THE NATURAL GRASSLANDS OF *FESTUCA RUBRA WITH AGROSTIS CAPILLARIES* FERTILIZED WITH MINERAL AND ORGANIC FERTILIZATION

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Abstract

The secondary meadows have special importance in the cultural mountain landscape (ROTAR and CARLIER, 2005). One of the main measures to increase production in all agricultural cultures is the fertilization, but the meadows fertilizers role is more complex. The natural grasslands are fertilized in general mineral and less organic and farmers should pay more attention to organic fertilization (JANKOWSKI et al., 2003). Even in the research, experiences with manure on natural grasslands are fairly low, compared to chemical fertilizers, the manure efficiency of meadows is lower, due to loss of amoniacal nitrogen which in some areas arrive up to 40% (CIUBOTARIU et al., 2002). In this research we followed the effect of fertilization with mineral fertilizers and organic fertilizer or combined, on dry matter yield and floristic composition. The experience includes 6 variants by 4 repetitions.

Keywords: mountain**,** natural grasslands, fertilization, productivity, *Festuca rubra Agrostis capillaris.*

INTRODUCTION

The combinations of colors in natural grasslands at all levels (to the lowland to the mountains) are the vital signs of a healthy environment (ROTAR *et al*., 2003). Secondary meadows with a high phitodiversity are not attractive to farmers because they are not economically efficient (PĂCURAR *et al*., 2011).

Only by conducting mutual interaction between the two factors - plant and animal - can get the positive economic results (ROTAR and CARLIER, 2010). Grasslands of secondary origin in the Baisoara village are exploited by mowing, grazing or mixed.

MATERIAL AND METHOD

The experiment was placed in 2014 in Băișoara Mountain village, Cluj County, at the altitude of 1240 m. The experimental variants, designed to follow the effect of large inputs of manure and mineral inputs on grassland productivity and floristic composition. The experience was placed after experimental technique method and there are 6 variants in 4 rehearsals. The surface of experimental plots is 20 m2. Experimental variants are: V1 - control variant, (unfertilized); V2 – variant fertilized with 10 t/ha manure; V3 - variant fertilized with 10 t/ha manure + 50N25P25K active substance/ha; V4 -variant fertilized with 20 t/ha manure; V5- variant fertilized with 10 t/ha manure + 100N50P50K active substance/ha; V6 - variant fertilized with 100N50P50K active substance / ha. Experience has been placed on the Festuca rubra - Agrostis capillaries of grassland type. The floristic composition was determined by the BRAUN-BLANQUET (1932) method as modified by PĂCURAR and ROTAR (2014). Production and quality data were analysed with Duncan Test.

RESULTS AND DISCUSSIONS

The *Festuca rubra - Agrostis capillaris* natural grassland responded well to mineral and organic fertilization. The reaction by mineral fertilization or combined with organic is particularly strong, registering very distinct significant increases in all variants of the experiment, compared to control. Application of manure and mineral fertilizers as separate or combined causes significant crop increases. The application of 10 t/ha manure get a difference of 7.88 t/ha green mass (G.M..), while the addition of 100 kg N, 50 kg K2O5 and 50 kg K2O at this quantity (10 t/ha manure), the difference crop reached to 21.88 t t/ha (G.M.), (Tab. 1.) it is the highest productivity in the experiment.

It is noted that the combined fertilization: manure + mineral fertilizers (NPK) causes a vigorous reaction to the canopy, increases crop is constant and important in terms of size.

This is explained on one hand by solubilizing better mineral fertilizers, and on the other hand by a structure in which the Gramineae have a share over 50%.

Table 1

Green mass

Variants	Yield (t/ha) mv	%	Differences	Significance
V1 (control)	10.88	100.0	0.00	Mt.
V2 (10 t manure)	18.75	172.7	7.88	***
V3 (10 t manure + 50 N + 25 P_2O_5 + 25 K_20)	21.50	197.7	10.63	***
V4 (20 t manure)	21.63	198.9	10.75	***
V5 (10 t manure + 100 N + 50 P_2O_5 + 50 K_20)	32.75	301.1	21.88	***
V6 (100 N + 50 P_2O_5 + 50 K_20)	21.88	201.1	11.00	***
DL (p 5%)		3.84		
DL (p 1%)		5.32		
DL (p 0.1%)		7.34		

Comparative analysis of green mass production using Duncan test in 2016 shows differences between variants and a growing trend to the harvest of increasing doses of fertilizers (Tab. 1 and Tab. 2).

Thus, at V6 reported at V1, we have a difference of harvest of 21.88 t / ha green mass and when compared V5 to V1 we have the same difference of 11.00 t / ha green mass.

Table 2

The yield differences among variants and their significance (2016)

Dosing of fertilization	Yield (t/ha)	Variants in order of increasing crop				
		2	3	4	5	6
		MV t/ha				
		18.75	21.50	21.63	21.88	32.75
V1- 0 kg/ha	10.88	7.88	10.63	10.75	11.00	21.88
V2- 10 t manure	18.75		2.75	2.88	3.13	14.00
V4- 20 t manure	21.50			0.13	0.38	11.25
V5- 10 t manure +100 N+50 P_2O_5+50 K_20	21.63				0.25	11.13
V6- 100 N+50 P_2O_5+50 K_20	21.88					10.88
V3- 10 t manure +50 N+25 P_2O_5+25 K_20	32.75					

Table 3

The values of significance difference for the various limits of the comparison between variants

Media error SX = 1.28 (t/ha)					
The distance in classification	2	3	4	5	6
Values q	3.01	3.16	3.25	3.31	3.36
Values DS teoretical	3.84	4.03	4.15	4.22	4.29

The dry matter production of *Festuca rubra- Agrostis capillaris* natural grassland recorded values between 2.41 t/ha DM in control variant and 7.28 t/ha DM in variants fertilized with 10 t/ha manure + 50 N + 25 P_2O_5 + 25 K_20 The increases are very distinct significant from statistical terms provided, as shown in Tab. 1.4. Just as in the green mass production when calculate the dry matter, under the application of manure and mineral fertilizers in the state combined or separated, there is significant production increases. hen applying 10 t/ha manure we achieve a production of 4.17 t / ha dry substance, so a difference of 1.76 t/ha compared to the control. If at the 10 tons of manure is added and fertilizers, on the one hand, 50 N + 25 P_2O_5 + 25 K_20, or on the other hand 100 N + 50 P_2O_5 + 50 K_20, there is a difference of production of 2.37 t /ha DM respectively 4.86 t / ha DM.

When applying only mineral fertilizers 100 N + 50 P_2O_5 + 50 K_20 the difference is the harvest of 2.45 t / ha DM substance.

Table 4

Dry matter

Variants	Yield (t/ha) mv	%	Differences	Significance
V1 (control)	2.41	100.0	0.00	Mt.
V2 (10 t manure)	4.17	172.7	1.76	***
V3 (10 t manure + 50 N + 25 P_2O_5 + 25 K_20)	4.78	198.1	2.37	***
V4 (20 t manure)	4.81	199.2	2.39	***
V5 (10 t manure + 100 N + 50 P_2O_5 + 50 K_20)	7.28	301.6	4.86	***
V6 (100 N + 50 P_2O_5 + 50 K_20)	4.86	201.6	2.45	***
DL (p 5%)		0.86		
DL (p 1%)		1.18		
DL (p 0.1%)		1.63		

It is observed that the combined fertilization manure + mineral fertilizers (NPK) determines a positive reaction to the grassy cover, recorded significant increases in production.

Table 5

The yield differences among variants and their significance (2016)

Dosing of fertilization	Yield (t/ha)	Variants in order of increasing crop				
		2	3	4	5	6
		MV t/ha				
		4.17	4.78	4.80	4.86	7.28
V1- 0 kg/ha	2.41	1.76	2.37	2.39	2.45	4.86
V2- 10 t manure	4.17		0.61	0.64	0.69	3.11
V4- 20 t manure	4.78			0.02	0.08	2.50
V5- 10 t manure +100 N+50 P_2O_5+50 K_20	4.80				0.06	2.47
V6- 100 N+50 P_2O_5+50 K_20	4.86					2.41
V3- 10 t manure +50 N+25 P_2O_5+25 K_20	7.28					

Table 6

The values of significance difference for the various limits of the comparison between variants

Media error SX = 0,28 (t/ha)					
The distance in classification	2	3	4	5	6
Values q	3.01	3.16	3.25	3.31	3.36
Values DS teoretical	0.85	0.90	0.92	0.94	0.95

In 2016 treatments applied to determine some separation of experimental versions of ordering space.

Regarding the floristic composition of natural grasslands fertilized with organic and mineral fertilizers, after three years can be seen that some treatments begin to distance themselves from each other and in some cases no longer overlap, which indicates the effect of mineral and organic inputs on the grassy cover (Fig. 1). Treatments determine the spacing plots (variants) in the space of ordering and therefore does not change the type of grassland. Null hypothesis testing (test MRPP) such that application of treatment does not lead to changes in the floristic composition is rejected in the case of variants. Minor differences occur in the floristic composition of several variations but inside the type of grassland.

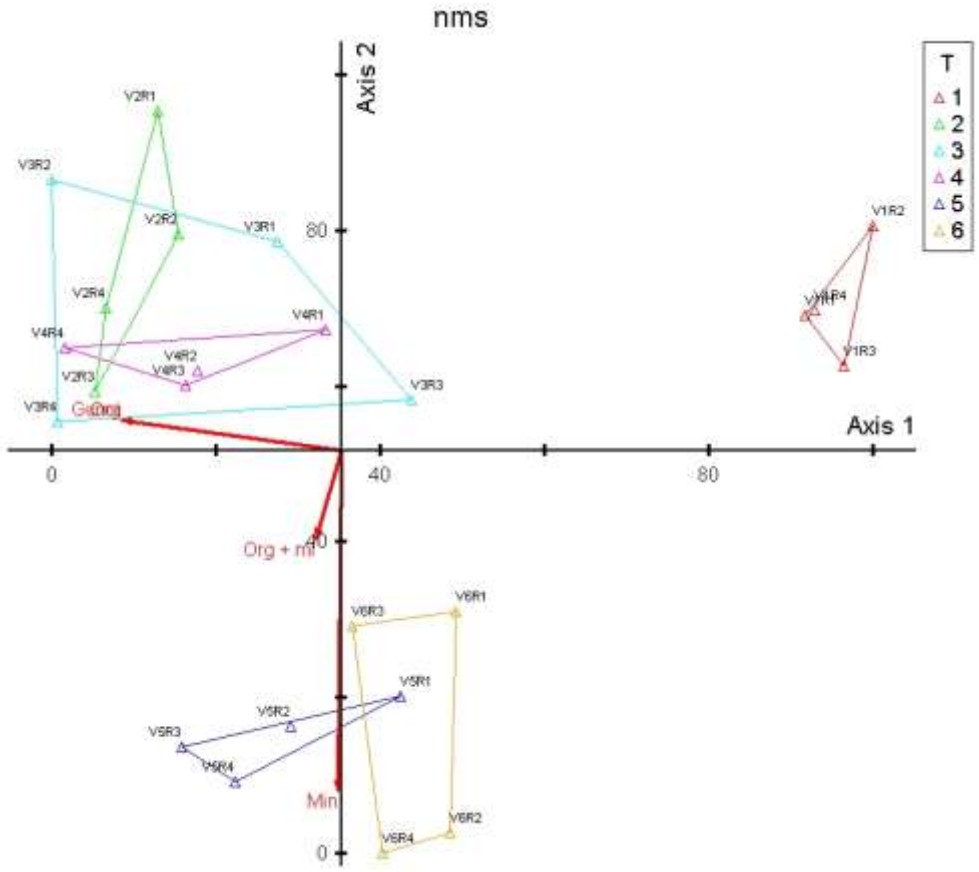

Fig. 1. Determination of floristic composition after fertilization and organic fertilizers

Following treatments applied were not significant changes in abundance-dominance average (Adm) the dominant species (*Agrostis capillaris* L.) and (*Festuca rubra* L.) as shown in Tab. 7. Also, the treatments make their effect felt in the case groups of plants.

The most obvious changes take place when compared to the control (V1) with variants V3, V4, V5, in some cases floristic composition differs slightly, registering distinct significant differences. And when comparing V2 with V5 V6 variants are registered still distinct significant differences, but is the same in the case of variant V 4 is compared with V5 and V6 to register distinct significant differences. When compared to the control variant with V6, V2, with V3, V4 but version V5 to V6 variants the difference is significant.

Table 7

Pairwise Comparisons

Compared variants	T	A	p	specification
1 vs. 2	-3.979	0.4180	0.0040	**
1 vs. 3	- 3.673	0.368	0.0032	**
1 vs. 4	-3.791	0.384	0.0038	**
1 vs. 5	-4.033	0.402	0.0044	**
1 vs.6	-3.854	0.148	0.0402	*
2 vs.3	- 1.738	0.1485	0.0482	*
2 vs.4	-1.650	0.1283	0.0482	*
2 vs.5	-3.736	0.3337	0.0035	**
2 vs.6	-3.864	0.3881	0.0038	**
3 vs. 4	-1.965	0.1736	0.0325	*
3 vs. 5	-3.316	0.2898	0.0028	**
3 vs. 6	-3.323	0.3287	0.0038	**
4 vs. 5	-3.2673	0.2730	0.0032	**
4 vs. 6	-3.6082	0.3424	0.0032	**
5 vs. 6	-1.896	0.1512	0.0372	*

Legend: (* = p <0.05, ** = p <0.01, *** = p <0.001, ns - not significant)

CONCLUSIONS

The green mass production of *Festuca rubra-Agrostis capillaris* grassland is strongly influenced by mineral and organic fertilization, with production increases ranging between 10.88 t / ha G.M. the V2 (10 t manure) and 21.88 t / ha G.M. V5 (10 t manure + 100 N + 50 P_2O_5 + 50 $K_2$0). Dry matter production is influenced by mineral and organic fertilization - if the V2 (10 t manure) production increase is 1.76 t / ha S.U., it reaches up to the value of 4.86 t / ha dry substance in V5 (10 t manure + 100 N + 50 P_2O_5 + 50 $K_2$0). Organic and mineral inputs determine the significant production increases in all experimental variants.

In 2016 application of organic and mineral inputs produced minor changes to the type of grassland.

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