
Distribution of *Lychnothamnus barbatus* community in Lithuania

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Lychnothamnus barbatus (Meyen) Leonh. is one of the rarest plant species enlisted into the Red Book of Lithuania. During the research, *L. barbatus* was found in two lakes (Balsys, Vilnius distr. and Vygrys, Vilkaviškis distr.), where the species forms the *Lychnothamnus barbatus* community. Totally, 22 species in the community were examined, but only 4 species appeared to be more constant. The place of *Lychnothamnus barbatus* community in the hierarchic system of syntaxa was determined and some investigations on the biomass and habitat chemical parameters have been performed in Lake Balsys.

Key words: *Lychnothamnus barbatus* (Meyen) Leonh., *Lychnothamnus barbatus* community, habitats, vegetation, Red Data Book

INTRODUCTION

Lychnothamnus barbatus (Meyen) Leonh. is one of the rarest plant species in Lithuania. It was enlisted into the first category of the Red Data Book [1, 2] as an endangered species.

The distribution of *L. barbatus* covers Central and Southern Europe (Germany, France, Poland, Italy) and Asia (India), but the species is rare in the whole area [3]. In Lithuania *L. barbatus* reaches the north-eastern boundary of its area: there are no data on this species from Latvia and Estonia, but up to 10 localities of the species are known in the lakes of South Poland [4].

The first known literature data on *Lychnothamnus barbatus* distribution in Lithuania were published by E. Eichwald [5] and J. Mowszowicz [6]. Revising the herbarium collected by S. Gorski in 1822–1823, I. Trainauskaitė [7] found even 42 specimens of *L. barbatus*; unfortunately, all of them were unlabeled. There are some data about the species composition of *L. barbatus* stands in Lake Šventininkai (Trakai district) and Lake Sūgardas (Ignalina district) [7–9].

The aim of the present study was to revise all known localities of *Lychnothamnus barbatus* in order to collect data on the species composition and habitat ecological parameters.

METHODS

Investigation of macrophyte species and communities was done during the period of intensive vegeta-

tion in 1994–2000. Common methods of macrophyte study [10, 11] were used. Describing the vegetation of the representative area (5–10 m²), the qualitative and quantitative inventory of species and communities, dry weight biomass, growing depth and some physical and chemical parameters of water and soil of the habitats were estimated.

Abundance of species and their covering were estimated according to the Braun-Blanquet scale [12]. The nomenclature and place of the *Lychnothamnus barbatus* community in the hierarchic system of syntaxa was established according to the principles of phytosociological classification [12–15].

RESULTS AND DISCUSSION

According to literature data [1, 7–9], only 4 localities of *Lychnothamnus barbatus* in Lithuania were known. Till the year 2000, the only revised and annually observed (since 1992) locality of *L. barbatus* was in Lake Balsys near Vilnius [16]. Three other localities in the lakes Šventininkai (Trakai district), Sūgardai (Ignalina district) and Vygrys (Vilkaviškis district) were investigated in 1999–2000, but *L. barbatus* was found only in Lake Vygrys.

Our study showed that *Lychnothamnus barbatus* grows and forms its community in almost the entire littoral of Lake Balsys (except its eutrophic northern end). The community grows on sand or silt, it occupies about 2 hectares *i.e.* 16% of the littoral zone covered by macrophytes, and reaches the depth of 0.4 to 9.5 m, what is quite possible in this lake

Table. Species composition of the <i>Lychnothamnus barbatus</i> community																									
Relevé No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Species constancy class (ascertained from 23 relevés)	
Date	Jul 60	Aug 67	Jul 92	Sep 92	Sep 92	Oct 94	Jul 97	Jul 99	Jul 99	Jul 99	Aug 97	Aug 99	Aug 97	Aug 99	Aug 99	Aug 99	Aug 99	Sep 99	Sep 99	Sep 99	Jun 2000	Jun 2000	Jun 2000		
Depth of the habitat, m	2	0.8-1.8	2-4	3-6.5	3-6.5	0.5-1	1-1.5	4-8	0.5-1	0.6	0.2-0.5	0.2-0.35	0.3	5	4	0.5-5.1	5	0.6	2-4	7	1.7	3.5	2.5		
Covering %: Herb layer:	80	80	60	60	80	95	90	40	90	95	60	50	60	50	60	90	70	90	70	20	65	70	60		
Bryophyte layer:	5		5	15	20												5		10	20	+	5	10		
No. of species in relevé	7	8	6	7	5	3	6	6	4	3	8	9	3	3	3	4	3	2	4	2	4	4	3		
Species Ch., D. Ass.:																									
<i>Lychnothamnus barbatus</i>	2	2	2	2	3	3	4	2	4	4	3	2	2	3	2	4	3	4	3	2	2	2	2	2	V ²⁻⁴
Ch. O. Charetalia hispidae																									
<i>Chara rudis</i>	.	1	2	2.	2	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I ⁻²
<i>Chara tomentosa</i>	.	.	.	.	+	2	.	+	+	+	.	.	.	1	+	+	+	+	+	.	.	.	.	.	III ⁺⁽²⁾
<i>Nitellopsis obtusa</i>	2	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ¹
Ch. Cl. Charetea fragilis																									
<i>Chara fragilis</i>	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺¹
Ch. Cl. Potamogetonetea pectinati																									
<i>Batrachium circinatum</i>	.	.	.	.	.	.	.	+	+	.	.	1	+	.	.	.	.	.	.	.	.	1	.	.	II ⁺¹
<i>Ceratophyllum demersum</i>	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	I ⁻²
<i>Elodea canadensis</i>	1	1	.	.	.	.	+	.	+	1	+	+	.	.	.	+	.	.	.	.	.	.	.	.	II ⁺⁽⁰⁾
<i>Myriophyllum spicatum</i>	.	.	.	.	.	.	.	.	.	1	1	1	1	.	.	.	.	.	+	.	.	.	.	.	I ⁺¹
<i>Nuphar luteum</i>	.	.	.	.	.	.	.	+	+	1	1	1	1	.	.	+	.	.	.	.	.	.	.	.	I ⁺¹
<i>Potamogeton compressus</i>	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺
<i>Potamogeton lucens</i>	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ¹
<i>Potamogeton pectinatus</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺
<i>Potamogeton perfoliatus</i>	.	.	1	+	.	.	+	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	II ⁺¹
<i>Stratiotes aloides</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺
<i>Utricularia vulgaris</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺
Ch. Cl. Phragmiti-Magnocaricetea elatae																									
<i>Hippuris vulgaris</i>	.	.	.	.	.	.	+	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	I ⁺¹
<i>Sagittaria sagittifolia</i>	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	I ⁺
<i>Schoenoplectus lacustris</i>	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺
Ch. Cl. Fontinaletea antipyreticae																									
<i>Fontinalis antipyretica</i>	1	.	1	2	2	.	.	.	.	.	.	.	.	1	.	.	+	.	+	2	+	1	1	1	III ⁺²
<i>Drepanocladus sendtneri</i>	.	.	+	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I ⁺²
<i>Scorpidium scorpioides</i>	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	sp. ⁺

Area of relevés: 5-10 m².
 Localities of relevés: 1 - Lake Šventinkai (Trakai district); 2 - Lake Stigardas (Ignalina district); 3-20 - Lake Balsys (Vilnius district); 21-23 - Lake Vygriai (Vilkaviškis district).
 Authors of relevés: No. 1 - I. Šarkintienė, No. 2 - I. Trauskaitė; No. 3-23 - A. Balevičius.

with clear water (water transparency during the period of investigations was 1.6–7 m, Secchi).

Besides *Lychnothamnus barbatus*, which predominates, *Chara tomentosa*, *C. rudis*, *Nitellopsis obtusa*, *Fontinalis antipyretica*, *Drepanocladus sendtneri*, *Elodea canadensis*, *Potamogeton perfoliatus* species are frequent in the *Lychnothamnus barbatus* community in Lake Balsys. Communities growing at a depth of 2–7 m have a greater species diversity (5–8 species) than those growing at a depth of 0.5–1 m (2–3 species).

The locality of *L. barbatus* in Lake Vygrys, mentioned in [1], was revised in 2000 and *Lychnothamnus barbatus* forming community was found there. The community was found only in the south and south-western parts of Lake Vygrys. It grows on silty sand with a thin layer of limestone above, at a depth of 1.7 to 3.5 m. The area covered by *Lychnothamnus barbatus* community is only about 100 m², so its survival is problematic in this eutrophic lake. In comparison with the data obtained by I. Trainauskaitė in 1969 [7], the habitat of *L. barbatus* in Lake Vygrys was less eutrophic, 8 plant species registered at that time (only 4 species left now) and just a few individuals of *Ceratophyllum demersum* (which now are quite dense) were growing there.

In order to preserve the second locality of *Lychnothamnus barbatus* which is known in Lithuania, a recommendation to establish a botanical reserve in Lake Vygrys was presented to the Ministry of Environment.

Lake Šventininkai was proclaimed as a botanical reserve in 1960 with a purpose to protect the habitats of rare species *Najas minor* and *Lychnothamnus barbatus*. After revising the lake in 1998 it became clear that the whole area of this shallow lake is continuously covered by *Myriophyllum spicatum*, *Ceratophyllum demersum*, *Elodea canadensis*, but no *L. barbatus* and *Najas minor* or their potential habitats have been found. Such a great shift in the aquatic vegetation of Lake Šventininkai most likely was caused by an intensive eutrophication of the lake ecosystem (a cattle farm had been functioning on the bank of this lake till 1990).

The locality of *Lychnothamnus barbatus* in the southwestern part of Lake Sūgardas was revised in 1998. Although *L. barbatus* was not found here, some potential habitats for this species with a high carbonate content and transparency of water (very similar to those of Lake Balsys) were observed. So, a more detailed research of this lake is needed.

The species composition of *Lychnothamnus barbatus* community was described. Alongside the characteristic species of the community, *Lychnothamnus barbatus*, which usually predominates, *Chara tomentosa*, *C. rudis*, *Nitellopsis obtusa*, *Fontinalis antipyre-*

tica, *Elodea canadensis*, *Drepanocladus sendtneri*, *Potamogeton perfoliatus* species are frequent (Table). Totally, 22 species (from 2 to 9 species in one relevé) growing in the *Lychnothamnus barbatus* community were registered, but only 4 species had a higher (II–V class) constancy.

The *Lychnothamnus barbatus* community belongs to the class *Charetea fragilis* and its place in the hierarchic system of syntaxa is supposed to be as follows:

Cl. *Charetea fragilis* Fukarek ex Krausch 1964

O. *Charetalia hispidae* Sauer 1957 ex Krausch 1964

All. *Charion fragilis* Krausch 1964

Lychnothamnus barbatus community A. Balevičius 2000

The *Lychnothamnus barbatus* community was enlisted into the first category of the Red Data Book of plant communities of Lithuania [2] as a community having a narrow area and rare in the whole area, whose diagnostic species are enlisted into the Red Data Book).

Biomass samples from two variations of *Lychnothamnus barbatus* community (from the depth of 0.5 m and 2.5 m) growing in Lake Balsys were taken. Samples taken from the depth of 0.5 m showed a greater biomass than those taken from a deeper littoral. *L. barbatus* predominated in both variants. The average dry weight biomass of samples from the depth of 0.5 m was 139.55 g/m² (*L. barbatus* 132.05 g, *Chara tomentosa* 6.1 g, other species 1.45 g). The average biomass of samples taken from 2.5 m was 110.72 g/m².

Some data on water and soil chemical composition of the habitats of *Lychnothamnus barbatus* community in Lake Balsys were obtained during the period from May to October 1999. These data mainly show cyclic annual fluctuations in gase regime, concentrations of biogenous compounds and main ions, so the trend could be observable just after a more detailed monitoring. Although it must be mentioned that the *Lychnothamnus barbatus* community prefers habitats rather rich in calcium and carbonate ions (Ca²⁺ concentration in water was 28.62 to 41.61 mg/l; HCO₃⁻ – from 183.0 to 219.6 mg/l). Concentrations of biogenous material in water fluctuated within a wide range: NH₄⁺-N – 0.000–0.464 mg N/l; NO₃⁻ – N – 0.000–0.211 mg N/l; N_{total} – 1.957– 2.337 mgN/l; PO₄³⁻ – 0.000–0.043 mg P/l. Similar fluctuations (of a less amplitude) were noticed in the soil chemical composition.

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LYCHNOTHAMNUS BARBATUS BENDRIJOS PAPLITIMAS LIETUVOJE

S a n t r a u k a

Lychnothamnus barbatus yra viena rečiausių Lietuvoje maurabraginių dumblių rūšių, įrašyta į Lietuvos raudonąją knygą [1]. Literatūros šaltiniuose [5, 6, 7, 8, 9] Lietuvoje buvo minimos 4 šios rūšies radimvietės. 1994–2000 m. šios radimvietės buvo patikrintos. Nustatyta, kad *L. barbatus* šiuo metu auga tik Balsio (Vilniaus r.) ir Vygrio (Vilkaviškio r.) ežeruose, kur formuoja *Lychnothamnus barbatus* bendriją [2]. Šioje bendrijoje vyrauja *L. barbatus*, dažnesnės *Chara tomentosa*, *C. rudis*, *Nitellopsis obtusa*, *Potamogeton perfoliatus*, *Fontinalis antipyretica*, *Drepanocladus sendtneri* rūšys (lentelė). Iš viso bendrijoje inventorizuotos 22 rūšys (nuo 2 iki 9 rūšių viename aprašyme), tačiau tik 4 iš jų siekia II–V pastovumo klasę.

Atlikus tyrimus, nustatyta *Lychnothamnus barbatus* bendrijos vieta sintaksonų hierarchinėje sistemoje. Balsio ežere atlikti kai kurie šios bendrijos biomasės ir jos augaviečių vandens bei grunto hidrocheminiai tyrimai. Vygrio ežerą, kuriame rasta *Lychnothamnus barbatus* bendrija, siūloma paskelbti botaniniu draustiniu, apriboti ūkinę veiklą ežero baseine.