THE INFLUENCE OF THE MODERATE FERTILIZATION ON THE PRODUCTION OF TIMOTHY GRASS (*PHLEUM PRETENSE*) IN PURE CULTURE AND IN MIXTURE WITH THE CLOVER (*TRIFOLIUM PRATENSE*)

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Abstract

The researches were made in the period 2005-2007 at the Agricultural Researches Center Pojorata, at an altitude of 700 m, on a lithic alluvial soil situated on the first terrace of Moldova river with a pH 8 water) 5.1, P (Al) 75 ppm, K (al) ppm and a humus content of 2.9.%. It was followed in a bifactorial experience of the 2 x 3 type in four repetitions the factors: A- the species or the mixture with two graduations: of the *Phleum pratense* 80% + *Trifolium pratense* 20%, a2- *Phleum pratense* 100%. B-the fertilization with three graduations: b1-0 N 0 P_2O_5; b2-50 N 50 P_2O_5; b3- 100N 50 P_2O_5; The harvesting was made as it follows: the Phosphorus was applied in autumn and the nitrogen in the spring before the starting of the vegetation. The results of the researches underlined the superiority of the *Phleum pratense* species in the pure culture in comparison with the mixture between *Phleum pratense* 80% and *Trifolium pratense* 20% from the production point of view and of the floristic composition

Key words: Phleum, Trifolium, floristic composition, Bucovina, dry substance

The mountain area of Suceava County, by the nature of the pedoclimatic conditions offers very favorable conditions for the development of the natural grass land with a great extension in the area, but at same time it offers conditions for the culture of the fodder plants. These ones, cultivated in a corresponding rotation contribute to the maintaining and extending a normal fertility of the soils.

The former researches made in this area showed the possibility and also the necessity of cultivating some perennial gramineous and leguminous in pure culture or in mixture, which in the conditions of some seeding grass lands contribute to the improvement of the biochemical attributes of the soils, becoming at the same time good predecessors for the cultures specific for the area (Saicu 1999).

The temporary grass lands represent an important source of volume fodder, to which, in our country and in other countries as well, are given a special attention. The advantages presented by these grass lands, like the big productions, the superior quality, the possibility to space out the production in the vegetation period by using species, varieties and mixtures of different precocities, the possibility to use the fodder in different ways, etc., explains the special interest which is given to these categories of grass lands (Ciubotaru 1978, Popovici, 1996, Samuil et al 1996). From the anterior researches we discovered that for Bucovina, the traditional mixture, inside of a crop rotation, is the one between Phleum pretense and Trifolium pretense (Saghin, 1998).

In this sense, were organized at the Agricultural Researches Center from Pojorata, Suceava County, some researches which could respond to the actual situation of the area conditions.

MATERIAL AND METHOD

The researches were made in the period 2005-2007 at the Agricultural Researches Center Pojorata, at an altitude of 700 m, on a lithic alluvial soil situated on the first terrace of Moldova river with a pH 8 water) 5.1, P (AL) 75 ppm, K (AL) ppm and a humus content of 2.9.%. It was followed in a bifactorial experience of the 2 x 3 type in four repetitions the factors: A- the species or the mixture with two graduations: of the *Phleum pratense* 80% + *Trifolium pratense* 20%, a2- *Phleum pratense* 100%. B-the fertilization with three graduations: b1-0 N 0 P_2O_5; b2-50 N 50 P_2O_5; b3- 100N 50 P_2O_5; The harvesting was made as it follows: the Phosphorus was applied in autumn and the nitrogen in the spring before the starting of the vegetation. The production was expressed in t/ha dry substance(s.u) and the

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floristic composition in percentage after the planimetric method.

Under climatic aspect, the respective area is characterized by a multiannual average of the precipitations of 726.2 mm, from which 531.0 mm in the vegetation period (tab.1, 1a). From the point of view of the precipitations, the year 2007 situated above the multiannual average with 31.5 mm for the whole year and close to normal but insignificant for the whole year and significant values above the normal in the vegetation period with 83 mm, respectively 106.9 mm. The multiannual average temperature in this area is 6.4°C during the whole year and of 12.7°C in the vegetation period. Under this aspect, the years 2005 and 2006 were normal for the whole year and a little bit above the multiannual average in the vegetation period. The year 2007 located above the normal with 2.5°C in the whole year and with 3.4°C in the vegetation period.

Table 1

Climatic conditions from the research period (2005-2007)

Year	Months												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Sum/ average
rainfall (mm)													
2005	18.8	16.8	13.4	53.6	99.1	104.2	121.8	224.5	10.8	11.6	13.2	4.9	692.7
2006	5.5	10.1	14.7	29.7	105.3	218.6	92.7	166.7	24.9	30.8	0.2	0.3	699.5
2007	6.6	14.7	57.5	31.8	155.4	45.8	93.2	146.8	47.8	113.1	22.4	22.9	757.7
the average yearly	13.6	21.8	56.5	37.2	109.1	88.2	118.0	113.1	65.4	50.8	28.1	23.9	726.2
average monthly temperatures (° C)													
2005	0.5	-5.4	0.3	6.2	12.4	14.7	16.5	17.1	12.1	1.3	1.1	-0.9	6.3
2006	-6.8	-0.1	0.1	7.0	11.4	14.5	17.4	17.9	12.8	1.2	1.2	-0.6	6.4
2007	2.7	-0.6	4.9	8.2	14.3	17.9	19.5	18.7	18.5	7.8	0.5	1.0	8.9
the average yearly	-4.3	-2.7	0.9	6.5	11.3	15.0	17.0	15.4	12.0	7.0	1.0	0.5	6.4

Table 1a

Temperature and precipitation in the warm season

Specification	Rainfall (mm)		Temperatures (° C)	
	annual	IV- IX	annual	IV – IX
2005	692.7	614.0	6.3	13.1
2006	699.5	637.9	6.4	13.5
2007	757.7	520.8	8.9	16.1
the average yearly	726.2	531.0	6.4	12.7

RESULTS AND DISCUSSIONS

a. The production of dry substance

As an average on the three agrofonds and three years, the mixture formed from 80% *Phleum pretense* +20% *Trifolium pretense* (a1) was significantly inferior to *Phleum pretense* species, which in pure culture realized on an average for three years 10.51 t/ha (*tab. 2*). It can be remarked in this case also, the *Phleum pretense* species, a species as it was already mentioned in other publications, in Obcinile Bucovinei it's in its ecological optimal, the gain realized towards the mixture being significantly distinct of 1.95t/ha s.u.

Table 2

The influence of the species and of the mixture on the s.u. production (average 2005-2007)

Agrofond (B)	t/ha	%	Difference t/ha	Signification
A1 - *Phleum pratense* - 80 % + *Trifolium pratense* 20 %	8.56	100.0	-	
A2 - *Phleum pratense* -100 %	10.51	111.1	1.95	* *

LSD 5% 0.81 t/ha s.u.
LSD 1% 1.36 t/ha s.u.
LSD 0.1% 2.01 t/ha s.u.

The fertilization constitutes in all the cases the main factor of growth of the production and also of its quality. In this experiment it was followed a moderate fertilization which could

respond to the actual demands regarding the reduction of the quantities of organic and chemical fertilizers and regarding the getting of some economical productions.

Table 3

Agrifund influence on the production of s.u. in average on species and mixed (average 2005-2007)

Agrifund (B)	t/ha	%	Difference t/ha	Significance
B1 - 0N $0P_2O_5$	5.20	100.0	-	
B2 -50N $50P_2O_5$	8.06	155.0	2.86	* * *
B3 -100N $50P_2O_5$	11.26	216.5	6.06	* * *

LSD 5% 0.75 t/ha s.u.
LSD 1% 1.68 t/ha s.u.
LSD 0.1% 2.51 t/ha s.u.

By analyzing all the date from *table 3* we can ascertain that towards the non fertilized witness (b1), the application of a moderate dose of fertilizers of 50N $50P_2O_5$ (b2) lead to the realization of a very significant production gain of 2.86 t/ha s.u, and by doubling the fertilizer quantity with nitrogen on the same foundation of P_2O_5 the gain became 6.06 t/ha s.u., a gain which is also very significant towards the non fertilized witness variant.

The interaction between species, mixture and fertilization underlined the very significant gains which had realized at the doses of 50 and 100 N on the foundation of $50P_2O_5$, gains which were comprised between 2.35-3.30 and respectively 1.35-2.15 (tab.4). It is also remarked from this table the productive superiority of *Phleum pretense* superiority (a2) towards the mixture *Phleum pretense* 80% with *Trifolium pretense* 20% (a1) which realized productions of 11.5 t/ha respectively 12.35 t/ha s.u.

Table 4

The influence of the species, of the mixture and of the fertilization on the s.u.production (the average 2005-2007)

Species/mixture (a)	Agrifund (b)	t/ha	%	Difference towards mt.	Signification
Phleum pratense 80% + Trifolium pratense 20%	0N $0P_2O_5$	5.80	100.0	-	
	50N $50P_2O_5$	8.15	140.5	2.35	***
	100N $50P_2O_5$	9.10	157.0	3.30	***
Phleum pratense 100%	0N $0P_2O_5$	10.20	100.0	-	
	50N $50P_2O_5$	11.55	113.2	1.35	***
	100N $50P_2O_5$	12.35	121.7	2.15	***

LSD 5% 0.51 t/ha s.u.
LSD 1% 0.82 t/ha s.u.
LSD 0.1% 1.32 t/ha s.u.

b. Floristic composition

To the mixture composed of *Phleum pretense* 80% and *Trifolium pretense* 20% (a1) after three years of exploitation, it was reduced the participation of the leguminous and have raised the species from other families which at the variant without fertilization reached the value of 40% (tab. 5).

Table 5

The floristic composition at the end of experiments (2007)

Species/mixture	% of participation			
	Species	0N $0P_2O_5$	50N $50P_2O_5$	100N $50P_2O_5$
Phleum pratense 80% + *Trifolium pratense* 20%	*Ph. Pratense*	53	60	65
	Tr. pratense	7	8	6
	miscellaneous	40	32	29
Phleum pratense 100%	*Ph. pratense*	75	82	88
	miscellaneous	25	18	12

There were installed in the vegetal carpet, the species *Capsella bursa pastoris, Taraxacum officinale, Agropyron repens, Cerastium arvense*, etc. The species *Phleum pretense* maintained at percentage comprised between 53% for the non fertilized variant and of 65% at the fertilized

variant with $100N50P_2O_5$ while *Trifolium pretense* got at most of the fertilization processes at percentage comprised between 6% and 8%. For the pure culture, *Phleum pretense*, after 3 years, the species consolidated pretty good, the plants from other families maintained with a higher percentage for the non fertilized variant and with a lower percentage for the fertilized variants.

CONCLUSIONS

The researches made in the period 2005-2007 at the Agricultural Researches Center Pojorata underlined the superior productivity of *Phleum pretense* species which realized for all the experimented years 10.5 l t/ha s.u.

The simple mixture of *Phleum pretense* 80% + *Trifolium pretense* 20% realized significant productions inferior to the pure culture of *Phleum pretense* of 8.56 t/ha s.u.

Towards the non fertilized variant (mt.) most of the nitrogen dose at 50N kg/ha or 100N kg.ha was accompanied by the *Phleum pretense* 80% + *Trifolium pretense* 20% mixture and also at *Phleum pretense* in pure culture by significant production gains as well.

After three years of experiments the simple mixture *Phleum pretense* + *Trifolium pretense* had a weed degree comprised between 40-29% while in the pure culture of *Phleum pretense* the weed percentage was a lot smaller, between 25-12%.

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