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INFLUENCE OF SPRING BARLEY PLANT NUTRITION OPTIMIZATION ON YIELD FORMATION IN THE RIGHTBANK FORESTSTEPPE OF UKRAINE

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This article presents the results of a study of the effect of complex fertilizers on the productivity of spring barley. As a result of the research, it was found that in the variants where three times of plant treatment with preparations were carried out in the most sensitive to nutrition phases of spring barley vegetation of the mid-season variety Modern, the maximum biometric parameters of plants were obtained. In the variants where spring barley plants were fertilized in the three phases of vegetation of tillering, emergence into the tube and at the beginning of earing with Humifriend potassium humate and Multicomplex StimOrganic, a significant increase in the number of productive stems by 265 pcs./m^2 and 273 pcs./m^2, respectively, was noted compared to the control. The use of the preparations stimulated plant growth and this had a positive effect on the formation of ears of spring barley, the length of which increased by 0,7 – 1,4 cm compared to the control. The highest number of grains in the ear was observed in the variants where three treatments with complex fertilizers were used, where this indicator increased by 2,6 – 3,7 pcs. compared to the control. Three times treatment of plants with preparations also contributed to an increase in grain weight per ear by 0,3 – 0,4 g compared to the control. For three times treatment of spring barley plants with Humifriend potassium humate, the weight of 1000 seeds increased by 2.4 g compared to the control, when using the preparation Multicomplex StimOrganic, this indicator increased by 3,8 g compared to the control, and when using Fulvigum, this indicator increased by 1,8 g compared to the control. An important indicator of productivity is the weight of the raw aboveground mass of plants, when calculating this indicator in the phase of earing, the highest values were obtained in the variants where preparations for fertilizing in two phases of vegetation were used, in particular when using Humifriend potassium humate, this indicator increased by 631 – 658 g/cm^2 compared to the control, when using Multicomplex StimOrganic, this indicator increased by 728 – 735 g/cm^2 compared to the control, and when using Fulvigum, this indicator increased by 435 – 436 g/cm^2 compared to the control. The highest yield of spring barley grain was obtained in the variant where three treatments of plants with StimOrganic Multicomplex were applied, where the yield increased by 1,0 t/ha compared to the control, which is 42%, when using Humifriend potassium humate, the yield increased by 0,9 t/ha compared to the control, which is 38%, and when using Fulvigum, the yield increased by 0,7 t/ha compared to the control, which is 29%. The data obtained indicate that the use of complex fertilizers on spring barley crops contributed to the growth, development of plants and an increase in grain yield in proportion to the number of plant treatments.

***Key words**: spring barley, complex fertilizers, yield.*
Table 4. Lit. 18.

Problem statement. Spring barley is an important universal grain crop in Ukraine. It is widely used as a food, fodder and industrial crop. Barley grain contains an average of 12,2 % protein, 77,2 % carbohydrates, 2,4 % fat, and up to 3 % ash elements, in particular, the protein is complete in terms of amino acid composition, and the protein content of barley grain exceeds that of other cereals in terms of the presence of amino acids such as tryptophan and lysine [9]. Double-row vitreous

coarse-grained barley grain is used to make cereals containing 9 – 11% protein and 82 – 85% starch, and barley grain is also used to make flour and beer [14]. For all types of animals, barley grain is used as a highly nutritious feed, as 1 kg of grain contains 1,2 feed units and 100 g of digestible protein. Green fodder made from mixtures of barley and legumes, as well as straw and even steamed chaff, is valuable for livestock [16]. Spring barley is widely used in Ukraine and is a valuable export crop. Exports account for 12% of the total amount of barley grown in world trade [11]. Barley yields depend on a number of factors, including soil and climatic conditions, weather conditions, and specific cultivation techniques. Barley is characterized by high economic efficiency of cultivation, but at low yields, its cultivation can even be unprofitable. The limiting factors in the cultivation of spring barley are moisture and nutrient content [5]. Moisture availability in the context of climate change is an important factor that encourages early sowing of this crop for productive, economical use of soil moisture for crop formation. Barley is a crop that responds well to fertilization. When plants are provided with sufficient nutrients, this contributes to the growth of the efficiency of spring barley cultivation and minimizes the negative impact of stress factors that are exacerbated by climate change and affect grain yields [13].

In order to obtain high and high-quality yields, modern agricultural production should be based on technology elements aimed at ensuring high productivity and unlocking the genetic potential of the crop variety, they should be resource-saving with minimal negative impact on the environment [16]. One of these elements of technology is biological products, which are an environmentally friendly and cost-effective way to increase crop yields; these products allow for a fuller realization of the genetic potential of the crop varieties grown [17].

Intensive cultivation technology results in a loss of soil fertility, a decrease in the availability of nutrients available to plants, etc. Therefore, the elements of crop cultivation technology are developed and aimed primarily at enhancing the growth and development of plants, providing them with nutrients and increasing yields. In recent years, the most noteworthy studies have been aimed at determining the effectiveness of modern biological products containing a complex of macro- and microelements, their impact on plant growth and development, biometric parameters of cultivated grain varieties, yields and grain quality indicators.

Analysis of recent research and publications. At present, the use of preparations with growth-regulating properties and containing trace elements for foliar feeding during spring barley cultivation to increase its productivity has not been sufficiently studied. According to the results of research conducted by scientists from the Institute of Plant Physiology and Genetics of the National Academy of Sciences of Ukraine, the effect of natural biostimulants on the root systems of peas and wheat was first revealed.

Scientists have confirmed that organo-mineral fertilizers have high agrochemical efficiency and mobilizing ability to dissolve indigestible phosphates, contain plant

growth stimulants, provide more efficient positional availability of nutrients for plants, and significantly affect yield growth and product quality [10].

As a result of field studies at Lviv State University, the influence of biostimulants of domestic production on the phytohormonal state of plant cells was noted. It is noted that under the influence of biostimulants, plants undergo changes that contribute to the emergence of plant resistance to pests and diseases by accelerating the phases of plant development, when the receptors of the plant cell become immune to the effects of pathogens and pests [8].

The Uman State Agrarian Academy studied the effectiveness of the combined use of growth regulators and modern herbicides for growing soybeans, wheat, barley, corn, and peas. They noted the impact on plant growth and development, the thickness of the epidermis and other cells. When applying these elements of the technology, a positive effect on plant resistance to pests and an increase in yield was found. Confirmation of the economic efficiency and environmental feasibility of these technology elements was obtained [3].

As a result of the research conducted in the conditions of the laboratory of agriculture of the Kirovograd State Agricultural Research Station of the National Academy of Agrarian Sciences of Ukraine, where microbial preparations were used in the cultivation of spring barley (Sozonivsky variety) on different backgrounds of mineral nutrition, their positive effect on the growth, development of plants, yield and quality of grain was noted [18].

At present, there are few data provided by scientists on the effect of individual plant growth regulators and phytohormones on the growth and development of plants and grain yields of spring barley, in particular Patyk V.F. [12], Vityukov O.O. [2], Gyrka A.D. [6], Gamayunova V.V. [4, 5] and others.

Agricultural production is constantly evolving and improving, and new products with improved properties are constantly being developed to replace old ones that no longer meet the needs of farmers. Currently, a large number of different natural and artificial compound fertilizers with growth-regulating properties have been created, but the mechanism of their action has not yet been fully studied, as research in this area has not yet been conducted to the fullest extent. Drugs with growth-regulating properties are complex organic compounds and expensive, so the organization of their research and production requires constant study and improvement [1]. When developing and researching growth-regulating substances, it should be taken into account that the same substance, depending on various factors and amounts, can have a stimulating or inhibitory effect on vital processes in plants, so when using each individual component, it is necessary to take into account the results of comprehensive studies, when studying their effects at the cellular level and mandatory testing in production conditions [4].

The issue of optimizing the plant nutrition process in order to increase the level of spring barley productivity by influencing the activation of physiological processes and biometric parameters through the use of growth regulating substances is still insufficiently studied and requires further research.

Research conditions and methods. The research was carried out in the conditions of the farm "Nakoryk V.G." in the village. Leonivka, Tulchyn district, Vinnytsia region in the conditions of the Pravoberezhny Foreststeppe in during 2021-2022 year. Hydrothermal conditions during the years of our research were close to the average long-term data, and were favorable for growing spring barley. The average amount of precipitation by year varied between 560-570 mm, of which the main part of about 70% of precipitation fell during the vegetation period of plants in the warm period of the year. On the territory of the farm there are gray forest soils of light medium loamy texture. The predecessor for spring barley was corn for grain. The area of the accounting plot was 25 m², and the experiment was replicated three times. The agrotechnology of cultivation in the experiment is generally accepted for the Forest-Steppe zone of Ukraine, except for the factors that were taken for the study. The research was conducted with a zoned mid-season spring barley variety Modern. The scheme of the experiment according to which the research was conducted included the variety of spring barley Modern and domestic complex fertilizers that have growth-regulating properties (table 1.).

Table 1

Scheme of the experiment

№ p/p	Of the experiment foliar fertilization (spraying) of spring barley (phases of plant development)		
	BBCH – 20 - 23	BBCH – 30 - 32	BBCH – 51 - 55
1	Control (water treatment)		
2	GUMIFREND potassium humate 0,5 l/ha		
3	GUMIFREND potassium humate 0,5 l/ha	GUMIFREND potassium humate 0.5 l/ha	
4	GUMIFREND potassium humate 0,5 l/ha	GUMIFREND potassium humate 0.5 l/ha	GUMIFREND potassium humate 0.5 l/ha
5	Multicomplex StimOrganic 1 l/ha		
6	Multicomplex StimOrganic 1 l/ha	Multicomplex StimOrganic 1 l/ha	
7	Multicomplex StimOrganic 1 l/ha	Multicomplex StimOrganic 1 l/ha	Multicomplex StimOrganic 1 l/ha
9	Fulvigum 0,3 l/ha		
10	Fulvigum 0,3 l/ha	Fulvigum 0.3 l/ha	
11	Fulvigum 0,3 l/ha	Fulvigum 0.3 l/ha	Fulvigum 0.3 l/ha

the source is formed on the basis of own research results

The Modern spring barley variety belongs to the mid-season type, has a two-row pyramidal ear type, a variety of inerme, and is used for growing for grain. Instead of awns, the spikelet has outgrowths in the form of teeth. The spike is loose and has a strong waxy coating. The grain is yellow filmy, elongated-elliptical in shape. The grain contains 12,9 – 14,9% protein. The variety was developed at the V.Y. Yuriev Institute of Plant Industry, registered in 2011, and is zoned for cultivation in the Steppe, Polissya, and Forest-Steppe regions of Ukraine. The vegetation period is 87 – 97 days. When sowing, the seeding rate is 4 – 4,5 million seeds per hectare. The

experiment used domestic complex fertilizers with growth-regulating properties.

Humifriend potassium humate is a preparation based on potassium humate containing beneficial microorganisms and their metabolic products, manufactured by BTU-Center. The composition includes potassium salts of humic and fulvic acids, a complex of microorganisms: *Bacillus subtilis*, *Bacillus megaterium* var. p *hosphaticum*, *Bacillus muciloginosus*, *Bacillus macerans*, *Paenibacillus polymyxa* and biologically active substances (amino acids, peptides); succinic (succinic) acid; polyethylene glycol; trace elements (sulfur, magnesium, zinc, iron, manganese, boron, copper, silicon, molybdenum, cobalt). The preparation is applied by spraying the plants with the working solution, avoiding direct sunlight.

StimOrganic Multicomplex is a composition of macro- and microelements in chelated form based on humic substances, fulvic acids, auscines, phytohormones, and contains an increased amount of nitrogen. Provides macro- and micro-nutrition in critical phases of plant development (harvesting, flowering, grain filling). The ratio of all the necessary chelated trace elements (Fe, Zn, Cu, Mn, Mo, B) with a high content of ammonia and nitrate nitrogen, as well as chelated magnesium in the composition, chelating agents and pH of aqueous solutions are selected to maximize the absorption of all nutrients. The product is manufactured by the Rivne plant of humic fertilizers TM "StimOrganic". Fulvigum is a fertilizer made from organic raw materials of natural origin. The manufacturer is Life Biochem. The preparation contains a complex of biologically active compounds, salts of fulvic (8%) and humic acids (13%), amino acids (5%) and trace elements of natural origin (1%).

The studied preparations were used to fertilize spring barley plants during the most critical periods of plant development and yield formation. In particular, in the tillering phase, when plants grow intensively, photosynthetic activity increases, and the main elements of productivity are formed. During this period, plants need increased nutrition with macro- and microelements. During the earing phase, when the grain and its quality indicators are formed: protein and gluten content and quality. During this period, plants need increased nutrition with macro- and microelements. And also, the earing phase, when the grain formation is completed, nutrients are actively accumulated, and growth-regulating agents prolong the ripening period, which contributes to the formation of a more full grain.

The yield was taken into account from each plot of the experiment by the method of continuous weighing. The structure of the crop was determined by taking sheaf samples before harvesting. The yield accounting data were processed by the method of analysis of variance [7].

Summary of the main research material. At present, the main task of farmers is to obtain high and stable yields of grain crops. One of the measures that contributes to increasing the yield and quality of crop production is the introduction of energy-saving elements of technologies into agricultural production, one of which is the use

of preparations containing macro- and microelements and having growth-regulating properties.

According to the results of the conducted research, it can be noted that the use of preparations with growth-regulating properties had a positive effect on the biometric parameters of spring barley plants of the Modern variety (table 2.).

Table 2

Effect of complex fertilizers on biometric parameters of plants of spring barley variety Modern (average 2021–2022)

№ p/p	Nutrition background	Plant height, cm	Number of productive stems, pcs./m^2	Spike length, cm	Number of grains per ear, pcs.	Grain weight per ear, g	Weight of 1000 seeds, g
1	Control (water treatment)	67,4±3,1	284±13	7,4±0,3	20,7±1,2	1,0±0,03	42,5±1,5
2	1 treatment with Humifriend potassium humate 0,5 l/ha	69,4±3,4	431±16	8,2±0,6	23,2±1,7	1,1±0,05	44,0±1,1
3	2 treatment with Humifriend potassium humate 0,5 l/ha	71,5±4,0	503±20	8,4±0,5	23,7±1,9	1,2±0,03	44,3±1,7
4	3 treatment with Humifriend potassium humate 0,5 l/ha	75,8±3,8	549±25	8,6±0,4	23,9±1,5	1,3±0,02	44,9±1,9
5	1 treatment Multicomplex StimOrganic 1 l/ha	70,1±4,1	447±15	8,4±0,8	23,6±1,2	1,2±0,04	44,8±1,4
6	2 treatment Multicomplex StimOrganic 1 l/ha	72,4±4,4	536±19	8,7±0,4	24,2±1,5	1,2±0,07	45,9±1,05
7	3 treatment Multicomplex StimOrganic 1 l/ha	74,9±3,9	557±22	8,8±0,7	24,4±1,4	1,4±0,04	46,3±1,9
8	1 treatment Fulvigum 0,3 l/ha	74,3±4,0	396±17	8,1±0,5	22,9±1,2	1,1±0,06	43,8±1,2
9	2 treatment Fulvigum 0,3 l/ha	75,1±3,7	472±24	8,1±0,6	23,2±1,9	1,1±0,03	44,0±1,4
10	3 treatment Fulvigum 0,3 l/ha	78,7±4,1	498±18	8,3±0,4	23,3±1,4	1,3±0,05	44,3±1,8

the source is formed on the basis of own research results

The formation of the photosynthetic apparatus by a plant is an important prerequisite for obtaining sustainable yields, so important indicators for characterizing the effect of growth-regulating preparations on plant development are plant height and bushiness, since these traits are closely related to other properties and traits, in particular, plant assimilation of nutrients, resistance to lodging, yield and quality of grain crops [15].

When determining the height of plants, it was noted that in the control variant the height of plants was the smallest and amounted to 67,4 cm, and when using Humifriend potassium humate and Multicomplex StimOrganic in the tillering phase, this measure contributed to an increase in plant height by 2,0 cm and 2,7 cm in comparison with the control, when treated in the tillering and emerging phase, this indicator increased by 4,1 cm and 5,0 cm, respectively, and with three treatments of vegetative plants in the tillering, emerging and early earing phases, this indicator

increased by 8,4 cm and 7,5 cm, respectively, compared to the control. Significantly higher rates were obtained when using Fulvigum in the tillering phase, this measure contributed to an increase in plant height by 6,9 cm compared to the control, when treated in the tillering and tube growth phase, this indicator increased by 8,5 cm, and with three times treatment of vegetative plants, this indicator increased by 11,3 cm compared to the control.

At the same time, when analyzing the number of productive stems, we noted that when using Humifriend potassium humate and Multicomplex StimOrganic in the tillering phase, this measure contributed to an increase in this indicator by 147 cm and 163 pcs./m^2, respectively, compared to the control, where the number of productive stems was the lowest and amounted to 284 pcs./m^2. When treating plants in the phase of tillering and emerging into the tube with biological products Humifriend potassium humate and Multicomplex StimOrganic, the number of productive stems increased by 219 pcs./m^2 and 252 pcs./m^2, respectively, and the highest rates were obtained with three times treatment of vegetative plants in the phase of tillering, emerging into the tube and at the beginning of earing, this indicator increased by 265 pcs./m^2 and 273 pcs./m^2, respectively, compared to the control. And when applying the biological product Fulvigum in the tillering phase, this measure contributed to an increase in the number of productive stems by 112 pcs./m^2 compared to the control, when treated in the tillering and tube growth phase, this indicator increased by 188 pcs./m^2, and with three times treatment of vegetative plants, this indicator increased by 214 pcs./m^2 compared to the control. Analyzing the results obtained, it can be noted that when using Humifriend potassium humate and Multicomplex StimOrganic, a slight increase in the height of spring barley plants was noted, but the number of productive stems increased significantly, especially in the variant where these preparations were used to spray plants in three phases of vegetation.

When analyzing the length of the ear, the lowest value of 7,4 cm was noted in the control, while the use of the preparations showed an increase in this indicator from 0,7 to 1,4 cm compared to the control. It can be noted that the use of preparations during the growing season had a positive effect on the formation of ears of spring barley.

An important indicator of plant productivity is the number of grains in the ear, when calculating this indicator, it was noted that when treated with Humifriend potassium humate, Multicomplex StimOrganic and Fulvigum in the tillering phase of plants, this indicator increased by 2,2 – 2,9 pcs. in the ear compared to the control, in the variants where two treatments were used in the tillering and tube emergence phase, the number of grains in the ear increased by 0,3 – 0,6 pcs. in comparison with the data obtained during the treatment in the tillering phase, and in the variants where three treatments were applied in the tillering, earing and earing stage, the number of grains per ear increased by only 0,1 – 0,2 pcs. per ear compared to the data obtained in the variants where two treatments were applied. The greatest increase in the number of

grains per ear was observed in the variant where the preparations were applied in the tillering phase of plants.

When determining the weight of grain from one ear, it was noted that with one-time and two-time treatment of plants with Humifriend potassium humate, Multicomplex StimOrganic and Fulvigum, this indicator increased by 0,1 – 0,2 g per ear compared to the control, and with three-time treatment of plants with preparations, the weight of grain from one ear increased by 0,3 – 0,4 g per ear compared to the control.

An important indicator of the structure of the crop is the weight of 1000 seeds, when analyzing this indicator, it can be noted that in the variants where fertilization was carried out, this indicator was significantly higher. In particular, when treating spring barley plants with Humifriend potassium humate in the tillering phase, the weight of 1000 seeds increased by 1,5 g compared to the data obtained in the control, when using the preparation Multicomplex StimOrganik, this indicator increased by 2,3 g compared to the data obtained in the control, and when using Fulvigum, this indicator increased by 1,3 g compared to the control. With two-time treatment of spring barley plants with Humifriend potassium humate, the weight of 1000 seeds increased by 1.8 g compared to the data obtained in the control, with the use of Multicomplex StimOrganic, this indicator increased by 3,4 g compared to the data obtained in the control, and with the use of Fulvigum, this indicator increased by 1,5 g compared to the control. When spring barley plants were treated three times with Humifriend potassium humate, the weight of 1000 seeds increased by 2,4 g compared to the data obtained in the control, when using Multicomplex StimOrganic, this indicator increased by 3,8 g compared to the data obtained in the control, and when using Fulvigum, this indicator increased by 1.8 g compared to the control.

Analyzing the results obtained, it can be noted that all the studied preparations had a stimulating effect on the plants to varying degrees, especially when applied in the first periods of vegetation, in the further development of the treated plants continued to maintain an advantage over the plants of the control variant.

Thus, in the cultivation of spring barley, the positive effect of optimizing plant nutrition by using preparations in fertilization was observed throughout the growing season, as the biometric parameters of the treated plants increased in proportion to the number of treatments.

One of the main indicators of the effective effect of the preparations is the accumulation of raw plant mass. This indicator is directly proportional to the provision of plants with nutrients and, accordingly, an increase in the area of the photosynthetic apparatus of plants. As a result of the conducted research, a positive effect of fertilizers on the accumulation of crude biomass of spring barley plants of the Modern variety was noted (table 3).

Table 3

Effect of complex fertilizers on the accumulation of crude plant biomass of spring barley variety Modern (average 2021–2022)

№ p/p	Nutrition background	Weight of raw aboveground mass of plants g/m^2	
		Phases of plant development	
		BBCH – 30 - 32	BBCH – 51 - 55
1	Control (water treatment)	947 ±41	1417±73
2	1 treatment with Humifriend potassium humate 0,5 l/ha	1730±68	1904±98
3	2 treatment with Humifriend potassium humate 0,5 l/ha	1734±82	2075±97
4	3 treatment with Humifriend potassium humate 0,5 l/ha	1728±89	2048±89
5	1 treatment Multicomplex StimOrganic 1 l/ha	1861±95	1972±96
6	2 treatment Multicomplex StimOrganic 1 l/ha	1874±86	2145±79
7	3 treatment Multicomplex StimOrganic 1 l/ha	1872±71	2152±95
8	1 treatment Fulvigum 0,3 l/ha	1496±76	1780±83
9	2 treatment Fulvigum 0,3 l/ha	1429±63	1853±92
10	3 treatment Fulvigum 0,3 l/ha	1498±81	1852±86

the source is formed on the basis of own research results

The lowest index of crude aboveground mass of plants was noted in the phase of tubing of spring barley plants in the control variant, where this index was 947 g/cm^2. The use of complex fertilizers contributed to the growth of this indicator, in particular, in the variants where plants were sprayed in the tillering phase with Humifriend potassium humate already in the tube phase, an increase in the weight of the raw plant mass by 781 – 787 g/cm^2 was noted compared to the data obtained in the control where no treatment was carried out. In the variant where the preparation Multicomplex StimOrganik was used for spraying plants in the tillering phase, an increase in the weight of the raw mass of plants by 914 – 927 g/cm^2 was noted already in the tubing phase compared to the data obtained in the control. In the variant where Fulvigum was used for spraying plants in the tillering phase, an increase in the weight of the raw mass of plants by 482 – 551 g/cm^2 was noted already in the tubing phase compared to the data obtained in the control.

When determining the crude aboveground mass of plants in the phase of early earing of spring barley plants, the lowest value was obtained in the control variant, where this figure was 1417 g/cm^2. In the variant where the preparation Humifriend potassium humate was applied in the tillering phase, when calculating the weight of the crude aboveground mass of plants in the phase of earing, an increase in this indicator by 487 g/cm^2 was noted compared to the data obtained in the control where no treatment was carried out, and when treating plants with this preparation in the tillering and tubing phases, this indicator increased by 631 – 658 g/cm^2 compared to the control. In the variant where the preparation Multicomplex StimOrganic was used

in the tillering phase, when calculating the weight of the raw aboveground mass of plants in the phase of earing, an increase in this indicator by 555 g/cm^2 was noted compared to the data obtained in the control, and when treating plants with this preparation in the tillering and tubing phases, this indicator increased by 728 – 735 g/cm^2 compared to the control. In the variant where Fulvigum was used in the tillering phase, when calculating the weight of the raw aboveground mass of plants in the phase of earing, an increase in this indicator by 363 g/cm^2 was noted compared to the data obtained in the control, and when treating plants with this preparation in the tillering and tubing phases, this indicator increased by 435 – 436 g/cm^2 compared to the control. It can be noted that the weight of crude aboveground mass increased in proportion to the treatments, from which it can be concluded that the treatment with complex preparations contributed to the improvement of plant nutrition, and as a result, contributed to the growth and development of plants and the accumulation of crude aboveground biomass.

As a result of the conducted research, a positive effect of preparations with growth-regulating properties on the yield of spring barley variety Modern was noted (table 4).

Table 4

Grain yield of spring barley variety Modern depending on on nutrition optimization, t/ha

№ p/p	Nutrition background	Yield, t/ha	Increase to control	
			t/ha	%
1	Control (water treatment)	2,4	-	-
2	1 treatment with Humifriend potassium humate 0,5 l/ha	2,7	0,3	13
3	2 treatment with Humifriend potassium humate 0,5 l/ha	3,1	0,7	29
4	3 treatment with Humifriend potassium humate 0,5 l/ha	3,3	0,9	38
5	1 treatment Multicomplex StimOrganic 1 l/ha	3,0	0,6	25
6	2 treatment Multicomplex StimOrganic 1 l/ha	3,2	0,8	33
7	3 treatment Multicomplex StimOrganic 1 l/ha	3,4	1,0	42
8	1 treatment Fulvigum 0,3 l/ha	2,6	0,2	8
9	2 treatment Fulvigum 0,3 l/ha	2,9	0,5	21
10	3 treatment Fulvigum 0,3 l/ha	3,1	0,7	29
	HIR0.05	0,1		

the source is formed on the basis of own research results

The use of complex fertilizers for plant treatment during the growing season contributed to an increase in the level of spring barley grain yield. In the variant where the preparation Humifriend potassium humate was applied in the tillering phase, an

increase in grain yield was noted by 0,3 t/ha compared to the data obtained in the control where no treatment was carried out, with two times of treatment of plants with this preparation in the tillering and tubing phases, this indicator increased by 0,7 t/ha compared to the control, and with three times of treatment of plants with this preparation, the yield increased by 0,9 t/ha compared to the control, which is 38%. In the variant where the preparation Multicomplex StimOrganic was applied in the tillering phase, an increase in grain yield was noted by 0,6 t/ha compared to the data obtained on the control where no treatment was carried out, with two treatments of plants with this preparation in the tillering and tubing phases, this indicator increased by 0,8 t/ha compared to the control, and with three treatments of plants with this preparation, the yield increased by 1,0 t/ha compared to the control, which is 42%. In the variant where Fulvigum was applied in the tillering phase, an increase in grain yield by 0,2 t/ha was noted compared to the data obtained in the control where no treatment was carried out, with two treatments of plants with this preparation in the tillering and tubing phases, this indicator increased by 0,5 t/ha compared to the control, and with three treatments of plants with this preparation, the yield increased by 0,7 t/ha compared to the control, which is 29%. The yield data indicate that the use of complex fertilizers contributed to an increase in the level of spring barley grain yield in proportion to the number of planting treatments. Among the fertilizers we tested, we can distinguish the more effective Multicomplex StimOrganik 1 l/ha and Humifriend potassium humate 0,5 l/ha, while Fulvigum 0,3 ml/ha was slightly less effective. Spring barley is characterized by a short growing season, and the use of fertilizers with a stimulating effect helps to improve plant nutrition, intensive formation of the assimilation apparatus in plants and is a prerequisite for increasing the level of grain yield of this crop.

Conclusions. As a result of the research, it was noted that the maximum indicators were obtained in the variants where three times treatment with plant preparations was carried out in the most sensitive to nutrition phases of spring barley vegetation. In particular, in the variants where spring barley plants were fertilized in three phases of vegetation with Humifriend potassium humate and Multicomplex StimOrganic, a slight increase in plant height was noted, but the number of productive stems increased significantly by 265 pcs./m^2 and 273 pcs./m^2, respectively, compared to the control. The use of preparations for plant nutrition had a positive effect on the formation of ears of spring barley, the length of the ear increased by 0,7 – 1,4 cm compared to the control. In the variants where three treatments with complex fertilizers were used, the number of grains in the ear was the highest, this indicator increased by 2,6 – 3,7 pcs. compared to the data obtained in the control. With three treatments of plants with preparations, the weight of grain per ear increased by 0,3 – 0,4 g compared to the control. When spring barley plants were treated three times with Humifriend potassium humate, the weight of 1000 seeds increased by 2,4 g compared to the control, when using Multicomplex StimOrganic, this indicator increased by 3,8 g compared to the control, and when using Fulvigum, this indicator increased by 1,8 g compared to the control.

When calculating the weight of the crude aboveground mass of plants in the phase of earing, the highest values were obtained in the variants where fertilizers were used in two phases of vegetation, when using Humifriend potassium humate, this indicator increased by 631 – 658 g/cm^2 compared to the control, when using Multicomplex StimOrganic, this indicator increased by 728 – 735 g/cm^2 compared to the control, and when using Fulvigum, this indicator increased by 435 – 436 g/cm^2 compared to the control.

The use of complex fertilizers for plant treatment during the growing season contributed to an increase in the level of spring barley grain yield, most of all, with three times treatment with the preparation Multicomplex StimOrganik, the yield increased by 1,0 t/ha compared to the control, when applying Humifriend potassium humate, the yield increased by 0,9 t/ha compared to the control, which is 38%, and when applying Fulvigum, the yield increased by 0,7 t/ha compared to the control, which is 29%. The yield data indicate that the use of complex fertilizers contributed to an increase in the level of spring barley grain yield in proportion to the number of planting treatments. Among the fertilizers we tested, StimOrganic Multicomplex 1 l/ha and Humifriend potassium humate 0,5 l/ha were more effective, while Fulvigum 0,3 ml/ha was slightly less effective. Thus, the use of complex fertilizers for the treatment of spring barley plants during the growing season is an effective measure for its cultivation in the conditions of the Rightbank Foreststeppe of Ukraine, which makes it possible to significantly increase the yield.

Список використаної літератури

1. Біднина І.О., Влащук О.С., Козирєв В.В., Томницький А.В. Ефективність сумісного застосування добрив та мікробних препаратів при вирощуванні сільськогосподарських культур на півдні України. *Зрошуване землеробство*. 2013. № 60. С. 54−56.

2. Вінюков О.О., Коробова О.М., Бондарева О.Б., Коноваленко П.В. Використання біо та рістрегулюючих препаратів для підвищення продуктивності та якості зерна ячменю ярого. *Збалансоване природокористування*. 2017. № 3. С. 46-50.

3. Волкогон В.В., Москаленко А.М., Дімова С.Б., Волкогон К.І., Пиріг О.В., Сидоренко В.П. Мікробні препарати в технологіях вирощування сільськогосподарських культур як чинник регулювання активності процесу денітрифікації. *Сільськогосподарська мікробіологія*. 2019. № 29. С. 3-11.

4. Гамаюнова В.В., Касаткіна Т.О. Вплив оптимізації живлення ячменю ярого на формування якості зерна в умовах Південного Степу України. «*Наукові горизонти*», «*Scientific horizons*». 2019. №10 (83). С. 3-12.

5. Гамаюнова В.В., Панфілова А.В., Кувшинова А.О., Касаткіна Т.О.,Бакланова Т.В., Нагірний В.В. Збільшення зерновиробництва в зоні Степу України за рахунок вирощування ячменю та оптимізації його живлення. «*Наукові горизонти*», «Scientific horizons». 2020. №2 (87). С. 15-23.

6. Гирка А.Д., Бокун О.І., Мамєдова Е.І. Вплив попередників, мінеральних добрив і біопрепаратів на формування елементів структури врожайності ячменю ярого в Північному Степу України. *Зернові культури*. 2017. Т. 1. № 1. С. 51–55.

7. Рожков А.О., Пузік В.К., Каленська С.М. Дослідна справа в агрономії: навчальний посібник. Книга 1. Теоретичні аспекти дослідної справи. За ред. А.О. Рожкова. Х.: Майдан, 2016. 316 с.

8. Кобилецька М.С., Терек О.І. Біохімія рослин: навчальний посібник. Львів: ЛНУ імені Івана Франка, 2017. 270 с.

9. Мазур В.А., Поліщук І.С., Телекало Н.В., Мордванюк М.О. Рослинництво: навчальний посібник. (Частина І). Вінниця. ТОВ «Друк» 2020. 352.

10. Мазур В.А., Паламарчук В.Д., Поліщук І.С. Новітні агротехнології у рослинництві. Вінниця. 2017. 588 с.

11. Мамєдова Е.І. Ефективність застосування біопрепаратів та мінеральних добрив при вирощуванні ячменю ярого після різних попередників. Стан і перспективи впровадження ресурсоощадних, енергозберігаючих технологій вирощування сільськогосподарських культур: ІІ міжнародна науково-практична конференція. Дніпро, 2017. С. 74–75.

12. Гриник І.В., Патика В.П., Шкатула Ю.М. Мікробіологічні основи підвищення врожайності та якості зернових культур. *Вісник Полтавської державної аграрної академії.* 2011. №4. С. 7-11.

13. Заєць С.О., Онуфран Л.І. Ячмінь ярий на півдні України : монографія. *Інститут зрошуваного землеробства НААН України*. Херсон : Олді-Плюс, 2019. 162 с.

14. Паламарчук В.Д., Поліщук І.С., Каленська С.М., Єрмакова Л.М. Біологія та екологія сільськогосподарських рослин: підручник. Київ, 2013. 636 с.

15. Панфілова А.В., Гамаюнова В.В. Вплив оптимізації живлення на висоту рослин та врожайність зерна сортів ячменю ярого в умовах Південного Степу України. *Вісник аграрної науки Причорномор`я*. 2018. Вип. 4. С. 42-47.

16. Петриченко В.Ф., Лихочвор В.В. Рослинництво. Нові технології вирощування польових культур: підручник.- 5-те вид., виправ. Львів: НВФ «*Українські технології*». 2020. 806 с.

17. Поліщук М.І. Продуктивність ячменю ярого залежно від застосування регуляторів росту рослин в умовах Лісостепу Правобережного. Вплив змін клімату на онтогенез рослин: матеріали доповідей міжнародної науково-практичної конференції. Миколаїв, 2018. С. 80−82.

18. Ткаліч І.Д., Сидоренко Ю.Я., Бочевар О.В., Ільєнко О.В., Кулик І.О., Мамєдова Е.І. Продуктивність ячменю озимого-дворучки за осінньої та весняної сівби залежно від обробки насіння та фону живлення. *Бюлетень*

Інституту сільського господарства степової зони НААН України. 2016. № 11. С. 31–35.

Список використаної літератури у транслітерації / References

1. Bednina I.O., Vlaschuk O.S., Kozyrev V.V., Tomnytskyi A.V. (2013). The effectiveness of the combined use of fertilizers and microbial preparations in the cultivation of agricultural crops in the south of Ukraine. *Irrigated agriculture*. № 60. P. 54−56. [in Ukrainian].

2. Vinyukov O.O., Korobova O.M., Bondareva O.B., Konovalenko P.V. (2017). The use of bio and re-regulating drugs to increase the productivity and quality of spring barley grain. *Balanced nature management.* № 3. P. 46-50. [in Ukrainian].

3. Volkogon V.V., Moskalenko A.M., Dimova S.B., Volkogon K.I., Pyrig O.V., Sydorenko V.P. (2019). Microbial preparations in technologies for growing agricultural crops as a factor in regulating the activity of the denitrification process. *Agricultural microbiology.* № 29. P. 3-11. [in Ukrainian].

4. Gamayunova V.V., Kasatkina T.O. (2019). The effect of optimization of spring barley nutrition on the formation of grain quality in the conditions of the Southern Steppe of Ukraine. *"Scientific horizons", "Scientific horizons".* № 10 (83). P. 3-12. [in Ukrainian].

5. Gamayunova V.V., Panfilova A.V., Kuvshinova A.O., Kasatkina T.O., Baklanova T.V., Nagirny V.V. (2020). Increasing grain production in the Steppe zone of Ukraine due to growing barley and optimizing its nutrition. *"Scientific horizons", "Scientific horizons".* №. 2 (87). P. 15-23. [in Ukrainian].

6. Girka A.D., Bokun O.I., Mamedova E.I. (2017). Influence of precursors, mineral fertilizers and biological preparations on the formation of elements of the spring barley yield structure in the Northern Steppe of Ukraine. *Cereal crops*. Vol. 1. № 1. P. 51–55. [in Ukrainian].

7. Rozhkov A.O., Puzik V.K., Kalenska S.M. (2016). Research work in agronomy: study guide. Book 1. Theoretical aspects of the research case. under the editorship A.O. Rozhkova. Kh.: Maidan, 316 p. [in Ukrainian].

8. Kobyletska M.S., Terek O.I. (2017). Biochemistry of plants: teaching. Manual. Lviv: LNU named after Ivan Franko. 270 p. [in Ukrainian].

9. Mazur V.A., Polishchuk I.S., Telekalo N.V., Mordvaniuk M.O. (2020). Crop production: a study guide. (Part I). Vinnytsia "Druk" LLC. 352. [in Ukrainian].

10. Mazur V.A., Palamarchuk V.D., Polishchuk I.S. (2017). Newest agrotechnologies in crop production. Vinnytsia. 588 c. [in Ukrainian].

11. Mamedova E.I. (2017). The effectiveness of the use of biological preparations and mineral fertilizers in the cultivation of spring barley after different predecessors. Status and prospects of implementation of resource-saving, energy-saving technologies for growing agricultural crops: II international scientific and practical conference. Dnipro. P. 74–75. [in Ukrainian].

12. Hrynyk I.V., Patyka V.P., Shkatula Y.M. (2011). Microbiological bases of increasing the yield and quality of grain crops. *Bulletin of the Poltava State Agrarian Academy*. №. 4. P. 7-11. [in Ukrainian].

13. Zayets S.O., Onufran L.I. (2019). Wild barley in the south of Ukraine: monograph. Institute of Irrigated Agriculture of the National Academy of Sciences of Ukraine. Kherson: Oldi-Plus, 162 p. [in Ukrainian].

14. Palamarchuk V.D., Polishchuk I.S., Kalenska S.M., Yermakova L.M. (2013). Biology and ecology of agricultural plants: textbook. Kyiv. 636 p. [in Ukrainian].

15. Panfilova A.V., Gamayunova V.V. (2018). The influence of nutrition optimization on plant height and grain yield of spring barley varieties in the conditions of the Southern Steppe of Ukraine. *Herald of Agrarian Science of the Black Sea Region*. Issue 4. P. 42-47. [in Ukrainian].

16. Petrychenko V.F., Lykhochvor V.V. (2020). Plant growing. New technologies for growing field crops: textbook. - 5th ed., corrected. Lviv: "Ukrainian Technologies" Scientific Research Institute. 806 p. [in Ukrainian].

17. Polishchuk M.I. (2018). Productivity of spring barley depending on the application of plant growth regulators in the conditions of the Pravoberezhny Forest-Steppe. The influence of climate changes on the ontogenesis of plants: materials of reports of the international scientific and practical conference. Mykolaiv. P. 80−82. [in Ukrainian].

18. Tkalich I.D. Sydorenko Yu.Ya., Bochevar O.V., Ilyenko O.V., Kulyk I.O., Mamedova E.I. (2016). Productivity of winter barley during autumn and spring sowing depending on seed treatment and nutritional background. *Bulletin of the Institute of Agriculture of the Steppe Zone of the National Academy of Sciences of Ukraine*. No. 11. P. 31–35. [in Ukrainian].

АНОТАЦІЯ

ВПЛИВ ОПТИМІЗАЦІЇ ЖИВЛЕННЯ РОСЛИН ЯЧМЕНЮ ЯРОГО НА ФОРМУВАННЯ УРОЖАЮ В УМОВАХ ПРАВОБЕРЕЖНОГО ЛІСОСТЕПУ УКРАЇНИ

У даній статті наведено результати дослідження впливу комплексних добрив на продуктивність ярого ячменю. В результаті проведених досліджень було встановлено, що у варіантах де проводили трьох разові обробки рослин препаратами у найбільш чутливі до живлення фази вегетації ярого ячменю середньостиглого сорту Модерн, були отримані максимальні біометричні показники рослин. У варіантах де проводили підживлення рослин ярого ячменю у трьох фазах вегетації кущення, виходу в трубку та на початку колосіння препаратами Гуміфренд гумат калію та Мультикомплекс СтимОрганік відмічено, значне зростання кількості продуктивних стебел відповідно на 265 шт./м^2 та 273 шт./м^2 у порівнянні до контролю. Застосування препаратів стимулювало ріст рослин і це мало позитивний вплив на формування колосків ярого ячменю, довжина яких зросла на 0,7 – 1,4 см у порівнянні до контролю. Найбільша кількість зерен у колосі була відмічено у варіантах де застосовували три обробки комплексними добривами де даний показник збільшився на 2,6 – 3,7 шт. у порівнянні з контролем. Трьох разова обробка рослин препаратами також сприяла збільшенню маси зерна з одного колоса на 0,3-0,4 г у порівнянні до контролю. За трьох разової обробки рослин ячменю ярого препаратом Гуміфренд

гумат калію маса 1000 насінин зросла на 2,4 г у порівнянні до контролю, при застосуванні препарату Мультикомплекс СтимОрганік даний показник зріс на 3,8 г у порівнянні до контролю, а при застосуванні препарату Фульвігум даний показник зріс на 1,8 г у порівнянні до контролю.

Важливим показником продуктивності є вага сирої надземної маси рослин, при підрахунку даного показника у фазу початку колосіння найвищі показники були отримані у варіантах де застосували препарати для підживлення у дві фази вегетації, зокрема, при застосуванні препарату Гуміфренд гумат калію даний показник зріс на 631 – 658 г/см^2 у порівнянні до контролю, при застосуванні препарату Мультикомплекс СтимОрганік даний показники зріс на 728 – 735 г/см^2 у порівнянні до контролю, а при застосуванні препарат Фульвігум даний показник зріс на 435 – 436 г/см^2 у порівнянні до контролю.

Найвищий показник урожайності зерна ячменю ярого був отриманий у варіанті де застосовували трьохкратну обробку рослин препаратом Мультикомплекс СтимОрганік де урожайність зросла на 1,0 т/га у порівнянні до контролю, що становить 42%, при застосуванні препарату Гуміфренд гумат калію урожайність зросла на 0,9 т/га у порівнянні до контролю, що становить 38%, а при застосуванні препарату Фульвігум урожайність зросла на 0,7 т/га у порівнянні до контролю, що становить 29%. Отримані дані свідчать, що застосування комплексних добрив на посівах ярого ячменю сприяло росту, розвитку рослин та збільшенню рівня урожаю зерна пропорційно кількості проведених обробок рослин.

Ключові слова: *ячмінь ярий, комплексні добрива, урожайність.*

Табл. 4. Літ. 18.

Інформація про автора

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