Productivity of *Festuca rubra* L. – *Agrostis capillaris* L. Grasslands

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ABSTRACT

European countries has changed and are focus on increasing productivity that prevailed during the early and middle twentieth century has now widened to incorporate environmental concerns. Today all concerns are related to the adaptation strategies to climate change on grassland. The replacement of nitrogen fertilizer with nitrogen derived from N₂ fixation offers important economic and environmental advantages. Therefore, we need more productivity systems but all have to be in the same time “friendly with environment”. This is the reason why our experiment tries to determine the productivity of mountain grasslands and find answer equally scientific and practical for next generation. The experiment was placed after experimental technique method and includes six different fertilized treatments in four replications on mountain grasslands. Experiment is establish in Baisoara Commune, Cluj County. The experience includes four variants in three repetitions, which are: V1 – control variant, (unfertilized); V2 – variant fertilizer with 10 t/ha manure; V3 – variant fertilizer with 10 t/ha manure + 50N25P25K; V4 – variant fertilizer 20 t/ha manure; V5-variant fertilizer with 10 t/ha manure + 100N50P50K and V6-variant fertilized with 100N50P50K. After a short time period there are statistical assurances in treatments which are fertilized with high organic or mineral inputs. Large quantity of fertilizer improve productivity of grasslands.

Keywords: *productivity, fertilization, grasslands, mountains.*

INTRODUCTION

For high-yielding dairy cows dietary crude protein requirements are assumed to range between 14 and 18% (Pacheco and Waghorn, 2008). Nitrogen yield increased linearly before reaching a plateau at an N input of 350 to over 400 kg N ha⁻¹ (Herrmann *et al*, 2014).

The addition of N-fertilizers not only stimulates growth of plants, but also increases the potential of direct N₂O losses (Sturite *et al*, 2014). No interaction between K and N application was found on the DM yield, but there was an interaction effect on the K content of the grass (Holshof *et al*, 2014).

Since legislation imposes restrictions on the use of mineral nitrogen-based fertilizers, traditional organic fertilizers (such is cattle manure) are being applied and are now becoming a significant factor for achievement required forage production (Simić *et al*, 2014). Fertilizer treatments affected yield, especially in the first cut: the yield was doubled by fertilization, in comparison with the control treatment (Simić *et al*, 2014).

MATERIALS AND METHODS

The experiment was established in 2014 in the place “Cross”, in Băișoara Commune, Apuseni

Mountains, Romania on a *Festuca rubra* L. - *Agrostis capillaris* L. grasslands type, at the altitude of 1240 m. It was delimited experimental field to remove any unwanted danger or grazing has been cleaned of woody vegetation and rocks. The experience was placed after experimental technique method. The surface of experimental plots is 20 m². The experience includes four variants in three repetitions, which are: V1 – control variant, (unfertilized); V2 – variant fertilizer with 10 t/ha manure; V3 – variant fertilizer with 10 t/ha manure + 50N25P25K; V4 – variant fertilizer 20 t/ha manure; V5-variant fertilizer with 10 t/ha manure + 100N50P50K and V6-variant fertilized with 100N50P50K.

Floristic studies were performed before mowing after scale vegetation interpretation given by Braun-Blanquet (1932). Cattle and horse manure and also the mineral inputs were applied in early springtime on the plots (in the beginning of March), according to the treatments.

RESULTS AND DISCUSSION

Like were expected, the mineral fertilization has the highest value compare to control. The combined fertilization have a good productivity compare to the treatments fertilized with organic manure (Tab.1). Variants fertilized with high quantity of fertilizer (V3, V4, V5 and V6) present statistical assurance compare to the control variant (V1). Nitrogen is a key factor in grassland farming and in ruminant nutrition and through the provision of feed from grasslands these two compartments are closely related (Isselstein and Kayser, 2014). In general, to increase the protein yield from grassland you have to increase nitrogen fertilization or fostering the growth of forage

legumes (i.e. grass-clover systems, Isselstein and Kayser, 2014).

Even if we put 20 t/ha manure (V4) this variant present only 2.12 % compare to the control. An explanation of this could be that time period is too short and organic manure did not have time to decompose. This affirmation is based on other studies made by Rotar, 2005, who show that on grassland fertilizers applied on vegetation cover which reason cannot incorporate, leading to a delay in action, especially in the case of less soluble.

A same result obtain Pavlu *et al*, 2012, when show that a continuous long-term application of nitrogen (N) phosphorus (P) and potassium (K) fertilisers increases stand productivity and nutrient content in soil and forage but substantially reduces plant species richness.

Compare with control variants, all fertilized variants present an increase of harvest (Tab. 2). Variants fertilized with 20 t/ha manure (V4) compared with variants with 10 t/ha manure (V2) present only 1.20 % an increased harvest. If we compared the variant with 20 t/ha manure with variants V3 and V6 we can noticed a difference of 1.64%.

Variants fertilized only with mineral fertilizer 100N50P0K (V6) compared with variants fertilized with 20 t/ha manure (V4) increase only with 0.44%. Similar data obtained Morea (2008) on a *Festuca rubra* L grassland type, in Gîrda de Sus village, where she show that the application 100N50P50K brings a quantity of harvest of 5.55 t/ha dry matter, a difference from the natural pastures of 2.13 t/ha dry matter, very close in value to that obtained from the application

Tab. 1. Influence of fertilization on dry matter yield in 2015 (t/ha)

Dosing of fertilization	Yield (t/ha)	Percent %	Differences t/ha	Significance
V1- 0 kg/ha	2,31	100,0	0,00	Mt.
V2- 10 t/ha manure	3,22	139,7	0,92	-
V3- 10 t/ha manure + 50N25P25K	4,86	210,8	2,56	***
V4- 20 t/ha manure	4,42	191,8	2,12	***
V5-10 t/ha manure + 100N50P50K	4,78	207,2	2,47	***
V6-100N50P50K	4,86	210,8	2,56	***
DL (p 5%)			0,96	
DL (p 1%)			1,33	
DL (p 0.1%)			1,84	

Tab. 2. The yield differences among variants and their significance (2015)

Variants in ascending order	1	2	3	4	5	6
	-	3,22	4,86	4,42	4,78	4,86
F1	2,31	0,91	2,55	2,11	2,47	2,55
F2	3,22		1,64	1,20	1,56	1,64
F4	4,42			0,00	0,36	0,44
F5	4,78				0,00	0,08
F6	4,86					0,00
F3	4,86					
SX average error	0,32					
Variants		2	3	4	5	6
Values q		3,01	3,16	3,25	3,31	3,36
Teoretical DS values		0,96	1,01	1,04	1,06	1,07

of 150N75P75K namely 5.58 t/ha dry matter difference of 2.15 t/ha compared to the control.

CONCLUSION

All treatments present differences when were compared to the control. Applied fertilizer produces changes in productivity. Long-term application of NPK fertilizers increases plant productivity and soil nutrient concentrations and this can result in the dominance of largely species-poor grasslands with little conservation value.

The grass yield was influenced mainly by mineral-nitrogen fertilizers.

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