

The effect of NPK fertilisation on structure and species composition of grasslands

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Introduction Long-term research into the effect of N+PK nutrition enables an objective evaluation of the trend and rate of succession and a prediction of changes including production development in permanent grassland (Hrabě *et al.*, 1991). Former research (Hrabě & Halva, 1993) and evaluation within an eco-system concept (Rychnovská *et al.*, 1994) demonstrated marked changes in the species composition of grass communities with the application of N+PK fertilisation that did not correspond to the sward type and site conditions.

Material and methods The experimental site is situated in the Českomoravská vrchovina highland at an altitude of 650 m a.s.l., total annual rainfall is 786 mm, mean annual temperature is 6.3°C. The period of study was 1992-2002. Fertilisation treatments were H₀ (no NPK application), H₁ (30 kg P/ha, 60 kg K/ha); H₂ (90 kg N/ha, 30 kg P/ha, 60 kg K/ha), H₃ (180 kg N/ha, 30 kg P/ha, 60 kg K/ha). The grassland swards used were a seminatural sward (PG) of the *Sanguisorba-Festuceum comutatae* type and a newly-sown sward (SG) established in 1991 (sown with a grassland mixture: *Trifolium pratense* 3.0 kg/ha, *Trifolium repens* 2.0 kg/ha, *Festulolium* 12.0 kg/ha, *Dactylis glomerata* 8.0 kg/ha, *Lolium perenne* 4.0 kg/ha). The measurements made were the changes in proportion of grasses, legumes and herbs, the effect of dominant plants and the effect of newly-sown legumes and grasses.

Results With intensive N+PK nutrition, the grass component (66-80%) dominated farm fodder from both sward types. In the absence of legumes, the remaining proportion was herb biomass. As compared with PG, the contribution of herbs in SG was about 1/3 lower. The extensive PG nutrient treatment, i.e. the variant with zero fertilisation and with only PK fertilisation, resulted in a stand type with a slight predominance of herbs (<50 %) and a proportion of legumes ranging from 3.5-9.7%. In the extensive SG nutrient treatment, the grass component was dominant, and the proportion of legumes was similar to that in PG (4.1-8.0%). Dominant species (Table 1) in both sward types and in all variants of fertilisation were *Alopecurus pratensis*, *Poa pratensis*, *Sanguisorba officinalis* and *Polygonum bistorta*.

Table 1 Proportion (%) of some dominant grass and forbs species in meadow herbage

Species	Sward type	Fertilisation variant			
		H0	H1	H2	H3
<i>Poa pratensis</i>	PG	8.4	11.9	13.6	22.2
	SG	5.7	8.9	9.8	12.8
<i>Alopecurus pratensis</i>	PG	12.8	14.6	25.0	31.8
	SG	7.6	14.3	12.3	17.2
<i>Sanguisorba officinalis</i>	PG	10.4	8.3	6.7	4.2
	SG	4.0	2.8	0.3	0.7
<i>Polygonum bistorta</i>	PG	4.4	21.5	15.2	10.8
	SG	6.6	3.7	7.7	5.1

Conclusions The NPK fertilisation increased the proportion of grasses in both sward types and in SG decreased the herbs. The legume contribution was low, only 4-8% in SG. There was speedy regeneration of species composition in SG, from 8 species to 29 species.

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