Influence of Some Red Fescue (*Festuca Rubra L.*) Associations and Nitrogen-Based Fertilization on Dry Matter Yield

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Abstract
One of the most efficient measures that contributes to forage improvement is represented by the temporary pastures consisted of legumes and perennial gramineae. Beside Agrostis tenuis, Festuca rubra is the forage gramineae with the largest spread and dominance in our country. That is why its introduction in various associations with forage legumes leads to qualitative and quantitative improvement of the yields obtained on temporary pastures.

Keywords: *Festuca rubra , Lotus corniculatus*, nitrogen-based fertilization, *Trifolium repens*

1. Introduction

The study of temporary pastures has a special scientific importance because it may clarify and characterize some fundamental aspects regarding ecosystem diversity, permanence and maturity, the relationships between species and the biological equilibrium between the natural and the artificially-created ecosystems. Under continuous population growth on Terra, the demand for animal-based products is permanently increasing, so that the animal-breeding sector development requires quantitative and qualitative forage enhancement.
One of the most efficient measures that contribute to forage improvement is represented by the temporary pastures consisted of legumes and perennial gramineae. Because temporary pasture settlement in Romania takes place in a wide range of ecologic conditions, it is necessary to elaborate new technologies and improve permanently the old ones, in order to make them adequate for the different pedoclimatic conditions and to keep up with the evolution of pratology and pratotechnique [1-3].

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2. Materials and methods

The researches were carried out at Grass Research-Development Station Timişoara, during 2004-2007, on a brown eumesobasic soil, moderately gleyed, with pH = 5.6.
The experience was of bifactorial type, displayed in field according to the method of subdivided parcels.
The experimental factors were:
A. Association type
  A1- Festuca rubra (100%)
  A2 - Festuca rubra (60%) + Trifolium repens (40%)
  A3 - Festuca rubra (60%) + Lotus corniculatus (40%)
  A4 - Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%)
B. Nitrogen doses
  B1 – N_0
  B2 – N_{50}

B3 – N_{100}

Planting was performed in the spring of 2004, with the *Festuca rubra* variety – Pastoral.

The nitrogen-based fertilization was performed early in the spring, and phosphorus and potassium were applied in the autumn.

3. Results and discussion

By analyzing the influence of the associations studied on dry matter yield, we observed the superiority of the legume associations to the pure *Festuca rubra* crop. The biggest yield (5.86 t/ha) was obtained in the complex association consisted of *Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%)* (table 1).

The nitrogen-based fertilizers applied exerted a great influence on dry matter yield, as shown in table 2. The mean yield growths obtained in the fertilized variants were very significant compared with the untreated control variant (0.68 t/ha for the dose of $N_{50,}$ respectively 1.23 t/ha for N_{100}).

The interaction between the factors studied (table 3) show that the presence of legumes and also the nitrogen-based fertilization have a great influence on dry matter yield. The complex association consisted of *Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%),* at a nitrogen level of 100 kg, produces the biggest dry matter yield, namely 6.35 t/ha.

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Table 1. Influence of some *Festuca rubra* associations on dry matter yield (mean of the production years)

Association type	Yield (t/ha)	Diff.	%	Signif.
Festuca rubra (100%)	3.57	mt	100	
Festuca rubra (60%) + Trifolium repens (40%)	4.27	0.7	120	***
Festuca rubra (60%) + Lotus corniculatus (40%)	5.49	1.92	154	***
Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%)	5.86	2.29	164	***

DL 5%=0.13 DL 1%=0.19 DL 0.1%=0.29

Table 2. Influence of nitrogen-based fertilization on dry matter yield (mean of the production years)

Nitrogen dose	Yield (t/ha)	Diff.	%	Signif.
N_0	4.16	mt	100	
N_{50}	4.84	0.68	116	***
N_{100}	5.39	1.23	130	***

DL 5%=0.08 DL 1%=0.11 DL 0.1%=0.14

Table 3. Influence of the interaction between the *Festuca rubra* associations and the nitrogen-based fertilization on dry matter yield (mean of the production years)

Association type	Nitrogen dose	Yield (t/ha)	Diff.	%	Signif.
	N_0	2.82	mt	100	
	N_{50}	3.59	0.77	127	***
Festuca rubra (100%)	N_{100}	4.31	1.49	153	***
	N_0	3.63	mt	100	
	N_{50}	4.12	0.49	113	***
Festuca rubra (60%) + Trifolium repens (40%)	N_{100}	4.75	1.12	131	***
	N_0	4.91	mt	100	
	N_{50}	5.43	0.52	110	***
Festuca rubra (60%) + Lotus corniculatus (40%)	N_{100}	6.15	1.24	113	***
	N_0	5.29	mt	100	
Festuca rubra (60%) + Trifolium repens (20%) +	N_{50}	5.95	0.66	112	***
Lotus corniculatus (20%)	N_{100}	**6.35**	1.06	120	***

DL 5%=0.09 DL 1%=0.12 DL 0.1%=0.16

4. Conclusions

Legume presence in the association exerts a significant influence on the dry matter yield achieved, the biggest yield being obtained in the complex association consisted of *Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%)*, namely 5.86 t/ha DM.

The nitrogen-based fertilization is decisive, too, in the achievement of dry matter yield. The production growths are very significant in the pure *Festuca rubra* crop and in the legume associations, as well.

The interaction of the two factors recommends us the complex association consisted of *Festuca rubra (60%) + Trifolium repens (20%) + Lotus corniculatus (20%)*, fertilized with the dose of $N_{100,}$ leading to the achievement of the biggest yield – 6.35 t/ha DM.

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