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RESEARCH ON THE EXPLOITATION OF TEMPORARY MEADOWS IN A MIXED SYSTEM UNDER THE CONDITIONS OF CENTRAL MOLDAVIA, ROMANIA

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ABSTRACT

The study of temporary meadows is of particular scientific importance, because they make possible the edification and characterization of some essential aspects regarding the relationship between the diversity, stability and maturity of ecosystems; the relationships between species; the biological balance between natural and artificial ecosystems; aspects that are greatly debated nowadays. They can replace degraded permanent meadows, or on arable land intended for fodder.

When creating the mixtures, the basic requirement that must be taken into account is that they form a uniform grass cover and are well adapted to stationary conditions. The importance of developing temporary meadows led to the initiation of studies at ARDS Secuieni, starting with 2017, with the aim of creating the best mixtures adapted to the pedo-climatic conditions in the area. The results obtained in the conditions of Central Moldavia showed that fertilization with different doses of fertilizer influenced the production of dry matter compared to the non-fertilized variants. The variant fertilized with the dose of $N_{80}P_{40}$ kg/ha had the highest fodder production, i.e.16.13 t/ha d.m.; the difference compared to the control was quite a significant one; and the lowest production was obtained with the control variable (N_0P_0), i.e. 9.47 t/ha d.m.

Analysing the data obtained, it can be easily noticed that, in the variants studied, there were five production cuttings; alternating hay mowing with that for simulating grazing (mixed regime). Analysing the results obtained, for the first cutting, regarding the influence of fertilization and the mixture used on the percentage of grass and leguminous species, it was found that in the mixture of 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous (*Lotus corniculatus* 15%), the percentage of grasses participation in the grass cover was between 64.5% for the variant fertilized with $N_{40}P_{40}$ and 86.0% for the variant fertilized with $N_{80}P_{40}$. The leguminous that are part of the grass cover were between 12.7% for the variant fertilized with $N_{80}P_{40}$ and 34.6% for the variant fertilized with $N_{40}P_{40}$, and the percentage of participation of various species was between 0.5% and 1.4%. The participation percentage of perennial grasses and leguminous varied depending on the dose of fertilizer applied, and the quality of the fodder obtained was good for all the mixtures studied, being primarily determined by the doses of fertilizers administered, but also by the species and the proportion of their participation in the sowing rate under the conditions of Central Moldavia from 2017 to 2020.

Keywords: grasses and leguminous, mixture, fertilization, grass cover, quality.

INTRODUCTION

The use of meadows only for grazing or only for mowing creates changes in the floristic composition, diminishing their production and quality over time.

From the existing statistical data, it appears that in 2017, the total area of Romania was about 23839.1 thousand ha, of which by use categories: arable 9442.5

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thousand ha, permanent meadows 4841.8 thousand ha, temporary meadows 877 thousand ha, forests 6334.0 thousand ha, vineyards and orchards 420.6 thousand ha, other lands 2364.9 thousand ha (www.fao.org/). The existence of this area of 4841.8 thousand ha of meadows does not mean that we also have a corresponding amount of biomass from them, on the contrary, the production obtained on most of them is small and of poor quality in terms of fodder.

Mowing hay yearly stimulates the growth of tall species, including the less valuable ones, to the detriment of short plants, which will eventually disappear (Bărbulescu et al., 1991).

By changing the way of use during the same year or every few years, floristic composition is balanced and a better correlation between the methods of use and those of improvement is achieved (Motcă et al., 1993).

Harvest phenophase determines the chemical composition of the feed. An important indicator in determining the chemical composition of perennial leguminous is the leaf/stem ratio, which also depends on the harvest time. The aim is to have the highest possible leaves percentage, as leaves have a higher protein, mineral and vitamin content than stems (Lamb et al., 2003, 2007; Schitea et al., 2007; Goliński and Golińska, 2008; Ketterings et al., 2008; Tyrolová and Výborná, 2008; Rimi et al., 2010; Samuil et al., 2012; Vasileva, 2013; Stavarache et al., 2015).

The main requirement that must be taken into account in the case of mixture composition is that they form a well-finished grass cover, which will further ensure the balanced development of the grass cover towards a lasting meadow, well adapted to the stationary conditions (Butkuté and Daugėlienė, 2008; Surmei-Balan et al., 2012; Naie et al., 2015).

The application of fertilizers on meadows influences their productive level, the quality of the fodder obtained, changes the structure of the grass cover, the properties of the soil and intervenes in the activity of soil microorganisms (Kleczek, 1991; Kostuch and Kopec, 1991; Godlewska and Ciepiela, 2017; Teliban et al., 2022).

Generally, after a two period use, a series of changes occur in the grass cover compared to grasses - leguminous ratio, since sowing. A decrease in plant participation of various group until their disappearance from the grass cover was found (Janicka and Stypinski, 1991).

Thus, tall species are used for hayfields, with a close growth rate, while for meadows medium or low growth species predominate, with a different growth rate (to achieve a better distribution of green mass over grazing cycles), high speed and energy after grass, resistance to soil subsidence, greater vivacity, etc. (Belesky et al., 2002; Sanderson et al. 2005).

When creating the mixtures, the ability to compete (competitiveness) will be taken into account. The introduction of aggressive species into mixtures alongside those with reduced competitive capacity leads over time to the elimination of the latter. Competitive ability is a species characteristic; however, it is greatly influenced by the environmental conditions and the way of exploitation (Lazaridou, 2004, 2008; Skinner et al., 2006; Katić et al., 2009; Vîntu et al., 2010).

Maintaining the productive potential of temporary meadows at the highest possible level is achieved by using valuable species at their establishment through the application of fertilizers as well as through rational exploitation (Deak et al., 2009; Hancock, 2011).

A balanced ratio between grasses and perennial leguminous gives the fodder obtained an optimal quality and content of mineral elements, which then have positive effects on the animals (Thumm, 2008; Tomić et al., 2011).

Considering the importance of cultivating mixed use temporary meadows in the conditions of Central Moldavia and not only, at ARDS Secuieni, since 2017, studies have been carried out on establishing the percentage of perennial grasses and leguminous in mixtures, as well as the influence of fertilization with different doses of fertilizers on fodder production. Thus, in this paper the results obtained from 2017 to 2020 regarding these aspects are illustrated.

MATERIAL AND METHODS

The research was carried out in the pedoclimatic conditions at the Agricultural Research and Development Station Secuieni (ARDS Secuieni is located in the S-E part of Neamţ County, between the geographical coordinates of 26°51'00" east longitude and 46°51'15" north latitude). The average annual temperature was 8.7°C, and the annual precipitation amount was 548 mm, during 2017-2020 agricultural years. The multiannual averages recorded during the analyzed period were 526 mm (2017/2018), 430 mm (2018/2019) and 376 mm (2019/2020). The recorded deviations from the multiannual average were between -22 mm and -172 mm, thus showing a precipitation decrease from one year to another.

In the spring of 2017, an experiment with two factors of the 4x3 type, according to the method of subdivided parcels, in four repetitions, was established in the experimental field of the Agricultural Research Development Station Secuieni, in Neamţ County. Factor A is represented by fertilization, with four gradations: a_1-N_0P_0; a_2-$N_{40}P_{40}$; a_3-$N_{80}P_{40}$; a_4-$N_{80+40}P_{40}$, and factor B, the mixture between perennial grasses and leguminous, with three gradations: b_1 - 85% grasses (60% *Dactylis glomerata* L. + 25% *Lolium perenne* L.) + 15% leguminous (15% *Lotus corniculatus* L.); b_2 - 90% grasses (20% *Dactylis glomerata* L. + 70% *Lolium perenne* L.) + 10% leguminous (5% *Lotus corniculatu*s L. + 5% *Trifolium pratense* L.); b_3 - 90% grasses (70% *Dactylis glomerata* L. + 20% *Bromus inermis* Leyss) + 10% leguminous (10% *Lotus corniculatus* L.). The soil type is chernozem (SRTS, 2012) and is characterized by a weakly acidic pH (6.29), humus content of 2.55-3.10%, medium N supplied and good P_2O_5 şi K_2O.

The sown surface of the experimental parcel was 10 m^2, of which 8 m^2 were harvested. In the year of sowing, three uniform mowings were carried out; the results of which were not recorded.

The way of exploitation was the mixed i.e. the first harvest (when the dominant grasses sprouted and the leguminous budded) was used as hay, and next four harvests in the simulated grazing regime, at 28 days. Background fertilization was carried out using phosphate fertilizers administered in autumn, and those based on nitrogen were administered in early spring at the start of vegetation, with the exception of N_{80+40} doses; the difference of which was administered after the first mowing.

"Bertolini" Mower was used for harvesting; at a height of 4-5 centimeters from the ground.

In order to determine the floristic composition, samples were collected from each parcel, at every cutting, and the floristic evolution was determined according to every species group (grasses, leguminous and species from other botanical families).

RESULTS AND DISCUSSION

Fertilization with mineral fertilizers positively influences fodder production, and the results obtained differ depending on the mixtures studied. Also, the species of perennial grasses and leguminous in the composition of the mixtures influenced the production obtained.

For the variants studied, during the analyzed period, the results pointed out that the highest production of dry matter, after the first mowing, was obtained for the variant *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15%, fertilized with $N_{80}P_{40}$ of 7.19 t/ha d.m. (Table 1).

Compared to the control variant, it achieved very significant production increases. Also, all differences between the values of the analyzed variants compared to the control were statistically assured as positive, distinctly significant or very significant. The lowest production was obtained for the control variant, sown with the mixture consisting of *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15%, of 3.22 t/ha d.m.

After the second mowing, the highest production obtained (3.07 t/ha d.m.) was for the mixture consisting of *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15%, fertilized with $N_{80}P_{40}$; the difference compared to the control variable was a very significant one.

For the other variants studied, it can be noticed that the productions obtained were higher compared to the control. After the third mowing, the highest production (2.78 t/ha d.m.) was obtained for the same variant as in the previous mowings.

As for the fourth harvest in the experiment based on mixt use mixtures, productions between 1.17 t/ha d.m. for the control variable and 2.45 t/ha d.m for the variant *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15% fertilized with $N_{80}P_{40}$ were obtained. After the harvest, the productions were lower than 2 t/ha d.m., for all the variants studied.

Analyzing the influence of the interaction between the mixtures of perennial grasses and leguminous and fertilization, during 2017-2020, it was observed that the highest average yields (17.23 - 15.56 t/ha d.m.) were obtained when fertilizing with $N_{80}P_{40}$. The differences obtained in all experimental variants were statistically assured as being very significant ones.

The results obtained point out the fact that by increasing the nitrogen dose, the dry matter production of the forage also increases.

Table 1. The influence of the interaction between the mixture and fertilization on production (the d.m., from 2017 to 2020), for mixed usage

Variant			Production (t/ha d.m.)					
			Cutting I	Cutting II	Cutting III	Cutting IV	Cutting V	Total
a_1 - N_0P_0 (Ct)	b_1 - D.g.60%+L.p.25%+L.c.15% (control)		3.22	1.55	1.31	1.17	0.84	8.09
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		4.72***	2.24***	1.75***	1.66***	0.85	11.22***
	b_3 - D.g.70%+B.i.20%+L.c.10%		3.82**	1.82**	1.52***	1.30**	0.63^{ooo}	9.09***
a_2 - $N_{40}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		5.61***	2.59***	2.61***	2.05***	1.28***	14.14***
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		6.24***	2.97***	2.69***	2.17***	1.43***	15.50***
	b_3 - D.g.70%+B.i.20%+L.c.10%		5.84***	2.82***	2.21***	2.05***	1.34***	14.26***
a_3 - $N_{80}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		7.19***	3.07***	2.78***	2.45***	1.74***	17.23***
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		6.65***	2.83***	2.46***	2.01***	1.64***	15.59***
	b_3 - D.g.70%+B.i.20%+L.c.10%		6.35***	3.05***	2.54***	2.02***	1.60***	15.56***
a_4 - $N_{80+40}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		5.69***	2.72***	1.63***	1.38***	1.13***	12.55***
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		4.84***	2.50***	1.83***	1.14	0.96*	11.27***
	b_3 - D.g.70%+B.i.20%+L.c.10%		6.45***	3.06***	1.88***	1.58***	1.34***	14.31***
DL		*5%*	*0.38*	*0.16*	*0.10*	*0.11*	*0.12*	*0.45*
		1%	*0.51*	*0.21*	*0.13*	*0.15*	*0.16*	*0.60*
		0.1%	*0.67*	*0.28*	*0.17*	*0.19*	*0.20*	*0.79*

Analyzing the correlations between the amount of nitrogen applied and the production of dry matter, in the analyzed period, for every harvest, it was found that there are positive correlations, and the coefficients were statistically assured and interpreted as being significant and distinctly significant (Figures 1, 2, 3, 4, and 5).

During 2017-2020, the correlations between nitrogen fertilization and dry matter production are positive; correlation coefficients are distinctly significant in the mixtures *Dactylis glomerata* 20% + *Lolium perenne* 70% + *Lotus corniculatus* 5% + *Trifolium pratense* 5%, *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10% and significantly in the mixture *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15% (Figure 6).

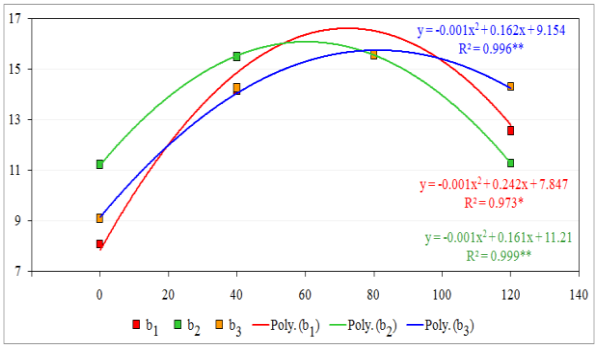

Figure 1. The correlation between the amount of nitrogen applied and production, for every studied mixture, after its first cutting, during 2017-2020, for mixed usage

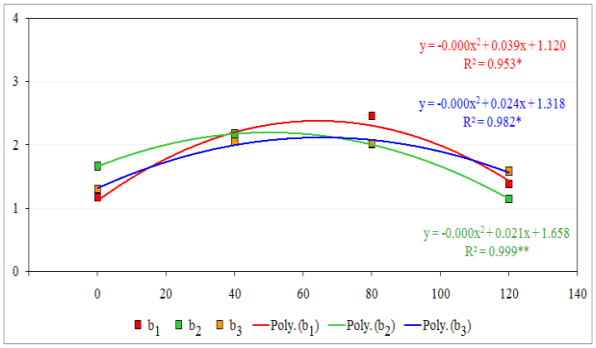

Figure 4. The correlation between the amount of nitrogen applied and production, for every studied mixture, after its fourth cutting, during 2017-2020, for mixed usage

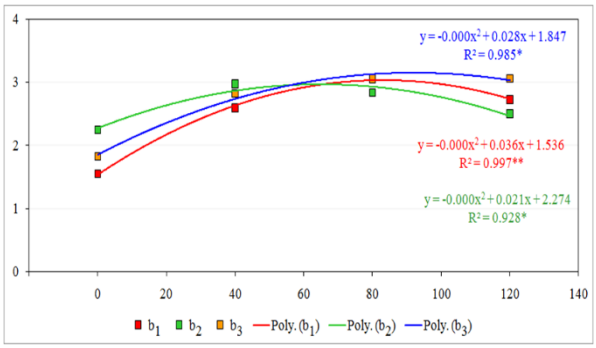

Figure 2. The correlation between the amount of nitrogen applied and production, for every studied mixture, after its second cutting, during 2017-2020, for mixed usage

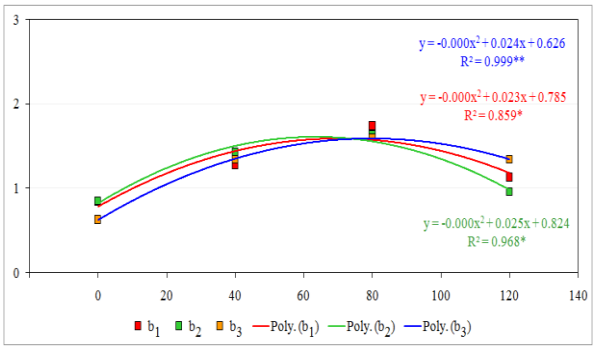

Figure 5. The correlation between the amount of nitrogen applied and production, for every studied mixture, at its fifth cutting, during 2017-2020, for mixed usage

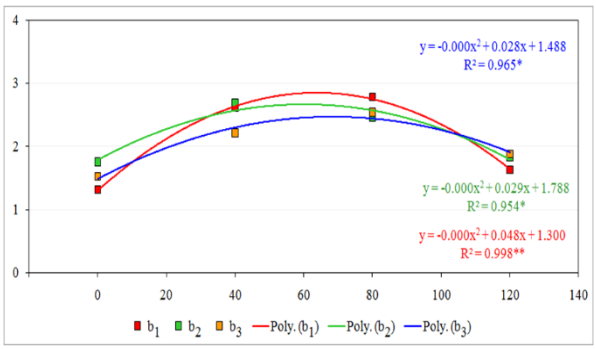

Figure 3. The correlation between the amount of nitrogen applied and production, for every studied mixture, after its third cutting, during 2017-2020, for mixed usage

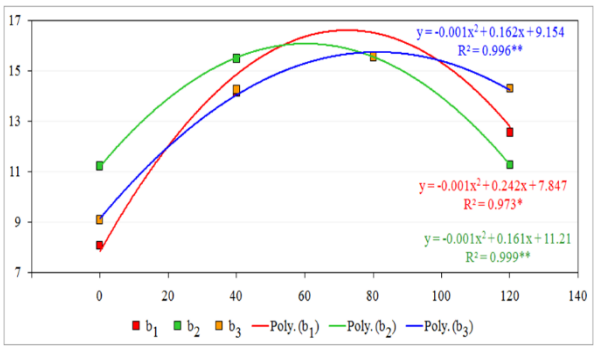

Figure 6. The correlation between the amount of nitrogen applied and total production, for every studied mixture, during 2017-2020, for mixed usage

In the pedoclimatic conditions of ARDS Secuieni, from 2017 to 2020, studies on the structure of the grass cover were carried out, for every of the mixtures studied after every mowing. Thus, it was found that the percentage of participation of perennial grasses and leguminous varied according to the dose of fertilizer applied.

Analyzing the results obtained, for harvest I, on the influence of fertilization and mixture used on the percentage of grass and leguminous species, it was found that for the mixture of 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous (*Lotus corniculatus* 15%), the percentage of grasses participation to the

grass cover was between 64.5% for the variant fertilized with $N_{40}P_{40}$ and 86.0% for the variant fertilized with $N_{80}P_{40}$. The percentage for the leguminous participating to the grass cover was between 12.7% for the variant fertilized with $N_{80}P_{40}$ and 34.6% for the variant fertilized with $N_{40}P_{40}$. Various species participation percentage ranged from 0.5% to 1.4% (Figure 7).

For the mixture of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% leguminous (*Lotus corniculatus* 5% + *Trifolium pratense* 5%), grasses participation percentage was between 56.9% for the variant fertilized with $N_{40}P_{40}$ and 67.2% for the variant fertilized with $N_{80}P_{40}$. Leguminous held a percentage between 30.9% for the variant fertilized with $N_{80}P_{40}$ and 42.5% for the variant fertilized with $N_{40}P_{40}$. The percentage of participation for species mixtures belonging to diverse group ranged from 0.6% to 1.9% (Figure 7).

For the mixture of 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% leguminous (*Lotus corniculatus* 10%), grasses participation percentage was between 72.9% for the variant fertilized with $N_{40}P_{40}$ and 85.5% for the variant fertilized with $N_{80+40}P_{40}$. Leguminous held a percentage between 13.9% for the variant fertilized with $N_{80+40}P_{40}$ and 27.1% for the variant fertilized with $N_{40}P_{40}$. The percentage of participation for species mixtures belonging to diverse group ranged from 0.0% to 2.6% (Figure 7).

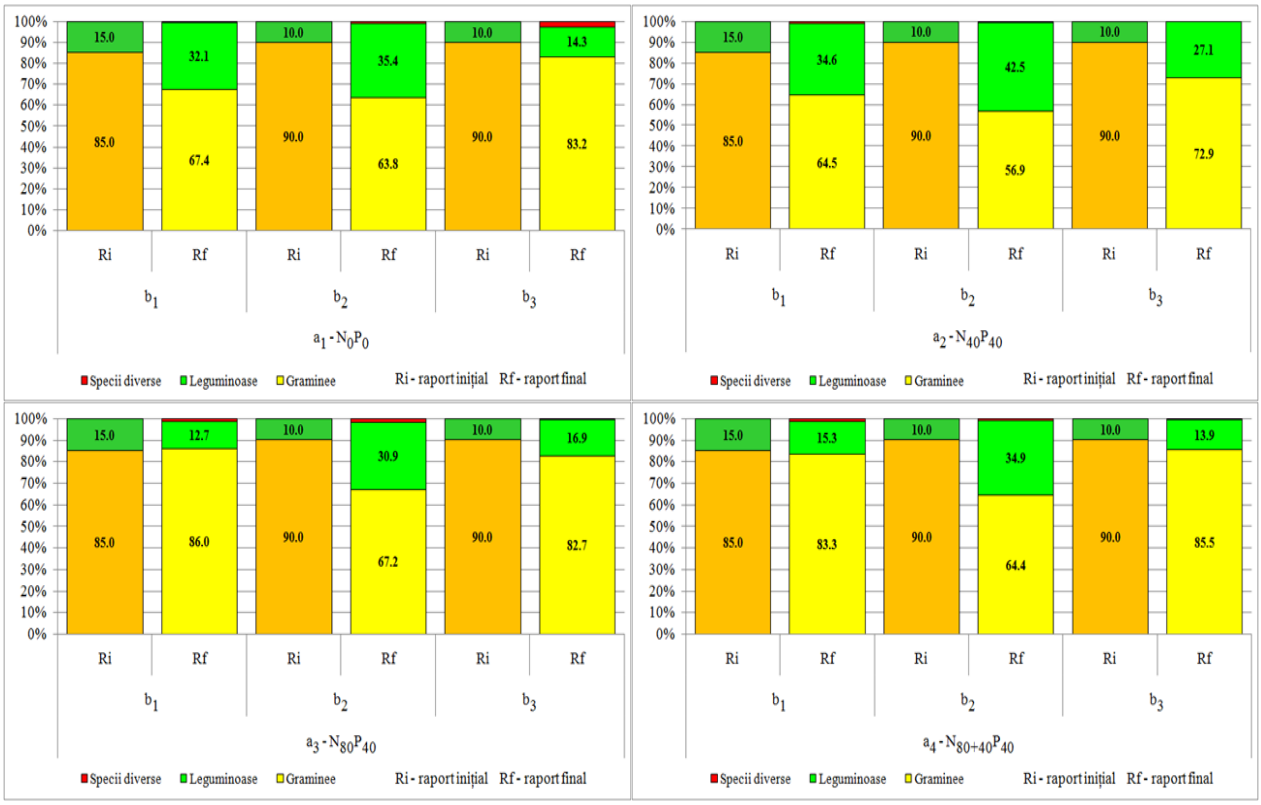

Figure 7. The influence of fertilization and mixed use on the grass cover structure, after the first mowing, during 2017-2020, for mixed usage

Analyzing the results obtained, for the second harvest, it was found that for the mixture consisting of 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous *(Lotus corniculatus* 15%), grasses participation percentage to the grass cover ranged from 68.1% for the variant fertilized with $N_{80}P_{40}$ to 74.0% for the variant fertilized with $N_{80+40}P_{40}$. As for the percentage of leguminous participating to the grass cover, this ranged from 21.9% for the non-fertilized variant to 26.0% for the variant fertilized with $N_{80+40}P_{40}$. Various species participation percentage ranged from 0.0% to 7.2% (Figure 8).

For the mixture of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% leguminous *(Lotus corniculatus* 5% + *Trifolium pratense* 5%), grasses participation percentage ranged from 55.8% for the variant fertilized with $N_{80+40}P_{40}$ to 62.2% for the unfertilized variant. Leguminous held a percentage ranging from 31.7% for the variant fertilized with $N_{40}P_{40}$ to 33.7% for the variant fertilized with $N_{80+40}P_{40}$. The percentage of participation for species mixtures belonging to diverse group ranged from 5.7% to 10.5% (Figure 8).

For the mixture of 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% leguminous (*Lotus corniculatus* 10%), grasses participation percentage ranged from 69.0% for the variant fertilized with $N_{80}P_{40}$ to 77.8% for the variant fertilized with $N_{80+40}P_{40}$. Leguminous held a percentage ranging from 16.7% for the variant fertilized with $N_{40}P_{40}$ to 22.2% for the variant fertilized with $N_{80+40}P_{40}$. The percentage of participation in mixtures of species from the diverse group ranged from 0.0% to 12.4% (Figure 8).

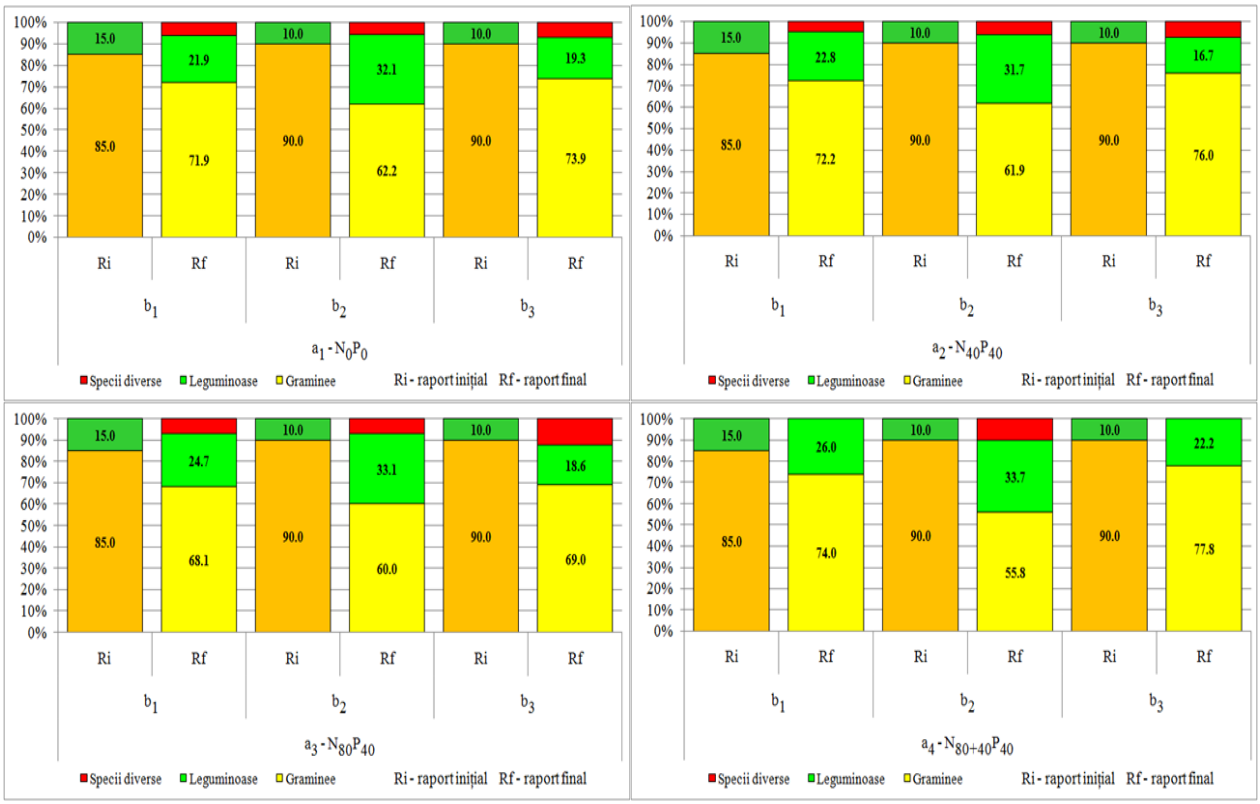

Figure 8. The influence of fertilization and mixed use on the grass cover structure, after the second mowing, during 2017-2020, for mixed usage

After the third mowing, data revealed the fact that for the mixture of 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous (*Lotus corniculatus* 15%), grasses participation percentage ranged from 59.0% for the variant fertilized with $N_{80}P_{40}$ to 72.4% for the variant fertilized with $N_{80+40}P_{40}$, and as for the leguminous participating to the grass cover the percentages ranged from 21.1% for the variant fertilized with $N_{40}P_{40}$ to 27.6% for the variant fertilized with $N_{80+40}P_{40}$. Various species participation percentage was from 0.0% to 14.0% (Figure 9).

For the mixture of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% leguminous (*Lotus corniculatus* 5% + *Trifolium pratense* 5%), grasses participation percentage ranged from 46.0% for the variant fertilized with $N_{80+40}P_{40}$ and 62.3% for the unfertilized variant. Leguminous held a percentage ranging from 28.5% for the

variant fertilized with $N_{80+40}P_{40}$ to 34.9% for the non-fertilized variant. The percentage of participation in mixtures of species from the diverse group ranged from 2.8% to 25.5%.

For the mixture of 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% leguminous (*Lotus corniculatus* 10%), grasses participation percentage ranged from 66.6% for the variant fertilized with $N_{80}P_{40}$ to 78.2% for the variant fertilized with $N_{80+40}P_{40}$. Leguminous held a percentage ranging from 18.4% for the unfertilized variant to 21.8% for the variant fertilized with $N_{80+40}P_{40}$. The percentage of participation in mixtures of species from the diverse group ranged from 0.0% to 14.1% (Figure 9).

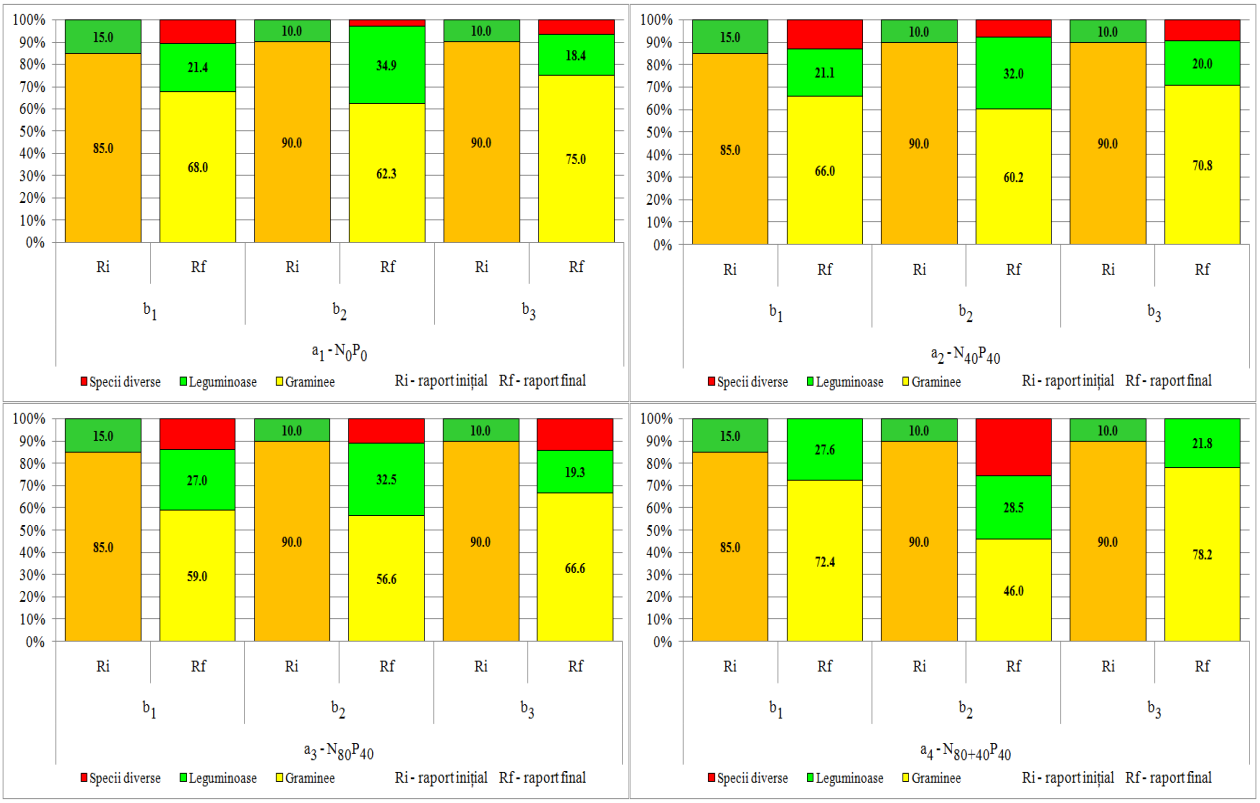

Figure 9. The influence of fertilization and mixed use on the grass cover structure, after the third mowing, during 2017-2020, for mixed usage

Analyzing the results obtained, for the second harvest, it was found that for the mixture of 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous (*Lotus corniculatus* 15%), grasses participation percentage ranged from 58.5 % for the variant fertilized with $N_{80}P_{40}$ to 69.2% for the non-fertilized variant. As for the percentage of leguminous participating to the grass cover, this ranged from 20.3% for the variant fertilized with $N_{80+40}P_{40}$ to 22.0% for the variant fertilized with $N_{80}P_{40}$. Various species participation percentage ranged from 10.3% to 19.5% (Figure 10).

For the mixture of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% leguminous (*Lotus corniculatus* 5% + *Trifolium pratense* 5%) with mixed use, grasses participation percentage ranged from 52.8% for the variant fertilized with $N_{80}P_{40}$ to 57.3% for the variant fertilized with $N_{80+40}P_{40}$. Leguminous held a percentage ranging from 34.2% for the variant fertilized with $N_{40}P_{40}$ to 37.4% for the non-fertilized variant. The percentage of participation in mixtures of species from the diverse group ranged from 6.0% to 12.3% (Figure 10).

For the mixture of 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% leguminous (*Lotus corniculatus* 10%) for mixed use, grasses participation percentage ranged from 67.6% for the variant fertilized with $N_{80}P_{40}$ to 77.9% for the unfertilized variant. Leguminous held a percentage ranging from

17.6% for the variant fertilized with $N_{40}P_{40}$ and 20.7% for the variant fertilized with $N_{80}P_{40}$. The percentage of participation in mixtures of species from the diverse group ranged from 3.6% to 12.6% (Figure 10).

From the data obtained during the fifth harvest, it was found that in the mixture exploited in a mixed regime, consisting of 85% grasses *(Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial leguminous (*Lotus corniculatus* 15%), grasses participation percentage ranged from 52.6% for the variant fertilized with $N_{80}P_{40}$ to 67.0% for the non-fertilized variant. Leguminous held a participation percentage ranging from 18.9% for the non-fertilized variant to 25.9% for the variant fertilized with $N_{40}P_{40}$. Various species participation percentage ranged from 11.4% to 26.2% (Figure 11).

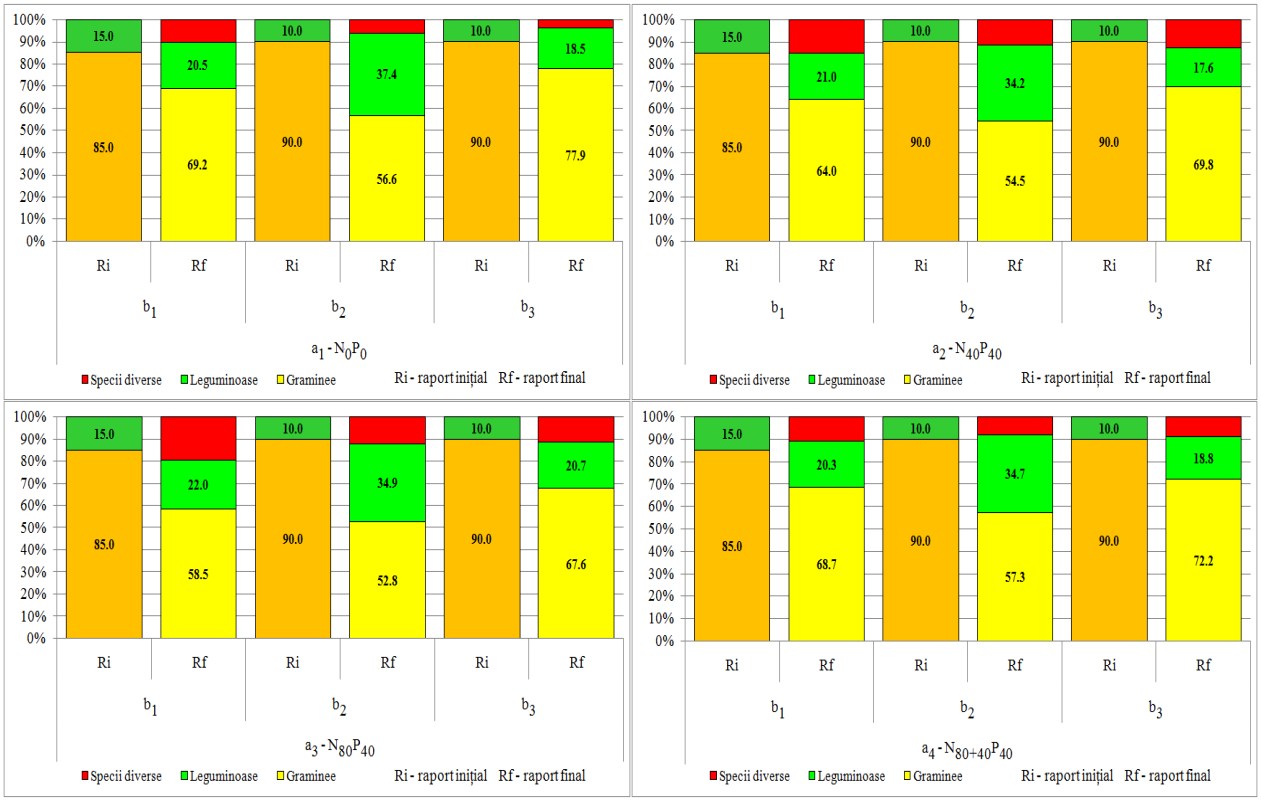

Figure 10. The influence of fertilization and mixed use on the grass cover structure, after the fourth mowing, during 2017-2020, for mixed usage

For the mixture of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% leguminous (*Lotus corniculatus* 5% + *Trifolium pratense* 5%) for mixed use, grasses participation percentage ranged from 49.6% for the variant fertilized with $N_{80}P_{40}$ to 54.5% for the variant fertilized with $N_{80+40}P_{40}$. Leguminous held a percentage ranging from 29.7% for the variant fertilized with $N_{40}P_{40}$ to 35.5% for the non-fertilized variant and the variant fertilized with $N_{80+40}P_{40}$. The percentage of participation in mixtures of species from the diverse group ranged from 10.0% to 17.9% (Figure 11).

For the mixture intended for a mixed-use consisting of 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% leguminous (*Lotus corniculatus* 10%), grasses participation percentage ranged from 63.4% for the variant fertilized with $N_{80}P_{40}$ to 74.9% for the unfertilized variant. Leguminous held a percentage ranging from 17.7% for the non-fertilized variant to 18.6% for the variant fertilized with $N_{80+40}P_{40}$. The percentage of participation in mixtures of species from the diverse group ranged from 7.4% to 18.5%.

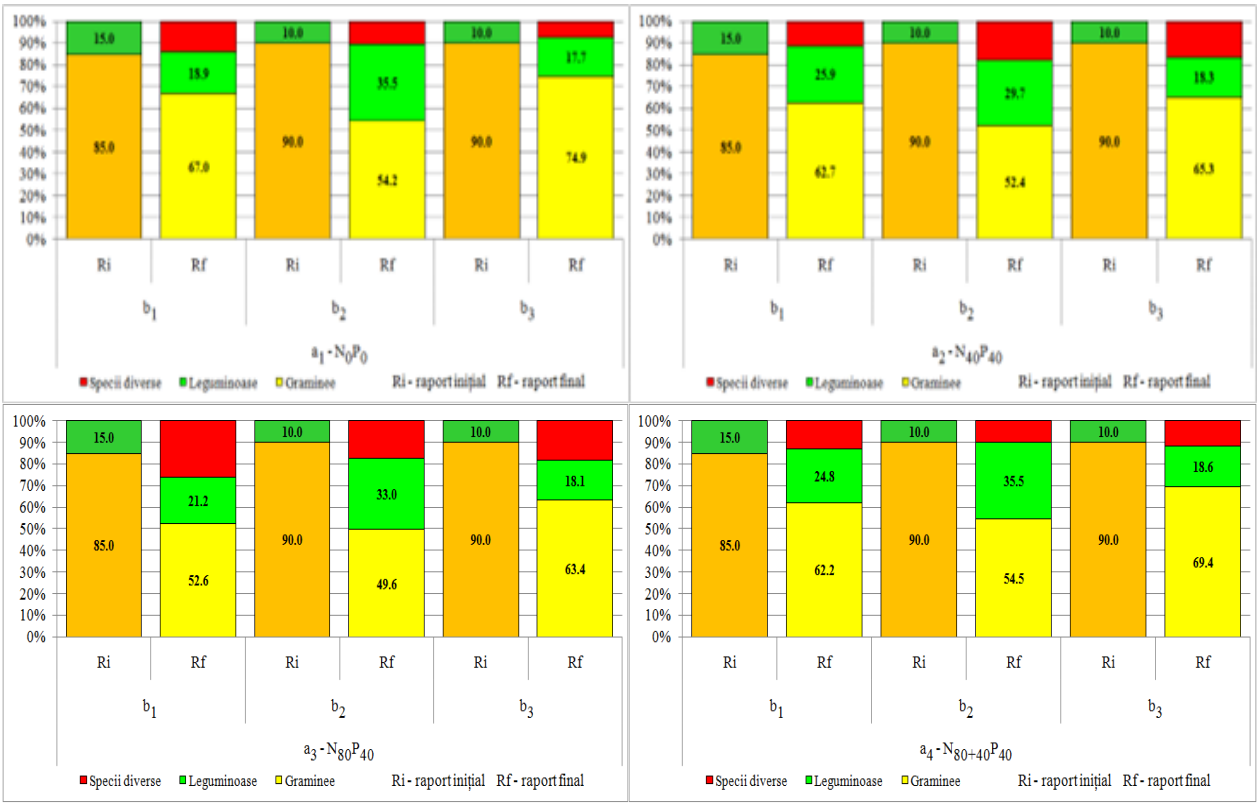

Figure 11. The influence of fertilization and mixed use on the grass cover structure, after the fourth mowing, during 2017-2020, for mixed usage

The quality of the forage obtained during 2017-2020 was a good one for all the mixtures studied, being mainly influenced by the doses of fertilizers administered, but also by the species and their participation proportion in the sowing rate.

Analyzing the influence of the interaction between fertilization and mixture on the quality of the fodder in the period 2017-2020, a difference in the content in CP is observed. Thus, in the variant fertilized with $N_{80+40}P_{40}$ and sown with the mixture of *Dactylis glomerata* 20% + *Lolium perenne* 70% + *Lotus corniculatus* 5% + *Trifolium pratense* 5%, the highest content of fodder in CP was obtained, of 15.78 g/100 g d.m., and the lowest, of 13.07 g/100 g d.m., was recorded in the unfertilized variant sown with the mixture *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10% (control). Compared to the control variant, all the differences obtained by the mixture of *Dactylis glomerata* 20% + *Lolium perenne* 70% + *Lotus corniculatus* 5% + *Trifolium pratense* 5% were significant. When fertilizing with $N_{80+40}P_{40}$, all studied mixtures showed positive, significant differences compared to the control variant (Table 2).

From the analysis of the obtained results, it can be observed that, in the case of the influence of the interaction between fertilization and mixture on the feed content in NDF, the recorded values were between 44.04 - 57.95 g/100 g d.m. Compared to the control variant, the differences obtained by the sown variant with the mixture of *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10% at the four fertilization doses, were positive, and very significant. The difference obtained by the mixture *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15%, fertilized with $N_{80+40}P_{40}$, was positive, and very significant.

Analyzing the influence of the interaction between fertilization and the mixture on the forage content in ADF, it is observed that, in the version sown with the mixture *Dactylis glomerata* 20% + *Lolium perenne* 70% + *Lotus corniculatus* 5% + *Trifolium pratense* 5%, in non-fertilization conditions, the content was obtained the lowest of the forage

in ADF, of 26.63 g/100 g d.m., and the highest, of 35.17 g/100 g d.m., was recorded in the variant sown with the mixture of *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10%, fertilized with $N_{80+40}P_{40}$. In the variant sown with the mixture of *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10%, the highest forage content in ADF was obtained, the differences compared to the control variant were statistically ensured, being very significant. The difference between the control variant and the variant sown with the mixture *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15% fertilized with $N_{80+40}P_{40}$, was statistically ensured, being distinctly significant.

Analyzing the influence of the interaction between fertilization and the mixture on the relative quality of the RFQ forage, it is observed that, in the unfertilized version, sown with the mixture *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10%, the best relative value was obtained, of 129, and the lowest value, of 105, was recorded for the variant fertilized with $N_{80+40}P_{40}$, sown with the mixture of *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10%. Fertilization influenced the relative quality of the forage (RQF) differently, so between the control variant and the other variants statistically guaranteed differences were obtained. In the variant sown with the mixture of *Dactylis glomerata* 70% + *Bromus inermis* 20% + *Lotus corniculatus* 10%, all the differences compared to the control variant at the four fertilization doses were negative, and very significant. The differences obtained between the control variant and the mixture *Dactylis glomerata* 60% + *Lolium perenne* 25% + *Lotus corniculatus* 15% fertilized with $N_{40}P_{40}$, $N_{80}P_{40}$ and $N_{80+40}P_{40}$, were negative, significant and very significant. In the case of the variant sown with the mixture *Dactylis glomerata* 20% + *Lolium perenne* 70% + *Lotus corniculatus* 5% + *Trifolium pratense* 5%, under non-fertilization conditions, the difference was 9, compared to the control variant, being positive, distinctly significant.

Table 2. The influence of the interaction between mixture and fertilization on the feed quality, in period 2017-2020, to mixed usage

Variant			Quality parameters			
			CP (g/100 g d.m.)	NDF (g/100 g d.m)	ADF (g/100 g d.m.)	RFQ
a_1 - N_0P_0 (Ct)	b_1 - D.g.60%+L.p.25%+L.c.15% (control)		13.08	45.25	27.05	156
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		14.69*	44.04	26.91	161**
	b_3 - D.g.70%+B.i.20%+L.c.10%		13,07	52.42***	30.99**	126ººº
a_2 - $N_{40}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		13.68	47.91	28.47	145º
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		15.11*	45.27	27.80	154
	b_3 - D.g.70%+B.i.20%+L.c.10%		13.72	53.20 ***	31.83 **	123ººº
a_3 - $N_{80}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		14.35	50,02*	29.56	136ººº
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		15.82*	47.34	29.03	145
	b_3 - D.g.70%+B.i.20%+L.c.10%		14.44	55.75***	33.14***	115ººº
a_4 - $N_{80+40}P_{40}$	b_1 - D.g.60%+L.p.25%+L.c.15%		14.84*	51.74***	30.57**	129ººº
	b_2 - D.g.20%+L.p.70%+L.c.5%+T.p.5%		15.78*	47.27	28.95	145
	b_3 - D.g.70%+B.i.20%+L.c.10%		14.92*	57.95***	34.29***	108ººº
DL		*5%*	*1.63*	*3.33*	*2.72*	*8*
		1%	*2.18*	*4.46*	*3.64*	*10*
		0.1%	*2.88*	*5.89*	*4.80*	*13*

Analyzing the interaction between fertilization and mixtures, it is found that with the increase in the doses of mineral fertilizers, the relative quality of the forage decreases.

CONCLUSIONS

The obtained results showed that the way of using the meadows is very important for the choice of the component plant species.

In the studied mixtures, low and medium-sized plants predominated, which formed a resistant vegetal carpet and had a good regeneration capacity. In the conditions of Central Moldavia area, the participation percentage of perennial grasses and leguminous varied depending on the dose of fertilizer applied and the quality of the fodder obtained was good for all the mixtures studied, being primarily determined by the administered doses of fertilizers. The maximum level of productions was recorded in the variants fertilized with the doses of 80 kg/ha nitrogen and 40 kg/ha phosphorous. The administration above this limit led to a decrease of the percentage of participation of leguminous in the mixture and an increase of the percentage of grasses, as well for the species from the miscellaneous group.

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