https://www.sworldjournal.com/index.php/swj/article/view/swj11-02-084
DOI: 10.30888/2663-5712.2022-11-02-084

UDC 631.5:633.2/.3

PRODUCTIVITY OF ANNUAL BEAN-CEREAL GRASS MIXTURES DEPENDING ON TECHNOLOGICAL FEATURES OF GROWING

Svystunova I.,
Ph.D., associate professor,
Pravedniyi V.,
student,
Kos N.,
Ph.D., associate professor,
National university of life and environmental sciences of Ukraine, Kyiv
Poltoretskyi S.,
d. a. s., professor,
Uman national university of horticulture, Uman, Ukraine
Hudoliy L.,
researcher, k.a.s.,
Lashuk S.,
Researcher,
Ukrainian institute for plant varieties examination, Kiev, Ukraine
Hudz N.,
Ph.D., researcher,
Institute of Veterinary Medicine of the NAAS of Ukraine, Kyiv

Abstract. *The results of research on the influence of technology elements on the formation of forage productivity of mixed crops of legumes and cereals are presented. It was found that for the cultivation of mixed crops of spring triticale and field peas, it is advisable to grow them in a ratio of 60:40 % with the application of fertilizers in the rate of $N_{30}P_{45}K_{45}$, which allows to obtain feed with the highest feed unit digestible protein – 171 g.*

Key words*: spring triticale, field peas, protein, feed nutrients.*

Introduction.

Providing the population with high-quality food in sufficient quantities is the most important task of the agro-industrial complex. The solution of this problem significantly depends on the development of the livestock industry, the efficiency of which depends on the availability of a sufficient amount of complete feed - in the structure of costs for the production of livestock products, they occupy 50-60% [3].

One of the ways to solve this problem is to grow legumes and cereal mixtures of annual crops for green fodder on arable land. Such mixtures have many advantages over single-species crops. First of all - increased nutritional value of feed due to the high content of digestible protein in legume plants. Therefore, increasing the production of quality feed from legumes and cereal mixtures of annual forage crops allows you to balance concentrated feed for protein and essential amino acids [1, 3]. In addition, the creation of mixed crops increases the productivity of photosynthesis and more efficient use of soil fertility, which, moreover, is enriched with biological nitrogen due to its fixation by tuberous bacteria of legumes from the atmosphere [2]. The increase in the productivity of legume-cereal grass mixtures is largely due to the reasonable selection of species and varieties of legumes and cereals, taking into account their genetic features of growth and development [5].

The purpose of the research is to identify the peculiarities of green mass yield

formation by mixed crops of spring triticale with field peas depending on the sowing norms of grass mixture components and norms of mineral fertilizers application.

Materials and methods of research. Field experiments were conducted during 2020-2021 in the fields of PAE "Shevchenkivske", which is located in the Kyievo-Sviatoshynskyi district of Kyiv region on sod-podzolic soil.

In these experiments, varieties of annual crops were studied: triticale spring variety Bulat Kharkiv (originator – Plant Production Institute nd. a. V. Ya. Yuryev of NAAS of Ukraine), field peas Nadiya Podillya (originator – Institute of Feed Research & Agriculture of Podillya NAAS of Ukraine).

The experiment was carried out according to the scheme: Factor A – seeding rates, % (1. Spring triticale, 100; 2. Field peas, 100; 3. Spring triticale, 50 + field peas, 50; 4. Spring triticale, 60 + field peas, 40 5. Spring triticale, 70 + field peas, 30); Factor B – norms of mineral fertilizers, kg / ha, a.s.: 1. Without fertilizers (control); 2. N_{30}; 3. N_{60}; 4. $N_{30}P_{45}K_{45}$. Predecessor – corn for silage.

The sowing rate of peas and spring triticale for sowing in net crop, respectively, 2.0 and 5.0 million / ha of germination seeds. Cultures in mixed crops were sown in the usual row method in one row.

Research results and their discussion.

In order to obtain feeds balanced in terms of protein and carbohydrates, as well as to improve nitrogen nutrition of crops and preserve soil fertility, many scientists suggest growing mixed agrophytocenoses from legumes and cereals, including with different ratios of components [1, 2].

In addition, the issue of studying the characteristics of annual legumes and cereals to agroecological conditions of their cultivation, identifying the basic patterns of formation of feed agrophytocenoses, development of effective ways to manage their productivity based on reasonable selection of species in grass mixtures, rates and doses of fertilizers [1,3].

According to the results of our research, it was found that the collection of feed units from single-species crops of spring triticale on the unfertilized variant was 4.25 t / ha, while for N30 and N60, respectively, 4.91 and 4.93 t / ha, and the largest collection of feed units was obtained by applying complete mineral fertilizers in the norm $N_{30}P_{45}K_{45}$ – 5.51 t / ha (tabl).

Under the conditions of sowing of spring triticale and field peas in the mixture, the largest collection of feed units – in the range of 4.00-4.52 t / ha was obtained for sowing of these components with seeding rates of 60:40 %. The maximum yield of feed units per hectare – 4.52 t / ha was obtained by applying only nitrogen fertilizers at a dose of N_{60}.

Under the conditions of sowing of spring triticale and field peas with norms of 50% of sowing norms of these crops in single-species crops, the collection of feed units was 3.80-4.26 t / ha. The most productive at this sowing rate were mixed crops of legumes and cereals with the application of nitrogen fertilizers at a dose of N_{30} – 4.27 t / ha. Under sowing conditions with a seeding rate of 70:30 %, the collection of feed units was 3.44-4.35 t / ha, including in the absence of fertilizer – 3.44 t / ha, with the application of only nitrogen fertilizers – 4.21-4.35 t / ha, for the application of complete mineral fertilizer in the norm $N_{30}P_{45}K_{45}$ – 4.20 t / ha.

Feed productivity of mixed crops of spring triticale and field peas, depending on technological factors of cultivation, on average for 2020-2021.

Species composition and seeding rate of components,%	Fertilizer rate	Collection of feed units, t / ha	Collection of digestible protein, t / ha	Provision of feed unit with digestible protein, g
Spring triticale, 100	No 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
Field peas, 100	No 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
Spring triticale, 50 + field peas, 50	No 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
Spring triticale, 60 + field peas, 40	No 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
Spring triticale, 70 + field peas, 30	No fertilizers	3,44	0,43	125
	N_{30}	4,21	0,61	145
	N_{60}	4,35	0,67	155

The yield of crude protein, as well as feed units, significantly depended on the level of fertilizer and seeding rates of components. During sowing of spring triticale in a single-species crop, the yield of digestible protein was 0.38-0.57 t / ha. The minimum values for this indicator – at the level of 0.38 t / ha, were observed in the absolute control, the maximum – 0.57 t / ha for the application of complete mineral fertilizers in the norm $N_{30}P_{45}K_{45}$.

Under the conditions of sowing spring triticale and field peas in mixed crops, the collection of digestible protein varied in the range of 0.48-0.68 t / ha. Interestingly, under sowing conditions on an unfertilized background, a lower yield of digestible protein was observed in the variants where field peas were sown with the lowest seeding rate – 30%, and spring triticale with the highest – 70%. Under the conditions of sowing of cereals and legumes with sowing rates, respectively, 50:50 and 60:40% protein yield was almost at the same level – 0.48-0.49 t / ha.

The nutritional value of plant biomass of mixtures of spring triticale with field peas is determined by the provision of the feed unit with digestible protein. Increasing the application of mineral fertilizers leads to an increase in the harvest of digestible protein and improve the supply of feed. The highest efficiency of nitrogen fertilizers was observed in single-species sowing of field peas, where the collection of digestible protein was 0.70-0.80 t / ha with a content in one feed unit of 176-191 g.

Provision of one feed unit of feed obtained from single-species crops of spring triticale in unfertilized areas was 90 g, for application of nitrogen fertilizers – 95-104

g, for application of complete mineral fertilizer in the norm $N_{30}P_{45}K_{45}$ – 104 g. The supply of the feed unit of its green mass with digestible protein only approached the level of the zootechnical norm, however, did not correspond to it.

We found that sowing spring triticale in a mixture with field peas in unfertilized areas, the collection of digestible protein, compared to single-species crops of cereals increased by 12.7-28.1%, so increased the supply of fodder unit digestible protein – up to 125-171 g.

Under the conditions of sowing cereal and legume components with half sowing rates, the feed unit's digestible protein supply, even in the unfertilized version, corresponded to the zootechnical norm and amounted to 127 g. With the application of complete mineral fertilizer the supply of feed unit was 169 g. With the sowing of field peas in the norm of 30% and the application of $N_{30}P_{45}K_{45}$ the supply of feed unit with digestible protein was 165 g. Under the conditions of cultivation on the same agricultural background, but sowing the legume component in the norm of 40%, the values of this indicator were the highest and amounted to 171 g. In addition, it was found that when sowing cereals and legumes with norms, respectively, 50:50 and 60:40 % application of different doses of nitrogen fertilizers did not have a significant impact on the supply of the feed unit with digestible protein. Thus, the best provision of the feed unit with digestible protein – at the level of 171 g, was observed in the variant where triticale and field peas were sown with seeding rates of 60:40% and complete mineral fertilizer was applied in the norm of $N_{30}P_{45}K_{45}$.

Conclusions.

Under the conditions of growing mixed crops of spring triticale and field peas, it is advisable to grow them in a ratio of 60:40% against the background of N30P45K45, which allows to obtain feed with the highest supply of feed unit digestible protein – 171 g.

Bibliography:

1. Квітко Г.П., Гетман Н.Я. Оцінка кормової продуктивності сумішей однорічних культур при конвеєрному виробництві зелених кормів. *Таврійський науковий вісник*. Херсон. 2009. Вип. 52. С.115-119.

2. Оліфорович В.О. Бобово-злакові травосумішки – основа виробництва якісних високобілкових кормів на схилових землях. *Корми і кормовиробництво*. 2012. Вип. 61. С. 118-122.

3. Петриченко В.Ф., Квітко Г.П., Гетман Н.Я. Агробіологічні підходи до інтенсифікації польового кормовиробництва в Україні. *Корми і кормовиробництво*. 2008. Вип.60. С.56-61.

4. Прыгунов В.А. Однолетние травы в зеленом конвейере. *Кормопроизводство*. 2014. №3. С.12-14.

5. Чернецька С.Г. Динаміка наростання висоти рослин тритикале та вики ярої при сумісному вирощуванні. *Передгірне та гірське землеробство і тваринництво*. Львів, 2017. Вип. 56.Част. II. С. 100-107.

© Svystunova I., Pravedniyi V., Kos N.,
Poltoretskyi S., Hudoliy L., Lashuk S., Hudz N.