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**FORAGE PRODUCTIVITY OF ANNUAL FORAGE GRASS DEPENDS ON GROWING TECHNOLOGICAL METHODS****Svystunova I.,***Ph.D., associate professor,***Denisyuk V.,***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,**Institute of Veterinary Medicine of the NAAS, Kyiv, Ukraine***Hryhorian L.,***lecturers,**SS NULESU «Nemishaevo Agricultural College»*

**Abstract.** The results of research on the influence of cultivation technology on the formation of fodder productivity of one-year fodder grass stands are presented. It has been established that the sowing of cereal and leguminous crops in mixed crops improves the nutritional value of forage and increases the productivity of the forage area in terms of forage N<sub>30</sub>P<sub>45</sub>K<sub>45</sub>.

**Key words:** triticale, field pea, fodder productivity, digestible protein, fodder unit.

**Introduction**

Providing the population with high-quality food products in full is the most important task of the agro-industrial complex. Solving this problem depends significantly on the productivity of the livestock industry, the effectiveness of which is determined by the availability of a sufficient amount of high-quality fodder [1].

One of the ways to solve this problem is to grow leguminous-cereal mixtures for green fodder on arable land. Such mixtures have many advantages over single-species crops. First of all, the combined cultivation of cereal and leguminous crops increases the nutritional value of feed due to the high content of feed protein and essential amino acids in leguminous plants. In addition, thanks to the formation of mixed crops, the productivity of photosynthesis is intensified, a higher yield of dry matter is formed, and soil fertility is used more effectively [2]. An example of such crops is the cultivation of mixed crops of field peas in a mixture with triticale yarrow [3, 4].

However, the level of productivity of crops of legume-cereal grass mixtures depends significantly on the fertility of the soil, weather and climatic conditions and technological methods of cultivation, in particular, on the species and varietal composition of crops and their ratio, on the availability of nutrients, sowing and mowing periods, sowing rates, etc. [1]. Therefore, today the issue of studying the specifics of the reaction of plants of annual cereal and leguminous crops to the conditions of their cultivation, identifying the main regularities of the formation of fodder agrophytocenoses, developing effective methods of managing their



productivity based on a reasonable selection of species in the composition of grass mixtures and norms and doses of mineral fertilizers during formation is an urgent issue agrophytocens of legume-cereal grass mixtures [2, 3].

The purpose of the research was to study the peculiarities of the formation of fodder productivity of one-year fodder grass stands depending on the technological factors of cultivation.

### **Research materials and methods.**

Field experiments were carried out in 2020-2021 in the fields of the Shevchenkivske Agricultural Production Plant of the Kyiv region on sod-podzolic light loamy soil with a humus content of 1.5-2.3%, easily hydrolyzed nitrogen - 76 mg/kg, mobile phosphorus - 102 mg/kg and exchangeable potassium – 61 mg/kg.

The experiment was laid out according to the scheme: Factor A - sowing rates, % 1. Triticale yare, 100; 2. Peas, 100; 3. Triticale yare, 50+field peas, 50; 4. Triticale yare, 60+field peas, 40; 5. Triticale yare, 70+field peas, 30; Factor B – rates of mineral fertilizers, kg/ha per year 1. Without fertilizers (control); 2. N<sub>30</sub>; 3. N<sub>30</sub>; N<sub>60</sub>; 4. N<sub>30</sub>P<sub>45</sub>K<sub>45</sub>. Field peas and triticale were sown in the usual row method in one row with the sowing rate, respectively, of 2.0 and 5.0 million/ha of similar seeds [5].

In the experiments, spring triticale of the Bulat Kharkiv variety (originator – V. Ya. Yuryev Institute of Plant Breeding of the National Academy of Agrarian Sciences of Ukraine, 2019) and seed pea of the Nadiya Podillia variety (originator – Podillia Institute of Forage and Agriculture of the National Academy of Sciences, 2014) were studied.

### **Results and their discussion.**

An important indicator that characterizes the nutritional value of feed is the harvest of feed units and the level of their provision of digestible protein.

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, and when applying N<sub>30</sub> and N<sub>60</sub>, it was 4.91 and 4.93 t/ha, respectively (table).

The maximum collection of fodder units was obtained with the application of complete mineral fertilizers at the rate of N<sub>30</sub>P<sub>45</sub>K<sub>45</sub> – 5.51 t/ha. Single-species sowing of field peas ensured the collection of fodder units in the control variant at the level of 3.68 t/ha, and when fertilizers were applied - in the range of 3.98-4.20 t/ha.

For sowing spring triticale and seed peas in a mixture, the maximum collection of fodder units - from 4.00 to 4.52 t/ha was obtained for sowing the specified crops with sowing rates of 60 : 40%. The maximum output of fodder units from one hectare – 4.52 t/ha was obtained by applying only nitrogen fertilizers in the dose of N<sub>60</sub>.

For spring triticale and field peas with rates of 50% of the rates of sowing of these crops in single-species crops, the collection of fodder units was 3.80-4.26 t/ha. The most productive at this seeding rate were mixed crops with the application of nitrogen fertilizers in a dose of N<sub>30</sub> - 4.27 t/ha.

For sowing with the sowing rate of components 70 : 30%, the collection 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 N<sub>30</sub>P<sub>45</sub>K<sub>45</sub> – 4.20 t/ha.



### Fodder productivity of mixed crops of spring triticale and seed pea depending on technological methods of cultivation, average for 2020-2021

Species composition and rate of sowing components, %	Fertilizer rate	Collection of fodder units, t/ha	Collection of digestible protein, t/ha	Provision of a feed unit with digestible protein, g
Triticale spring, 100	without fertilizers	4,25	0,38	90
	N <sub>30</sub>	4,91	0,46	95
	N <sub>60</sub>	4,93	0,51	104
	N <sub>30</sub> P <sub>45</sub> K <sub>45</sub>	5,51	0,57	104
Sow peas, 100	without fertilizers	3,68	0,55	153
	N <sub>30</sub>	3,98	0,70	176
	N <sub>60</sub>	4,23	0,76	180
	N <sub>30</sub> P <sub>45</sub> K <sub>45</sub>	4,20	0,80	191
Triticale spring, 50 + Sow peas, 50	without fertilizers	3,80	0,48	127
	N <sub>30</sub>	4,27	0,66	155
	N <sub>60</sub>	4,26	0,67	158
	N <sub>30</sub> P <sub>45</sub> K <sub>45</sub>	4,24	0,69	169
Triticale spring, 60 + Sow peas, 40	without fertilizers	4,00	0,49	124
	N <sub>30</sub>	4,47	0,69	155
	N <sub>60</sub>	4,52	0,70	156
	N <sub>30</sub> P <sub>45</sub> K <sub>45</sub>	4,49	0,76	171
Triticale spring, 70 + Sow peas, 30	without fertilizers	3,44	0,43	125
	N <sub>30</sub>	4,21	0,61	145
	N <sub>60</sub>	4,35	0,67	155
	N <sub>30</sub> P <sub>45</sub> K <sub>45</sub>	4,20	0,68	165

When spring triticale was sown in a single-species crop, the yield of digestible protein was 0.38-0.57 t/ha. The lowest values for this indicator - at the level of 0.38 t/ha, were noted for absolute control, the maximum - 0.57 t/ha for the application of complete mineral fertilizer at the rate of N<sub>30</sub>P<sub>45</sub>K<sub>45</sub>. The yield of digestible protein was 0.55-0.80 t/ha when sowing peas in a single-species crop. The minimum values (0.55 t/ha) were noted on the site in the control variant, the maximum values were 0.80 t/ha for the application of complete mineral fertilizer in the norm of N<sub>30</sub>P<sub>45</sub>K<sub>45</sub>.

When sowing spring triticale and seed pea in mixed crops, the collection of digestible protein was 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 field peas and triticale were sown in a ratio of 30 : 70%. When sowing cereal and leguminous components with sowing rates of 50 : 50 and 60 : 40%, respectively, the yield of protein was almost at the same level - 0.48-0.49 t/ha.

In general, when cereal and legume components were sown with sowing rates of 50:50 and 60:40%, with the introduction of only nitrogen fertilizers, the yield of digestible protein was 0.66-0.70 t/ha. For sowing with sowing rates of 70:30% and application of mineral fertilizers in the rate of N<sub>60</sub> and N<sub>30</sub>P<sub>45</sub>K<sub>45</sub>, the yield of digestible protein was 0.67-0.68 t/ha.

The feed value of the plant biomass of mixtures of spring triticale with field peas is determined by the supply of the feed unit with digestible protein. An increase in the doses of mineral fertilizers leads to an increase in the collection of digestible protein from the crop and an improvement in its supply to the fodder stock. The highest



efficiency of nitrogen fertilizers was noted in single-species sowing of field peas, where the collection 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  $N_{30}P_{45}K_{45}$  –  $N_{30}P_{45}K_{45}$  - 104 g. That is, for sowing triticale in a single-species crop, the supply digestible protein of the fodder unit of its green mass only approached the level of the zootechnical norm, however, it did not meet it.

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 sowing of cereal crops, therefore, accordingly, the supply of digestible protein per feed unit also increased and amounted to 125-171 g.

When cereal and leguminous components were sown with sowing rates of 50:50%, the supply of digestible protein per feed 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. With the introduction 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 introduction of  $N_{30}P_{45}K_{45}$ , each fodder unit accounted for 165 g of fodder protein. For growing on the same agricultural background, but sowing the leguminous component at a rate of 40%, the values of this indicator were the highest and amounted to 171 g. It was also established that when sowing cereal and leguminous components with the rates, respectively, of 50 : 50 and 60 : 40% different doses of nitrogen fertilizers did not have a significant effect on the availability of digestible protein of the feed unit.

### **Conclusions and suggestions.**

Thus, the sowing of cereal and leguminous crops in mixed crops improves the nutritional value of forage and increases the productivity of the forage area in terms of forage protein output. The most complete fodder, in which each fodder unit contains 171 g of digestible protein, is provided by the following technological model, which involves sowing triticale and pea with sowing rates of 60:40% and applying  $N_{30}P_{45}K_{45}$ . The obtained data should be taken into account when planning highly effective sowing of fodder crops with a high formation of digestible protein.

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