RESEARCH REGARDING COMPETITION IN PURE AND MIXED CULTURE BROMUS INERMIS AND MEDICAGO SATIVA

Stanciu Alina- Ştefania*, Vidican Iuliana Teodora*, Iancu Carmen *, Stanciu Ioana-Teodora *, Vidican Oana Maria*

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048,Oradea, Romania, e-mail: as1stanciu@yahoo.com; iuliateodora68@yahoo.com; ciancu2000@yahoo.com; sit06stanciu@yahoo.com; oanavidican02@yahoo.com

Abstract

The sown meadows are of particular importance in increasing the productivity and quality of the fodder obtained. Sown meadows are usually associated crops of poaceae and perennial legumes that are equally suitable for organic or intensive cultivation, depending on their structure. The research carried out between 2016 and 2020 aimed at the behavior of associated and pure cultures of Medicago sativa and Bromus inermis in uniform technological conditions. The highest DM productions were obtained for B.inermis monoculture in the third year of establishment (2019), which is explained by the tolerance by this species of unfavorable conditions, respectively drought. Regarding the evolution of the floristic composition of the mixtures cultivated under the conditions of a uniform technology, it is necessary to emphasize the fact that in the culture associated with M.sativa + B.inermis as the years pass the participation of legumes in the structure of the vegetal carpet decreases not by sown grass (D.glomerata or B.inermis), but by species belonging to other botanical families. The amount of crude protein varies between 1300.2 - 2285.70 kg / ha, the lowest value being recorded in the pure culture of Bromus inermis, and the highest value was in the monoculture of Medicago sativa (2020).

Keywords: productivity, grassland, dry matter, associated crops

INTRODUCTION

Many researchers have studied sown meadows, developing recommendations for growing perennial fodder plants. Frame, 2000, emphasizes the role of sown meadows in Eastern European agriculture, appreciating that mixtures of grasses and corn for silage are the basic fodder for many EU countries. In general, in the countries of Western Europe, countries with a highly developed livestock sector, the area occupied by sown meadows is constantly growing (Rotar, 2010, 2011). Obtaining high, constant and quality feed production is possible only by applying a complex of technological measures that will aim at overseeding degraded meadows and setting up cultivated meadows where the choice of species and varieties is an important element. Following the effect of nitrogen fertilizers applied in different doses on the dry matter content of different species of perennial grasses grown in pure culture and mixture, there is a decrease in dry matter content and an increase in water content (Carlier et al., 1998; Oprea et al. 1986). The productivity of grass mixtures with legumes gives higher yields

than grasses fertilized with 200N. (Mossimann et al. 1994, 2008. Cited by Şuteu Alina, 1997, Cardaşol et al. 1987, Samuil et al. 2009, 2010; Rotar et al. 2014).

MATERIAL AND METHOD

The experiment was established in 2016 and carried out over a period of four years (2017 - 2020), in which the behavior of some species of perennial grasses and legumes in specific technological conditions was studied. The experience includes 4 variants, in 4 repetitions, arranged in randomized blocks. The surface of a plot is 20 m^2.

This experiment was set up in the spring of 2016 on a plowed land from the autumn of the previous year and where the basic fertilization was done with 80 kg / ha P2O5 and 80 kg / ha K_2O, uniform in all experimental variants, and the spring before sowing s -they carried out the work of preparing the germination bed and the administration of nitrogen fertilizers (100 kg / ha N) for the variants sown with grasses in pure culture, following that these variants will be administered 50 kg / ha after each mowing. In the year of establishment, due to the fact that from a climatic point of view and also in order to obtain a well-coagulated and hollow plant carpet, only uniformity harvests were carried out, thus achieving a control of weeds in these crops. During the vegetation, a series of observations were made regarding the emergence, growth and development of plants, the dates of the start of vegetation in spring, the degree of weeding, the entry and exit of winter, the persistence of some species sown in the vegetation and their degree of dominance. Harvesting was done at plot level, in the first year when the legumes fully bloomed, and in the following years when the legumes sprouted and the grasses sprouted. The green mass crop was transformed into SU and statistically processed according to the variance analysis method.

Objectives pursued were: estimating the productive potential of simple mixtures of perennial grasses and legumes in order to ensure economic exploitation; the influence of differentiated nitrogen fertilization of grass and legume mixtures on the evolution of the carpet and on the chemical composition of the feed and the obtaining of a high quality feed. The annual average temperature was 10.17^0C and the annual average rainfall of 566.3 mm.

Soil - Chernozem, cambic subtype, on clays, sandy-clayey clay on medium clay (SRTS), Haplic Chernozems (WBR-SR-1998), Typic Haplustosolls (USDA-ST-1999)

Succession of horizons***: Am – Bv – C***

Table 1.

Analytical data

Horizons	**Am_1**	**Am_2**	**Bv**	**C**
Coarse sand % (2-0,2mm)	0-25	25-48	48-78	78-100
Fine sand % (0,2-0,02mm)	0,50	0,50	0,40	0,20
Dust % (0,02-0,002mm)	61,7	51,70	60,10	56,10
Physical clay % (sub 0,01 mm)	13,1	18,00	12,10	19,40
Texture	**LN**	**LL**	**LN**	**LL**
Carbonates	-	-	-	-
Ph in water	7,1	7,25	6,75	7,85
Humus	2,13	1,40	-	-
Total nitrogen %	0,105	0,070	-	-
Mobile phosphorus (ppm)	12	3	-	-
Mobile Potassium (ppm)	120	130	-	-
Amount of exchange bases (me./100 g. sol)	18,3	-	-	-
Exchangeable hydrogen	3,0	-	-	-
Degree of saturation in bases	96	-	-	-

Interpretation of analytical data - the texture is medium; the soil reaction is neutral at a depth of 0-48 cm and slightly alkaline at a depth of 78-100 cm; the nitrogen content is small at a depth of 0-25 cm and very low at a depth of 25-48 cm; the potassium content is low; sum of exchange bases: is small, degree of saturation in bases: indicates a eubasic soil.

RESULTS AND DISCUSSION

The highest level of DM production was obtained in 2018, and the lowest in 2019. We consider that these large and relatively constant productions in the three experimental years are due to nitrogen fertilization. kg / ha / year applied after each mowing.

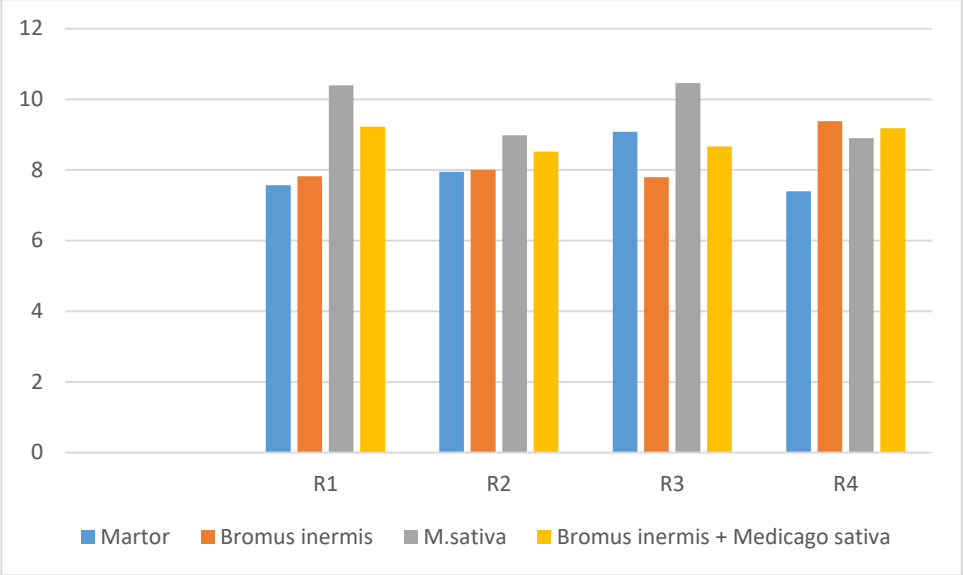

Fig.1 DM harvest t / ha on repetitions in the studied crops (2017-2020)

Analyzing statistically the data obtained in the three experimental years, it can be observed that in the pure culture of B.inermis were obtained differences of production ensured as distinctly significant positive, in 2019 the harvest of DM obtained being 10.23 t / ha DM. We can say that this level of harvest obtained for the species B.inermis was, in general, due to the climatic conditions and drought of the last years, knowing that this species is recommended for the drier areas, with southern exposure. From the point of view of the floristic composition, the B.inermis species maintains a high percentage of participation in the vegetal carpet, during the three experimental years, respectively 88-86%, decreasing in the fourth year from sowing to a 54%. What we must emphasize is that in this experiment the monocultures of legumes were not fertilized with nitrogen-based chemical fertilizers. The basic fertilization was done at the land preparation with 80 kg / ha P_2O_5 and 80 kg / ha K2O. The very good behavior of the M. sativa species can be noticed, which recorded in each experimental year with 2-4 t / ha the DM crops obtained from M. sativa, the latter being considered the most productive fodder legume.

Table 2

Influence of fertilization on dry matter yield (t/ha) (2018)

Variant	Yield t/ha	Diferencet	%	Semnificances
A1 Martor	7.05	0.00	100	Mt
A2 (*B.inermis*)	7.26	0.21	102.97	-
A3 (*M.sativa*)	10.64	3.59	150.92	***
A4 (*M.sativa*+*B.inermis*)	11.64	4.59	165.10	***

LSD (p 5%) = 1.11 LSD (p 1%) = 1.59 LSD (p 0.1%) = 2.35

Table 3

The yield differences among variants and their significance (2018)

Variant	Yield (t/ha)	Variants in order of increasing crop		
		2	3	4
		SU t/ha		
		7.26	10.64	11.64
A1 Martor	7.05	0.21	3.59	4.59
A2 (*B.inermis*)	7.26		3.38	4.38
A3 (*M.sativa*)	10.64			1.00
A4 (*M.sativa+B.inermis*)	11.64			

Table 4.

Influence of fertilization on dry matter yield (t/ha) (2019)

Variant	Yield t/ha	Diferenc et	%	Semnificances
A1 Martor	8.18	0.00	100	Mt
A2 (B.inermis)	10.23	2.05	125.06	**
A3 (M.sativa)	11.25	3.07	137.53	***
A4 (M.sativa+B.inermis)	11.96	3.78	143.21	***

LSD (p 5%) = 1,69 LSD (p 1%) = 2,43 LSD (p 0.1%) = 3,57

Table 5.

The yield differences among variants and their significance (2019)

Variant	Yield (t/ha)	Variants in order of increasing crop		
		2	3	4
		SU t/ha		
		10.23	11.25	11.96
A1 Martor	8.18	2.05	3.07	3.78
A1 (B.inermis)	10.23		1.02	1.73
A2 (M.sativa)	11.25			0.71
A3 (M.sativa+B.inermis)	11.96			

The evolution of the floristic composition in the conditions of a uniform technology demonstrates the very good persistence of the M.sativa species (98-73% dominance in the vegetal carpet) even in the IV year from the sowing. In the crop associated with *M.sativa + B.inermis*, statistically assured yields were obtained as very significant positive compared to the crops associated with pure crops. There is a difference in production between the associated culture of *M.sativa + B.inermis* and those obtained in the monocultures of M.sativa and B. inermis, but the difference is smaller than in the previous year. In 2020 (the fourth year after sowing) the yields decreased compared to previous years, however the monoculture of *M.sativa* obtained a yield increase of 2.08 t / ha, statistically assured as distinctly significant.

In the crop associated with *M.sativa + B.inermis*, statistically assured yields were obtained as very significant positive compared to the crops associated with pure crops. There is a difference in production between the associated culture of M.sativa + B.inermis and those obtained in the monocultures of M.sativa and B. inermis, but the difference is smaller than in the previous year. In 2020 (the fourth year after sowing) the yields decreased compared to previous years, however the monoculture of M.sativa obtained a yield increase of 2.08 t / ha, statistically assured as distinctly significant.

Table 6

Influence of fertilization on dry matter yield (t/ha) (2020)

Variant	Yield t/ha	Diferencet	%	Semnificances
A1 Martor	6.75	0.00	100	Mt
A2 B.inermis	7.71	0.96	114.22	-
A3 M.sativa	8.83	2.08	130.81	**
A4M.sativa+B.inermis	7.85	1.10	116.29	*

LSD (p 5%) = 1,26 LSD (p 1%) = 1,82 LSD (p 0,1%) = 2,68

Table 7

The yield differences among variants and their significance (2020)

Variant	Yield (t/ha)	Variants in order of increasing crop		
		2	3	4
		SU t/ha		
		7,71	8,83	7,85
A1Martor	6,75	0,96	2,08	1,10
A2 B.inermis	7,71		1,12	0,14
A3 M.sativa	8,83			-0,98
A4 M.sativa+B.inermis	7,85			

Feed quality is a complex attribute to the shaping of which contributes a number of interdependent elements (chemical composition, digestibility, efficiency of use of digestion products), which determine the nutritional value and voluntary consumption, and finally its nutritional value.

Table 8

The yearly average chemical composition of forage obtained

Chemical composition	Variant / Year					
	B.inermis		*M.sativa*		*M.sativa+B.inermis*	
CF %	29.35	29.30	27.42	29.56	28.44	28.90
F %	3.01	1.90	2.47	2.35	2.63	2.05
A %	8.33	9.10	9.92	12.05	8.72	10.72
ESN %	41.40	44.15	42.19	35.73	40.19	37.80
BP kg/ha	1300.2	1590.7	1915.20	2285.70	2218	2243

A remark should be made about the production of crude protein per hectare. As can be seen from the figures in Table 8, the production of crude protein per hectare in B.inermis monoculture satisfactorily fertilized with nitrogen amounts to significant values, between kg / ha 1300.2 - 1590.70 Kg / ha. Higher values are obtained for pure and associated crops of M. sativa and B. inermis (1915.20 - 2285.70 kg / ha and 2218 - 2243 kg / ha in the case of the associated crop). The crude protein content varies from year to year within very limited limits, these variations being significant, and the differences between species are influenced by the varieties used. Thus, in the case of M.sativa monoculture, the highest values of PB (1915,20 - 2285,70) were obtained, which are mainly due to the variety used (Madalina), a variety in which the percentage of crude protein is higher than to the other improved varieties.

CONCLUSIONS

The yields obtained from the pure crops of *M.sativa* and *B. inermis,* in all the three experimental years are between 7.26 - 11.25 t / ha SU, it was found that the highest yields of SU in conditions of non-fertilization with nitrogen were obtained for the monoculture of M.sativa, respectively 8.83 - 11.25 t / ha SU.

In the structure of the mixture of *M.sativa* + *B.inermis* can be observed some changes that are generated by the high competition capacity of the partners. It can be noticed that the *M.sativa* species has the highest dominance in the vegetal carpet, having a percentage of participation between 88-86%, and 54% in the fourth year of use. B.inermis has a low percentage of participation in the first 2 years of use (22-26%) while in the third year it reaches a dominance of 14% in the vegetation, while weeds occupy 38%.

The chemical composition of the feed obtained was influenced by the species used, but nitrogen fertilization influenced to some extent the chemical composition of the feed, so that there is a slight increase in the values of all constituents depending on the doses of nitrogen applied. However, it should be noted that although there is a slight increase in the amount of crude protein per hectare when applying nitrogen, it is of the same order of magnitude as that obtained under uniform technology.

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