ASPECTS REGARDING THE REPORT PRODUCTION-QUALITY OF FORAGE AT THE MIXTURE OF ITALIAN RYEGRASS AND PERSIAN CLOVER

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Abstract: *The researches have as objective to determine the best experimental variant, in terms of feed production - feed quality, through growing Persian clover (annual clover) with Italian ryegrass var. westerwoldicum, in varying degrees of mixture. At present, in agriculture, at global level is desired to reduce the amount of chemical fertilizer used for the prevention and reduction of soil pollution by nitrates and nitrites, resulted after an unreasonable application of nitrogen fertilizers. One of the most important technological solutions is growing in mixture of grasses and legumes, with or without a minimum contribution of chemical fertilizers. Expanding in the production of a large and varied assortment of species and varieties requires the development of technological solutions that will achieve an optimal energy-protein ratio for animal nutrition and to offer multiple possibilities to feed use. The obtained fodder from annual mixtures must ensure a constant supply of food for animals, so it must be characterized by a rhythmic production during the growing season and a good conservation. Another factor of great importance at present time is related to feed quality, especially with reference to digestibility and feed consumability. Along with quantity, quality feed represents a very important role and their cost price in increasing the economic efficiency of livestock. As biological material we used Wesley variety from Lolium multiflorum specie and Gorby variety from Trifolium resupinatum specie. We studied Italian ryegrass (L.m.) and Persian clover (T.r.), both in pure and mixed culture, in the following proportions: L.m.75% + % T.r.25, L.m.50% + T.r.50%%, L.m.25% + T.r.75%. Another experimental factor studied was fertilization. Were studied variants without fertilizer and with chemical fertilizers ($N_{100}P_{50}K_{50}$) to can compare the dry matter production obtained in both variants. The culture of these annual forage mixtures types is at the beginning in our country, but they are very successfully used in other countries, especially in countries where can be seeded even in the fall. A special importance of this work lies in the fact that through these researches are brought important contributions for the knowledge of these types of crops, in order to diversify the plants assortment and annual forage crops and which have the possibility to be used in feed crop rotation.*

Key words**:** *Lolium multiflorum, Trifolium resupinatum, pure culture, mixture, quality*

INTRODUCTION

In modern agriculture, sustainable animal husbandry occupies an important place because this area provides a large part of humanity feed. On the other hand the development of the agriculture field is dependent on ensuring the fodder necessary for animal feed (7).

How the existing meadows may not cover the feed necessary all year, people are obligated to cultivate fodder also. Some of these plants are grown for grain, while others are grown for hay or green mass (6).

At present is considered that approximately 60% of arable land are not cultivated with plants that get directly in human food, but with plants that are used in animal feeding (7).

In the case of seeded meadows a decisive factor in the evolution of vegetation cover is the degree of intensively culture system (7).

Thus, is recommended the use of complex mixtures of extensive culture systems, of simple mixtures for intensive culture systems and of monocultures for very intensive systems, characterized by an optimum supply of water and minerals (2,4,8).

Annual forage mixtures are forage crops composed of forage grasses (Italian Ryegrass) or annual clovers (berseem clover, crimson clover) or mixtures of spring or autumn vetch with grain cereal (oats, barley, etc..), these mixtures being known as spring or autumn mash. These cultures have a shorter use, which makes them able to get in rotation with other forage plants.

Regarding the quality of produced feed in spring (digestibility, energy, protein, minerals) MOISUC A. and DUKIC A. (2002), says that it remains of high quality till before the flowering beginning of gramineae and till the inflorescence appearance of the legumes.

MATERIAL AND METHODS

The experience was settled at The Experimental Didactic Station of The University of Agricultural Sciences and Veterinary Medicine of Banat, Timisoara. The settlement area is in West Plane of Romania and the soil on witch the experiences have been placed is a chambic chernozem.

After Koppen, the perimeter's climate is situated in region c.f.b.x., characterised through a temperate climate with precipitations all the year, but with humidity deficit in the summer months.

Climatic conditions study was done for 50 years and found that: annual average temperature is 0.80 C, the hottest month is July, with a temperature of 21.4 ^{0}C and the coldest month is January with a temperature of 1.6 ^{0}C.

Annual average precipitations in our area are 517.6 mm, of which 63% fall during the vegetation period. The driest months are June and July.

During the growing season, temperatures were raised over the multi-annual average in both experimental years, against low rainfall, that leaded to different yield results.

As biological material we used Wesley variety of *Lolium multiflorum* and Gorby variety of *Trifolium resupinatum*.

I studied *Lolium multiflorum* (L.m.) and *Trifolium resupinatum* (T.r.), both in pure and mixed culture, in the following proportions: L.m.75% + % T.r.25, L.m.50% + T.r.50%%, L.m.25% + T.r.75%.

Another studied experimental factor was fertilization. Variants were studied without fertilizer and with chemical fertilizers ($N_{100}P_{50}K_{50}$) to can compare dry matter production in both variants.

In the paper can be found average dry matter yields obtained in the three experimental years (2006 - 2008). This allowed some conclusions on the production capacity but also adapting capacity of Persian clover in Banat plain conditions.

The forage quality analysis was realized before the flowering beginning of gramineae, because in this vegetation stage the forage quality is the highest. Climatic conditions from Romania, in this vegetation stage, favorizes the quality and also the quantity of forage. Samples of pasture were chied in a freed – air oven al 105^{0}C respectively 25 hour and D.M. content calculated. Ground samples (1mm) were analyzed for KJEDHAL N (AOAC, 1990, ID), Crude protein was calculated as KJEDHAL Nx6.25. Neutral detergent fiber (NDF); and detergent fiber (ADF) were determined by the detergent procedures of VAN SOEST et all (1981) and ROBERST. VAN SOEST (1981), with £-amylase being used Sodium Sulfite was not added.

The results interpretation have been done according to the three factorial analysis of variance (3).

RESULTS AND DISCUSSIONS

From the analysis of Table 1 we see that the lowest amount of dry matter was obtained at pure culture of Italian ryegrass (witness). This made that all the other variants to have superior dry matter production comparatively to the witness.

Highest dry matter production was obtained at the mixture variant L.m. 50% + T.r. 50% of 6,1 t/he, with an increase of 1.7 t/he D.M. comparatively to the witness *Lolium multiflorum*, very significantly higher production and with an increase of 1,5 t/he D.M. comparatively to pure culture of Persian clover, very significantly higher production.

Table 1

Significance of yield differences (D.M. t/he) of the studied variant – without fertilizer

No. cr.	Experimental variant	D.M. prod. (t/he) Average	Against to *Lolium multiflorum*		Against to *Trifolium resupinatum*	
			Relative value (%)	Difference Significance	Relative value (%)	Difference Significance
1.	*Lolium multiflorum*	4,4	100,00	Witness	95,65	-0,20
2.	*Trifolium resupinatum*	4,6	104,54	0,20	100,00	Witness
3.	L.m.75%+T.r25%	5,4	122,72	1,00**	117.39	0,80*
4.	L.m.50%+T.r.50 %	6,1	138,63	1,7***	132,60	1,50***
5.	L.m.25%+T.r.75 %	5,06	115,00	0,66*	110,00	0,406

Confidence - DL 5%=0.58; 5%=0.85; 0.1%=1.28

A very good dry matter production was obtained and at mixture variant L.m.75% + T.r. 25% of 5.4% t/he, with an increase of 1.00 t/he D.M., higher significant distinctly production than of Italian ryegrass (witness) and with an increase of 0,8 t/he comparatively to Persian clover (witness) production who is significant higher.

From table 2 analysis we observe the influence of fertilization on dry matter production in all experimental variants (compared with unfertilized variant), especially on pure culture of Italian ryegrass. This shows that Italian ryegrass has a very good response to nitrogen fertilization, which is confirmed by specialty literature (Margineanu T., 1980). this did that mixtures in which this is found in a equal proportion or greater a greater proportion with Persian clover to obtain the best production results.

Table 2

Significance of yield differences (D.M. t/he) of the studied variant – with fertilizer

No. cr.	Experimental variant	D.M. prod. (t/he) Average	Against to *Lolium multiflorum*		Against to *Trifolium resupinatum*	
			Relative value (%)	Difference Significance	Relative value (%)	Difference Significance
1	*Lolium multiflorum*	5,5	100,00	Witness	112,24	0,6
2	*Trifolium resupinatum*	4,9	89,09	-0,60	100,00	Witness
3	L.m.75%+T.r25%	6,3	114,54	0,80*	128,57	1,4***
4	L.m.50%+T.r.50%	6,4	116,36	0,90*	130,60	1,5***
5	L.m.25%+T.r.75%	5,4	98,18	-0,10	110,20	0,5

DL 5%=0.61; 1%=0.89; 0.1%=1.34

And in this variant the biggest dry matter production was obtained at the mixture L.m.50% + T.r.50% of 6.4 t/he D.M., with a increase of 0,9 t/he D.M. against to Italian ryegrass (witness), the production being significantly higher and with an increase of 1,5 t/he D.M. against to Persian clover (witness), the production being very significantly higher.

Chemical analysis (table 3) yields results similar to those reported in the literature. The results reflect the influence of type of grass and as well as of the management treatment.

In the unfertilized variant the smallest protein content was obtained in pure culture of Italian ryegrass and the highest in pure culture of Persian clover. This made that all mixture variants to have protein content higher than the one obtained in pure culture of Italian ryegrass, but smaller than the one obtained in pure culture of Persian clover.

From the mixtures the highest protein content was obtained when Persian clover is found in the highest proportion (L.m.25% + T.r.75%).

Also, we note that through fertilization at pure culture of Italian ryegrass and the mixture in which it is found in the greatest proportion occurs a protein content increase (compared with unfertilized variant) and in pure culture of Persian clover and at the mixture in which it is found in equal or greater proportion with Italian ryegrass the protein content decreases due to the fertilizers application.

In which it regards the content of crude cellulose and NDF, it can be seen that the highest content in unfertilized variant is found in pure culture of Italian ryegrass and lowest in pure culture of Persian clover. This made all three variants of mixture to have a crude cellulose content and of NDF lower than in pure culture of Italian ryegrass, but higher than that is obtained in pure culture of Persian clover.

Due to fertilization can be observed that the crude cellulose content and NDF increases in all experimental variants comparably to unfertilized variant.

Table 3

The chemical composition of forage

Specification	**Crude protein (C.P.) (%)**	**Crude fibre (C.F.) (%)**	**NDF (%)**	**ADF (%)**
Unfertilized variant				
Lolium multiflorum	10,69	30,23	49,25	31,10
Trifolium resupinatum	18,13	14,7	39,20	34,24
L.m.75%+T.r.25%	11,49	29,28	47,56	31,99
L.m.50%+T.r.50%	16,02	21,24	44,29	32,76
L.m.25%+T.r.75%	17,53	17,15	42,84	33,87
Fertilized variant				
Lolium multiflorum	13,23	31,69	52,21	34,67
Trifolium resupinatum	17,83	16,18	41,54	35,78
L.m.75%+T.r.25%	13,8	30,67	48,29	34,87
L.m.50%+T.r.50%	14,97	22,89	45,23	34,92
L.m.25%+T.r.75%	16,75	18,58	43,59	35,02

In which it regards the contents of the ADF, from Table 3 can be seen that the highest content is found in pure culture of Persian clover and the lowest content is found in pure culture Italian ryegrass. This made that all three mixture variants to have a ADF content higher than that obtained in pure culture of Italian ryegrass, but smaller than that obtained in pure culture of Persian clover.

By the application of chemical fertilizers can be observed that the ADF content increases in all the 5 analyzed experimental variants (compared with unfertilized variant).

From the analysis of Table 4 can be observed that due to fertilization there is a decrease of all the 5 quality indicators.

A bigger decrease can be observed in RFV index (a relative feed value). Generally is considered the index value must be greater than 100, for the feed to be quality. Thus, in Table 4 is observed that even the value of this index decreases due to the chemical fertilizers application, though its value is greater than 100 in all 5 experimental variants.

Table 4.

The main quality indicators

No. cr.	Experiment variant	DDM (%)	DMI (%)	RFV	TDN (%)	NE_L (kJ/Kg)
Unfertilized variant						
1.	*Lolium multiflorum*	64.67	2.43	122.15	60.58	0.620
2.	*Trifolium resupinatum*	62.22	3.06	147.66	56.97	0.580
3.	L.m.75%+T.r25%	63.97	2.52	125.13	59.56	0.609
4.	L.m.50%+T.r.50%	63.37	2.70	133.11	58.67	0.599
5.	L.m.25%+T.r.75%	62.51	2.80	135.74	57.39	0.585
Fertilized variant						
1.	*Lolium multiflorum*	63.06	2.29	112.35	58.20	0.594
2.	*Trifolium resupinatum*	61.02	2.88	136.66	55.20	0.560
3.	L.m.75%+T.r25%	61.73	2.48	118.92	56.24	0.572
4.	L.m.50%+T.r.50%	61.69	2.65	126.89	56.19	0.571
5.	L.m.25%+T.r.75%	61.61	2.75	131.49	56.07	0.570

CONCLUSIONS

- Can be observed the fact that at all five experimental variants was registered a production increase due to chemical fertilisers application.

- The biggest production increase, due to chemical fertilisers application, was realised at pure culture of Italian ryegrass, this one grew up with appreciatively 1,1 t/he DM.

- At both fertilisation variants the biggest dry matter production was obtained at mixture variant L.m.50%+T.r.50%.

- In which it regards the protein content, at both fertilization variant, the biggest value was observed at pure culture of *Trifolium resupinatum*, so that at mixtures, the biggest protein value was registered when *Trifolium resupinatum* was in the biggest proportion besides *Lolium multiflorum.*

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