

The effect of different utilisation methods on composition of semi-natural grassland

J. Jančovič, E. Vozár and E. Jančovičová

Slovak Agricultural University, Tr. Andreja Hlinku 2, SK-949 76 Nitra, Slovakia, Email: Jan.Jancovic@uniag.sk

Keywords: semi-natural grassland, botanical composition, cessation of fertilising

Introduction There has been much research on application of mineral fertilisers to permanent grasslands to maximise production of above-ground phytomass (Folkman & Jančovič 1990), but the changes arising after exclusion of fertilisers have not been studied in Slovak Republic up to now despite current interest in low input systems. This paper reports on the effects of cessation of fertiliser inputs for an eight-year period.

Materials and methods The changes in botanical composition were investigated on permanent grassland (association *Lolio-Cynosuretum cristati*) on a site in the Strážov Hills (central part of the Slovak Republic). A small-plot experiment was established with four replicates (area of the harvest plot was 10m²). In the years 1986-1989, grassland was harvested at the grazing stage four times a year, in the years 1990-1993 at the hay-making stage (2-3 cuts). During the years 1994-2001 fertilisation was omitted and only one cut was realised at the time of maximum biomass production according to the method of Rychnovská *et al.* (1987). Before each cut, botanical analysis was assessed on particular treatments by the method of projective dominance for the purpose of determining changes in botanical composition of grassland. Fertiliser treatments in the years 1986-1993 were as follows: 1. K – non-fertilised control, 2. PK – constant rate of P and K (35 kg P/ha and 70 kg K/ha), 3. N₆₀ – 60 kg N/ha was applied in spring (+PK), 4. N₁₂₀ – 80 kg N/ha was applied in early spring, 40 kg N/ha after the 1st cut (+PK), 5. N₂₄₀ – 100 kg/ha was applied in early spring, 80 kg N/ha after the 1st cut and 60 kg N/ha after the 2nd cut (+PK).

Results In the initial year (1986) of the experiment grasses dominated in all treatments. Cover was compact without any blank places. By 2001, after eight years of intense fertilising and utilisation and after eight years exclusion of fertilisation and minimum harvest (1cut) changes of a degraded character had happened in botanical composition (Table 1). The covers had markedly thinned and blank places represented 16% (treatment 1) to 40% (treatment 5) of the total area. After 16-years observation (1986-2001) only seven species dominated in the respective treatments (Figure 1).

Table 1 Composition of grassland in 1986 and 2001 (%±SE)

Year	Treatments	Botanical groups			
		Grasses	Legumes	Other herbs	Blank places
1986	1	70.75±2.2	0.75±0.3	29.5±2.2	–
	2	69.0±1.7	5.25±0.6	25.75±1.6	–
	3	64.0±2.7	1.75±0.3	34.25±2.8	–
	4	57.0±2.9	3.0±0.4	40.0±3.1	–
	5	66.5±1.9	1.0±0.2	32.5±2.2	–
2001	1	42.0±3.0	12.0±5.0	30.0±2.0	16.0±6.0
	2	40.0±6.0	5.0±0	37.5±3.5	17.5±2.5
	3	28.0±0	2.0±1.0	40.0±6.0	30.0±5.0
	4	48.5±5.5	1.0±1.0	31.5±5.5	19.0±1.0
	5	37.5±4.5	–	22.5±5.5	40.0±10.0

Conclusions The results of the present study demonstrate that intense utilisation without fertilising reduced the number of species and the dominance of grasses and increased the portion of dicotyledonous plants, mainly those forming ground leaf rosette (*Plantago lanceolata* and *Taraxacum officinale*). The highest stability of dominance during 16-year investigating period was shown by the following seven species – *Agrostis tenuis* Sibth., *Anthoxanthum odoratum* L., *Festuca rubra* L., *Festuca pratensis* L., *Achillea millefolium* L., *Alchemilla vulgaris* L and *Taraxacum officinale* auct. non Weber.

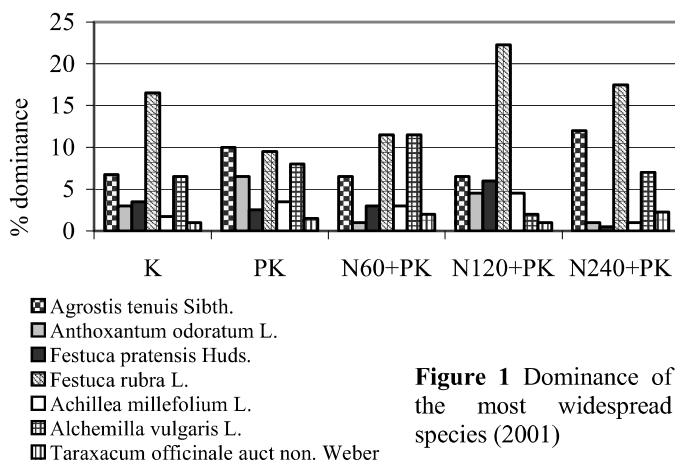


Figure 1 Dominance of the most widespread species (2001)

This paper was supported by the Slovak Grant agency VEGA No. 1/2425/05.

Acknowledgement Grant agency Slovak university of Agriculture No. 703/02190

References

- Folkman, I. & J. Jančovič (1990). Uplatnenie stupňovaných a striedavých dávok dusíka na TTP. Závěrečná správa. VŠP Nitra, 71 pp.
- Rychnovská, M. *et al.* (1987). Metody Studia Travných Ekosystémů. Academia, Praha.