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INFLUENCE OF TECHNOLOGICAL GROWING MEASURES ON FEED VALUE AND NUTRITION OF ONE-YEAR BEANS- CEREAL GRASS MIXTURES**Svystunova I.,***Ph.D., associate professor,***Gladun A.,***student,***Chumachenko I.,***Ph.D., associate professor,**National university of life and environmental sciences of Ukraine, Kiev***Poltoretskyi S.,***d. a. s., professor,**Uman national university of horticulture, Ukraine***Hudz N.,***Ph.D., senior researcher,***Tarasov O.,***Ph.D., senior researcher, Head of the Laboratory of Zoonotic Diseases and Risk Assessment**Institute of Veterinary Medicine of the NAAS, Kyiv, Ukraine***Vaskivska S.,***researcher,**Ukrainian institute for plant varieties examination, Kiev***Turak O.,***Ph.D., associate professor,**Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk*

Abstract. The results of research on the impact of mineral fertilizer rates and the ratio of spring triticale and spring pea plants on the feed productivity of mixtures are presented. It was established that the best supply of digestible protein per feed unit - at the level of 171 g - was noted on the option where triticale and peas were sown with sowing rates of 60 : 40% and complete mineral fertilizer was applied at the rate of $N_{30}P_{45}K_{45}$.

Key words: triticale spring, sowing peas, sowing rate, mineral fertilizer, fodder unit, digestible protein.

Introduction.

An important indicator of the zootechnical value of fodder is the collection of fodder units from the sown area and the level of providing them with digestible protein. Feeds in which each feed unit contains 110-115 g of digestible protein (for cattle) are considered complete. Today, each feed unit rarely contains more than 90 g of digestible protein. Therefore, the problem of plant protein deficiency is extremely urgent [1].

In order to obtain fodder with a balanced sugar-protein ratio, as well as to improve nitrogen nutrition of crops and preserve soil fertility, many scientists suggest growing mixed crops of leguminous and cereal crops [3]. Therefore, the issue of studying the specifics of the reaction of plants of leguminous and cereal crops to the conditions of their cultivation, identifying the regularities of the formation of fodder agrophytocenoses and developing effective methods of managing their productivity (selection of grass species in annual grass mixtures, setting norms and doses of mineral fertilizers, etc. [2].

According to Ukrainian scientists, the green mass of spring triticale is characterized



by a high digestibility of organic matter: 82.2% in the tuber phase, 77.1% in the earing phase. At the same time, the digestibility of crude protein was equal to 80.6 and 77.1%, respectively, and fiber - 90.2 and 88.1%, respectively. The above data indicate a rather slow lignification of spring triticale plants. This allows you to use its green mass for fodder purposes for 11-13 days without a sharp decrease in its quality [1].

Other authors [4] established that a mixture of spring triticale and seed pea with half the sowing rates of each component provided a yield of crude protein at the level of 0.462 t/ha, which is 28.7-55.1% higher, compared to single-species sowing of the bean component. A significant increase in crude protein is caused by a higher collection of vegetable raw materials under mixed sowing in fodder agrophytocenosis.

The forage productivity of sown phytocenoses is significantly affected by the application of mineral fertilizers [1]. Thus, increasing the norm of mineral fertilizers from $N_{60}P_{60}K_{60}$ to $N_{90}P_{90}K_{90}$ contributed to a significant increase in the yield of green mass of mixtures of spring triticale with legumes and spring triticale with cabbage crops.

The purpose of the research is to study the influence of mineral fertilizer rates and the ratio of spring triticale and spring pea plants on the feed productivity of mixtures.

Research materials and methods.

Field experiments were conducted during 2020-2021 in the fields of the «Shevchenkivske» PAE in the Kyiv-Sviatoshyn district of the Kyiv region on sod-podzolic light loam soil with a humus content of 1.5-2.4%. In the experiments, varieties of annual crops were studied: spring triticale of the Bulat Kharkiv variety, seed peas of the Nadiya Podillia variety. Agrotechnics of growing one-year legume-cereal mixture of spring crops is generally accepted for the right-bank forest-steppe. The seeding rate of field pea and spring triticale in single-species crops, respectively, is 2.0 and 5.0 million/ha of similar seeds. Mineral fertilizers were applied in the form of nitroammophoska and lime nitrate for pre-sowing cultivation.

Results and their discussion.

According to the results of our research, it was established that the collection of fodder units from single-species crops of spring triticale in the control variant was 4.25 t/ha, while with the introduction of N_{30} and N_{60} , it was 4.91 and 4.93 t/ha, respectively. The highest output of fodder units was obtained with the application of complete mineral fertilizer at the rate of $N_{30}P_{45}K_{45}$ - 5.51 t/ha (table).

Single-species pea crops provided the output of fodder units on the unfertilized version at the level of 3.68 t/ha and within 3.98-4.20 t/ha, depending on the dose of mineral fertilizers.

When sowing spring triticale and seed pea in the mixture, the highest yield of fodder units (4.00-4.52 t/ha) was obtained when sowing the specified components of the mixture with sowing rates of 60 : 40%. The difference between the fertilizer options did not exceed 0.5 t/ha. The maximum output of fodder units from one hectare (4.52 t/ha) was obtained by applying only nitrogen fertilizers in a dose of N_{60} .

When spring triticale and field peas were sown with rates of 50% of the rates of sowing of these crops in single-species crops, the output of fodder units was 3.80-4.26 t/ha. The difference between the fertilizer options did not exceed 0.0.3 t/ha. At this rate of sowing, the most productive were the mixed crops of leguminous and cereal crops with the introduction of nitrogen fertilizers in the dose of N_{30} - 4.27 t/ha.



Fodder productivity of mixed crops of spring triticale and field pea depending on the technological factors of cultivation (average for 2020-2021)

Species composition and rate of sowing components, %	Fertilizer rate	Output of fodder units, t/ha	Yield of digestible protein, t/ha	Content of digestible protein in one feed unit, g
Triticale spring, 100	without fertilizers	4.25	0.38	90
	N ₃₀	4.91	0.46	95
	N ₆₀	4.93	0.51	104
	N ₃₀ P ₄₅ K ₄₅	5.51	0.57	104
Sow peas, 100	without fertilizers	3.68	0.55	153
	N ₃₀	3.98	0.70	176
	N ₆₀	4.23	0.76	180
	N ₃₀ P ₄₅ K ₄₅	4.20	0.80	191
Triticale spring, 50 + sow peas, 50	without fertilizers	3.80	0.48	127
	N ₃₀	4.27	0.66	155
	N ₆₀	4.26	0.67	158
	N ₃₀ P ₄₅ K ₄₅	4.24	0.69	169
Triticale spring, 60 + sow peas, 40	without fertilizers	4.00	0.49	124
	N ₃₀	4.47	0.69	155
	N ₆₀	4.52	0.70	156
	N ₃₀ P ₄₅ K ₄₅	4.49	0.76	171
Triticale spring, 70 + sow peas, 30	without fertilizers	3.44	0.43	125
	N ₃₀	4.21	0.61	145
	N ₆₀	4.35	0.67	155
	N ₃₀ P ₄₅ K ₄₅	4.20	0.68	165

For sowing with the sowing rate of components 70 : 30%, the output of fodder units was 3.44-4.35 t/ha, including in the absence of fertilizer - 3.44 t/ha, with the introduction of only nitrogen fertilizers - 4.21-4.35 t/ha, for application of complete mineral fertilizer in the norm N₃₀P₄₅K₄₅ – 4.20 t/ha.

The output of crude protein, as well as feed units, depended significantly on the level of fertilization and the rates of sowing components. When spring triticale was sown in a single-species crop, the yield of digestible protein was 0.38-0.57 t/ha. The yield of digestible protein, depending on the norms of mineral fertilizers, was 0.55-0.80 t/ha when sowing peas in a single-species crop.

When spring triticale and field peas were sown in mixed crops, the yield of digestible protein varied between 0.48-0.68 t/ha. Moreover, when sowing on an unfertilized agrobbackground, a lower yield of digestible protein was noted in the variants where peas were sown with the lowest sowing rate - 30%, and triticale with the highest - 70%. When sowing the cereal and leguminous component with sowing rates of 50 : 50 and 60 : 40%, respectively, the protein yield was almost at the same level - 0.48-0.49 t/ha, with a predominance of the option where the leguminous component was sown with a lower rate sowing.

In general, the yield of digestible protein was 0.66-0.70 t/ha when sowing cereal and leguminous components with sowing rates of 50 : 50 and 60 : 40% on variants with the introduction of only nitrogen fertilizers.



The feed value of plant biomass of mixtures of spring triticale with field peas is determined by the supply of the feed unit with digestible protein. Increasing the doses of mineral fertilizers helps to increase the yield of digestible protein and improve the supply of it to the feedlot. The highest efficiency of nitrogen fertilizers was noted in single-species sowing of field peas, where the yield of digestible protein was 0.70-0.80 t/ha with a content of 176-191 g in one fodder unit.

The availability of one fodder unit of fodder obtained from single-species sowing of spring triticale on unfertilized plots was 90 g, for the application of nitrogen fertilizers - 95-104 g, for the application of complete mineral fertilizer in the norm $N_{30}P_{45}K_{45}$ – 104 g. That is, for sowing triticale in a single-species crop, the availability digestible protein of the fodder unit of its green mass only approached the level of the zootechnical norm, however, it did not meet it.

According to many scientists [1], the feed obtained from crops of leguminous-cereal mixtures is characterized by higher nutrition due to the better supply of the feed unit with digestible protein, which is also confirmed by the results of our research. We established that when triticale was sown in a mixture with peas on unfertilized areas, the collection of digestible protein increased by 12.7-28.1%, compared to single-species cereal crops, therefore, accordingly, the supply of digestible protein to the fodder unit also increased and amounted to 125-171 g.

When cereal and leguminous components were sown with half the sowing rates, the supply of digestible protein per fodder unit, even in the unfertilized version, corresponded to the zootechnical norm and amounted to 127 g. With the introduction of nitrogen fertilizers in doses of N_{30} and N_{60} , it increased to 155 and 158 g, respectively. The difference, as you can see, was insignificant. With the application of complete mineral fertilizer, the supply of the fodder unit was 169 g. With the sowing of peas at the rate of 30 % and the application of $N_{30}P_{45}K_{45}$, the supply of the feed unit with digestible protein was 165 g. For growing on the same agro background, but sowing the leguminous component at the rate of 40%, the value of this of the indicator were the highest and amounted to 171 g. In addition, it was established that when sowing cereal and legume components with rates of, respectively, 50 : 50 and 60 : 40%, the application of different doses of nitrogen fertilizers did not have a significant effect on the supply of digestible protein to the fodder unit.

Conclusions and suggestions.

The best provision of the feed unit with digestible protein - at the level of 171 g, was noted in the variant where triticale and peas were sown with sowing rates of 60 : 40% and full mineral fertilizer was applied at the rate of $N_{30}P_{45}K_{45}$. The obtained data should be taken into account when creating highly productive of one-year beans-cereal grass mixtures.

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