



Improvement of permanent grasslands from NE of Romania

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INTRODUCTION

The diminution of the productive potential of the permanent grasslands from north-eastern Romania, which are found, at a percent of over 70%, on slope fields, is caused by erosion, at which unfavourable climatic conditions and their wrong management may be added (Samuil C. and col., 2008). The increase in the productive potential of these grasslands can be done by fertilization with different rates and types of organic and mineral fertilizers. The permanent grasslands from northeastern Romania, situated on soils with low natural fertility, are weakly productive and have an improper flower composition (Britaňák N. and col., 2008). The main means for improving these grasslands consist in adjusting soil fertility, changing the dominance in the vegetal canopy and their good management (Ryser J.P. and col. 2001). This paper presents the results obtained during 2006-2009, on *Festuca valesiaca* L. permanent grassland, improved by fertilization with different rates and combinations of organic and mineral fertilizers.

METHODS

The trial was carried out on *Festuca valesiaca* L permanent grassland with a low plant composition, situated at 107 m height, on a 10% slope. The soil was cambic chernozem, weakly leached, with a clayey texture and a pH of 6.5-6.7, at the depth of 0-30 cm. The climatic conditions during the testing period were characterized by mean temperatures of 9.5°C and mean annual rainfalls of 552.4 mm. The experiments are single factor type, set in accordance to the randomized blocks method, in four repetitions, with 9 experimental variants: V₁-Unfertilized control; V₂-10 Mg ha⁻¹ cattle manure applied every year+N50 kg ha⁻¹+P 36 kg ha⁻¹; V₃-10 Mg ha⁻¹ cattle manure applied every 2 years+ N 50 kg ha⁻¹ + P36 kg ha⁻¹; V₄-20 Mg ha⁻¹ cattle manure applied every 3 years+ N50 +50 kg ha⁻¹+P72 kg ha⁻¹; V₅-20 Mg ha⁻¹ cattle manure applied every 3 years+ N50 kg ha⁻¹+P 36 kg ha⁻¹; V₆-30 Mg ha⁻¹ cattle manure applied every 3 years+N50+50 kg ha⁻¹+P72 kg ha⁻¹; V₇-30 Mg ha⁻¹ cattle manure applied every 3 years+ N50 kg ha⁻¹+P 36 kg ha⁻¹; V₈-40 Mg ha⁻¹ cattle manure applied every 3 years+ N50 kg ha⁻¹+P 36 kg ha⁻¹; V₉-40 Mg ha⁻¹ cattle manure applied every 3 years+N50+50 kg ha⁻¹+P72 kg ha⁻¹ (N = nitrogen; P = phosphorus).

RESULTS

The obtained DM yields were influenced very strongly by climatic conditions, type and level of organic and mineral fertilization. In 2007, the vegetation of permanent grasslands was highly affected by the long-term drought that dominated the testing area of Ezăreni. Therefore, the productivity was greatly diminished, resulting in a very low effect of fertilization on production. The yields uniformity may be noticed, irrespective of the used fertilization level. Analysing the mean yields, we found that their augmentation was due to the increase in the applied manure rate and, especially, to the increase in the rate of mineral fertilizers (Table 1). In 2009, the analysis of the canopy structure has shown that the mean recorded values of the presence percentage were of 38% for grasses, 26% for legumes and 36% for other species (Table 2). In *Festuca valesiaca* grassland of Ezăreni, a total number of 45 species was recorded, of which six species belonging to grasses, 10 species to fabaceae and 29 species to other species. Table 3 shows the values of crude protein (CP), raw ash (RA), Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), organic matter (OM), extractive substances without nitrogen (ESN).

Table 1 Influence of fertilization on dry matter production (Mg ha⁻¹)

Fertilization variant	Ezăreni – Iași				
	2006	2007	2008	2009	Average
Control	2.3	1.5	6.2	2.0	3.0
V ₂	3.4	2.2	8.7	2.6	4.2*
V ₃	3.7	2.4	9.4	2.7	4.6**
V ₄	3.5	2.3	9.0	2.4	4.3*
V ₅	3.9	2.5	10.3	2.9	4.9***
V ₆	3.9	2.6	8.4	2.8	4.4**
V ₇	4.1	2.6	10.3	3.1	5.0***
V ₈	3.9	2.3	9.3	2.8	4.6**
V ₉	4.7	2.6	11.3	3.6	5.6***
Average	3.7	2.4	9.2	2.8	4.5

*=P<0.05; **=P<0.01; ***=P<0.001; NS= not significant

Table 2 Influence of fertilization on the canopy structure (%)

Fertilization variant	Grasses		Legumes		Others	
	2006	2009	2006	2009	2006	2009
Control	69	49	10	20	21	31
V ₂	76	36	13	25	11	39
V ₃	59	38	16	21	25	41
V ₄	70	37	11	28	19	35
V ₅	67	38	15	27	18	35
V ₆	62	37	11	28	27	35
V ₇	68	38	16	28	16	34
V ₈	71	34	12	27	17	39
V ₉	69	36	11	26	20	38
Average	68	38	13	26	19	36

CONCLUSIONS

The obtained DM yields were influenced by climatic conditions, type and level of organic and mineral fertilization. The highest yields were obtained at the fertilization with 40 Mg ha⁻¹ cattle manure, applied every 3 years+N50 + 50 kg ha⁻¹+P72 kg ha⁻¹. The obtained results have shown the positive effects of fertilization on productivity, biodiversity and canopy structure of the studied permanent grassland. On *Festuca valesiaca* grassland, the tested fertilization variants resulted in improved fodder quality, by increasing the content of CP from 120.1 to 136.0 g kg⁻¹ D.M.



Table 3 Influence of fertilization on the chemical composition (g kg⁻¹ D.M.)

Fertilization variant	RA	CP	Fats	NDF	ADF	OM	ESN
Control	78.2	120.1	25.1	672.5	405.7	831.2	342.8
V ₂	96.1	128.1	28.1	624.8	378.8	808.6	344.2
V ₃	84.3	132.7	32.7	659.9	398.8	822.4	334.0
V ₄	79.7	126.9	30.3	691.6	390.4	824.3	332.9
V ₅	89.8	136.0	30.3	669.1	402.0	819.2	280.6
V ₆	84.4	134.4	31.2	687.8	390.5	821.9	273.9
V ₇	89.2	127.7	28.8	646.7	389.9	812.6	328.8
V ₈	98.0	127.4	34.6	652.9	386.9	804.2	268.5
V ₉	96.2	132.5	29.8	610.7	370.3	800.4	281.2

REFERENCES

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