Conclusions

Some yield structure elements were different among the triticale cultivars: cultivar ‘Tewo’ has more grain per ear and the cultivar with the highest weight of 1000 grain was ‘Alzo’ – by 1.1 times compared with other cultivars.

The winter triticale cultivar ‘Alzo’ was more resistant to septoria and rust than the other cultivars, whereas cultivar ‘Tewo’ was the least resistant.

The preceding legume crop – red and white clover, as a green manure, had a positive effect on the formation of productivity elements of winter triticale ‘Tewo’, compared with their identical cultivation after timothy.

In winter triticale ‘Tewo’ preceded by white clover we identified a more intensive occurrence of diseases, such as scald, leaf rust and septoria, compared with the other preceding crops.

References


FLORISTIC DEVELOPMENT OF NATURAL AND SOWED SWARDS

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Abstract

Investigations were carried out during 2003-2005 at Research Station of Lithuanian University of Agriculture. The impact of monomial N, P, K fertilizers, their combinations and rates on feeding well-composed sowed sward as well on a natural sward, not improved for more than 10 yrs, of poor nutrient value was examined.

Accordingly to the investigation data, the decreasing of legumes share was determined and increasing of grasses in the 3rd yr after sowing irrespective of fertilizing background. The legumes flood in was not determined by any treatment. The grasses part increased from 4 to 14 %. The share of legumes ranged 4-12 % higher in P and K background to compare with other treatments. In the 3rd yr after sowing the percentage of legumes decreased sequentially with increasing N rates. The biggest share of legumes remained in treatments with P medium rates, K background supported legumes persistence to lesser extent. Impact of fertilizer background on floristic composition had the same tendencies in natural swards as in sowed one.
Key words
Sowed sward, floristic composition, natural sward, grasses, legumes, dry matter

Introduction
Grasslands and pastures occupy more than 1.2 M ha (Daugelienė, 2002). Such grass areas are responsible for more than 150 M ha in Europe (Vilkins, Vidrīhs, 2000). Every sowed sward is a cultured one, however not every cultured sward is sowed. Therefore not all swards used for forage have been sowed, a part of cultured grasslands are created by improving natural ones by agrotechnical means (fertilization, weed destruction) (Rimkus, 2003). The main plants in swards are perennial grasses of different plant families. They differ from each other both by morphological characteristics and ecological features as well as by nutrient and economic value. Perennial grasses are divided into the following groups: legumes, grasses, forbs and sedges. Researchers of grassland flora count to 350 grasses species and 250 legumes species. Their distribution depends on a geographical position and agricultural level. In Lithuanian grasslands 297 species are found or 28 % of all floras.

Families of legumes (Fabaceae) are one of the most important components of grasslands phytocoenoses. Red, white and hybrid clovers, simple bird's-foot trefoil, lucerne are grown for forage generally. All legumes are of good nutritional value. They contain 1.5-2 times more green and digestible protein than that grasses, therefore forages composed of legumes do not lack protein. There are slightly more green fat and green ashes in legumes, as well as less fiber and non-nitric extract matters (Kadžiulis, 1972; Daugelienė, 1995). That is why legumes grown together with grasses improve forage’s chemical composition.

Grasses (Poaceae) are one of the most common plants in the world. Grasses are usually more fertile than legumes, if they are grown in the soil with high level of ground water or where period of vegetation is more rainy. Grasses are the most important source of carbohydrates in forage.

One of the main factors to form productive pastures is supplying soil with nutritional materials. Experience of many countries proves that the most reliable way to increase fertility of pastures is fertilizing them with mineral fertilizers. Their suitable rates and combinations effect harvest of pasture swards as well as its chemical and botanical composition.

Nitrogen is necessary for young growing and regrowing grasses. Improving plant nutrition with nitrogen, the grasses develop a greater leaf surface, become dark green, prolong their vegetation period, yield accumulates more proteins (Kučinskas et al., 1999). Efficiency of nitrogen mostly depends on meteorological conditions, as well as on soil characteristics, level of active phosphorus, potassium and microelement fertilizers. Phosphorus has great significance for synthesis of carbohydrates and proteins, is a component of cell nucleus and many ferments. Due to potassium right physical and chemical characteristics of protoplasm are maintained. Besides, as potassium decreases evaporation, swards become more resistant to droughts and diseases. Efficiency of potassium fertilizers also depends on meteorological conditions, soil qualities, fertilizing with nitrogen and phosphorus fertilizers. Its efficiency drops as the amount of potassium in soil increases (Daugelienė, 2002).

Objective of this investigation is to determine impact of nutritious elements, their rates and combinations on botanical composition, productivity and longevity of a productive nutrient sward. Results of this investigation will be compared to results of analogical investigation of natural, pure nutritional value sward not commonly used on the farms.

Materials and Methods
Field trials started in 2002 at the Research Station of the Lithuanian University of Agriculture, in the light deeply carbonate washed light loam soil (Baltihikelogley- Calc (ar) ic Luvisol). The soil was of neutral reaction, pHkCl 7.1, moderate hummus (2.5 %), phosphorus rich (P2O5 180-240 mg kg-1 soil) and moderate potassium level (K2O 120-150 mg kg-1 soil).

To achieve the objectives of investigation, two trials were carried out. Fertilizing scheme designed of two blocks with 18 systematical treatments (1-Control, N0P0K0; 2-N60; 3-N120; 4-
N180; 5-N240; 6-N180+P120; 7-P40; 8-P80; 9-P120; 10-P160; 11-P120+K150; 12+K150; 13-K50; 14-K100; 15-K150; 16-K200; 17-N60+P40+K50; 18-N180+P120+K150) and with three replications each. The plot size - 10 m² (2 x 5 m).

I block. A natural, not fertilized for 17 yrs sward was chosen for investigation. At the beginning of May, 2002 a part of sward was sprayed with a 6.0 l ha⁻¹ rate of Roundup. After plants in the sprayed fields had died off, with a sowing machine “Multidril” a mixture of forage swards was sown in (seed rate 25kg ha⁻¹) consisting of the following components: Trifolium pratense ‘Liepsna’ 20%; Trifolium repens ‘Atoliai’ 20%; Lolium perenne ‘Sodrē’ 15%; Phleum pratense ‘Gintaras’ 15%; Festuca pratensis ‘Dotnuvos 1’ 20%; Poa pratensis ‘Lanka’ 10%.

II block. Composition of a natural sward was established the following: 67 % of grasses, 14 % of legumes, 19 % of forbs.

Monomial fertilizers (ammonium saltpeter, (N- 34.4%); granulated superphosphate (P2O5-19%); potassium chloride (K2O – 60%) were used. P and K fertilizers were applied in early spring and N fertilizers - at the beginning of vegetation period and after the first harvesting. Swards were harvested twice. Botanical composition of a sward and content of dry matter (DM) were determined in 2004-2005. Investigation is being continued.

Temperature and rate of precipitation were normal for sward growth in 2004. July was relatively dry (45 mm) and August was damp (136.2 mm) in 2005. Weather temperature was close to the annual average.

Data was analyzed with a statistical programme ANOVA.

Results and Discussion

Impact of the fertilization background on the botanical composition of a natural sward. Grasses composed 71 % in natural sward in 2004, and 69 % remain of them after a yr (Fig.1). It was not determined significant changes in grasses share of sward structure with applying N60 at the 2nd and 3rd yr of investigation. With applying of double N rate the share of grasses increased by 3 and 6 % in 2004 and 2005 respectively. Increasing rate of nitrogen up to 180 kg ha⁻1 stipulated flooding share of grasses from 2 to 9 % in 2004 and 2005 respectively. The greatest nitrogen rate (240 kg ha⁻1) increased the share of grasses in the natural sward by 5 %. N180P120 fertilizing background resulted the rising of the grasses amount. Applying of N180K150 increased the share of grasses by 1 and by 5 % respectively in 2004 and 2005. Investigation data showed that fertilization with nitrogen only brought about increasing tendencies in the share of grasses in a natural sward composition. This could be determined by the characteristic of grasses to use nitrogen fertilizers in a better way. Using phosphorus together with nitrogen also increased the share of grasses at the 3rd yr, however less in compare with applying the great rates of nitrogen only.

In the backgrounds including phosphorus, the decrease tendencies of legumes were observed. This was better visible in the 3rd yr of investigation than in the 2nd one. Potassium is an important nutrient matter for herbs. In a background where a rate of 200 kg ha⁻¹ (the largest in this investigation) was used, in the third yr of research a significant increase in legumes was achieved compared to the control variant. As the amounts of potassium were increased in different treatments, a slight increase tendency in legumes was observed. The greatest N180P120K150 rates researched gave a statistically significant increase in legumes in a natural sward in 2005.
According to the data of the research fertilization background had greater effect on the legumes than on grasses in the natural sward (Fig. 1). Forage should be composed at least 40% of legumes for full providing of proteins. The share of legumes determined 13% (2004) and 17% (2005) in the treatment without fertilizers. A small N60 rate increased the share of legumes by 2% in the 2nd and did not have any impact in the 3rd yr. A double N120 rate had a negative effect on legumes in the natural sward. This is demonstrated by both yrs’ data. A N180 fertilizing background decreased the share of legumes by 5% only in the 3rd yr and did not have any influence in the 2nd yr. The greatest N240 kg ha-1 rate applied during the experiment decreased the share of legumes by 1% in the 2nd and by 10% in the 3rd yr. Applying nitrogen fertilizers together with phosphorus increased the rate of legumes by 2% in the 2nd and decreased their quantity by 2% in the 3rd yr.

A background of nitrogen and potassium (N180K150) had a similar influence, only in 2005 legumes decreased by 3% in compared to the control treatment. Treatments treated with phosphorus fertilizers showed a positive influence on the legumes of the natural sward. As the rates of phosphorus fertilizers increased, legumes showed increase tendencies both in the 2nd and the 3rd yr. However, the same number of legumes was found after separate treatments had been fertilized with rates of P120 and P160 in 2005. A background of P120K150 statistically significantly increased the quantities of legumes in 2004. Significant increase of legumes was also determined in the treatments fertilized with K100, K150 and K200. The share of legumes increased by 3, 2 and 1% respectively K rates in 2005. Share of legumes determined closer to the control treatment and fluctuated less at NPK treatments.

Forbs are an inevitable part of every natural sward. Forbs ranged from 14% in the 2nd yr and 16% of in the 3rd yr in a control treatment of natural sward (Fig. 2). The share of forbs decreased by 1% in a treatment treated with N60 in compare to the control both in 2004 and 2005. The tendencies of forbs decreasing remained with increased N rate to 120 kg ha-1. Share of forbs decreased by 4% and by 2% in the treatment N180 kg during 2004-2005. With applying the greatest rate (N240) the share of forbs decreased also. The greatest P rates in this investigation significantly increased the quantity of forbs especially in the second yr. Accordingly to the obtained data the quantity of forbs decreased both in the 2nd and the 3rd yr in the PK treatments.

Impact of fertilization background on the botanical composition of a natural sward. According to the data of botanical composition of the sowed sward in 2004, a ratio between grasses and legumes changed by 5-10% in compare to the composition of the sowed mixture (Fig. 2 and 3). Increase of grasses share was observed in treatments 4 and 5, 12, 17 and 18. These treatments had been treated with N fertilizers. Legumes made 29-40% of the total composition of the sward in 2004. It was observed in the 2nd yr already that legumes reacted negatively to the background of N. The share of legumes was by 6% less than in the control treatment (N0P0K0). In the treatment fertilized with a 240kg ha-1 rate of N, The background of P (from 120 kg ha-1) and K influenced legumes in a positive way and their share grew up. Legumes rate increased by 5% in the treatments fertilized with K100 and K200 at the 2nd yr after sowing than in a control treatment. In all treatments 1-5% of forbs were found.
Botanical composition of the sowed sward varied more during 2005 in compare with 2004. The share of grasses increased from 4 to 14 % in all treatments. Increase in the share of legumes was not observed in the 3rd yr after sowing an in any treatment irrespectively from the fertilizing background. Increase in the share of grasses was determined in the treatments with greater rate of N (treatment No.5), as well as NP and NPK. The share of legumes decreased from 4 to 18% in different fertilizing backgrounds. Share of legumes remained by 4 to 12 % higher in the treatments with P and K backgrounds than in other treatments in 2005. Share of legumes determined by 18 % less in the treatment fertilized with the greatest rate of N than in the treatment without fertilizers (Control) in 2005. DM accumulated more in sowed sward than in a natural one, except for the treatment fertilized with the greatest rate of N in 2005. The highest concentration of DM were observed in the treatments fertilized with the biggest rate of N240, in N180+P120 as well as in the treatment fertilized with NPK both in case of the sowed and natural swards.

Share of forbs was accounted for 1-10 % of the swards in 2004 (Fig. 3). The largest amounts of them were found in treatments fertilized with K50 and K100. That is by 3 % more than in a control treatment. Fertilizing with phosphorus and potassium only did not have any significant influence on forbs in 2004. Share of forbs decreased by 6 % in treatments fertilized with NK, NP and NPK, than in the control sward. Forbs composition was found increased in five treatments than control in 2005. Treatments N180, N60 and N60P40K50 especially distinguished themselves, due to the increased amount of forbs compared both to the control treatment and investigations of the 1st and the 2nd yr.
Conclusions
Grasses composed 71, legumes 13, Forbs 16 % of a natural unfertilized extensive sward. Nitrogen fertilizers increased the share of grasses in the total yield of green matter by 6-12 %; N120-240 diminished the part of legumes. Decrease of legumes ranged even by 10 % in the 3rd yr. Phosphorus fertilizers increased the share of legumes, whereas botanical composition of the sward varied insignificantly in combination with N and K.

Botanical composition of a sward improved by surface means (spraying with Glyphosate and sowing in) varied and depended on the amount of nutritious matters in the soil.
The most effective means for maintaining a suitable composition of a sowed sward is balanced fertilization with NPK.

References

PERSPEKTIVE MANAGEMENT AND UTILISATION OF GRASSLAND IN THE CZECH REPUBLIC

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Abstract
Permanent grasslands in the Czech Republic (CR) cover the area of 950 000 ha, that is 22.2 % of agricultural land (4280 000 ha). In our paper we evaluate the influence of three cut frequencies performed at four sites of permanent grassland in CR at the standard level of fertilizing PKN90 on yield, quality and utilisation of fodder by cattle measured in terms of milk production. We carried out a model calculation of cattle herd size needed for farming utilisation of grasslands on the basis of exact results completed with accessible literary sources on fodder intake by cattle at the stated intensity. Dry matter production in the average of evaluated sites and treatments decreases from a two-cut to four-cut utilisation from 8.05 t.ha-1 to 6.42 t.ha-1 and calculated dry matter production for the model area of 500 000 ha of grasslands is 4025 000 t at the two-cut system, 3665 000 ha at the three-cut system and 3210 000 ha at the four-cut system. Hence, the cow herd size necessary for the conversion of feedable dry matter is 382 000 cows in the treatment without grain supplementation and extensive utilisation in form of a two-cut system, 306 000 in a...