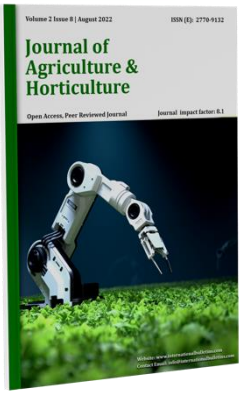

BIOPREPARATION, LOCAL, AND MINERAL FERTILIZERS AFFECT THE COMPOSITION OF COMMON WHITE CABBAGE IN TYPICAL GRAY SOILS, DEPENDING ON RATE AND DURATION.

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Abstract: This article presents scientific data on the mineral content, biochemical composition, vitamins and ash content of local, mineral and biopreparations applied to the common white cabbage plant in the conditions of typical gray soils subjected to irrigation erosion, depending on the rate and duration.

Key words: irrigation erosion, typical gray soils, biopreparation, mineral and local fertilizers, rates and terms, common white cabbage, minerals, biochemical composition, vitamins, ash content.

"Almost half of the world's global production of cabbage, more than 71.0 million tons, is in China, followed by India, Russia, South Korea, Ukraine, Indonesia, Japan, Poland, and the United States of America." In general, cabbage is grown in more than 150 countries of the world[1]. To get a high and quality harvest by applying local and mineral fertilizers, biological preparations to white cabbage in areas affected by irrigation erosion, as well as growing organic products, is considered as one of the urgent tasks in the world today.

The role and importance of the agricultural sector in ensuring the food security of the population on a global scale is increasing day by day. In particular, it is an urgent issue to use the available resources and opportunities in our country, to provide the population with guaranteed agricultural products, to further increase productivity and interest, to introduce scientific achievements and modern approaches to the field.

From this point of view, in the pilot farm of the center of the Research Institute of Vegetables, Rice Crops and Potatoes of Uzbekistan, a biopreparation, local and mine, which ensures a higher and higher quality yield than common white cabbage in the conditions of typical gray soils with a slope of 1.50, which has been irrigated for a long time In order to determine the rates and terms of fertilizers, a field experiment was conducted during 2021-2023. The experiment consisted of 9 options and was placed in 3 returns. Conducting field experiments was implemented using the named UzPITI methods [1], B.J. Azimov and B.B. Azimov's "Methodology for conducting experiments in vegetable, vegetable and potato growing" [2], V.F. Belik's "Methodology of experimental work in vegetable growing and melon growing" resources [3]. The experimental system is presented in Table 1.

It is known that cabbage is a very useful product for human health. Cabbage contains sugars, organic acids, vitamins (C, P, B, B2, PP, K, E) and carotene, pantothenic and folic acids, fat, enzymes, phytoncides, salts of potassium, calcium, iodine, manganese, iron and other

[1] https://worldmapper.org/maps/cabbage-production/

elements. there is It is used directly for food, salted and canned. Cabbage is used in folk medicine for various diseases, it accelerates the removal of cholesterol from the body. Cabbage is rich in astringents. It contains potassium, sugar, sulfur, calcium, phosphorus, fats, lactose.

According to N.A. Duktova, A.S. Masterov, E.V. Ravkov [5], white cabbage has a high nutritional value, it contains 1.6% protein, 4.0% carbohydrates, 0.8% fiber. White cabbage is very rich in vitamins K and C (40-50 mg, 100 g) compared to other cabbages. White cabbage is also called "northern salad" by the popular name in Russia and European countries.

According to N.A. Golubkina., M.S. Antoshkina and other [4], vitamin C in the white cabbage plant is one of the antioxidants that play an important role and is a regulator of the most important physiological processes in the plant. Vitamin C is more abundant in early ripening varieties of cabbage than in mid-ripening and late ripening varieties.

R. N. Kirakosyan, E. A. Kalashnikova [6] stated that in recent decades special attention has been paid to plants rich in secondary metabolites, often called phytochemicals. Among them, substances with antioxidant activity are of particular interest. Kale plant has been found to be a valuable source of natural antioxidants, including high levels of carotenoids, tocopherols, ascorbic acid, as well as phenolic compounds that play a protective role in the human body. These antioxidants are essential for human health and help reduce the risk of chronic diseases, cardiovascular disease and cancer.

The analysis of literature data on the effect of agrochemical substances on the chemical composition of white cabbage shows that the ratio of individual components of the applied fertilizers, as well as the time of application, can significantly change its chemical composition in the direction of improvement and deterioration of the main biochemical parameters. It is also worth noting that the lack of phosphorous and potassium fertilizers during the growing season of white cabbage leads to a decrease in productivity and the amount of sugar in it, but in most cases, the amount of sugar increases due to the lack of nitrogen fertilizers. In addition, a significant increase in indicators such as ascorbic acid or sugar content is associated with unfavorable growth conditions for plants.

Table 1

Experience system

	The annual rate of fertilizers, kg/ha; t/ha	**Application of fertilizers during vegetation period, kg/ha; t/ha**			
		Before plowing	**Before planting**	**The first feeding is when the seedling germinates**	**The second feeding is when the cabbage begins to harvest**
	Without fertilizer - control	-	-	-	-
	Manure 20 t/ha	20 t/ha	-	-	-
	Biopreparation 30 l/ha	10 l/ha	10 l/ha	5 l/ha	5 l/ha
	Biopreparation 30 l/ha + Manure 20 t/ha	10 l/ha +20 t/ha	10 l/ha	5 l/ha	5 l/ha

	Biopreparation 30 l/ha +P-150, K-100	10 l/ha+ P-105, K-50	10 l/ha +P-45	5 l/ha	5 l/ha + K-50
	N-150, P-150, K-100	P-105, K-50	N-50, P-45	N-50	N-50, K-50
	N-200, P-150, K-100	P-105, K-50	N-50, P-45	N-75	N-75, K-50
	Biopreparation 30 l/ha + N-150, P-150, K-100	10 l/ha +P-105, K-50	10 l/ha, N-50, P-45	5 l/ha + N-50	5 l/ha + N-50, K-50
	Biopreparation 60 l/ha + N-150, P-150, K-100	20 l/ha +P-105, K-50	20 l/ha, N-50, P-45	10 l/ha + N-50	10 l/ha +N-50, K-50

In our scientific research conducted in 2021-2023, the information obtained on the effect of bioremedial, local and mineral fertilizers on the white cabbage plant in three years, depending on the norms and terms, is presented in Table 2.

In option 1, where the white cabbage plant was maintained without the use of fertilizers, the ash content was 0.60%, the mineral content (per 100 g of raw cabbage) was sodium 16.0 mg, potassium 171.2 mg, calcium 45.0 mg, magnesium 12.2 mg, phosphorus 26.3 mg, biochemical composition (in % raw weight) protein 1.13%, sugar 3.2%, starch 0.51%, vitamins (in mg/% raw cabbage) C (ascorbic acid) 33.6 mg%, (carotene) 0.02 mg%, B_1 (thiamine) was 0.05 mg%.

In the 2nd option of the experiment (20 t/ha of local manure was used), the ash content was 0.64%, the amount of sodium, potassium, calcium, magnesium, and phosphorus in 100 g of raw cabbage was 16.7 mg, 184.5 mg, 55, 7 mg, 12.8 mg, and 27.1 mg, the biochemical content of protein, sugar, and starch is 1.44%, 3.7%, and 0.58%, respectively, and the amount of vitamins C, A, and B_1 is 35 ,2 mg%, 0.02 mg% and 0.07 mg%, or compared to the control option, ash content by 0.04%, sodium by 0.6 mg, potassium by 13.3 mg, calcium by 10 .7 mg, magnesium 0.6 mg, phosphorus 0.8 mg, protein 0.31%, sugar 0.5%, starch 0.07%, vitamin C 1.6 mg and vitamin B_1 0.02 in cabbage mg was found to be higher.

In option 3, where 30 liters of "Baikal EM-1" biopreparation per hectare was applied to the white cabbage plant, it was found that the amount of mineral, biochemical contents and vitamins in the head of cabbage was higher compared to the control option, but lower compared to option 2.

Table 2

The effect of biopreparation, local and mineral fertilizers of white cabbage on its mineral, biochemical composition and vitamin content depending on the rate and duration (three-year average)

Options	Annual rate of fertilizers, kg/ha; t/ha	Ash content, %	Mineral content (based on 100 g/mg raw cabbage)	Biochemical composition (in % of raw	Vitamins (mg/% of dry cabbage)

								weight)					
			sodium	potassium	calcium	magnesium	phosphorus	protein	sugar	starch	C (ascorbic acid)	A (caratine)	B1 (thiamine)
	Without fertilizer - control	,60	6,0	71,2	5,0	2,2	6,3	,13	,2	,51	3,6	,02	,05
	Manure 20 t/ha	,64	6,7	84,5	5,7	2,8	7,1	,44	,7	,58	5,2	,02	,07
	Biopreparation 30 l/ha	,62	6,4	77,3	1,5	2,5	6,7	,34	,4	,54	4,5	,02	,06
	Biopreparation 30 l/ha + Manure 20 t/ha	,66	6,8	90,6	9,7	3,6	7,9	,57	,1	,62	6,6	,03	,08
	Biopreparation 30 l/ha +P-150, K-100	,68	7,0	00,9	2,4	4,7	8,5	,61	,4	,65	7,5	,03	,13
	N-150, P-150, K-100	,70	7,3	13,8	5,8	5,2	8,8	,71	,7	,71	8,4	,03	,13
	N-200, P-150, K-100	,72	7,5	19,2	6,7	5,5	9,2	,79	,9	,75	9,2	,03	,14
	Biopreparation 30 l/ha + N-150, P-150, K-100	,77	8,0	30,6	0,1	6,0	1,1	,24	,3	,92	3,5	,04	,15
	Biopreparation 60 l/ha + N-150, P-150, K-100	,74	7,4	26,5	9,2	5,7	0,5	,18	,1	,86	2,9	,03	,14

The experiment was carried out in option 4 (30 liters of "Baikal EM-1" biopreparation and 20 tons of local manure were used per hectare) with ash content of 0.66%, sodium 16.8 mg, potassium 190.6 mg, calcium 59.7 mg, magnesium 13,6 mg, phosphorus 27.9 mg, protein 1.57%, sugar 4.1% and starch 0.62%, vitamin C 36.6 mg%, vitamin A 0.03 mg%, vitamin B_1 0.08 was equal to mg/%, or the amount of ash, sodium, potassium, calcium, magnesium, and phosphorus was 0.02-0.04%, respectively, compared to option 2, where local fertilizers were used at 20 t/h, and options 3, where biopreparation was used at 30 l/h, 0.1-0.4 mg; 6.1-13.3 mg; 4.0-8.2 mg; 0.9-1.2 mg, 0.7-1.1 mg, protein 0.1-0.2%, sugar 0.4-0.6%, starch 0.0-0.1%, Vitamin C was found to be 1.5-2.1 mg/ha higher. Therefore, it was found that, compared to the

separate application of local fertilizers or biopreparations to the white cabbage plant, if both are used together, it will have a positive effect not only on its mineral and biochemical composition, but also on the amount of vitamins contained in it.

In option 6, 150 kg of nitrogen, 150 kg of phosphorus, 100 kg of potassium mineral fertilizers were applied to the white cabbage plant, and in option 7, where 200 kg of nitrogen, 150 kg of phosphorus, 100 kg of potassium mineral fertilizers were applied, the corresponding amount of ash was 0.70-0.72%, sodium 17.3-175 mg, potassium 213.8-219.2 mg, calcium 65.8-66.7 mg, magnesium 15.2-15.5 mg, phosphorus 28.8-29.2 mg, protein 1.71-1.79%, sugar 4.7-4.9% and starch 0.71-0.75%, vitamin C content 38.4-39.2 mg%, vitamin A 0.03- 0.03 mg%, vitamin B_1 was equal to 0.13-0.14 mg% or the amount of ash, sodium, potassium, calcium, magnesium, phosphorus, respectively, due to the additional applied nitrogen fertilizers of 50 kg/ha (compared to option 7) 0.02%, 0.2 mg, 5.4 mg, 0.9 mg, 0.4 and 0.4 mg, protein, sugar, fiber amounts 0.08%, 0.2 and 0.03%, ascorbic acid and thiamine vitamins were observed to be higher at 0.8 and 0.01 mg%.

In the experiment, acceptable indicators were observed in the option 8, where the amount of dry matter was 0.77%, and the amounts of sodium, potassium, calcium, magnesium, and phosphorus were 18.0 mg, 230.6 mg, 70.1 mg, 16.0 and 31 mg, respectively, 1 mg, the amounts of protein, sugar, fiber are 2.24%, 5.3 and 0.92%, vitamins C, A and B_1 in cabbage are 2.24 mg%, 5.3 and 0.92 mg% was found to be equal.

Therefore, it can be concluded from the above information that in the conditions of typical gray soils subjected to irrigation erosion of the Tashkent region, in order to obtain mineral, biochemical and vitamin-rich cabbage from the white cabbage plant, 30 liters of biopreparation per hectare and 150 kg of nitrogen, 150 phosphorus and 100 kg of potassium per plant during the season it was recommended to use fertilizers.

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