BEHAVIOR OF THE STRUCTURE OF THE VEGETABLE CARPET BY THE APPLICATION OF SOME MINERAL FERTILIZERS, UNDER THE CONDITIONS OF A.R.D.S. SECUIENI

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Abstract. At A.R.D.S. Secuieni (Agricultural Research and Development Station Secuieni) was followed the evolution of the structure of the vegetal carpet to some mixtures of perennial grasses and legumes, with mixed use, taking into account the mode and duration of use, but also the capacity of competition between the studied species. In the technology of cultivation of temporary meadows, the composition of the mixtures is the most important work because it largely depends on the yield and evolution of the composition of the plant carpet. During 2018-2020, research was carried out on three mixtures of perennial grasses and legumes, under the influence of doses of nitrogen fertilizers on phosphorus agrofund. The experience was placed on a phaeozium-type soil, according to the method of subdivided plots into a bifactorial experience, in four repetitions. In the experience, the A factor was represented by fertilization, with four graduations \( \text{N}_0 \), \( \text{N}_{40} \), \( \text{N}_{80} \), and \( \text{N}_{120} \), and B factor was represented by the mixture between grasses and perennial legumes, with three graduations \( b_1 = 85\% \) grasses + 15\% legumes (control), \( b_2 = 90\% \) graminee + 10\% legumes, \( b_3 = 90\% \) graminee + 10\% legumes. In the structure of the vegetal carpet, the percentage of participation of legumes increased slightly, and the grasses had a decreasing tendency compared to the percentage of participation at the sowing norm. Various species from the group were present, and the participation percentage was between 0 - 3.1\% at scythe I, with a tendency to increase from one scythe to another.

Keywords: grasses, legumes, mixtures, fertilization, vegetable carpet.

INTRODUCTION

The sown meadows have valuable traits, unmatched by the other forage crops. Among them are, first of all, the high yield that can be three - five times higher than those of permanent meadows. Temporary meadows also play a remarkable role in improving soil attributes.

Thus, following the cultivation of meadows, there is an increase in the content of organic substances and minerals in the soil, its structure becomes stable, the water and air regime improves, the microbiological activity develops intensely, and agricultural crops following perennial grasses find the best growing conditions and give high yields with low amounts of fertilizers.

The structure of the vegetal carpet is established according to scientific criteria, according to the exploitation method and the agrotechnics used but also according to the climatic conditions for obtaining a high quality fodder, compared to the one obtained from the permanent meadow. The choice of the most suitable species for the composition of the mixtures is the main condition for creating a well-concluded vegetable carpet, in which the participating plants do not compete with each other, adapted locally and maximizing the low fertility potential of the land (Dumitrescu, 1979). Depreciation of forage quality is achieved by fertilization with high and very high doses of nitrogen when, under certain conditions, the absorption by plants of mineral nitrogen becomes more active and exceeds the biosynthetic capacity of protein formation, accumulating nitric and nitrous nitrogen (Samoil 1975, Simtea, 1979, Iacob, 2002).

The cultivation of mixtures of perennial grasses and legumes is limited by the maintenance of a balanced ratio between components and the impossibility of optimally ensuring the biological requirements of each species. An important role in the choice of species in mixtures has the length of the vegetation phases (Blancquaert, 1971).

Fertilizers applied on the meadows, influence the soil characteristics, their productive level, the structure of the vegetal carpet as well as the quality of the obtained fodder (Kopec, 1991, Kleczek, 1991, Gheorghiu, 1998). The use of organic and mineral fertilizers influences the chemical composition of the fodder obtained from the temporary meadows both directly and indirectly by modifying the floristic composition of the vegetable carpet (Rotar, 1991).

Fertilization with nitrogen-based fertilizers, in increasing doses, changes the composition of grasslands in the sense of enriching the grass carpet with grasses and decreasing the share of legumes even with plants from other botanical families (Motcă, 1993). It is been known that the doses of nitrogen fertilizers are lower in mixtures of grasses and perennial legumes, compared to grasses grown in pure culture, because this element is provided biologically by symbiotic bacteria, but also in these mixtures fertilization has an important role for obtaining large...
yields (Rotar, 1995, Cardașol, 2003, Motea, 2008). For pastures, medium or low-sized species with a different growth rates, high speed and energy of poisoning, resistance to soil compaction, higher vivacity are used, while for meadows, high-sized species with a close growth rate are used (Belesky, 2002, Sanderson, 2005, Wind, 2010).

MATERIAL AND METHODS

At the Agricultural Research and Development Station Secuieni, in the period 2018-2020, a two-factor experiment, type A x B, was set up in the field according to the method of subdivided plots, in four repetitions. Factor A was represented by fertilization, with four graduations a1 - N0P0, a2 - N40P40 a3 - N80P40, a4 - N80 + 40P40, and factor B was represented by the mixture between grasses and perennial legumes, with three graduations b1 - 85% grasses (Dactylis glomerata 60% + Lolium perenne 25%) + 15% legumes (Lotus corniculatus 15%) (control), b2 - 90% graminee (Dactylis glomerata 20% + Lolium perenne 70%) + 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%), b3 - 90% graminee (Dactylis glomerata 70% + Bromus inermis 20%) + 10% legumes (Lotus corniculatus 10%).

The experiment was located on a phaeoziuim-type soil with a water pH of 7.05, a humus content of 2.12% and a well-supplied phosphorus (162.4 ppm) and mobile potassium (638.6 ppm). and medium supplied with nitrogen (12.0 ppm). The harvestable area of the experimental plot was 10 square meters.

Basic fertilization was done with phosphate fertilizers administered in the fall, and nitrogen-based fertilizers were administered at the beginning of vegetation in early spring. At N80 - 40 graduation, the difference was administered after the first harvest.

Harvesting was done in a mixed regime, when the dominant grasses sprout and the legumes bud. One hayfield crop and four pasture simulation crops were obtained at a 28-day interval between them.

In order to determine the floristic composition, samples were collected from each plot, at each mowing, according to the gravimetric method and the floristic evolution was followed on groups of species (grasses, legumes and species from other botanical families).

RESULTS AND DISCUSSIONS

The studied mixtures showed high adaptability in the climatic conditions in which they were studied. By moderate fertilization with chemical fertilizers it was observed that the mixtures of grasses and perennial legumes studied, it lends itself for intensive cultivation and can be used in a mixed regime. Analyzing the dynamics of the floristic composition in the years studied, it was observed that it depends on the interaction between the species in the mixture, the period of harvest formation and the doses of chemical fertilizers applied.

The results obtained at first scythe, on average over the two years, the influence of fertilization and the mixture used on the percentage of grasses and perennial legumes, exploited in mixed regime, showed that in the mixture b1 with 85% grasses (Dactylis glomerata 60% + Lolium perenne 25%) and 15% perennial legumes (Lotus corniculatus 15%), the percentage of grasses participation in the vegetation carpet it was between 78.5% in the unfertilized variant and 82.8% for the variant fertilized with N80.+40P40. The legumes participating in the vegetal carpet varied between 14.6% for the fertilized variant with the dose of N80P40 and 18.4% for the unfertilized variant. The percentage of participation of miscellaneous species was between 0% and 3.1% (Figure 1).

In the case of the b2 mixture consisting of 90% grasses (Dactylis glomerata 20% + Lolium perenne 70%) and 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%), the percentage of grasses participation was between 83.0% in the variant fertilized with N80P40 and 89.5% in the unfertilized variant. Legumes had a share between 10.1% in the unfertilized variant and 15.1% in the variant fertilized with N80P40. The percentage of participation in mixtures of species from miscellaneous groups was between 0.4% and 1.9%.

In the b3 mixture with 90% grasses (Dactylis glomerata 70% + Bromus inermis 20%) and 10% legumes (Lotus corniculatus 10%), the percentage of grasses participation was between 82.0% in the variant fertilized with N80P40 and 86.4 % for the unfertilized variant. The legumes had a share between 11.3% in the variant fertilized with N80+40P40 and 15.1% in the variant fertilized with N80P40. The percentage of participation in mixtures of species from miscellaneous groups was between 1.5% and 3.0% (Figure 1).
The results obtained at first scythe, regarding the structure of the vegetal carpet, showed that the percentage of participation of legumes increased slightly, and the grasses had a decreasing tendency compared to the percentage of participation in the sowing norm, and the percentage of participation of species from miscellaneous groups was between 0-3.1% (Figure 1).

At the second scythe, in the mixture b1 with 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial legumes (*Lotus corniculatus* 15%), the percentage of grasses participation in the vegetation carpet was between 80, 6% for the unfertilized variant and 84.2% for the variant fertilized with N<sub>40</sub>P<sub>40</sub>. The legumes participating in the vegetal carpet were between 15.1% in the variant fertilized with N<sub>80</sub> + 40P<sub>40</sub> and 19.4% in the unfertilized variant. The percentage of participation of miscellaneous species was between 0.0% and 3.0% (Figure 2).

In the case of the b2 mixture consisting of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% legumes (*Lotus corniculatus* 5% + *Trifolium pratense* 5%), the percentage of grasses participation was between 82.3% in the fertilized variant with N<sub>40</sub>P<sub>40</sub> and 85.7% for the fertilized variant N<sub>80</sub> + 40P<sub>40</sub>. Legumes had a share between 9.5% in the unfertilized variant and 15.2% in the variant fertilized with N<sub>80</sub>P<sub>40</sub>. The percentage of participation in mixtures of species from miscellaneous groups was between 1.6% and 5.4% (Figure 2).

In the mixture b3 with 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% legumes (*Lotus corniculatus* 10%), the percentage of grass participation was between 79.6% in the variant fertilized with N<sub>40</sub>P<sub>40</sub> and 86.2% for the fertilized variant. Legumes had a share between 11.2% in the unfertilized version and 15.3% in the version fertilized with N<sub>40</sub>P<sub>40</sub>. The percentage of participation in mixtures of species from miscellaneous groups was between 1.3% and 5.1% (Figure 2).
Analyzing the structure of the vegetable carpet at the second harvest, it was found that the percentage of grasses participation decreased in all fertilization variants compared to the percentage of participation in the sowing norm, and legumes tended to increase slightly. The percentage of participation in mixtures of species from miscellaneous groups was between 0 and 5.41% (Figure 2).

At the third scythe, in the case of the mixture b1 consisting of 85% grasses (Dactylis glomerata 60% + Lolium perenne 25%) and 15% perennial legumes (Lotus corniculatus 15%), the percentage of grasses participation was between 74.7% for the variant fertilized with N_{40}P_{40} and N_{80+40}P_{40} and 77.3% for the variant fertilized with N_{80}P_{40}, and the legumes participating in the vegetable carpet were between 13.4% for the variant fertilized with N_{40}P_{40} and 15.3% for the unfertilized variant. The percentage of participation of miscellaneous species was between 7.5% and 11.9% (Figure 3).

In the mixture b2 with 90% grasses (Dactylis glomerata 20% + Lolium perenne 70%) and 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%), the percentage of grass participation was between 82.3% in the variant fertilized with N_{80}P_{40} and 89.0% for the unfertilized variant. Legumes had a share between 9.4% in the unfertilized variant and 14.0% in the N_{80}P_{40} fertilized variant. The percentage of participation in mixtures of species from miscellaneous groups was between 1.6% and 5.4%.

Analyzing the mixture b3 consisting of 90% grasses (Dactylis glomerata 70% + Bromus inermis 20%) and 10% legumes (Lotus corniculatus 10%), the percentage of grass participation was between 80.6% in the variant fertilized with N_{80+40}P_{40} and 84.5% for the unfertilized variant. Legumes had a share between 11.3% in the version fertilized with N_{80+40}P_{40} and 16.5% in the version fertilized with N_{80}P_{40}. The percentage of participation in mixtures of species from miscellaneous groups was between 2.4% and 8.1% (Figure 3).
From the analysis of the results obtained at the third scythe, regarding the structure of the vegetable carpet, it is observed that the participation percentage of grasses had a decreasing tendency, the participation percentage of legumes increased in all variants studied, but the differences were observed in the variant fertilized with dose N80P40. The share of species in the miscellaneous group ranged from 1.6% to 11.9% (Figure 3).

At the fourth scythe, it was found that in the mixture b1 with 85% grasses (*Dactylis glomerata* 60% + *Lolium perenne* 25%) and 15% perennial legumes (*Lotus corniculatus* 15%), the percentage of grass participation was between 70.4% for the variant fertilized with N80-a4P40 and 80.1% for the variant fertilized with N80P40. The percentage of participation of legumes in the vegetable carpet was between 10.0% in the variant fertilized with N80-a4P40 and 17.5% in the unfertilized variant. The percentage of participation of miscellaneous species was between 2.5% and 19.6% (Figure 4).

In the mixture b2 consisting of 90% grasses (*Dactylis glomerata* 20% + *Lolium perenne* 70%) and 10% legumes (*Lotus corniculatus* 5% + *Trifolium pratense* 5%) with mixed use, the percentage of grass participation was between 78.5% in the variant fertilized with N80 + 40P40 and 85.9% in the unfertilized variant. Legumes had a share between 7.1% in the variant fertilized with N80-a4P40 and 14.6% in the variant fertilized with N80P40. The percentage of participation in mixtures of species from miscellaneous groups was between 3.1% and 14.4%.

In the mixture b3 with 90% grasses (*Dactylis glomerata* 70% + *Bromus inermis* 20%) and 10% legumes (*Lotus corniculatus* 10%) the percentage of grasses participation was between 71.4% in the variant fertilized with N80-a4P40 and 81.5% for the unfertilized variant. Legumes had a share between 6.2% in the variant fertilized with N80-a4P40 and 14.7% in the variant fertilized with N80P40. The percentage of participation in mixtures of species from miscellaneous groups was between 5.6% and 22.4% (Figure 4).

Analyzing the structure of the vegetable carpet at the fourth scythe, it was found that the percentage of grasses participation varied between 6.2% in the fertilized version with the dose N80-a4P40 and 17.5% in the unfertilized version. Legumes had a slight upward, with the exception of those fertilized with the dose N80-a4P40.

Figure 3. Influence of fertilizer and mixture used on the structure of the vegetable carpet, at the third scythe, average 2018-2020, with mixed use.

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which decreased compared to the initial ratio in the mixture. The share of miscellaneous species was between 2.5% and 22.4% (Figure 4).

![Figure 4. Influence of fertilizer and mixture used on the structure of the vegetable carpet, at the fourth scythe, average 2018-2020, with mixed use](https://www.lssd-journal.com)

The results obtained at the fifth scythe, showed that for the mixture b1 exploited in mixed regime, consisting of 85% grasses (Dactylis glomerata 60% + Lolium perenne 25%) and 15% perennial legumes (Lotus corniculatus 15%), the share of grasses was between 54.9% for the variant fertilized with N80+40P40 and 78.6% for the variant fertilized with N0P40. Legumes had a percentage of participation between 6.4% in the variant fertilized with N80+40P40 and 16.6% in the variant fertilized with N0P40. The percentage of participation of miscellaneous species was between 5.6% and 37.7% (Figure 5).

Analyzing the mixture b2 with 90% grasses (Dactylis glomerata 20% + Lolium perenne 70%) and 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%) with mixed use, the percentage of grasses participation was between 74.4% in the variant fertilized with N80+40P40 and 82.5% for the variant fertilized with N0P40. Legumes had a share between 6.2% in the variant fertilized with N80+40P40 and 14.7% in the variant fertilized with N0P40. The percentage of participation in mixtures of species from miscellaneous groups was between 4.2% and 19.4%.

The results obtained for the b3 mixture with mixed use, consisting of 90% grasses (Dactylis glomerata 70% + Bromus inermis 20%) and 10% legumes (Lotus corniculatus 10%), showed that the percentage of grasses participation was between 69.4 % for the variant fertilized with N80+40P40 and 80.0% for the unfertilized variant. Legumes had a share between 4.4% in the variant fertilized with N80+40P40 and 14.1% in the variant fertilized with N0P40. The percentage of participation in mixtures of species from miscellaneous groups was between 8.5% and 26.3% (Figure 5).

Analyzing the results obtained at the fifth scythe, regarding the structure of the vegetable carpet, it is found that the percentage of participation of legumes was dominant in the variants fertilized with doses of N40P40 and N80P40. In the version fertilized with the dose of N80+40P40 it was found that the percentage of grasses participation decreased very much, the difference being covered by miscellaneous species in the group reaching up to 37.7% (Figure 5).
During the five scythe, on average over the two years analyzed, for all fertilization variants, the percentage of grasses participation in the structure of the vegetable carpet had a decreasing tendency from one mowing to another, the difference being in favor of the percentage of legumes, and the species from the various group had the highest percentage in the variant fertilized with the dose of N80+40P40.

Under the conditions of A.R.D.S. Secuieni, the highest adaptability was recorded in the mixture b2 consisting of 90% grasses (Dactylis glomerata 20% + Lolium perenne 70%) and 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%) by maintaining a balanced ratio of grasses on during the five scythe, in the structure of the vegetable carpet.

CONCLUSIONS
The results obtained at first scythe, regarding the structure of the vegetable carpet, showed that the percentage of participation of legumes increased slightly, and the grasses had a decreasing tendency compared to the percentage of participation in the sowing norm, and the percentage of participation of species from various groups was between 0 - 3.1%.

The results obtained at the fifth scythe showed that the percentage of participation of legumes was dominant in the variants fertilized with doses of N40P40 and N80P40.

At A.R.D.S. Secuieni, the mixture b2 consisting of 90% grasses (Dactylis glomerata 20% + Lolium perenne 70%) and 10% legumes (Lotus corniculatus 5% + Trifolium pratense 5%) was noted by maintaining a balanced ratio of grasses during the five scythe, in the structure of the vegetable carpet.

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