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POPULATION DYNAMICS OF *Liparis loeselii* (L.) L. C. Rich. IN THE NATURE RESERVE 'MIELNO' – SOME RESULTS FROM A 8 YEAR STUDY

Leszek Bednorz

Department of Botany, August Cieszkowski Agricultural University of Poznań, Poland

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ABSTRACT

This paper presents some results of a 8 year (1995-2002) observation of *Liparis loeselii* population in the nature reserve 'Mielno'. The total population numbers as well as generative and vegetative ones differ from year to year. The population grew from 73 in 1995 to 106 in 1997, falling to 29 in 2002. At the same time unfavourable changes in population environment (progressive drainage of the area and expansion of woody plants) have been observed.

Key words: *Liparis loeselii*, population dynamics, microhabitat, nature reserve 'Mielno'.

INTRODUCTION

Liparis loeselii is the only European species of genus *Liparis* L. C. Rich. and it has Eurasian range of distribution. The species is found generally in northern Europe from British Isles through southern Scandinavian Peninsula to East European Lowland. In the south it occurs in southern France, northern part of Italy and the Balkan Peninsula [3, 5, 6].

In Poland *L. loeselii* is a very rare orchid recognised as vulnerable in Polish Red Book. The species has been described from approximately 200 localities in our country but only 52 sites were confirmed or newly found after 1980. Most of them are distributed in the Mazurian Lakeland, the Dobrzyń Lakeland, the Wielkopolska Lakeland and western Pomerania. Two *L. loeselii* populations are included in the all-Polish nature monitoring net [2].

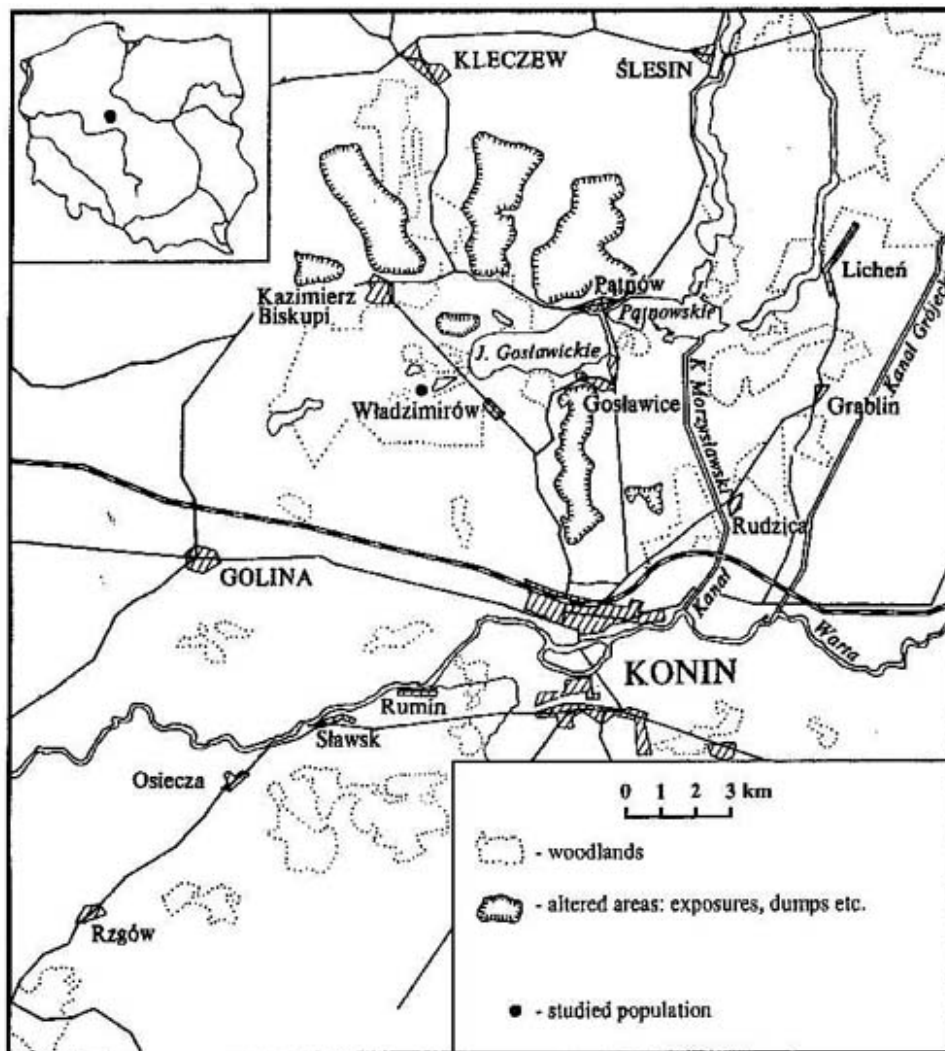
Constant, long term observations on populations numbers dynamics especially these under environmental changes pressure are the basis of prognosis of future populations fate and their possible active protection postulate.

The present study, which began in 1995 and still continues, is aimed at gaining an insight into population dynamics of *L. loeselii* growing on a protected site in the nature reserve 'Mielno'.

SITE DETAILS

The study area is situated in nature reserve 'Mielno', which was established in 1957 generally as wetland birds sanctuary. The reserve is located in the eastern part of the Wielkopolska Lakeland about 10 km north from city Konin and close to the large brown coal strip mine (Fig. 1). The reserve comprises the Lake Mielno surrounded by fens, meadows and woods. The area with *L. loeselii* population is situated close to the lake in the fen zone and the population is a component of plant community belonging to phytosociological alliance *Caricion davalliane* and class *Scheuzerio-Caricetea fuscae*. The soil is peat-mud with pH 6.8-7.2 (in the top 10 cm), high content of calcium carbonate, humus, total nitrogen and available magnesium, and an average content of available potassium and phosphorus [1].

Fig. 1. Location of *L. loeselii* population



METHODS

Three permanent plots (5x5 m each) within *L. loeselii* population area were set up for study in July 1995. The position of individual plants of *L. loeselii* was mapped each year in blooming time (when flowers were fully open). The stage structure of *L. loeselii* population was determined each year (since 1998) in respect to frequency of plants in four development stages; I. juvenile plants with 1 leaf, II. immature (not developing) ones with 2 small leaves, III. grown up ones with 2 big, fully developed leaves, IV. generative (flowering) plants.

Additionally all flowering plants were described according to four morphological features: 1. height of plant, 2. length of the greatest leaf, 3. width of the greatest leaf, 5. the number of flowers in inflorescence.

RESULTS AND DISCUSSION

The number of *L. loeselii* plants recorded in the study area each year in June or July from 1995-2002 is shown in [Table 1](#) and [Fig. 2](#). Plants are separated into generative (which had inflorescence) and vegetative (which did not produce an inflorescence). The population grew from 73 in 1995 to 106 in 1997, falling to 29 in 2002. The percentage of plants which flowered during the 8 year study varied considerably from year to year. The proportion of the population which has flowered has varied from 60.0% in 1995 to 21.4% in 1999 and 21.8% in 2000. Decreasing in numbers of generative plants in years 1997-2000 is responsible for fall in numbers and percentage of juvenile plants which were recruited to the population from 25.7% in 1999 to 10.6% in 2001 and 6.9% in 2002 ([Table 2](#)). It is well known that orchids may fluctuate in numbers from year to year according to specific life cycle (dormancy) and meteorological conditions. Considering these factors and relatively short time of observations it's hard to form strong conclusions about the population dynamics. But it seems to be a tendency to recession of studied population.

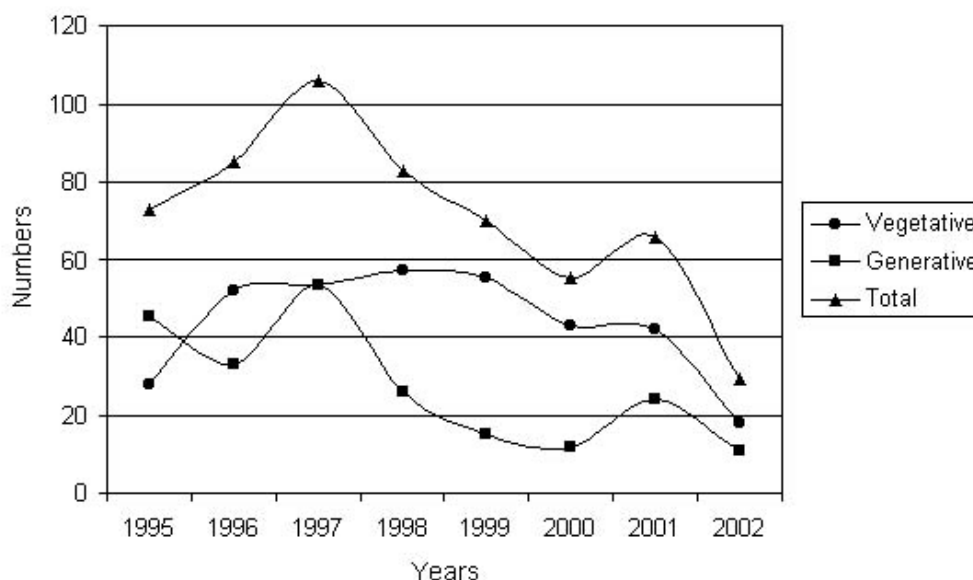
Table 1. Changes in *L. loeselii* population numbers in the years 1995-2002

	1995	1996	1997	1998	1999	2000	2001	2002
Vegetative plants	28	52	53	57	55	43	42	18
Generative plants	45	33	53	26	15	12	24	11
Total numbers	73	85	106	83	70	55	66	29

Table 2. Changes in stage structure of *L. loeselii* population in the years 1995-2002

Stages of development	Frequency (%)				
	1998	1999	2000	2001	2002
I. Juvenile	16.9	25.7	16.4	10.6	6.9
II. Immature	21.7	25.7	47.3	25.7	27.6
III. Grown up	30.1	27.2	14.5	27.3	27.6
IV. Generative	31.3	21.4	21.8	36.4	37.9

Fig. 2. Population dynamics of *L. loeselii*, 1995-2002



At the same time changes in population environment has been observed. Comparing phytosociological relevés made in the study area in 1995 and 2002 one can see differences in composition of phytocoenoses ([Table 3](#)). In all three plots the amount of woody species (*Salix cinerea*, *S. pentandra*, *Alnus glutinosa*, *Betula pubescens*) has increased. Close proximity of these species increases the shade of plant community, and this might determine the

studied population threat as *L. loeselii* tolerates only light shade [7]. Expansion of woody plant species is relevant to progressive drainage of the fen, whereas *L. loeselii* grows only on wet, water soaked soils [7] and is sensitive to water stress. The observed overgrowing of fen area which is the habitat of *L. loeselii* may cause the extinction of this rare orchid species. The decline of microhabitats is one of the reasons of orchids extinction [4, 8].

Table. 3. Phytosociological structure of community with *L. loeselii*

No of plot	Plot. 1	Plot. 1	Plot. 2	Plot. 2	Plot. 3	Plot. 3
Date	3.08.1995	27.07.2002	3.08.1995	27.07.2002	3.08.1995	27.07.2002
Cover of layer B [%]	-	15	10	35	20	30
Cover of layer C [%]	80	80	80	90	80	80
Cover of layer D [%]	70	70	60	60	50	50
Ch.All. Caricion davallianae						
<i>Liparis loeselii</i> C	+	+	1.1	+	+	+
<i>Epipactis palustris</i>	1.1	+	1.1	+	1.1	+
<i>Parnasia palustris</i>	+	+	+	+	+	+
Ch. Cl. Scheuchzerio- Caricetea fuscae						
<i>Triglochin palustris</i> C	4.4	4.4	3.3	2.2	3.3	3.3
<i>Juncus articulatus</i>	1.1	1.1	1.2	1.2	+	2.2
<i>Comarum palustre</i>	2.1	1.1	.	.	.	.
<i>Eriophorum angustifolium</i>	+	+	.	.	.	.
<i>Drepanocladus</i> sp. D	+	+	.	.	.	.
Others						
<i>Caliergonella cuspidata</i> D	4.4	4.4	4.4	4.4	3.3	3.3
<i>Carex pseudocyperus</i> C	2.2	1.2	1.2	1.2	1.2	1.2
<i>C. leporina</i>	1.2	1.2	2.2	2.2	2.2	2.2
<i>C. paradoxa</i>	+2	+2	+2	+2	1.2	1.2
<i>C. flava</i>	+2	+2	+2	+2	+2	1.2
<i>C. limosa</i>	+	+	.	.	.	.
<i>C. acutiformis</i>	.	+	+	2.2	.	.
<i>Mentha aquatica</i>	1.1	1.1	1.1	1.1	1.1	1.1
<i>Linum catharticum</i>	+	1.1	1.1	+	1.1	+
<i>Euphrasia Rostkoviana</i>	+	+	1.1	1.1	1.2	1.1
<i>Lysimachia vulgaris</i>	+	+	1.1	1.1	1.1	1.1
<i>Agrostis stolonifera</i>	+	+	1.2	+	1.1	1.1
<i>Lycopus europaeus</i>	.	+	.	.	1.1	1.1
<i>Eupatorium cannabinum</i>	+	1.1	+	+	1.1	1.1
<i>Calamagrostis canescens</i>	+	1.2	+	1.2	+	1.2
<i>Galium palustre</i>	+	1.1	+	+	+	+
<i>Galium uliginosum</i>	+	1.1	+	1.2	.	.
<i>Typha angustifolia</i>	.	.	+	+	+	.
<i>Scutellaria galericulata</i>	+	+	.	+	+	+
<i>Cirsium palustre</i>	+2	+2	+	+	+	+
<i>Phragmites communis</i>	.	.	+	+	.	.
<i>Myosotis palustris</i>	.	+	.	.	.	.
<i>Peucedanum palustre</i>	.	+	.	.	.	.
<i>Lythrum salicaria</i>	.	.	.	+	.	.
<i>Bryum pseudotriquetrum</i> D	.	.	.	.	+	+
<i>Salix cinerea</i> B/C	./1.1	2.1/1.1	1.1/1.1	2.1/2.1	2.2/.	2.2/1.1
<i>Salix pentandra</i> C	.	.	.	+	.	.
<i>Betula pubescens</i> B/C	./+	+/+	+/+	1.1/+	+/.	+/.
<i>Alnus glutinosa</i> B/C	.	1.1/+	.	1.1/+	+	2.1/+

Considering the results of eight years observation of *L. loeselii* population and its microhabitat in nature reserve 'Mielno' the conservation activities should be undertaken in the nearest few years.

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Leszek Bednorz
Department of Botany
August Cieszkowski Agricultural University of Poznań
Aul. Wojska Polskiego 71C, 60-625 Poznań, Poland
tel. +48 61 848-76-99
e-mail: lbednorz@owl.au.poznan.pl

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