

Influence of elements of biologization of cultivation of winter wheat on different backgrounds of mineral nutrition in conditions of South Steppe of Ukraine

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The purpose. To study influence of biological preparations and their elements in *biologization of cultivation* of winter wheat after such predecessors, as bare fallow and winter mustard, and also productivity, quality of grain on different backgrounds of importation of basic mineral nutrition. **Methods.** General scientific: field experiments, laboratory (physicochemical parameters of grain), calculation-relative and mathematical (dispersing). **Results.** It is determined that at use in technique of growing winter wheat of some biological preparations on different backgrounds of basic mineral nutrition productivity raises on 0,08-0,25 t/hectare and quality of grain from the 5-th to 3-rd class treats to food one. **Conclusions.** On the basis of probes it is determined that for deriving stable high and quality yield under the basic cultivation of soil it is necessary to deposit complex fertilizers in doze NPK₃₂, NPK₆₄ and to inoculate seed grain with biological preparations on the basis of nitrogen-fixing, phosphate-mobilizing, potassium-mobilizing bacteria with the use of organomineral fertilizers, microelements on the basis of chelates, biostimulus, biofungicides, vitamins, amino acids, betaine, spores of mycelium of fungus *Trichoderma lignorum*, bacterial crop *Bacillus subtilis*. Use of elements of *biologization of cultivation* of winter wheat on the background of different predecessors and mineral nutrition for martempering productivity and quality of grain of winter grain crops in conditions of South Steppe of Ukraine is perspective.

Key words: winter wheat, fertilizer, biological preparation, predecessor.

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One of the ways to increase its quality is to introduce highly effective competitive technologies for the cultivation of this crop. Experimental data and research results of domestic and foreign scientists show that growing competitive crop production is possible only on the basis of scientific and technological progress, which is embodied in agricultural systems by modern technologies of growing crops [1-3]. In the current economic conditions, the solution to this problem is restrained by the shortage of material and technical resources, the inadequate use of the genetic potential of varieties, the inexhaustibility of growing technologies, etc. [4-5]. Excessive chemicalization and depletion of soils lead to a sharp decline in soil fertility, which is why it is extremely important to reduce the chemical load, to uncover unused biotechnology opportunities, to develop and implement new methods for the ecological optimization of plant protection. These biologization measures should be aimed at restoring soil fertility, increasing productivity and quality of grain of winter wheat cereals [6, 7]. In today's conditions of development of grain production, the complex use of traditional means of chemistry with the new elements of biologization with innovative microbiological preparations that can perform a number of functions on increasing the yield of winter wheat is of particular importance. And also the location of winter wheat in the crop rotation, which, in turn, depends on the stability of the crop and the quality of the grain [8-11]. The purpose of research. To study elements of biologization of winter wheat cultivation and its influence on yield and quality of

grain on different backgrounds of mineral nutrition. Materials and methods. Field experiments were conducted on the experimental field of the Odessa State Agricultural Research Station of the National Academy of Sciences of Ukraine, whose land is located in the Southern Steppe zone. Soil - black earth, southern medium-heavy heavy-lime on carbonate forest. The content of humus in the arable layer is 3.2%, safety he content in the extractor for Chirikov is 7,37 and 15,48 mg / 100 g, respectively); the reaction of the soil is light-walled (pNosolove - 7.3). Winter wheat was sown with Knop. Repeat 4x. Variants are placed on the same highway systematically. The date of sowing on October 28, the rate of seeding 4.5 million similar seed per 1 hectare. The total area of the plot is 43.2m², the account is 26.4m². The soil tillage system after the predecessors of the winter and black steam mustard was carried out by counting the recommendations for the Southern Zone of Ukraine [12]. Under basic cultivation, nitro-amphosus was injected at the norm (NPK) 32 ds per 1 hectare, (NPK) 64 ds per 1 hectare Seeds of winter wheat before sowing and vegetation were treated with biological standards: Пероплан - 250 ml / t seeds, Helaphite - 1l / t, Biocomplex-BTU (m) for grain crops - 1l / ton. Research results. The study of the effectiveness of the use of biologized technology for growing grain crops, including winter wheat, which we conducted in previous years, did not show a significant increase in yield and its quality. Therefore, we have developed a scheme of research, where under the basic cultivation introduced complex fertilizers in the normal (NPK) 32 and (NPK) 64 active substances per 1 hectare. on the basis of the balance content of substances and extracted mineral substances with a crop. In (Table 1) there are three factor research experiments on winter wheat cultivation after the black pairs and the winter mustard. When placing black pairs in the background after the predecessor without introducing the main mineral fertilizer, but only inoculating the seeds and treating the vegetative plants with the Helaphita biopreparatum, the average yield was 3.05 t / ha, which is 2.3% more than control, the increase was 0.07 t / ha On the background there was introduced (NPK) 32 kg. d.r. ha, when treated with Helaphita, the yield was 3.36 t / ha at the control of 3.18 t / ha (5.6%), the increase was 0.18 t / ha, other biological preparations such as Regaplan and BTU (m) - 3, 34-3.30 t / ha. In the general background of the introduction of complex tuk (NPK) 64, the yield was 3.66 t / ha. On the general background when processing seeds biological the product Helafitom and subsequent application in the vegetation period was obtained an increase in wheat grain of winter 0.25 t / ha. Placing winter wheat after the predator of winter mustard without the main fertilizer application in the processing of seeds by biological preparations and their subsequent use in the periods of organogenesis, the increase in yield was from 0.12 to 0.14 t / ha. On the background (NPK) 32 from 0.08 to 0.11 t / ha (4.7-4.6%), on the background (NPK) 64 from 0.17 to 0.25 t / ha (10.1- 8.9%). According to the results of the dispersion analysis of experimental data, the yield of wheat of winter wheat Knop has revealed that the precursors had the maximum impact on the productivity of plants, which ensured the formation of the crop by 73% (Figure 1)

1 Yield of winter wheat grain depending on predecessor, main fertilizer and biopreparations for seed treatment before sowing, t / ha

Попередник (Фактор А)	Удобрення (Фактор В)	Обробка насіння та рослин (Фактор С)	Урожайність при 14% вологості зерна, т/га					Середня по фактору	
			Повторність				Середня	А	В
			I	II	III	IV			
Чорний пар	Без добрив	Контроль	3,19	2,80	3,10	2,79	2,98	3,40	2,59
		Регоплант	2,98	3,09	3,15	2,92	3,04		
		Хелафіт	2,84	3,15	3,09	3,06	3,05		
		БТУ(м)	3,16	2,96	3,18	2,77	3,02		

	(NPK) ₃₂	Контроль	3,18	3,22	3,12	3,23	3,18	2,81	
		Регоплант	3,27	3,32	3,23	3,55	3,34		
		Хелафіт	3,25	3,31	3,34	3,65	3,36		
		БТУ(м)	3,34	3,31	3,22	3,33	3,30		
	(NPK) ₆₄	Контроль	3,76	3,75	3,71	3,43	3,66		3,26
		Регоплант	3,96	3,84	3,75	4,02	3,89		
		Хелафіт	3,93	3,86	3,95	3,90	3,91		
		БТУ(м)	4,01	3,76	3,87	3,89	3,88		
Гірчиця озима	Без добрив	Контроль	1,95	1,91	1,90	2,03	1,92	2,37	
		Регоплант	1,92	2,13	2,09	2,01	2,04		
		Хелафіт	2,11	1,99	2,01	2,14	2,06		
		БТУ(м)	1,91	1,96	1,99	2,34	2,05		
	(NPK) ₃₂	Контроль	2,20	2,31	2,48	2,28	2,32		
		Регоплант	2,49	2,20	2,47	2,42	2,40		
		Хелафіт	2,39	2,50	2,33	2,46	2,42		
		БТУ(м)	2,46	2,53	2,31	2,42	2,43		
	(NPK) ₆₄	Контроль	2,63	2,64	2,22	2,36	2,46		
		Регоплант	2,73	2,43	2,68	2,66	2,63		
		Хелафіт	2,65	2,71	2,50	2,84	2,68		
		БТУ(м)	2,89	2,31	2,85	2,80	2,71		
Середня по фактору С			2,80	2,95	2,91	2,88			
Сила впливу факторів: А-0,57%, В-0,16%, С-0,01%, АВ-0,03%, АС-0,01%.									
НІР ₀₅ середніх (головних) ефектів, т/га для факторів: А – 0,15; В – 0,19; С – 0,22; АВ-0,27, АС-0,31, ВС-0,38, АВС-0,53.									

It should be emphasized that other factors have a significant impact on the formation of the crop. Thus, pre-planting of seed before sowing and vegetation by biological agents (Factor C) provided 1% in the total specific gravity weight, and fertilizer (Factor B), which introduced into pre-sowing cultivation - 21%. The minimum value was the interaction of investigative factors, factors A (predecessor), C (treatment of seeds and vegetative plants), which contributed to the formation of a yield of 1%, the interaction of factors A and B - 4%.

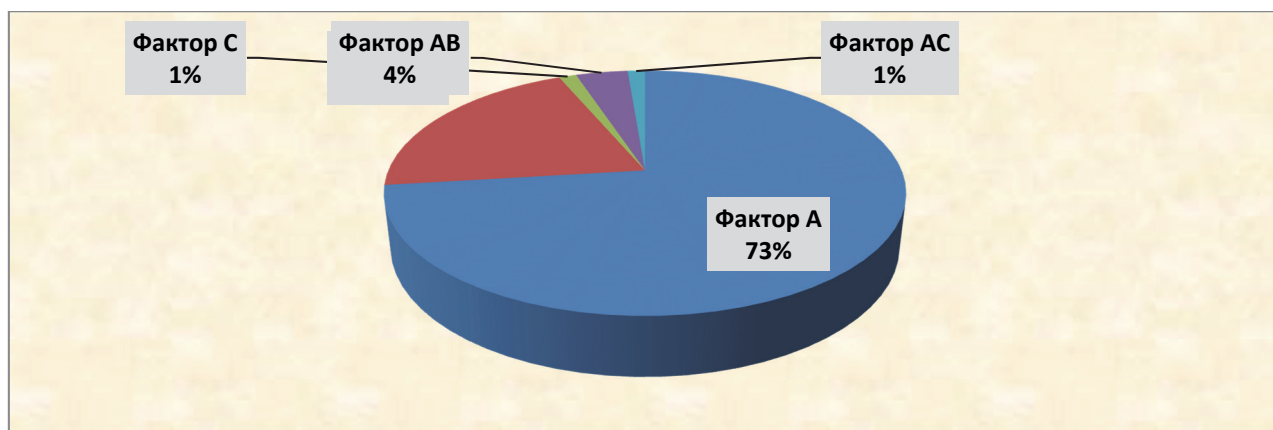


Fig. 1. Share of the influence of the investigated factors: predecessor (factor A); fertilizer (factor B); seed treatment before sowing (factor C) on the formation of winter wheat grain yield, %

In Table 2, in the background without the main introduction and inoculation of seeds with biological products, the quality of the grain was: gluten 17.2%, protein 11.8%, VDK 61.2 Umol., le grain belongs to grade 5. When applying biological products, the quality rises to grade 4. But when obtaining a stable level of requirements of 2-3 class of food grain relative to the concentration of protein, received only with the addition of sowing fertilizer application and pre-sowing inoculation of wheat seeds with winter biological preparations Regoplant, Helafit and BTU (m).

2 Quality of grain of wheat of winter depending on the main fertilizer and biological preparations for processing seeds in front of the seed (black pairs predecessor)

Основне добриво	Обробка насіння	Клейковина, %	ВДК, ум. од.	Білок, %	Клас зерна
Без добрив	Контроль	17,2	61,2	11,8	5
	Регоплант	18,1	75,1	11,9	4
	Хелафіт	19,3	69,7	11,7	4
	БТУ(м)	18,9	68,6	11,9	3
(NPK) ₃₂	Контроль	18,5	62,4	12,1	3
	Регоплант	20,2	63,7	12,8	3
	Хелафіт	20,7	78,0	13,1	3
	БТУ(м)	19,0	68,3	12,5	3
(NPK) ₆₄	Контроль	18,5	59,3	13,1	3
	Регоплант	19,9	67,7	13,3	3
	Хелафіт	22,5	86,3	13,7	3
	БТУ(м)	20,5	66,4	13,1	3

Conclusions

On the basis of the research it was established that in order to obtain a stable high-quality crop, it is necessary to introduce complex mineral fertilizers in the norm (NPK) 32, (NPK) 64 for basic soil tillage and to inoculate with biological biological preparations. The prospect is to introduce elements of biologization of winter wheat growing against the background of various precursors and mineral nutrients to improve the yield and quality of the grain.

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