and Krasnyj (Romintен) Forest. Currently this species is not recorded in the region and its status is uncertain (Dedkov, 1999). In the northeastern part of Poland, the plants of this species are found in five separate forest areas (Borki, Romincka, Białowieża, etc.) (Pawlikowski, 2010).

Until recently the status of this plant in Lithuania has raised many doubts. The oldest information was presented by Mowszowicz (1938) indicating two localities according to S. Gorski's (1802–1864) herbarium: near Vilnius and Krivoshin environs – "ok. Krzywoszyna". The latter locality is on the current territory of Belarus, south of Baranovichi. S. Gorski's herbarium is now divided into separate parts at Vilnius University, Warsaw, Krakow and maybe Kiev. In the part of the herbarium in Vilnius, no specimens of *C. disperma* were found.

According to the Lithuanian botanists of the interwar period (Dagys et al., 1934), *C. disperma* is indicated only as probable in Lithuania (excluding Vilnius region). Another old reference (Abromeit et al., 1931–1940) in addition to the mentioned localities in Kaliningrad region also reports two localities from

Lithuania, the former Klaipėda region (Memelland). The localities are rather precisely indicated. Plant specimens were probably deposited at the Herbarium of Königsberg University, which perished during the war. In Volume II of "Lithuanian Flora" (Stancevičius, 1963), four localities were indicated: Biržai forest, Lipniškės (Švenčionys district, most probably a former grange near Trečiūnai), Tauragė and Vilnius environs. Unfortunately, there are no more accurate references or herbarium specimens from these areas. The last compendium of the Baltic flora (Baroniņa et al., 2003) indicates that this species is very rare in Lithuania, known only by literature references.

In the period of 1995–2005, the investigations on biodiversity in separate regions involving a number of amateur botanists were exceptionally popular. Having explored Utena district, Obelevičius (2002) reported the finding of *C. disperma* in Vyžuonos forest, near the Botanical Reserve established by the municipality.

The aim of this work was to clear the status of *Carex disperma* in Lithuania and present the data on detailed investigation of the population, which was mentioned by Abromeit (Abromeit et al., 1931–1940).

MATERIALS AND METHODS

The publication of Abromeit et al. (1931–1940) was used as primary information on *Carex disperma* localities in recent territory of Lithuania. The data on abundance and morphometry of *C. disperma* individuals were collected in 2008–2009. The relevés of the habitat were performed using Braun-Blanquet scale (Braun-Blanquet, 1964). The relevé plot was projected considering the *C. disperma* position in the centre. The size of the relevé in 2008 was 20 × 20 m (400 m^2). Due to mosaic character of the habitat, the fragment of plant community of other type was included. Therefore, an additional relevé, the size of which was reduced by about one third, considering the boundaries of homogeneous community, was performed in 2009.

The group of characteristic species of the *Vaccinio-Piceetea* Br.-Bl. in Br.-Bl. et al. 1939 class was drawn up after Čiuplys (2004).

To evaluate the abundance of plants in the population and collect sufficient morphometric data, all detected *Carex disperma* plants were examined.

INVESTIGATION AREA

The investigation area is located in the western part of Lithuania, in the region of the lower reaches of the River Nemunas (Fig. 1). There is a large sandy fluvioglacial plain covered by Karšuva forest array. It occupies the area of 40 000 ha. Pine forests with admixture of spruce referable to taiga type prevail in the area. In 1991, the Viešvilė State Strict Nature Reserve was established in the central part of the forest surrounding the Viešvilė stream. It occupies the area of 3220 ha (Baškytė et al., 2006). It is rich in various types of forest habitats, including old swampy forests.

Fig. 1. Current distribution of *Carex disperma* in Lithuania
● – Investigated locality
○ – Uninvestigated locality in Utena district (according to Obelevičius (2002))

Until the World War I, the southwestern part of the forest belonged to East Prussia. The flora of this territory was investigated and described by Abromeit et al. (1931–1940). At the beginning of the 20th century, the forestry became more intensive, swampy forests were reclaimed. Now, human activity in the forest, except the territory of the Reserve, is rather intensive.

RESULTS AND DISCUSSION

Both localities precisely referred by Abromeit et al. (1931–1940) in the current territory of Lithuania are situated in the western part of Jurbarkas district. They are close to each other. One of them is reported

on the right bank of the stream Viešvilė between the hammer factory and the log bridge („r. Wischwillufer zw. Eisenhammer und Knüppelbrücke“ according to Abromeit et al. (1931–1940)). Another locality is indicated in Smalininkai forestry close to Tetervinė, in 161 forest quarter („F.-R. Schmalleningken, Bel. Auerhahn, Jg. 161“ according to Abromeit et al. (1931–1940)). Based on the mentioned reference, *Carex disperma* plants first were observed (or possibly collected?) by Rudolf Gross in 1897.

Carex disperma was re-discovered close to the Viešvilė stream. It is not clear whether the plants were found in the same or slightly different place, whereas two log bridges situated close to each other were above the mentioned former hammer factory. The current locality is in the territory of Viešvilė State Strict Nature Reserve above the lower bridge (55° 05’ 14.28” N, 22° 24’ 24” E) (Fig. 2).

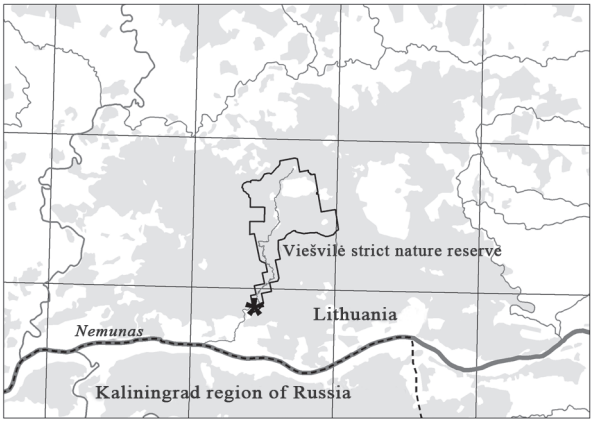

Fig. 2. *Carex disperma* locality (*) in the central part of Karšuva forest included into the Viešvilė State Strict Nature Reserve

Attempts to find *C. disperma* in Tetervinė forest were not successful. Swamp forests in the surrounding area were drained already at the beginning of the 20th century. Currently, degenerating swampy coniferous forest communities are found in these areas. Due to abandoned reclamation system deciduous swamp forests assume their natural appearance, but the recent logging resulted in the prevalence of young alder and birch stands.

Habitat

The habitat of *Carex disperma* in the Viešvilė Reserve is a swampy valley spruce forest. The forest area surrounding the stream is dominated by middle-aged *Dicrano-Pinetum sylvestris* Preising et Knapp ex Oberdorfer 1957 pine forests influenced by economic activity. It is not usual that the generally more fertile stream valleys of the southern margin of boreal belt are overgrown with coniferous forests. In this case, cold, carbonate-poor ground waters reaching the soil surface in the valley predetermine the forest community. Consequently, the processes of bogging up and non-intensive peat accumulation are noted. Due to the special cool microclimate and not convenient situation for land use, boreal-type old-growth forest fragment has survived in the Viešvilė stream valley. According to the forest inventory data, the age of forest stand is about 150 years. Visually, the forest stand is composed of trees of various age, it contains a lot of dead wood and a large variety of cryptogamic flora. Certain moss indicator species of the old-growth forests (according to Andersson et al., 2002) were recorded: *Anastrophyllum hellerianum, Barbilophozia attenuata, Bazzania trilobata, Trichocolea tomentella* (Jukonienė, Uselienė, 2007). Rare lichens such as *Arthonia leucopellea, A. vinosa, Chaenotheca chlorella, Menegazzia terebrata, Usnea scabrata, Cladonia norvegica* (Motiejūnaitė, 2000) and fungi such as *Pycnoporellus fulgens, Phlebia centrifuga, Ischnoderma benzoinum, Gloeophyllum abietinum* (personal communications of A. Gricius, R. Iršėnaitė, and Ž. Preikša) also represent the same ecological group. Red-listed vascular plant species such as *Huperzia selago, Dactylorhiza fuchsii, Listera cordata* were registered as well. High concentration of indicator species clearly shows a specific status of the forest community.

Old-growth forest stand with *Carex disperma* occupies the area of about 6 ha. It is located in the stream valley with a width of 150 m. The stand is quite mosaic due to uneven microrelief resulting from the slight terraces, springs, and peat soil patches. Wet spruce grove alternates with alder patches that have features of both *Carici elongatae-Alnetum* W. Koch 1926 and *Circaeo-Alnetum* Oberd. 1953 associations. Some tall grass (*Eupatorium cannabinum, Cirsium oleraceum, Carex acutiformis, Phalaroides arundinacea*) clearings and regenerating groups of young trees have formed in places of naturally decayed fallen trees.

Population and morphometric data

The *Carex disperma* plants were very sparse. Only 12 loose tussocks growing in the area of 3 m^2 were recorded in 2009. An individual contained 16 shoots on average (from 3 to 44), four of which were generative (from 0 to 12). The average length of a generative stem was 29 cm (h_{min} = 12, h_{max} = 50, n = 49). Since the stems were nodding, the actual height of the plant was about 20 cm. The height of vegetative shoot – 4–12 cm. One stem contained 2–5 spikes, with 1–3 fruits per spike. On each stem an average of four and maximum of nine fruits

Table 1. Relevé of the plant community with *Carex disperma* in the valley of Viešvilė stream

Date		2008 06 12	2009 06 09
Cover, %:			
Trees	a	80	90
	b	20	10
	c	2	5
Shrubs		7	2
Herbs		60	70
Bryophytes		98	98
Number of species per relevé		50	43
Woody species			
Picea abies	a	5	5
Picea abies	b	2	2
Picea abies	c	1	1
Alnus glutinosa	a	2	1
Alnus glutinosa	b	2	+
Betula pubescens	b	+	+
Quercus robur	b	+	+
Quercus robur	c	1	+
Acer platanoides	c	+	+
Fagus sylvatica	c		+
Frangula alnus		2	1
Sorbus aucuparia		1	1
Ribes spicatum		+	
Ch. et D. Ass. *Sphagno girgensohnii-Piceetum*			
Sphagnum girgensohnii		1	2
Lysimachia vulgaris		1	1
Carex echinata		+	
Galium palustre		+	
Lepidozia reptans			+
Ch. All. *Piceion abietis*, O. *Piceetalia abietis*, Cl. *Vacinio-Piceetea*			
Vaccinium myrtillus		3	2
Lycopodium annotinum		2	2
Trientalis europaea		+	+
Huperzia selago		+	
Pleurozium schreberi		2	3
Polytrichum formosum		1	1
Dicranum polysetum		+	1
Hylocomium splendens		1	

Accompanying species		
Maianthemum bifolium	2	2
Equisetum sylvaticum	2	2
Athyrium filix-femina	1	2
Luzula pilosa	1	1
Dryopteris dilatata	1	1
Calamagrostis canescens	+	1
Oxalis acetosella	+	1
Dryopteris carthusiana	1	+
Carex nigra	1	+
Carex disperma	+	+
Carex loliacea	+	+
Carex remota	+	+
Circaea alpina	+	+
Geranium robertianum	+	+
Equisetum pratense		+
Urtica dioica		+
Viola palustris		+
Carex cinerea	+	
Poa trivialis	+	
Dryopteris expansa	+	
Thuidium tamariscinum	3	3
Plagiochila major	2	2
Sphagnum centrale	2	2
Sphagnum capillifolium	1	
Plagiomnium undulatum	+	1
Eurhynchium angustirete	+	1
Tetraphis pellucida	+	+
Rhytidiadelphus triquetrus	+	+
Mnium hornum		+
Plagiomnium rostratum		+
Plagiomnium affine	+	
Plagiomnium ellipticum	+	+
Hypnum cupressiforme	+	
Calypogeia sp.	+	
Herzogiella seligeri	+	

were recorded. The average length of stem leaf was 22 cm.

Although continual botanical investigations in the Viešvile State Strict Nature Reserve have been performed for 20 years already, *C. disperma* has not been found at other sites.

Phytocoenological data

Geobotanical description of the site with *Carex disperma* is presented in Table 1. Judging by the diagnostic species, the community can be attributed to the association *Sphagno girgensohnii-Piceetum* Polak. 1962. Microrelief is distinctly structured with hollows and hummocks arround the trees. *C. disperma* grows in the hollows. Topographic position (the valley was under the influence of groundwater flow) determined the presence of species characteristic of *Alnion incanae* Pawł. in Pawł. et al. 1928 (*Ribes spicatum, Carex remota, Circaea alpina, Equisetum pratense, Plagiomnium undulatum*). Unusual occurrence of *Fagus sylvatica* in the plant community can be explained by the fact that the planted stand of these trees is located nearby. Thus the seeds could have been brought from it by birds.

Diagnostic evaluations of *Carex loliacea* and, moreover, of *C. disperma* for syntaxonomic characterization in phytocoenological works of the neighbouring countries are not found. According to the literature references (Pawlikowski, 2001), *C. disperma* grows in transitional belt between boggy spruce forests (*Sphagno girgensohnii-Piceetum* and *Betulo pubescentis-Piceetum*) and mesotrophic black alder forests (*Thelypterido-Betuletum pubescentis* and *Carici elongatae-Alnetum* variants with moss) (authors of syntaxa are absent in the source).

Among the most widely known ecological scales, only the works of Russian (Cyganov, 1983) and Polish (Zarzycki et al., 2002) botanists contain data on *Carex disperma*. According to the first reference, by the soil moisture *C. disperma* matches 12–18 point range (23 point scale), by acidity – 1–7 (13), nitrogen richness – 1–4 (11), according to shade conditions – 3–7 (9). Therefore, the plant prefers relatively oligotrophic, acidophilous conditions of water-saturated soil. It is not particularly demanding for illumination conditions. Ecologically similar *C. loliacea* grows under more neutral (3–9 points), nutrient richer (3–7) and more shady (4–9) conditions.

Polish botanists (Zarzycki et al., 2002) refer that *C. disperma* plants are found in half-shaded habitats on wet, mesotrophic, acid ($4 \leq pH < 5$) soils rich in organic matter. These conditions more or less correspond the described habitat except major shading.

CONCLUSIONS

Considering the distribution of localities on the border of the range it could be guessed that *Carex disperma* is probable in other areas of Lithuania, especially in the northeastern part. However, because of the similarity with *C. loliacea*, inconspicuous habitus, and a short time suitable for its identification (fruits drop early and the plant becomes unrecognizable) the plant is often overlooked. As *C. disperma* prefers old swampy forests, which are often disturbed by economic activity, the species must be included into the national list of protected species as in the neighbouring countries.

Recent status of *C. disperma* population is not good due to low abundance of the individuals. Though the habitat protection is ensured by the status of state strict nature reserve, the plants can vanish due to natural fluctuations of the plant community: tumbling down of the old tree stand, thickening of the understory, etc.

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CAREX DISPERMA – DAR NEIŠNYKUSI PELKINIŲ SENGIRIŲ RŪŠIS LIETUVOJE

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Santrauka

Straipsnyje aprašoma po šimtmečio pakartotinai patvirtinta *Carex disperma* radvietė, dabar esanti Viešvilės valstybiniame gamtiniame rezervate. Augalai aptikti sename pelkėtame eglyne, kuris pagal geobotaninį aprašą atitinka asociaciją *Sphagnio girgensohnii-Piceetum* Polak. 1962. Medyne daug sengirėms būdingų indikatorinių rūšių. 2009 m. suskaičiuota 12 *Carex disperma* kerelių, augančių 3 m^2 plote. Be šios radvietės Lietuvoje yra žinoma dar viena, neseniai aptikta Utenos rajone, bet neskelbta mokslinėje spaudoje. Informacija apie kitas šios rūšies radvietes yra labai sena (19 a. vidurys) arba nepatvirtinta herbariumo pavyzdžiais.