INFLUENCE OF FERTILIZATION ON BOTANICAL COMPOSITION AND CROP CAPACITY OF LEGUME-CEREAL PLANT STAND

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Наведено результати досліджень впливу способів удобрення на зміну ботанічного складу бобово-злакового травостою. Встановлено, що найбільша частка бобових компонентів у травостої – 56,5% в перший та 67,2% в другий рік використання була на варіантах, де висівали інокульоване насіння люцерни посівної, вносили фосфорно-калійні добрива ($P_{60}K_{60}$) та застосовували гумінове добриво з властивостями стимулятора росту Лігногумат.

Ключові слова: *бобово-злакова травосумішка, удобрення, ботанічний склад*

Botanical composition of a plant stand is one of the indicators that determine the quality of the feed, its biological usefulness and durability of a field. Research has established that the potential productivity, i.e. the ability of a plant stand to fuller use the soil nutrients, fertilizers and the full range of favorable conditions for the growth and development of meadow grasses, depends on the botanical composition of a plant stand [6].

In most soils there is low content of nutrients mobile forms. That is why to maintain the proper level of species composition of plant communities and get high and stable yields one must annually restock the soil nitrogen, phosphorus, potassium and other elements of supply by fertilizing the quantities needed to stop the destructive phenomenon in biogeocenoses and provide the planned harvests. The lack of any macro- or micronutrient leads to profound disturbances in the metabolism of

plants and reduces in crop productivity, while their absence - even to the complete destruction. [1].

Mineral fertilizers actively influence the growth and development of perennial grasses. Nutritious substances of fertilizers are one of the major elements of the technology used to grow meadow grasses, so they need to be used with consideration of such environmental factors as temperature, lighting and moisture conditions. It enables to support the most valuable species of plants and high productivity of complex phytocoenosis in a plant stand for a long time [3, 5].

The aim of our research was to study the effect of different methods of fertilization of legume-cereal mixture on the formation of its botanical composition.

Materials and methods. The study was being conducted during 2011-2012 on the mixture of Alfalfa Seed + chaff reed + awnless inermis on the basic farm of Ternopil State Agricultural Experiment Station of the Institute of Forage and Podillya Agricultural Skirts of National Academy of Agricultural Sciences – Separate department of National University of Bioresources and Use of Natural Resources of Ukraine "Zalishchyky Agricultural College named after E. Khraplyvyy" in Zalishchyky district near Ternopil region under the following scheme: 1 – Control; 2 - $P_{60}K_{60}$; 3 - $N_{60}P_{60}K_{60}$; 4 – Lihnohumat; 5 - $P_{60}K_{60}$ + Lihnohumat; 6 - $N_{60}P_{60}K_{60}$ + Lihnohumat.

In the experiment the two factors have been studied: A (inoculation) and B (fertilization).

For the preplant inoculation of alfalfa seed the bacterial drug Ryzobofit was used.

The area of the field - 36 м², three-time repetition, the variants were placed by the method of split plots.

The study was conducted in accordance with generally accepted method of scientific research on fodder production and grass farming [4].

Botanical composition of the plant stand was determined by sequential disassembly of samples weighing 1 kg taken from two adjacent repetitions and dividing them into the following fractions: legumes, cereals, motley grasses.

Statistical processing of the results was performed by the method of B. A. Dospehov [2] using the computer program Statistica 6,0.

Results. It has been proved that the fertilization methods of seeded meadow agrophytocenoses significantly influenced the changing of its botanical composition.

Thus, in the first year of use (the second year of life) of a plant stand the fraction of alfalfa seed, the most valuable plant in the mixture of legume was, depending on the version of the experiment, equal to 44,1-56,5% (Table 1).

Botanical composition of legume-cereal plant stand depending on fertilization, %

Inoculation (factor A)	Group of herbs	Fertilization (factor B)					
		Control	$P_{60}K_{60}$	$N_{60}P_{60}K_{60}$	Lihnohumat	$P_{60}K_{60}$ + Lihnohumat	$N_{60}P_{60}K_{60}$ + Lihnohumat
2011							
Without inoculation	Legumes	47,5	51,3	44,1	50,2	53,1	45,6
	Cereals	46,4	44,0	52,8	46,7	43,0	53,0
	Forbs	6,1	4,7	3,2	3,1	3,8	1,4
With inoculation	Legumes	51,6	55,4	47,1	54,0	56,5	47,6
	Cereals	43,2	40,6	51,1	43,5	40,4	51,5
	Forbs	5,2	4,0	1,8	2,5	3,1	0,9
HIP_{05}, %	Legumes: A – 0,57, B – 0,99, AB – 1,40 Cereals: A – 0,90, B – 1,56, AB – 2,21 Forbs: A – 0,54, B – 0,94, AB – 1,32						
2012							
Without inoculation	Legumes	48,2	63,2	34,3	53,5	65,9	37,5
	Cereals	51,2	36,3	65,5	45,9	33,8	62,5
	Forbs	0,6	0,5	0,2	0,6	0,3	0,0
With inoculation	Legumes	51,8	64,9	36,5	55,0	67,2	38,6
	Cereals	48,4	34,9	63,5	44,7	32,5	61,4
	Forbs	0,4	0,2	0,0	0,2	0,3	0,0

HIP_{05}, %	Legumes: A – 0,9, B – 1,5, AB – 2,1 Cereals: A – 1,4, B – 2,5, AB – 3,5 Forbs: A – 0,09, B – 0,15, AB – 0,22

In the variant where the superficial fertilization with phosphorus-potassium fertilizer (R60K60) and foliar humic fertilizer with Lihnohumat growth stimulation properties was used the proportion of legumes was, respectively, 53,1% without inoculation and 56,5% with inoculation. Adding nitrogen fertilizer as a part of full mineral fertilizer led to a decrease in the proportion of legumes in a mixture of herbs to 44,1% without inoculation and 47,1% with inoculation.

In the variants where Lihnohumat was additionally brought in we have observed a tendency of reduction of the negative impact of nitrogen fertilizers on alfalfa, which had manifested in a slight increase in its share of the plant stand to 45.6% without inoculation and 47,6% with inoculation.

The largest share of cereals was while using $N_{60}P_{60}K_{60}$ on the surface and Lihnohumat foliar – 53,0% without inoculation and 51,5% with inoculation, and the lowest - in the version with preplant bacterization of alfalfa seed, using phosphorus-potassium fertilizer $P_{60}K_{60}$ on the surface and Lihnohumat foliar – 40,4%. Share of herbage grasses in a plant stand was 0,9-6,1%, depending on the variant of the experiment.

In the second year of use (the third year of life) of meadow agrophytocenoses its botanical composition continued to change, which manifested in reducing the percentage of legumes and increase in the proportion of cereals on the background of a complete fertilizer and growing proportion of legumes and decrease of cereals while using the phosphorus-potassium fertilizers.

Most legumes – 67,2% have been observed in the variant where the inoculated alfalfa seed were sown, phosphorus-potassium fertilizer was used on the surface ($P_{60}K_{60}$) and Lihnohumat foliar, and least - when fertilizing the grass meadow by a full mineral fertilizer ($N_{60}P_{60}K_{60}$) – 34,3% without inoculation of legumes.

Share of cereals in herbage depending on variations of the experiment ranged from 32,5 to 65,5%. It has been the lowest while using $P_{60}K_{60}$ on the surface and

Lihnohumat foliar – 32,5%, and the biggest - at the surface usage of complete mineral fertilizer $N_{60}P_{60}K_{60}$ – 65,5%.

Application of Lihnohumat, both alone and in combination with phosphorus-potassium and complete mineral fertilizer contributed to the growth in the percentage of alfalfa herbage seed compared to variants where it was not used.

In all variants of the experiment it has been observed the decrease of forbs to 0,6%, due to its inhibition by the cultivated plants of agrophytocenoses.

We have found that preplant inoculation of alfalfa seeds by Ryzobofit bacterial drug contributed to the growth in the proportion of alfalfa herbage on all variants of the experiment compared with options, where it was not used. Thus, in the first year its increasing was 2,0-4,1%, and in the second - 1,2-2,1%, indicating the positive effect of inoculation on the formation of a plant stand with a high proportion of economically valuable components.

Conclusion. The use of fertilizers on meadow grass helps to control its botanical composition. The largest share of legumes - 56.5% in the first and 67.2% in the second year of use had been achieved in the variants where it had been sown the inoculated alfalfa seed, used the phosphorus-potassium fertilizer ($P_{60}K_{60}$) and humic fertilizer with the properties of Lihnohumat growth stimulation.

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БОТАНИЧЕСКИЙ СОСТАВ БОБОВО-ЗЛАКОВОГО ТРАВОСТОЯ В ЗАВИСИМОСТИ ОТ УДОБРЕНИЯ

Г.П. Сидорук

Приведены результаты исследований влияния способов удобрения на смену ботанического состава бобово-злаковго травостоя. Установлено, что наибольшее долевое участие бобовых компонентов в травостое – 56,5% в первый и 67,2% во второй год использования отмечалось на вариантах, где высевались инокулированные семена люцерны посевной, вносились фосфорно-калийное удобрение $Р_{60}К_{60}$ и применялась гуминовое удобрение со свойствами стимулятора роста Лигногумат.

Ключевые слова: бобово-злаковая травосмесь, удбрения, ботанический состав

БОТАНІЧНИЙ СКЛАД ТА УРОЖАЙНІСТЬ БОБОВО-ЗЛАКОВОГО ТРАВОСТОЮ ЗАЛЕЖНО ВІД УДОБРЕННЯ

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