

GRASSLAND MANAGEMENT IN CENTRAL AREA OF THE MASURIAN LANDSCAPE PARK

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ABSTRACT

Permanent grassland occupy some 12% of the area of the Masurian Landscape Park. The *Cirsio-Polygonetum* plant association was distinguished on the semi-natural meadows situated on the peat-marsh soil. Changes in botanical composition of the meadow sward and the productivity of DM, against a background of different mineral fertilization, were examined in a medium-scale plot experiment. It was concluded that both aspects of utilization must be accorded high priority in the case of extensively managed meadows: medium level of forage production and the landscape conservation.

KEYWORDS

Meadow, peatland, management, species diversity, landscape

INTRODUCTION

Masurian Landscape Park (north-east Poland) was established in 1977, in order to preserve young post-glacial landscape, formed on the edge of two different geomorphological formations-outwash and terminal moraine. This region is characterized by great variety of flora and fauna, large forests, numerous lakes and peat areas. Flora of the park consist of 850 plant species; some of them are very rare species, characteristic only for this region. For instance *Trollius europaeus*, *Cladium mariscus*, *Eriophorum gracile*, *Carex chordorrhiza*, *Chamaedaphne calyculata*, *Cypripedium calceolus* and several other orchids (Polakowski, 1985).

This is one of the largest landscape parks in Poland; it covers 70 000 ha. Grasslands occupies some 12% of the area. Most of them are natural or seminatural meadows situated on peat soils. Due to their botanical diversity, they influence the specific character of the region and give the impression of protected landscape.

The aim of the investigations was to find out the possibilities of grassland production with the special respect to the biodiversity of farmed landscape.

METHODS

The investigations were conducted in the years 1992-1995 on semi-natural grasslands in the central area of the Masurian Landscape Park, 117-118 m above sea level. Mean temperature in vegetation periods was 13,7 °C, and mean precipitation was 380 mm. Previous management of this grassland (until 1986) involved yearly mineral fertilization on the average level 300 kg NPK/ha. Hay was cut in early-mid June and early September each year. After 1986, no fertilizers were used and the meadows were cut for hay once only in late June or in early July.

In the beginning of the undertaken investigations (1992-1993) determination of the plant associations was done according to the Braun-Blanquet method. The medium-scale plot experiment was established in 1994 on a predominantly *Cirsio-Polygonetum* association growing on peat-marsh soil. This soil ($pH_{HCl} = 6,3$), had shown a moderate content of available phosphorus and a low content of potassium. The fertilizer treatments were as follows: **A** - 90 kg N, 80 kg P and 120 kg K per ha; **B** - 60 kg N, 50 kg P and 80 kg K per ha; **C** - 30 kg P, 50 kg K per ha (without N); **D** - control (no fertilizer). The plots had been cut 2 times per season: in mid June

and late September. Each year the botanical composition of the sward and the total number of species per plot were estimated.

RESULTS AND DISCUSSION

The documental material of this work represents 47 fitosociological records which had been made in 1992-1993. This data shows that 80% of the area is occupied by *Cirsio-Polygonetum* plant association. The characteristic species of this association are *Cirsium oleraceum* and *Polygonum bistorta*, but it contains a high proportion of valuable legumes and grasses (Olkowski and Olesiński, 1976). For instance *Lotus uliginosus*, *Trifolium repens*, *T. pratense*, *Festuca pratensis*, *Alopecurus pratensis*, *Poa pratensis* and *Festuca rubra*. Many of the most attractive species such as, *Lychnis flos-cuculi*, *Campanula patula*, *Cardamine pratensis*, *Briza media*, *Carex panicea*, *Iris pseudoacorus* and *Dactylorhiza incarnata* were recovered. The results of this part of investigations showed that the flora of the examined meadows consist of 86 species.

The results from the plot experiment showed the high differentiation in botanical composition after the short period of fertilization. Higher fertilization caused enlargement of area covered by grasses, particularly at the highest level of fertilization, and decline of legumes, herbs and weeds participation in the meadow sward (Table 1). The fertilization of 90 kg N, 80 kg P and 120 kg K reduced the number of species to 36 (Table 1), and the mean annual DM increased to 8,63 t/ha (Table 2). Meadow sward with the treatment "no nitrogen" produced 6,51 t/ha. There is no doubt that it is satisfactory production level of this kind of the meadow site (Benedycki et al., 1989).

The above discussed grassland management on the peatland sites take into consideration both aspects of meadows utilization: forage production and non-forage utilization (Nösberger et al., 1994). The landscape perspectives in Masurian Lakeland are becoming increasingly important functions of permanent grassland, equally important as forage production and positive influence on the environment.

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Table 1

Changes in botanical composition (% of DM) and species richness relative to the unfertilized control after two years of fertilization

	Fertilizer treatments			
	A	B	C	D (control)
Grasses	80,6	69,6	48,9	44,5
Legumes	3,2	5,7	19,4	19,7
Reed grasses	4,8	5,1	5,8	5,7
Herbs and weeds	11,4	19,6	25,9	30,1
Number of species	36	38	41	42

Table 2

Yields of DM (t/ha)

	Fertilizer treatments				LSD (P<0,01)
	A	B	C	D (control)	
1994	8,28	6,62	6,34	4,84	1,03**
1995	8,98	8,34	6,67	5,00	1,57**
Average	8,63	7,48	6,51	4,92	1,12**