# INCREASING BIOMASS IN LOLIUM PERENNE SPECIES ACORDING TO CLIMATIC CONDITIONS AND FERTILIZATION

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RESEARCH ARTICLE

**Abstract**

*An objective of great importance in achieving a rational fodder base is the continuous provision of green fodder, in sufficient quantities and of superior quality, throughout the vegetation period. The research carried out was oriented towards improving productivity and crude protein content, knowing that these present different values depending on the harvest phenophase, the moment of grazing and the mowing technique, or different technological factors. White clover mixed with grasses ( Lolium perenne) forms the traditional mixture, which cooperates very well in terms of the sustainable use of nitrogen, many researchers confirm the strong connection between the two species (Trifolium pratense and Lolium perenne). Through the participation of white clover in the mixtures, it makes available to the perennial, partner grasses, symbiotically fixed nitrogen, so that at the production level of 5-10 t/ha SU, the amount of crude protein obtained in mixtures with white clover is between 710-850 kg/ha at N0 – N180 and only 305-906 kg/ha in the case of mixtures without clover, values that were also influenced by the weather. Regarding the green mass harvest for the simple mixture consisting of Trifolium repens with Lolium perenne, in 2018 green mass harvests between 42.70 t/ha for the non-fertilized version and 67.62 t/ha for the fertilized version were obtained with N180P80K50 (table 12.). The increase in yield obtained with the version with maximum fertilization is 6.35 t/ha of green mass.*

**Keywords**: crude protein, perennial grasses, white clover, green fodder
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## INTRODUCTION

Animal husbandry can be considered the agricultural industry, which transforms primary agricultural products into foods with a particularly high biological value, essential in human nutrition; animal husbandry also has an essential economic role, contributing to the profitability of agriculture, and to the significant increase of its contribution to the achievement of the gross domestic product on the economy (Moga et al., 2005). Thus, the expansion of sown meadows is linked to the intensification of animal husbandry systems. Along with the improvement and specialization of animal breeds for meat or milk, the need to cultivate some plant species appeared, in order to ensure higher quality fodder. In general, in Western European countries, countries with a highly developed animal husbandry sector, the area occupied by sown meadows is constantly increasing (Rotar, 2010, 2011). By establishing the sown meadows, a floristic composition established according to scientific criteria is achieved with an optimal balance between fabaceae and poaceae, and superior fodder is obtained from a qualitative point of view. It also restores the structure of the soil, capillarity and microbiological activity in the soil and improves the mineral nutrition of the plants, through the annual fixation of 100-150 kg/ha/year of nitrogen by the fabaceae in the mixture (Dragomir, 2005). The productivity and utilization coefficient of sown meadows, as a rule, are higher than natural meadows (Dragomir et al. 2004, Rotar and Vidican, 2005). From the data entered in Table 1, it follows that the net primary production of sown meadows is

three times higher than that of natural meadows, meadows that were initially cleared and sown.

The consumption coefficient of net primary production calculated at the trophic level of herbivores (sheep) was made according to the formula:

$$Ec = Cn / Pn^{-1}$$

in which:

Ec – consumption efficiency

Cn - consumption (c) at the level (n) of herbivores

Pn-1 – production at the lower trophic level (in our case at the level of primary producers, so PPN).

According to the data in Table 1., the production at the lower trophic level was 0.26 (ie 26%) relative to the entire PPN and 0.33 (33%) relative to the above-ground PPN in the case of the natural meadow. In the sown meadow, the corresponding values were 0.54 (54%) compared to PPN and 0.68 (68%) if the ratio is made to aboveground PPN. It is obvious that in the case of the sown meadow the coefficient of use, expressed in our example by the efficiency of the consumption made by the sheep, is much higher than in the case of the natural meadow.

I calculated the accumulation efficiency (Ea) according to the relationship:

$$Ea = Pn^{-1} – Cn$$

in which the meaning of the symbols Pn-1 and Cn is the same as in the relationship expressing consumption efficiency. The values for the accumulation efficiency were 80% of the PPN (ie 1895 kcal m2 year-1) in the natural meadow and 57% of the PPN (ie 3990 kcal m-2 year-1) in the sown meadow. If we proceed to convert the above figures into kg/ha SU, estimating the energy value of SU at 4400 kcal/kg, then we can note the particularly significant fact that in the case of the natural meadow made available to wild herbivores and decomposers, it remains, annually , a quantity of 4300 kg/ha SU, while in the case of the sown meadow made available to the same wild consumers and decomposers, a quantity more than double remains: 9068 kg/SU. This, in the case of the sown meadow, means a much greater biodiversity and a more intense microbial activity in the soil (Şuteu, 1997).

## MATERIAL AND METHOD

The experiences were established in 2017 in an experimental field in Sălard commune.

From a climatic point of view, the area is characterized by a multiannual average temperature of 12.60C. In spring, as a result of the increase in solar radiation, the average air temperature rises, the multiannual average of this season being 11.5°C, i.e. 8.95°C higher than in winter. In summer, compared to the previous season, the temperature rises by 12.1°C, the average air temperature being 23.6°C (Table 2). The change in the degree of cloudiness and, in general, the weather conditions during the summer, determines, in a multiannual profile, important variations in the average temperature of this season. The multiannual precipitation average (2017-2021) is 582 mm with decreasing trends ( Table 3).

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 (Table 4).

The experience is bifactorial, of the 3 x 3 type, placed according to the block method in subdivided plots comprising variants in 3 repetitions. The surface of a plot is 10 m2.

The factors of the experience were the following: - factor D (the main factor) - the doses of chemical fertilizers with the following graduations:

$d_1$ - $N_0P_0K_0$

$d_2$ – $N_{80}P_{80}K_{50}$

$d_3$ – $N_{180}P_{80}K_{50}$

- factor C - culture with 3 gradations:

$c_1$ - *Lolium perenne (Mara, 25kg)*

$c_2$- *Lolium perenne50% + Trifolium repens 50%*

$c_3$ – *Trifolium repens* (*Mioriţa, 10kg*)

During the growing season, a series of observations were made regarding the emergence, growth and development of the plants, the dates of the start of vegetation in the spring, the degree of weediness, the entry and exit from the winter, the persistence of some species sown in the vegetal carpet and their degree of dominance. The harvests were done at the plot level, in the first year at the full flowering of the legumes, and in the following years at the budding of the legumes and the sprouting of the grasses. The green mass harvest was transformed into SU and processed statistically according to the analysis of variance method.

The objectives of this research are the following: the influence of differentiated fertilization with nitrogen on the evolution of the vegetal carpet and the determination of the productive potential of the simple mixture of *Lolium perenne* and *Trifolium repens* and of monocultures in order to ensure an economic use.

## RESULTS AND DISCUSSIONS

In the conditions of our country, it is necessary to establish sown meadows, by cultivating mixtures made up of perennial poaceae and fabaceae. These mixtures are artificially composed phytocenoses and are far from having a behavior similar to climax communities. According to their complexity, mixtures can be simple or complex. The most important advantage of using mixtures consists in reducing the doses of chemical fertilizers with nitrogen, in order to stimulate the symbiotic fixation of nitrogen by fabaceae and in this way to complete the nitrogen requirement of the mixture. The productivity and profitability of mixtures of perennial poaceae and fabaceae also depends on the system of their use. In the first year, it is recommended to use them by mowing at the full flowering of the fabaceae, a fact that allows the good establishment of the fabaceae, taking into account their high sensitivity to frequent mowing at this stage of vegetation.

Most of the experiments carried out in our country used nitrogen doses between 200-300 kg/ha/year, there are also some experiments where the nitrogen dose reached 400 kg/ha/year. The response of different species to the doses of fertilizer applied is greatly influenced by the seasonal conditions in which they are cultivated, the variety and the applied technology. Thus, the same varieties under the same fertilization conditions, but cultivated in different seasonal conditions, achieve very different SU productions, the difference of which can exceed 6 t/ha SU (Simtea, 1990).

At the beginning of the 19th century Mittscherlich (1874) cited by Razec 1995 illustrated how agricultural systems respond to the increase in the intensity of a production factor (Figure 1.).

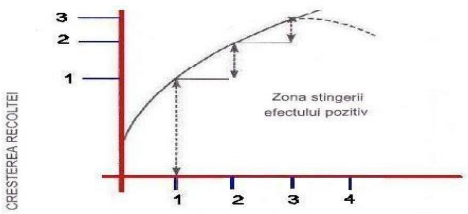


Figure. 1. **Diagram illustrating the non-linear relationship dose-response (Razec,1995)**

The specialized agronomic literature records numerous reactions of this kind of agricultural crops to various treatments. Unlike non-living systems, a linear dose-response relationship never appears in living systems. A uniform intensification of a factor does not lead to a uniform reaction of the body. However, there are tolerance limits everywhere, exceeding which can instantly lead to lethal effects. Some authors consider this as the fundamental theory of autoecology (Remmert, 1978, cited by RAZEC, 1994). Thus, when used for grazing, the *Lolium perenne* species is rich in basal leaves, resists trampling very well and regenerates easily after grazing, for this reason it dominates in the first year all the mixtures in which it participates, while also having a very high nutritional value. Under the conditions of exploitation by mowing, all species of poaceae behave well, less so the species *Lolium perenne*, however, even in this species there are varieties suitable for exploitation by mowing.

Depending on the floristic composition, the maximum production is achieved in pure fabaceae crop (13.08 t/U.S.ha), followed by complex mixtures in which at least one of the perennial fabaceae species is present (12.07-12.43 t/ha US ).

Regarding the floristic composition in the case of the monoculture of *Lolium perenne*, the influence of nitrogen fertilizers can be noted, thus, in the second year of use, the participation of this species in the vegetal carpet is maintained at a level between 85-89% in the variants fertilized with $N_{80}$ and $N_{180}$, plants from other botanical families occupying between 10-12% ( Figure 3). On the other hand, from the third year of use, the *Lolium perenne* species almost disappears from the vegetation (12-20%) being replaced by species from other botanical families whose weight increases up to 93% in the unfertilized version and 87% in the fertilized version with the dose maximum nitrogen.

The species *Trifolium repens* in pure culture has a better behavior towards the administration of nitrogen, reacting especially to moderate doses of nitrogen ($N_{80}$) with values between 78-98%, and in the case of the maximum dose, participation in the vegetal carpet was 57-78 %. The maintenance of white clover in the vegetal carpet in a large proportion, both in the non-fertilized version (80%) and in the fertilized versions ($N_{80}$, $N_{180}$), we consider it to be a result of the high installation capacity of the species, as well as the climatic conditions of the years experimental.

In the culture associated with *L.perenne* and *T. repens,* the evolution of the floristic composition shows us a maintenance of the two species at a similar level in the experimental years with the maximum fertilized variant, respectively *Lolium perenne* has a weight of 52% and *Trifolium repens* with 38% which which emphasizes both the influence of nitrogen on the two species and their capacity for protocooperation. Different situation with the variant with moderate doses of nitrogen ($N_{80}$), especially in the third year of use, when the species *Lolium perenne* (11%) is replaced in a mixture of species from other botanical families (55%)

In the simple mixture made up of *Trifolium repens with Lolium perenne*, in 2018 green mass harvests were obtained between 42.70 t/ha in the unfertilized version and 67.62 t/ha in the version fertilized with $N_{180}P_{80}K_{50}$ (Table 12.). The increase in yield obtained with the version with maximum fertilization is 6.35 t/ha of green mass. With the same mixture, the application of nitrogen in doses between 80-180 kg/ha determines statistically very significant yield increases of 8.50 t/ha of green mass, for $N_{80}P_{80}K_{50}$, and of 6.35 t/ha for the variants fertilized with $N_{180}P_{80}K_{50}$ ( table 11).

In the next two experimental years, a maintenance of green mass yield increases between 4.75 and 10.50 t/ha is observed in the variant fertilized with moderate doses of nitrogen, and in the $N_{180}P_{80}K_{50}$ variant the yield increase is 6.35 t/ha of green mass. Increases that are statistically assured as highly significantly positive.

The quality of the fodder is influenced mainly by the structure of the mixture, and only second by fertilization. For the meadow white clover based mixture, we have registers a slight decrease of the protein percentage following fertilization, from 18.68% ($N_{80}$) to 17.53% ($N_{180}$) for the *Trifolium repens* and *Lolium perenne* mixture, or from 19.05% ($N_{80}$) to 18.58% ($N_{180}$) for *Trifolium repens ( Table 14).*

Nitrogen applied recovered by harvest is greater as the amount of nitrogen is lower, both monocultures and mixtures. Thus, in 2019, the largest amount of nitrogen is recovered *Lolium perenne* where monoculture of 62%, the application $N_{80}P_{80}K_{50}$ dose.

**Table 1**

**Energy relations in natural and sown grassland ecosystems (kcal $m^2$ $year^{-1}$) after PUIA *et al.***

| Energy transformation | Grasslands | |
|---|---|---|
| | Natural grasslands | Seeded grassland |
| Net primary production (NPP): | | |
| - plant (aerial part) | 1880 | 5600 |
| - roots | 500 | 1400 |
| TOTAL | 2380 | 7000 |
| Consumption (by sheep): | | |
| - food (weight gain) | 300 | 1880 |
| - excreta | 130 | 790 |
| - breath | 180 | 1090 |
| - wool production | 5 | 40 |
| TOTAL | 615 | 3800 |
| Available (for other wild primary consumers and decomposers): | | |
| - plant (aerial part) | 1265 | 1800 |
| - roots | 500 | 1400 |
| - excreta | 130 | 790 |
| TOTAL | 1895 (80% din PPN) | 3990 (57% din PPN) |

Table 2

**The average temperature (°C) monthly and annual weather of Săcuieni station**

| Month/ Year | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2017** | -6.1 | 2.3 | 9.0 | 10.5 | 16.8 | 21.6 | 23.0 | 23.9 | 16.6 | 11.2 | 6.1 | 3.3 | **11.5** |
| **2018** | 3.2 | 1.3 | 3.8 | 15.7 | 19.7 | 21.2 | 22.0 | 24.1 | 17.8 | 13.7 | 8.0 | 1.2 | **12.6** |
| **2019** | -0.9 | 3.6 | 8.4 | 13.3 | 14.8 | 23.0 | 21.8 | 24.0 | 17.8 | 13.2 | 10.9 | 4.2 | **12.8** |
| **2020** | -1.5 | 4.4 | 6.9 | 11.0 | 14.5 | 20.0 | 21.6 | 23.2 | 18.9 | 12.7 | 5.1 | 4.9 | **11.8** |
| **2021** | 1.8 | 3.6 | 4.7 | 8.7 | 14.7 | 22.2 | 25.0 | 21.8 | 17.1 | 10.5 | 6.4 | 2.1 | **11.6** |

Table 3

**Monthly and annual precipitations in Săcuieni**

| Month/ Year | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2017** | 14.7 | 39.2 | 39.5 | 46.5 | 138.3 | 76.9 | 35.0 | 60.9 | 95.4 | 38.2 | 56.4 | 84.9 | **725.9** |
| **2018** | 32.2 | 58.6 | 65.8 | 38.3 | 57.6 | 83.6 | 127.6 | 36.9 | 22.1 | 12.7 | 39.8 | 61.0 | **636.2** |
| **2019** | 46.8 | 8.7 | 12.0 | 46.0 | 105.8 | 119.3 | 21.9 | 11.5 | 33.0 | 10.9 | 35.3 | 46.4 | **497.6** |
| **2020** | 13.5 | 45.2 | 43.8 | 15.4 | 60.0 | 101.5 | 133.2 | 29.0 | 31.0 | 62.7 | 14.1 | 45.2 | **594.6** |
| **2021** | 56.8 | 46.4 | 18.6 | 36.5 | 80.8 | 5.4 | 43.5 | 24.8 | 9.1 | 4.7 | 75.9 | 57.1 | **459.6** |

Table 4

**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*- 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** | **-** | **-** | **-** |

Table 5

**Influence of fertilization on green mass yield of the culture *Trifolium perenne* (2018) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 (control) | 35.35 | 100,0 | 0,00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 35.35 | 153,5 | 0,00 | - |
| d3 ($N_{180}P_{80}K_{50}$) | 38.30 | 108,40 | 0,59 | - |
| LSD (5%) | | 1.85 | | |
| LSD (1%) | | 2.54 | | |
| LSD (0.1%) | | 3.32 | | |

Table 6

**Influence of fertilization on green mass yield of the culture *Trifolium perenne* (2019) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 (control) | 25.65 | 100.0 | 0,00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 35.75 | 139.37 | 10.10 | *** |
| d3 ($N_{180}P_{80}K_{50}$) | 39.15 | 152.63 | 13.50 | *** |
| LSD (5%) | | 1.80 | | |
| LSD (1%) | | 2.60 | | |
| LSD (0.1%) | | 3.85 | | |

Table 7

**Influence of fertilization on green mass yield of the culture *Trifolium perenne* (2020) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 ( control) | 18.70 | 100,0 | 0,00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 26.75 | 143.04 | 8.05 | *** |
| d3 ($N_{180}P_{80}K_{50}$) | 22.00 | 117.64 | 3.30 | ** |
| LSD (5%) | | 2.10 | | |
| LSD (1%) | | 3.03 | | |
| LSD (0.1%) | | 4.63 | | |

Table 8

**Influence of fertilization on green mass yield of the culture *Lolium perenne* (2018) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 (control) | 30.75 | 100.0 | 0.00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 38.75 | 243.00 | 8.00 | *** |
| d3 ($N_{180}P_{80}K_{50}$) | 39.45 | 259.70 | 8.70 | *** |
| LSD (5%) | | 1.85 | | |
| LSD (1%) | | 2.54 | | |
| LSD (0.1%) | | 3.32 | | |

Table 9

**Influence of fertilization on green mass yield of the culture *Lolium perenne* (2019) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 (control) | 26,25 | 100.0 | 0.00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 35.25 | 134.28 | 9.00 | *** |
| d3 ($N_{180}P_{80}$K50) | 40.15 | 152.95 | 13.90 | *** |
| LSD (5%) | | 1.72 | | |
| LSD (1%) | | 2.48 | | |
| LSD (0.1%) | | 3.65 | | |

Table 10

**Influence of fertilization on green mass yield of the culture *Lolium perenne* (2020) (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 (control) | 12.50 | 100.0 | 0.00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 24.75 | 198.0 | 1.80 | * |
| d3 ($N_{180}P_{80}K_{50}$) | 26.80 | 214.40 | 2.78 | ** |
| LSD (5%) | | 1.65 | | |
| LSD (1%) | | 2.40 | | |
| LSD (0.1%) | | 3.71 | | |

Table 11

**Influence of fertilization on green mass yield of the mixture *Trifolium repens* + *Lolium perenne* in 2018 (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 ( control) | 42.70 | 100.0 | 0,00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 51.20 | 119.90 | 8,50 | *** |
| d3 ($N_{180}P_{80}K_{50}$) | 49.05 | 114.87 | 6,35 | *** |
| LSD (5%) | | 1.86 | | |
| LSD (1%) | | 2.55 | | |
| LSD (0.1%) | | 3.33 | | |

Table 12

**Influence of fertilization on green mass yield of the mixture *Trifolium repens + Lolium perenne* in 2019 (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Differences t/ha | Significance |
|---|---|---|---|---|
| d1 ( control) | 32.70 | 100.0 | 0.00 | Mt. |
| d2 ($N_{80}P_{80}K_{50}$) | 43.20 | | 10.50 | *** |
| d3 ($N_{180}P_{80}K_{50}$) | 39.05 | | 6.35 | *** |
| LSD (5%) | | 1.76 | | |
| LSD (1%) | | 2.45 | | |
| LSD (0.1%) | | 3.23 | | |

Table 13

**Influence of fertilization on green mass yield of the mixture *Trifolium repens + Lolium perenne* in 2020 (t/ha)**

| Dosing of fertilization | Yield (t/ha) | Percent % | Diferența t/ ha Differences t/ha | Semnificația Significance |
|---|---|---|---|---|
| d1 ( control) | 18.55 | 100.0 | 0.00 | Mt. |
| d2 (N80P80K50) | 23.30 | | 4.75 | *** |
| d3 (N180P80K50) | 24.25 | | 5.70 | *** |
| LSD (5%) | | 1.65 | | |
| LSD (1%) | | 2.40 | | |
| LSD (0.1%) | | 3.71 | | |

Table 14

**The influence of nitrogen on the chemical composition of SU in the studied crops**

| Dose N | Variants | BP % | BP kg/ha | CA | A % | P % | K % | Ca % | Mg % |
|---|---|---|---|---|---|---|---|---|---|
| $N_0$ | | 17.06 | 638.04 | 27.56 | 13.88 | 0.23 | 2.41 | 2.20 | 0.41 |
| $N_{80}$ | *T.repens* | 19.05 | 1019.17 | 23.78 | 15.45 | 0.31 | 3.58 | 2.19 | 0.47 |
| $N_{180}$ | | 18.58 | 817.52 | 28.58 | 12.04 | 0.28 | 3.06 | 1.87 | 0.31 |
| $N_0$ | | 15.36 | 305.60 | 25.61 | 17.19 | 0.32 | 3.18 | 1.55 | 0.30 |
| $N_{80}$ | *L. perenne* | 17.72 | 855.80 | 28.62 | 14.02 | 0.30 | 3.54 | 1.40 | 0.31 |
| $N_{180}$ | | 17.56 | 906.00 | 26.47 | 15.13 | 0.32 | 3.46 | 1.58 | 0.36 |
| $N_0$ | | 19.14 | 710 | 21.53 | 15.03 | 0.30 | 3.23 | 2.53 | 0.48 |
| $N_{80}$ | *L.perenne+T.repens* | 18.68 | 870 | 26.58 | 14.03 | 0.34 | 3.32 | 2.15 | 0.45 |
| $N_{180}$ | | 17.53 | 850 | 23.42 | 18.72 | 0.33 | 3.35 | 1.86 | 0.43 |

## CONCLUSIONS

Analyzing the dry mass production of the experimental field, we can state that seeded grasslands are an extremely advantageous option for producing the necessary hay for the housing period or for grazing.

Generally, by nitrogen fertilization favor Poaceae growth in disfavor to Fabaceae. As the fertilizer doses increase, so does the participation rate of Poaceae.

We recommend for the Săcuieni area, Bihor county, (the area where the experiment took place) a mixture of *Trifolium repens* and *Lolium perenne and pure culture of Lolium perenne.*

Starting its second year of seeding, the *Trifolium pratense* and *Lolium multiflorum* mixture yields results between 23.30 to 51.20 t/ha of green mass on N80P80K50 and between 24.25 to 49.05 t/ha of green mass on N180P80K5 fertilization. This mixture displays a good perennity in the third year of cultivation, with the chosen cultivars maintaining an elevated proportion, *Lolium perenne* with 52% and *Trifolium repens* with 38% in N180P80N50 fertilization version.

The quality of the fodder is influenced mainly by the structure of the mixture, and only second by fertilization. For the meadow white clover based mixture, we have registers a slight decrease of the protein percentage following fertilization, from 18.68% (N80) to 17.53% (N180) for the Trifolium repens and Lolium perenne mixture, or from 19.05% (N80) to 18.58% (N180) for Trifolium repens.

Nitrogen applied recovered by harvest is greater as the amount of nitrogen is lower, both monocultures and mixtures. Thus, in 2019, the largest amount of nitrogen is recovered *Lolium perenne* where monoculture of 62%, the application N80P80K50 dose.

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