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THE EFFECT OF THE RATES AND TIMING OF APPLICATION OF BIOPREPARATIONS, ORGANIC AND MINERAL FERTILIZERS ON THE BIOMETRIC INDICATORS OF THE AVERAGE WHITE CABBAGE PLANT

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Abstract:

This article presents scientific data on the weight, diameter, height, and productivity of a single head of medium-maturing white cabbage depending on the application rates of organic, mineral, and biological preparations under irrigated typical sierozem soil conditions.

Keywords: Typical serozem soils, biopreparations, mineral and organic fertilizers, rates and timing, medium-maturing white cabbage, single head weight, diameter, height, productivity, yield.

In the world, attention is paid to scientific research on the care of vegetable crops in irrigated areas, determining their requirements for organic and mineral fertilizers, biological preparations, maintaining and increasing soil fertility, improving the agrophysical and agrochemical properties of the soil, and ensuring ecosystem stability. Determining the norms of organic and mineral fertilizers, biological preparations for white cabbage in irrigated areas, maintaining and increasing soil fertility, is of great importance.

In accordance with the tasks set out in the Decree of the President of the Republic of Uzbekistan No. PF-5853 dated October 23, 2019 " On approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" [1], a number of measures are being implemented to increase the productivity of agricultural crops and soil fertility, effectively use land, water, fertilizers and other resources, mineral and organic fertilizers, biological preparations, and introduce advanced agrotechnologies. It is advisable to expand the scope of scientific research to maintain and increase soil fertility by using organic and mineral fertilizers and biological preparations in the cultivation of white cabbage in irrigated areas, and to meet the needs of the population in food products .

In this regard, a field experiment was conducted in 2021-2023 at the Tashkent Experimental Farm of the Research Institute of Vegetables, Melons and Potatoes of Uzbekistan in order to determine the standards of biopreparations, mineral and organic fertilizers that would ensure high and high-quality yields of medium-sized white cabbage in conditions of typical gray soils with a slope of 1.5 ^{0} , which have long been irrigated . The experiment consisted of 8 variants and was arranged in 3 rotations. Field experiments were conducted according to the methods of UzPITI [1; P. 180], BJAzimov and BBAzimov "Methodology of conducting experiments in vegetable, melon and potato growing" [2; B. 9-11], "Metodika opytnogo dela v ovoshchevodstve i bahchevodstve" by VFBelik [3; S. 30–45] were carried out according to the methods described in the sources. The experimental system is presented in Table 1.

As is known, vegetable crops are a large group of plants belonging to various botanical families, genera and species. These plants can be grown in open or protected areas for a short time, or they can be perennial. Various vegetative and generative organs (leaves, fruits, tubers, etc.) are used as a commodity . At the same time , to achieve high productivity of vegetable crops, it is necessary to introduce harmonious combined mechanisms that can only ensure the life of plants. By applying biological, organic, mineral, macro and micro fertilizers to these crops, and with a rational system of protection against pests and diseases, it is possible to achieve stable yields of vegetable crops while maintaining high product quality.

[2] Decree of the President of the Republic of Uzbekistan No. PF-5853 dated October 23, 2019 "On approval of the Strategy for the Development of the Republic of Uzbekistan for 2020-2030"

Table 1
Experience system

No.	Annual rate of fertilizers, kg/ha; t/ha	Fertilizer application during the growing season, kg/ha; t/ha			
		Before plowing	Before planting	First feeding when seedlings take root	When the second feeding cabbage begins to roll
1	Without fertilizer - abs. control	-	-	-	-
2	Fertilizer 20 t/ha	20 t/ha	-	-	-
3	Biopreparation 30 l/ha	10 l/ha	10 l/ha	5 l/ha	5 l/ha –
4	Biopreparation 30 l/ha + Fertilizer 20 t/ha	10 l/ha +20 t/ha	10 l/ha	5 l/ha -	5 l/ha –
5	Biopreparation 30 l/ha +P-150, K-100	10 l/ha+ R-105, K-50	10 l/ha +R-45	5 l/ha -	5 l/ha + K-50
6	N -150, P-150, K-100	R-105, K-50	N -50, R-45	N -50	N -50, K-50
7	N -200, P-150, K-100	R-105, K-50	N -50, R-45	N -75	N -75, K-50
8	Biopreparation 30 l/ha + N -150, P-150, K-100	10 l/ha +R-105, K-50	10 l/ha, N -50, R-45	5 l/ha + N -50	5 l/ha + N -50, K-50

R.P. Gladkikh [4. P. 6-7] states that the most effective is the use of Baikal EM-1, Azotofit-r, Fitotsid-r biopreparations for agricultural crops, which contain photosynthetic bacteria, lactic acid, nitrogen-fixing, phosphorolyzing, actinomycetes, etc. These microorganisms stimulate the biological activity of the soil, help convert nutrients into a form convenient for plants, improve plant photosynthesis, absorb free nitrogen from the air, and allow plants to obtain high yields.

According to the results of two years of scientific research conducted in the soil conditions of the Moscow region of Russia, when growing and caring for the white cabbage variety "Podarok 2500" with various rates of mineral fertilizers, the optimal amount of nitrogen per hectare was 127 kg, phosphorus - 101 kg, potassium - 69 kg, and microelements - 71.2 t/ha, the average total yield of cabbage was 68.5 t/ha, the marketable yield was 2.6 t/ha, and the non-marketable yield was 2.6 t/ha [2].

In the conditions of alluvial meadow soils of the Ramenskoye district of the Moscow region, when various mineral and plant-regulating preparations were applied to the new F_1 hybrid of white cabbage, the most optimal was the application of 180 kg of nitrogen per hectare, 100 kg of phosphorus, 270 kg of potassium per hectare, and treatment with an extrasol stimulator, the total yield per hectare was 68.3 tons, of which 96 percent was marketable products [3].

Experiments conducted in 2021-2023 determined the effect of biopreparations, organic and mineral fertilizers applied to white cabbage plants on cabbage height, diameter, weight of one head of cabbage, total, marketable and non-marketable yields, depending on the rates and timing.

Under the conditions of the experiment in 2021, the height of the white cabbage plant was 18.2 cm, the diameter was 20.1 cm, the weight of one cabbage head was 0.97 kg, the total yield was 33.7 t/ha, the marketable yield was 30.1 t/ha, and the non-marketable yield was 3.5 t/ha, which is 89.5 percent of the total yield, or compared to option 2, where 20 tons of organic fertilizer were applied per hectare, the corresponding amount of fertilizer applied increased the height and diameter of the cabbage head by 0.6 cm - 0.6 cm, the weight of one cabbage head was 0.21 kg, the total and marketable yield was 6.4 t/ha and 6.6 t/ha higher, the non-marketable yield was 0.15 t/ha lower and 2.1 percent higher than the marketable yield. It is also worth noting that the data obtained in option 3, where 30 liters of Baikal EM-1 biopreparation per hectare was applied to white cabbage, were higher than in the control option, but lower than in option 2, where organic fertilizers were applied (Table 2).

[2] http://potatoveg.ru/wp-content/uploads/2021/03/Современные-минеральные-удобрения-ФосАгро.pdf
[3] file:///C:/Users/ALFATECH.UZ/Downloads/Effektivnost-primeneniya-udobreniy.pdf

Table 2

The effect of biopreparation, organic and mineral fertilizer rates on the weight, diameter, height and productivity of a single cabbage head

No.	Annual rate of fertilizers, kg/ha; t/ha; l/ha	Cabbage height, cm	Cabbage width diameter, cm	Average head weight, kg	Productivity, t/ha			Goods, %
					general	slang	unusual	
2021								
1	Without fertilizer - abs. control	18.2	20.1	0.97	33.7	30.1	3.5	89.5
2	Fertilizer 20 t/ha	18.8	20.7	1.18	40.1	36.7	3.4	91.5
3	Biopreparation 30 l/ha	18.5	20.4	1.11	38.6	35.6	3.0	92.2
4	Biopreparation 30 l/ha + Fertilizer 20 t/ha	19.1	20.9	1.24	42.6	39.3	3.3	92.3
5	Biopreparation 30 l/ha +P-150, K-100	19.5	21.3	1.28	44.4	41.2	3.2	92.8
6	N-150, P-150, K-100	20.3	22.1	1.40	48.6	43.8	4.8	90.1
7	N-200, P-150, K-100	20.6	22.5	1.42	49.2	44.4	4.8	90.2
8	Biopreparation 30 l/ha + N-150, P-150, K-100	21.9	24.1	1.47	50.9	47.3	3.6	93.0

In the experiment, in option 4, where 30 liters of Baikal EM-1 biopreparation and 20 tons of organic fertilizers were applied to white cabbage plants, the height and diameter of the cabbage heads were 19.1 and 20.9 cm, the weight of one head of cabbage was 1.24 kg, the total and marketable yield was 42.6 and 39.3 t/ha, the non-marketable yield was 3.3 t/ha, and the marketable yield was 92.3 percent. Therefore, based on the above data, it was determined that applying Baikal EM-1 biopreparation to white cabbage plants with organic fertilizers had a positive effect on their biometric measurements and productivity, rather than applying it separately.

In option 6, where 150 kg of nitrogen, 150 kg of phosphorus, and 100 kg of potassium were applied per hectare to the white cabbage plant, the cabbage height was 20.3 cm, the diameter was 22.1 cm, the cabbage weight was 1.4 kg, the total yield was 48.6 t/ha, the marketable yield was 43.8 t/ha, and the non-marketable yield was 4.8 t/ha, which is 90.1% of the total yield. In option 7, where 50 kg/ha of nitrogen was applied in addition to these mineral fertilizer standards (200 kg/ha, phosphorus 150 kg/ha and potassium 100 kg/ha) , the height of the cabbage head was 20.6 cm, the diameter was 22.5 cm, the weight of one cabbage head was 1.42 kg, the total yield was 49.2 t/ha, the marketable yield was 44.4 t/ha, and the non-marketable yield was 4.8 t/ha, which is 90.2% of the marketable cabbage yield compared to the total yield. If we compare these data with option 5, where 30 liters of biopreparation and P-150, K-100 kg per hectare of white cabbage plants were applied, it turned out that although the biometric measurements were slightly lower, the marketability was 2.7 and 2.6 percent higher compared to the total yield, respectively. So, it turned out that the Baikal EM-1 biopreparation we recommend has a positive effect not only on soil fertility, but also on its biometric measurements and crop quality.

In the experiment, relatively acceptable indicators were determined in option 8, where 30 liters of Baikal EM-1 biopreparation and mineral fertilizers of nitrogen-150 kg, phosphorus-150 kg and potassium-100 kg were applied to the white cabbage plant . In this case, the height of the cabbage was 21.9 cm, the width of the cabbage was 24.1 and the average weight of one head of cabbage was 1.47 kg, the total, processed and unprocessed yield was 50.9 t/ha, 47.3 t/ha and 3.6 t/ha, respectively, and the processed yield was 93.0% of the total yield.

The above-mentioned patterns were also observed in the 2022 and 2023 studies. In conclusion, it was found that in the conditions of typical irrigated gray soils of the Tashkent region, the application of organic or mineral fertilizers in combination with the Baikal EM-1 biopreparation to white cabbage plants has a positive effect on their biometric measurements, yield and crop quality. At the same time, the application of 30 liters of Baikal EM-1 biopreparation per hectare and mineral fertilizers N -150 kg/ha, P-150 kg/ha, K-100 kg/ha to white cabbage plants has a favorable effect on plant growth and development, as well as on yield and crop quality.

LIST OF USED LITERATURE

1. "Methods of conducting field experiments" – Tashkent. 2007. P.180.
2. Azimov BJ, Azimov BB Methodology of conducting experiments in vegetable, melon and potato growing // - Tashkent, UzME. 2002. – P. 9–11.
3. Belik V.F. Methodology of experimental work in ovoshchevodstve and bakchevodstve. - M.: Agropromizdat, 1992. - C . 30–45.
4. 4 . Gladkich R. P. Primenenie bioudobreniya "Baikal EM - 1U" na Sumshchine // Nadezhda planety. - No. 3, 2007. - S. 6-7.
5. Mirziyoyev Sh.M. – Decree of the President of the Republic of Uzbekistan dated October 23, 2019 No. PF-5853 "On approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030". –Tashkent. 2019.
6. http://potatoveg.ru/wp-content/uploads/2021/03/Sovremennye-mineralnnye-udobreniya-FosAgro.pdf
7. file:///C:/Users/ALFATECH.UZ/Downloads/ Effektivnost - primeneniya - udobreniy .pdf