

# The effectiveness of the use of Organostim agrochemicals in cucumber cultivation technology

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**Abstract.** The paper considers the results of studying the effect of agrochemicals Organostim on the growth and production processes of cucumbers. The use of agrochemicals in cucumber cultivation technology by the Organostim contributed to the activation of growth processes, an increase in the leaf surface area and the formation of more cucumber fruits with better quality. The use of Organostim, a drug capable of suppressing oxidative processes, possessing homeostatic and fungistatic properties, made it possible to increase significantly the productivity of cucumber plants (yield increase was 34.9%) and significantly improve the quality of its fruits.

## 1 Introduction

Cucumber fruits are valued for their taste and dietary qualities, and are widely used in therapeutic nutrition and cosmetology. Cucumber occupies one of the leading places in the structure of nutrition of the population, as it is used for food in fresh, pickled, salted, canned form at any time of the year, due to the possibility of growing in open and protected ground. The chemical composition of cucumber fruits is rich in fiber, B vitamins, ascorbic acid, provitamin A, as well as easily digestible iodine, necessary for the normal functioning of the thyroid gland and the endocrine system as a whole [1-4].

The high productivity of vegetable crops, including cucumbers, and the production of high-quality vegetable products is due to many natural and man-made factors, including the use of agrochemicals and growth regulators in vegetable crop cultivation technology, which have many useful qualities, in small doses affect growth and generative processes in plants, contribute to maintaining balance in the "oxidants–antioxidants" system, mitigate various kinds of stresses, including climatic ones, improve plant adaptation to chemical treatments [5-10].

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## 2 Materials and methods

The object of research is an early hybrid of cucumber Spino F1. The tested 2-component preparation is Organostim (component A is dihydroquercetin, component B is triethanolammonium salt of orthocresoacetic acid).

The main objective of the study was to research the effect of the use of Organostim agrochemicals in cucumber cultivation technology, to determine the biological effectiveness of the tested agrochemicals and to identify the optimal doses of its use.

The soil in the research is leached chernozem, which has a high content of gross potassium and low moisture retention capacity. The thickness of the humus horizon is more than 150 cm.

Cucumber seeds were soaked for 30 minutes before sowing (the dose of Organostim agrochemicals was 0.45 ml / kg of seeds: component A – 0.30 ml / kg of seeds + component B – 0.15 ml / kg), after planting seedlings in the ground, double foliar treatment was carried out in the 2-4 leaf phase and at the beginning of flowering (drug consumption – 450 ml/ha: component A – 300 ml/ha + component B – 150 ml/ha; 600 ml/ha: component A – 300 ml/ha + component B – 300 ml/ha; 900 ml/ha: component A – 600 ml/ha + component B – 300 ml/ha; options 2, 3 and 4, respectively). In the control variant (option 1), seeds and plants were not processed. The consumption of the working solution during seed treatment is 1.0 l / kg, plants – 300 l / ha). The area of the accounting plots is 10 m<sup>2</sup>, the repeatability is fourfold.

## 3 Results

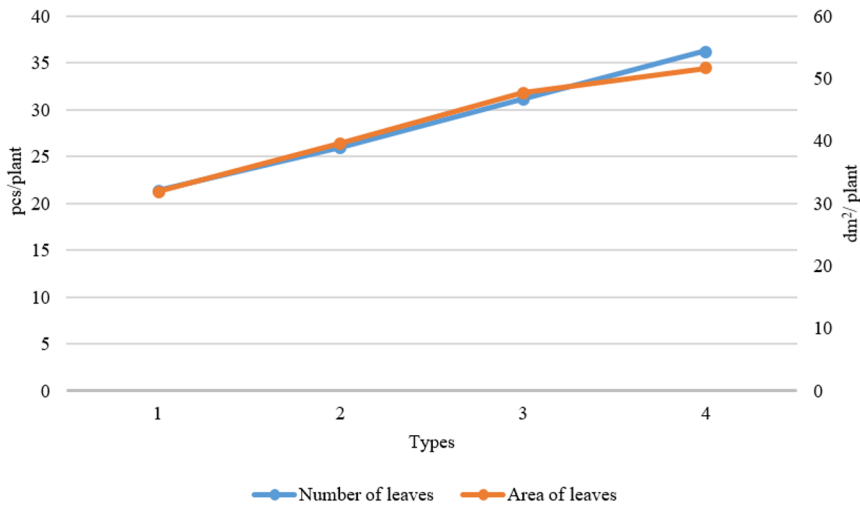
The composition of the preparation by the Organistim includes two components, each of which has exceptional properties that have a positive effect on the vital activity of the plant organism. Component A contains auxin, which takes an active part in the passage of plant metabolism processes, accelerating it, especially at the initial stages of ontogenesis. Due to this property of component A, the treatment of cucumber seeds with the tested agrochemicals contributed to the rapid germination of seeds and the formation of strong and friendly shoots. The composition of component B includes silatrans with an antioxidant, membrane-stabilizing effect, due to the content of silicon, which also had a beneficial effect both on the passage of the initial stages of development of cucumber plants, and on the processes of fruiting and the formation of product quality parameters.

The use of Organostim agrochemicals for non-root treatment of cucumber plants contributed to the improvement of shoot formation, which was reflected in an increase in the number of lateral shoots in experimental versions (the total number of shoots was 9.1-11.6 pcs., in the control – 6.8 pcs./plant, including shoots of the 1st and 2nd orders - 8.1-10.6, in the control – 5.8 pcs./plant; the length of the main shoot is 115.6-137.2, in the control – 103.4 cm; the wet and dry mass of aboveground organs is 418.17-524.36 and 314.56 g, 66.07-87.04 and 48.76 g/plant, respectively) (Table 1).

In this variant, the most favorable effect on leaf formation processes was observed, which is expressed in the formation of the maximum number of large leaves on the plant (number of leaves – 36.3, in the control – 21.4 pcs./plant; leaf area – 39.64-51.72, in the control – 31.88 dm<sup>2</sup>/plant) (Figure 1).

**Table 1.** The effect of the drug by an Organostim on the growth processes of cucumber plants.

Type	Number of shoots, pcs./plant			The length of the main shoot, cm	Overground mass of plants, g/plant		% dry matter
	total	including			wet	dry	
		1 <sup>st</sup> order	2 <sup>nd</sup> order				
1	6.5	4.4	1.1	103.4	314.56	48.76	15.5
2	9.0	6.3	1.8	115.6	418.17	66.07	15.8
3	10.5	7.2	2.3	126.8	489.28	79.26	16.2
4	11.6	8.0	2.6	137.2	524.36	87.04	16.6
HCP <sub>05</sub>	0.4	0.3	0.1	4.9	18.04	2.92	

**Fig. 1.** The effect of the drug Organostim on the number and area of leaves of cucumber plants.

The use of the tested agrochemicals for pre-sowing soaking of seeds and subsequent spraying of vegetative plants twice in phases 2-4 of the leaf and the beginning of flowering (Table 1, Figure 1) contributed to the improvement of the growth processes of cucumber plants of experimental variants, while increasing the consumption rate of Organostim, caused a maximum increase in the values of cucumber plant growth and leaf surface growth.

A significant increase in the leaf area under the action of the test drug led to an increase in their life span, efficiency, and activation of the accumulation of assimilates necessary for the formation of cucumber fruits (Table 2).

**Table 2.** The effect of the drug by the Organostim on the formation of cucumber fruit and their collection from shrubs.

Type	Sizes, cm		Mass, g	Fruit yield, kg/shrub
	length	diameter		
1	11.2	3.1	82.54	1.65
2	12.0	3.5	86.78	1.98
3	12.8	3.6	88.41	2.14
4	13.1	3.6	90.12	2.22
HCP <sub>05</sub>	0.5	0.1	3.76	0.07

Treatment of seeds and plants with Organostim preparation, enhancing the accumulation of dry matter by vegetative mass (15.8-16.6, in the control – 15.5%) and thereby increasing the reserve of assimilates, had a positive effect on the formation of fruits on cucumber plants (Table 2). In the experimental versions, the fruits had larger sizes than in the control (length – 12.0-13.1, in the control – 11.2 cm; diameter – 3.5-3.6, in the control – 3.1 cm) and weight (86.78-90.12, in the control – 82.54 g) fruits, which led to a significant increase in fruit harvesting from the bush (1.98-2.22, in the control – 1.65 kg /bush, HCP<sub>05</sub> = 0.07 kg).

The strengthening of the growth and production processes of cucumber plants under the action of the test preparation contributed to an increase in the yield and quality of cucumber fruits (Table 3).

**Table 3.** The effect of the preparation by the Organostim on the yield of cucumber fruit and their quality.

Type	Yield, kg/m <sup>2</sup>	Increase in control		Content in fruit	
		kg/m <sup>2</sup>	%	common sugars, %	ascorbic acid, mg%
1	2.35	-	-	2.2	10.3
2	2.83	0.48	20.4	2.7	12.7
3	3.06	0.71	30.2	2.8	14.2
4	3.17	0.82	34.9	3.0	15.4
HCP <sub>05</sub>	0.12				

Research results (Table 3) showed that in the experimental variants, the yield of cucumber fruit was significantly higher than that of the control variant (2.83-3.17, in the control – 2.35 kg/m<sup>2</sup>, HCR05 =0.12 kg/m<sup>2</sup>). In addition, according to Table 3, the content of total sugars (2.7-3.0, 2.2% in the control) and vitamin C (12.7–15.4, 10.3 mg% in the control) increased in the cucumber fruits of the experimental variants.

## 4 Discussion

In the process of growing cucumber plants with the help of Organostim preparation (on seeds and plants twice), which has a multifunctional effect, its beneficial effect on shoot and leaf formation, accumulation of assimilates by aboveground organs, and as a result, the process of fruit formation was observed. The experimental variants, in comparison with the control, differed in improving the processes of shoot formation, leaf and fruit formation, which contributed to an increase in fruit harvest from the bush and m<sup>2</sup> and a better accumulation of total sugars and vitamin C.

## 5 Conclusion

The highest yield of cucumber fruits (3.17, in the control – 2.35 kg / m<sup>2</sup>) of the best quality (fruit content: sugar – 3.0, in the control – 2.2%; vitamin C – 15.4 and 10.3 mg%, respectively) was noted during seed treatment (soaking seeds for 30 minutes, drug consumption – 0.45 ml/ kg of seeds: component a – 0.3 ml / kg + component B – 0.15 ml / kg; consumption of the working solution – 1.0 l / kg of seeds) and sequential double spraying of plants: 1e – in the 2-4 leaf phase, 2e – at the beginning of flowering (consumption of the drug – 900 ml / ha: component a – 600 ml/ha + component B – 300 ml/ha; the consumption of the working solution is 300 l / ha).

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