Scientific Papers. Series A. Agronomy, Vol. LXI, No. 1, 2018
ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785

QUALITATIVE MODIFICATIONS PRODUCED IN FEED OF *Festuca rubra* L. AND *Agrostis capillaries* L. UNDER INFLUENCE OF UAN LIQUID FERTILIZER

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Abstract

The paper aimed to present the analysis of the qualitative changes in feed obtained as a result of fertilization with UAN liquid fertilizer of Festuca rubra - Agrostis capillaries. The experiment was established in 2014 in the Baisoara Mountain village (Cluj county), at the altitude of 1240 m about sea level. The experience includes four variants in three repetitions, which are: first variant (V1) – control variant (unfertilized); the second variant (V2) – fertilizer with 50 kg UAN/ha^{-1}; third variant (V3) – fertilizer with 75 kg UAN/ha^{-1}; fourth variant (V4) – fertilizer with 100 kg UAN/ha^{-1}. The grass was cut once in 2014 and in 2015, botanical composition were determined and also feed quality. The natural meadow of Festuca rubra L. and Agrostis capillaris L. responded very well to the application of the liquid fertilizer. The use of liquid mineral fertilizer (UAN) can be taken into account in mountain conditions at moderate doses of up to 75 kg/ha of active substance applied at deworming. The floral composition evolving over the dominance of Agrostis capillaris L. with Festuca rubra L., which produce good quality hay.

Key words: *Festuca rubra L., Agrostis capillaris L., liquid fertilizer, natural grassland, productivity, feed quality.*

INTRODUCTION

Semi-natural grasslands are particularly important in mountainous areas of Romania, and for many farms, they are the only source of forage. An important part of efficient livestock production is ensuring the sufficient grass for hay and pasture. However, low soil nutrient levels often limit forage production. In Romania, grasslands are an important forage resource, but irrational management systems during the last period have led to their present state of degradation (Vîntu et al., 2011). For fifty years, animal production in most European countries has grown considerably, and the economic efficiency of milk and meat production has improved. Demand for more digestible feed resulted in mowing earlier in the spring and more frequent pastures, but nitrogen fertilization had to be increased.

Intensive pasture management has brought with nitrogen fertilization an increase in economic efficiency and has led to a reduction in the number of plant and animal species. Modern farming methods have been criticized for their impact on the environment and the landscape. Grazing management faces a choice between the opportunities offered by modern technologies and the demand for high biodiversity and attractive landscapes. There is a European-wide move towards extensive management systems as a result of agricultural reform, politics and the desire to promote biodiversity and preserve rural communities. This is particularly true in the regions where the landscape with semi-natural meadows dominates, and where it has the potential to sustain or increase biodiversity (Nösberger, 1998).

The floristic composition and the potential of grassland productivity is an essential, ecological and demographic phenomenon, representing the net result of a complex set of physiological, ecological, and evolutionary interactions in demographic and physical processes. In most cases, an increase in plant productivity due to fertilization leads to a decrease in the number of plant species coexisting in a given area. As a result of the application of fertilizers, the semi-natural grasslands have gradually been transformed into intensely managed meadows (Nösberger 1998).

MATERIALS AND METHODS

The experiment was established in 2014 in the eastern part of Apuseni Mountains at Baisoara Mountain village (Cluj county), at the altitude of 1240 m. The experience was placed after experimental technique method. The surface of experimental plots is 20 m^2. The experience includes four variants in three repetitions, which are: first variant (V1) – control variant, (unfertilized); the second variant (V2) – fertilizer with 50 kg UAN/ha^{-1}; third variant V3 – fertilizer with 75 kg UAN/ha^{-1}; fourth variant (V4) – fertilizer with 100 kg UAN/ha^{-1}. Experience has been placed on grassland *Festuca rubra* - *Agrostis capillaries* type of that is specific of nemoral floor, beech forest the sublevel and mixed beech resinous (Ţucra et al., 1987) determined after Braun-Blanquet (1932). Natural grasslands of *Festuca rubra* with *Agrostis capillaris* responded particularly well to mineral fertilization with liquid fertilizer UAN which is a mixture of ammonium nitrate and urea Chemical formula: NH_4NO_3 NH_2-CO-NH_2. Average annual temperature was 6.6°C (the year 2015). Average annual precipitation: 1069.2 mm / m^2 (the year 2015). The soil type is *Litosol Skeletal.*

RESULTS AND DISCUSSIONS

After applying treatments in the second year of experiment changes in phytocoenosis are noted. Graphical representation in space 2-dimensional (2D) allowsus an explanation of floristic changes in proportion of 94.7%. The most important is axis 1 (87.7%) andonly a small proportion of explanation can be attributed to Axis 2, respectively 7.1% (Table 1).

Table 1. Importance of axis and recommended ordinarion space in 2015

Axis	Axis importance (*r*)	Cumulative	Recommended solution
1	87.7	87.7	2D
2	7.1	94.7	

r-the determination coefficient for the correlations between the ordinal distances and the original distances in dimensional space.

The effect of applying liquid fertilizers is replicated on axis 1. The application of 75 kg UAN/ha^{-1} (correlation -0.416) and 100 kg UAN/ha^{-1} (correlation -0.600) is found in the negative space of axis 1.

In the positive space are shown the effects of treatments with lowe ramounts of fertilizers (50 kg UAN/ha^{-1}) and variants without fertilizers. The application of 50 kg UAN/ha^{-1}presents only a tendency to explain the floristic composition on axis 2, the effect be ingstatistically not statistically assured: $p \geq 0.05$ (Table 2) .

Table 2. The significance of ordination axes in 2015

Experimental factors	Axis 1		Axis 2	
	r	Significance	r	Significance
50 UAN/ha^{-1}	0.181	not statistically assured	-0.216	not statistically assured
75 UAN/ha^{-1}	-0.416	*	0.171	not statistically assured
100 UAN/ha^{-1}	-0.600	**	0.009	not statistically assured

The changes found this year are minor and fall within the type of meadows, a phenomenon supported by small floristic distances between the separate groups following the ordering (T 0.9562 without statistical assurance and T -2.793 with significant differences, $p \leq 0.05$). (Păcurar, Rotar, 2014). When comparing the control variant with variants V3 and V4, but also variants V2 with V4 (Table 3).

Table 3. Comparison of the floristic composition of experimental variants in 2015 (MRPP)

Treatments	T	A	p-value	Significance
V1 vs. V2	-1.24568390	0.06604944	0.09699409	not statistically assured
V1 vs. V3	-2.58826401	0.27203282	0.02373384	*
V1 vs. V4	-2.79310580	0.34235917	0.02289233	*
V2 vs. V3	-1.04145652	0.06186578	0.13965715	not statistically assured
V2 vs. V4	-1.98965091	0.15360126	0.03832053	*
V3 vs. V4	0.95622641	-0.06452769	0.83048504	not statistically assured

In 2015, the dry matter yield is directly proportional to the large quantities of applied fertilizers (75-100 kg UAN/ha^{-1}, $p \leq 0.001$). Harvest growth is mostly attributable to plants in the *Poaceae* family which are directly proportional to harvest and high fertilizer quantities ($p \leq 0.001$). Plants in the *Cyperaceae* and *Juncaceae* families prefer treatments with small amounts of fertilizers ($p \geq 0.05$). Plants of the *Fabaceae* family have a greater weight in the phytocoenosis of the control variant and

after application of the fertilizers they will be reduced (p≥0.05). Plants from other botanical families respond well to either the control variant or the 50 kg UAN/ha^{-1} fertilization. Floral diversity is reduced due to the application of the treatments, the greatest diversity is recorded in the control phytocoenosis (p≤0.001), respectively (p≥0.05).
Most species prefer the control variant (without applied treatments) or the application of small amounts of fertilizers such as: *Briza media* L., *Luzula multiflora*, *Trifolium panonnicum* L., *Campanula abietina* Griseb., *Genista tictoria*,. *Crepis biennis* L., *Galium verum* L., *Genista sagittalis*, *Hieracium aurantiacum* L. etc.
Phytocenosis of the control variant (V1–unfertilized) is represented by the type of grass *Festuca rubra* L. With *Agrostis capillaris* L., but for the other treatments (75-100 UAN / ha^{-1}), the species *Agrostis capillaris* L. will be dominated (Figure 1).

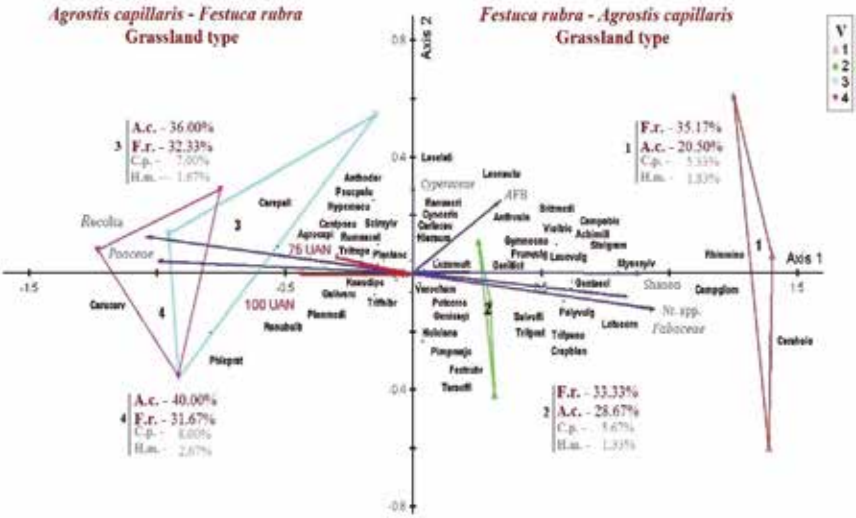

Figure 1. Ordering of floristic composition by applied treatments in 2015:
V1 – control variant (unfertilized); V2 - 50 kg UAN/ha^{-1}; V3 - 75 kg UAN/ha^{-1}; V4 - 100 kg UAN/ha^{-1}; F.r.- *Festuca rubra* L., A.c. - *Agrostis capillaris* L., C.p .- *Centaurea pseudophrygia* C.A. Mey., H.m. – *Hypericum maculatum* Crantz

Concerning the chemical analysis of the feed produced in 2015, it revealed that UAN fertilization results in a decrease of the protein content from 8.38%, in the control variant to 6.03% in fertilization with 75 kg UAN/ha^{-1}. The results indicate a very close relationship between the protein and the weight percentage of the plants from *Fabaceae* family participation of the cannopy.
The nitrogen content is the same as that of the protein, according to the values (Figure 2). Crude fat content reduced from 4.44% to 3.41% in the control variant selected fertilization with 75 kg UAN/ha^{-1}. Crude ash presents a slight decrease this case selected tome asure thea mount of fertilizer to increase, varying between hard 5.42% (control) to 4.80% (V3-75 kg UAN/ha^{-1}) (Figure 2).
The results presented for crude cellulose show a slight increase from 35.10% in the case of the control to 38.52% when applying 75 kg/ha of UAN.
The results on the NDF feed content of 2015, show a significant increase from 50.86% in the control variant to 68.62% when applying 100 kg/ha of UAN.
The results obtained in our experience it shows that the average NDF content, which is the total cellwalls, is roughly double to the gross fiber content.
The content of ADF increases this year from 43.24% in the control variant to 46.35% for the variant fertilized with 100 kg/ha of UAN (Figure 3).

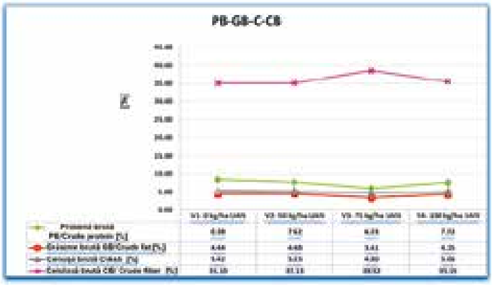

Figure 2. Influence of fertilization with UAN on some quality indexes

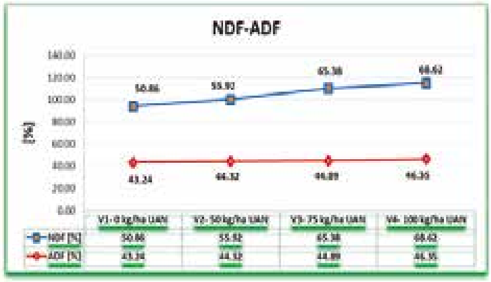

Figure 3. Influence of fertilization with UAN on the content of NDF and ADF

CONCLUSIONS

The use of liquid mineral fertilizer (UAN) can be taken into account in mountain conditions at moderate doses of up to 75 kg / ha of active substance applied at deworming. This yields crop yields of up to 5.64 t / ha SU. The floral composition evolving over the dominance of *Agrostis capillaris* L. with *Festuca rubra* L., which produce good quality hay.

Large doses of liquid fertilizers in liquid form (100 kg/ha of active substance), we do not recommend on mountain meadows because they cause degradation of the cannopy by the appearance of some species, *Centaurea pseudophrygia* C.A. May up to 17.50% and *Hypericum maculatum* Crantz. up to 9.50%, contributing to a degradation of the feed quality by reducing the protein content from 8.38% to 6.03%.

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