POSSIBILITIES OF RENOVATION ON HUNGARIAN GRASSLAND

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ABSTRACT

The object of renovation was to increase the production of run-down permanent pastures by cultivation and by replanting good grasses. The experiment went on for four years on disked and ploughed areas, with pasture mix seed. Although fertilizer was not applied to the seedbed, 3 types of fertilizers were used every spring except on the control plots. The dry matter yield of the original pastoral flora decreased from 2.9 to 2.2 t/ha. On the fallow land it increased from 2 to 2.3 t/ha. When planted after disking, it increased from 2.1 to 6.1 t/ha and when planted after ploughing it increased from 4.2 to 6.1 t/ha. The results of this investigation show that treatment with nil fertilization increased the yield of seeded grassland. The average yield was determined by tilling and seedbed preparation in 18 %, by NPK fertilizer in 82 % respectively.

KEYWORDS

Renovation, run-down grassland, seedbed preparation, fertilizer

INTRODUCTION

The total grassland area in Hungary makes up 1.3 million ha., The size of the areas occupied by grazing lands and meadows gradually decreased because some parts which were better quality, and suitable for field-growing of plants, were drawn into cultivation (Barcsák, 1986). Consequently, a large part of the native grasslands that remain can be found only on steep hillsides or on flood-plains and on salty steppes. This was accompanied by the fact that the productivity the quantitative and qualitative production of native grasslands decreased. On average in Hungary, the grazing field yield is 1.2 while the meadow-land yield is 1.7 t/ha of hay production of which the average hay yield makes up 1.5 t/ha. The best cow farms can achieve a hay yield of 10 t/ha (Vinczeffy, 1988).

The object of renovation is to increase the production of rundown permanent pastures by cultivation and soil conservation (Bánszki, 1971, 1983; Szabó 1965). Barcsák (1981) stated that a NPK ratio 1:0.4:0.4 is satisfactory and economical when, after using 1 kg of N fertilizer agent, an extra production of 20 kg dry matter can be expected. As a result of deterioration in the soil of swards and of neglect in the cultivation of the soil, weeds have increased in the vegetation of the meadows. Barcsák (1986) stated that 30% of the swards were covered by valueless weed plants. Weedy grasslands can be made more valuable for foddering by mechanical and chemical weed-killing (Barcsák, 1986; Szemán, 1990).

MATERIALS AND METHODS

The experiments were carried out in Ramman's brown forest soil, the top soil of which was 25-30 cm. Its humus content was 2.3 % K_A:45, pH:6.3 in water and 5.6 in KCl, and it had 45 ppm P_2O_5 and 265 ppm K_2O nutrient content. The average annual rainfall was 519 mm distributed unevenly. During the time of the experiment the summers were particularly dry. The experimental area was situated at a height of 200 m. The stand of the area was species-poor, run-down and degraded grassland which it was hoped would be improved by tilling and replanting and whose stand component would be changed by the cultivation of regrowing plants of the fallow.

The experiment was carried out on a control area which was characterized by indigenous-species and on a disked and a ploughed area. Fertilizer was not applied to the seedbed. Plots were sown in autumn with a seed mixture of Lolium perenne 6 kg/ha, Festuca rubra 6 kg/ha, Festuca pratensis 10 kg/ha, Phleum pratense 3 kg/ha, Dactylis glomerata 7 kg/ha, Trifolium repens 2 kg/ha and Lotus corniculatus 2 kg/ha.

Every spring, fertilizers were applied on the plots (size 5x4 m) at a rate of 150 and 300, 50 and 100, 100 and 200 kg/ha N, P_2O_5 and K_2O respectively, and two harvests were taken. All plots were cut and the weight of fresh herbage was recorded.

The significance of productivity and changes in the plant stock were determined using an analysis of variance. The data were analyzed on the basis of the four-year results of the experiment. The aim of the study was to assess whether the seedbed preparation and fertilization could be sufficient to cause differences in the yield of permanent grassland.

RESULTS AND DISCUSSION

The productivity of plants differed significantly according to seedbed preparation (Table 1). From the data we can observe that the advantage of the ploughed area disappeared in the fourth experimental year.

At each harvest, there were highly significant differences in dry matter production between grasses and between N rates. From the point of view of environmental protection, the most important result is that the application of rapid-growing grass seeds and legumes resulted in an increase in the yield without using fertilizers (Table 2).

The results were evaluated by multifactorial regression analysis. On average in the experiment, the tilling and seedbed preparation determined the yield in 18% and the fertilization in 82% percent.

The stand of original grassland was species-poor and could not be changed during the experiment. The quality and quantity of the original pastoral flora were improved by replantation after disking or ploughing.

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Table 1
Effect of the seedbed preparation and the planting of grasses on the dry matter yield (1983-1986)

	Dry matter yield t/ha					
Treatment	1983	1984	1985	1986	Average	%
E control	2.9	2.5	2.4	2.2	2.5	100
U control	2.0	2.5	2.7	2.3	2.4	96
TV control	2.1	2.1	6.4	6.1	4.2	170
SV control	4.2	5.9	6.9	6.1	5.8	230
SD 5%	-	-	-	-	1.96	-

E = indigenous-grasses of trial site
U = after ploughed and unsown area
T V = after disked and replanted area
S V = after ploughed and replanted area

Table 2
Yield results and efficiency / 1983 - 1986. /

Treatment		Average of dry matter		Extra yields yields		Yield excess for 1 kg N active agent		Equation and correlation of regression
A	B	t/ha	%	t/ha	%	kg	%	
E	F_0	2.5	100	-	-	-	-	Y_E=0.292+0.14x^2+33x
	F_1	7.3	292	4.8	192	31	100	R_E=0.999
	F_2	9.6	384	7.1	284	23	100	
U	F_0	2.4	96	-	-	-	-	Y_U=0.432-0.128x^2+2.03x
	F_1	6.7	268	4.2	176	28	88	R_U=0.999
	F_2	8.4	336	5.9	236	20	83	
TV	F_0	4.2	168	1.7	68	-	-	Y_{TV}=1.953-0.113x^2+2.035x
	F_1	8.3	332	5.8	232	39	121	R_{TV}=0.993
	F_2	10.7	428	8.2	328	27	115	
SV	F_0	5.8	232	3.3	132	-	-	Y_{SV}=3.98-0.111x^2+2.04x
	F_1	10.1	404	7.6	304	51	159	R_{SV}=0.996
	F_2	12.9		516	10.4	416	35	146

A=Cultivation — F_1=N: 150 kg/ha + P: 50 kg/ha + K: 100 kg/ha
B=Fertilization (F) — F_2=N: 300 kg/ha + P:100 kg/ha + K: 200 kg/ha active
F_0=nil fertilizer control;