

# Improvement of valuable signs by using "Zerex" immunostimulant in cotton

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**Abstract.** The article provides data that the depth of groundwater located at 2-2.5 m above sea level in the moderately saline meadow-alluvial soil of the Bukhara region of the Republic of Uzbekistan, which is applied in agriculture immunostimulant contact and triple action - "Zerex" norms (1 - 2 - 3 l / t; 1 - 2 - 3 l / ha + surfactant 0.15 l / ha) and terms (in pre-sowing treatment of seeds, in the appearance of 2-4 true leaves, budding and flowering) of cotton vegetation, and in various densities (80-90; 100-110; 120-130 thousand pcs. bush / ha) standing, the highest yield (52.5 c / ha) and quality (fiber length 35.3 mm; fiber yield - 40% and 22.6% oil content) fiber and seed oil content were obtained when using Zerex at 2 l / t; 2l / ha + surfactant 0.15 l / ha at a plant density of 80-90 thousand pcs. bush / ha, which leads to high economic efficiency, the share of the first harvest (28.7%) and the constituent crop additives (by 11.7 c / ha), the quality (1.1 mm; 2.5%) of the fiber and oil content of seeds (1.5%) more than the control variant.

## 1 Introduction

Studies of the nature of the stimulating or contact action of growth regulators on the cotton plant are being intensively carried out in many countries of the world. J. J. Herve was one of the first to develop a real conceptual approach to stimulants, using chemical synthesis, biochemistry and biotechnology in the development of "biorational products", as well as how these products affect the physiological and ecological processes of agricultural crops, in what proportions and periods of time they are used above and beyond them. proposed a systematic approach on how to grow high-quality, environmentally friendly products. According to him, these products are ecologically beneficial and highly effective in growing agricultural crops when they are used in small amounts and at reasonable rates. He also noted that stimulators influence the metabolic process, control the synthesis of enzymes and hormones, and that most of these substances stimulate the physiological processes in the living organism, thereby increasing the productivity and ripening processes in plants [1-3].

In the last few years, research has been conducted in the field of world science, and there are universally acting regulators (immunostimulators) [4]. Immunostimulants regulate growth and development increase the adaptability of plant resistance to stress, increasing immunity to various diseases in nature.

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Due to the fact that immunostimulants contain active growth-regulating substances (auxin, cytokinin, etc.) or affect them, the metabolic processes in the plant are activated, and the growth (height, root length, leaf level) and development (bud, flower, fruit) indicators in the plant are compared to the control plant will be relatively high.

It also increases phytoimmunity and mitigates the effects of adverse conditions (drought, warm wind, etc.) observed in the atmosphere during the critical phases of the plant's vegetation period, especially during budding, active flowering or ripening of fruits. Chemical substances in immunostimulants destroy pathogens and pests found in plants and create immunity in plants against pathogens [5].

Zerex is one of these immunostimulants and has a three-way effect on plants in comparison with other immunostimulants [6].

The drug is especially indispensable in years with adverse weather conditions, it destroys causative agents of bacterial and fungal diseases that have developed resistance to systemic fungicides [7], resistance to drought stress factors, high hot (warm wind) temperatures and strengthens the cotton immune system, helps to reduce pesticide load, has a powerful growth-stimulating effect, favorably affects physiological and biochemical processes, thereby accelerating maturation, increasing the yield and quality of agricultural products.

Chemical regulation of the growth and development of cotton plants is one of the most interesting and promising industries. Growth regulators can be used both for pre-sowing seed treatment and for spraying vegetative and generative organs of plants. And at the same time they can serve as fungicides, bactericides and stimulants. In this regard, scientific developments in the field of creation and application of immunostimulants to improve the quality and productivity of the most important agricultural crops, including cotton, are very relevant.

An increase in yield, increase the photosynthesis efficiency [8], the quality of cotton and a reduction in cost, as a rule, can be achieved as a result of compliance with all advanced agricultural technologies for cultivating agricultural crops, however, the use of an immunostimulator for plant growth and development is of considerable importance. All physiological (respiration rate, metabolism, water evaporation, photosynthesis productivity, etc.) and biochemical processes in the plant organism, cell water supply, nutrition, type of stimulant or immunostimulator, the norm and timing of their use, cotton variety, soil salinity, depend on the density of plant standing. If this process is carried out normally, the yield and quality indicators will be high.

The purpose and objective of the research was to study and identify the effect of optimal doses and terms of application of "Zerex" 3000 mg / l of colloidal silver at different density of standing cotton plants on yield, the rate of opening of pods, seed quality, length and yield of fiber in the medium-saline soil of the Bukhara region, the Republic of Uzbekistan.

## **2 Object and subject of research**

The cotton variety "Bukhara-10", as well as the immunostimulator "Zerex" 3000 mg/l of colloidal silver and three different norms and terms of use and the density of standing cotton plants were the object of research.

## **3 Research methodology**

The research was carried out according to the methodology adopted in NIISAVH "Methodology of field and vegetation experiments with cotton" (1973), [9], [10]. "Methodology of field research" (Tashkent, 2007) [11]. These results on yield were

analyzed by variance according to the method of B.Dospekhov "Methodology of field experience" (Moscow, 1985) [12]. The distance between the rows consists of 90 cm. The area of each plot is 72 m<sup>2</sup>. The depth of groundwater is 2 m. according to the mechanical composition of the average weight. The control background was untreated cotton plants. The reference variant was the immunostimulator "Fitovak" - 200 ml / t; 200 ml / ha in different periods of use. A total of 15 options were studied. The distribution of experimental variants of variants by repetitions on the field was carried out using the randomization method.

When using the "Zerex" immunostimulator, different doses were used in the experiment (1-2-3 l/t; 1-2-3 l/ha + surfactant 0.15 l/ha) and terms (in pre-sowing seed treatment, during the appearance of 2-4 real leaves, budding and flowering) of cotton when used on three (80-90; 100-110; 120-130 thousand pcs. bush / ha) of different plant standing density. In studies, spraying of plants was carried out using a manual automax. Harvesting was carried out manually by weighing method from the entire area of the plot. The fiber quality was determined in the laboratory of the regional "Siphat", the oil content of the seeds was extracted by petroleum ether on the Soxhlet apparatus.

In order to study and determine the effectiveness of the drug "Zerex", what are the densities of standing cotton plants and what are the costs and timing of the use of plant growth immunostimulators is the most optimal option, we took 3 different densities (80-90; 100-110; 120-130 thousand bush/ha) of standing and 3 different doses of expenses (1-2-3L/t; 1-2-3L/ha + surfactant 0.15 l / ha) "Zerex" and 4 terms (pre-sowing treatment of seeds, the appearance of 2-4 leaves, budding and in the flowering phase) of application. In order for the immunostimulator "Zerex" to work effectively during the growing season on cotton, a surfactant of 0.15 l/ha was used.

To determine the effect of pre-sowing seed treatment in different doses of "Zerex"om (tested variants) and Phytovac (standard) on the germination energy and germination of seeds was carried out on omitted cotton seeds of the Bukhara-10 variety. The seeds were soaked for ten hours in various doses (1-2-3 l / t) with Zerex solutions and Phytovac (200 ml / t) and the control in water. And during the growing season (in the phase of the appearance of 2-4 real leaves, budding and flowering), cotton with the same preparations was suspended in doses of 1-2-3 l/ha + surfactant 0.15 l/ha and Phytovac 200 ml/ha.

## 4 Research results and analyses

The experiments were carried out in 2018-2020 in medium-saline, meadow-alluvial soils in the experimental farm NIISIAVKH Bukhara NOS.

The study of "Zerex", as an immunostimulator, was carried out using "Zerex" in various doses (1-2-3 l/ha + surfactant 0.15 l/ha) of consumption and at various stand densities (80-90; 100-110; 120-130 thousand bush/ ha) of the cotton variety "Bukhara-10". Table1 shows data on yield, fiber quality and oil content of seeds.

The consistent use of the drug "Zerex" (2l / t) with a standing density of 80-90 thousand pieces of bush / ha) during the pre-sowing treatment of seeds and then spraying (2l / ha + surfactant 0.15 l / ha) of vegetative plants contributed to the manifestation of synergism of the activity of "Zerex"but. In the variants of its sequential use, all the studied indicators exceeded not only the control variant, but also the variants on which doses of Zerex per 1-3L/t and 1-3l/ha + surfactant of 0.15 l/ha and at a standing density of 100-110; 120-130 thousand bush/ha were used.

The formation of a larger number of pods on cotton in variants when using the drug "Zerex" in the pre-sowing treatment of seeds of 2 l / t and during the growing season (in the appearance of 2-4 real leaves, in budding and flowering), which was suspended by 2 l / ha + surfactant 0.15 l / ha and the density of bushes per hectare 80-90 thousand pcs.bush/ ha,

predetermined a large number (24.1 pcs per rast.) of boxes compared to the control (12.7 pcs per rast.). The use of "Zerex" with a consumption rate of 1-3 l / t; 1-3 l / ha + surfactant 0.15 l / ha with a standing density of 80-90 thousand pcs. bush / ha allowed to obtain a small number of boxes, respectively: 15.3-16.8 pcs / rast. and the increase in the yield of raw cotton was by 8.4 c/ha and 2.0 c/ha (see Table 1).

**Table 1.** The effect on the yield and quality of cotton when using different plant densities and the consumption of doses and terms of the drug "Zerex" (data for 2020).

Plant standing density, thousand pcs. bush/ha	Consumption rate ml / t; l/t; ml /ha; l/ha + surfactant 0.15 l/ha	Number of boxes per bush, pcs.	Weight of one box, g	Weight 1000 pcs. seeds, g	Yield, c/ha						Fiber quality	
					1-collection		2-collection		Gross howl	Oil content, %	Fiber length, mm	Fiber yield, %
					Total, c/ha	± t %	Total, c/ha	± t %				
80-90	0.0	12.7	6.5	136	36.3	89.0	4.5	11.0	40.8	21.1	34.2	37.5
100-110		10.1	6.3	133	32.0	87.7	4.5	12.3	36.5	21.0	34.1	37.2
120-130		5.7	6.0	130	30.4	84.7	5.5	15.3	35.9	20.8	34.0	37.2
80-90	200 ml/t;	15.7	7.0	139	44.3	95.7	2.0	4.3	46.3	21.2	35.1	40.0
100-110		10.6	6.7	137	39.8	90.0	4.4	10.0	44.2	21.1	35.1	39.4
120-130		7.9	6.4	136	37.6	93.0	2.8	7.0	40.4	21.0	35.0	37.2
80-90	1l/t; 1l/ha+ Surfactant	15.3	6.8	138	42.1	95.5	2.0	4.5	44.1	21.2	35.0	38.5
100-110		9.7	6.5	135	37.6	88.5	4.9	11.5	42.5	21.0	34.8	38.1
120-130		6.9	6.3	133	36.0	89.8	4.1	10.2	40.1	20.9	34.6	37.2
80-90	2 l/t; 2 l/ha +surfactant	24.1	7.2	143	51.0	97.1	1.5	2.9	52.5	22.6	35.3	40.0
100-110		14.4	7.1	141	47.0	92.5	3.8	7.5	50.8	22.2	35.2	39.2
120-130		13.0	6.8	137	45.4	91.3	4.3	8.7	49.7	22.0	35.1	38.4
80-90	3l/t;	16.8	7.2	141	49.0	97.0	1.5	3.0	50.5	21.4	35.1	40.0
100-110		15.2	7.1	137	44.0	88.9	5.5	11.1	49.5	21.3	35.0	39.0
120-130		14.2	6.9	135	43.8	92.0	3.8	8.0	47.6	21.1	35.0	38.3
S <sub>n</sub>										0.08	0.09	
HCP <sub>005</sub>										1.2	0.8	

The regulating effect of the immunostimulator "Zerex" on the formation of pods and their maturation contributed to obtaining a high-quality and additional harvest, not only in the gross harvest, but also the first harvest of raw cotton, the length and yield of fiber and the oil content of seeds, which differ in higher technological qualities. If an average of 40.8 c/ha of the gross harvest was harvested in the control, of which 36.3 c/ha is the first harvest, then when using (in pre-sowing seed treatment, in the appearance of 2-4 real leaves, in budding and flowering) "Zerex" in consumption rates of 2 l/t; 2 l/ha + surfactant 0.15 l/ha the density of bushes per hectare of 80-90 thousand pieces of plants is 52.5 c/ha, 1-51.0 c/ha was harvested or the additive to the crop is 11.7 c/ha (28.7%) more than the control. Considering in Table 1, it was noted that the positive effect of "Zerex" when used in the consumption rates of 2 l/t; 2 l/ha + surfactant 0.15 l/ha, depending on the density of standing cotton (80-90 thousand pieces of plants), the formation of the number of boxes formed more than in the control variants. Quantity and weight of one box and 1000 pcs.seeds on the 10th variant averaged: 24.1 pcs/rast.; 7.2 g. and 143g., which is more than the control by 11.4 pcs/rast.; 1.2 g. and 7 g.

A similar pattern was observed with the use of "Zerex" at 1-3 l/ha; 1-3 l/ha + surfactant 0.15 l/ha of the consumption dose and the same density of plants, the number of boxes and the weight of one box and 1000 pcs. seeds, respectively: 15.3-16.8 pcs/rast.; 6.5-7.2 g. and 138g-141g.

Even in the above experiments, it was determined that with an increase in the density of standing per hectare (100-110; 120-130 thousand pieces per bush), the length, fiber yield and percentage of oil content of seeds on each plant decreased in all variants.

According to the data of Table 1, with the use of "Zerox" 2 l / t and 2 l / ha + surfactant 0.15 l / ha when applied to 100-110 thousand and 120-130 thousand pieces of bush / ha of plants with an increase in the density of standing, the formation of the number of boxes per bush decreases, since in this variant the number of boxes in the ripening phase were respectively: 14.4-13.0 pcs/rast, which is 9.7-11.1 pcs/rast. less than the optimal option.

A large accumulation of pods and their earlier maturation in the application options of Zerox 2-3 l / t; 2-3 l / ha + surfactant 0.15 l / ha and leaving the density of standing plants at 80-90 thousand pieces of bush / ha led to a larger amount of harvest both early harvest and gross yield (52.5-50.5 c / ha; 1-harvest - 51.0 - 49.0 c/ha, respectively).

In the 10-variant of the application of "Zerox" (2 l / t; 2 l / ha + surfactant 0.15 l / ha and leaving the density of standing plants at 80-90 thousand pieces of bush / ha), the stimulating effect of the drug was expressed not only in obtaining an additional harvest, but also in obtaining significant increases in the first harvest, the harvest of which it is characterized by high quality fiber. So in the 10-variant of the processed "Zerox" om, the gross yield and the first harvest increased the benchmarks by 11.9 and 14.7 c/ha.

Thus, in the variants with the use of "Zerox", the proportion of raw cotton of higher quality significantly prevailed over the proportion of a crop of lower quality than the control one. Our studies on the effect of growth stimulators and plant density on the technological qualities of fiber and oil content of seeds showed that the tested immunostimulator "Zerox" had a positive effect on these indicators. The results of the analyses showed that plant growth regulators not only improve the quality of fiber and oil content, but also slightly increase its yield. The positive effect of "Zerox" on the weight of 1000 seeds and the length and yield of fiber was noted. In the control variant, they were respectively: 136 g; 34.2 mm and 37.5%; and for the subjects in the 10th variant, these indicators were 143 g; 35.3 mm and 40%, which is more than the control by 7 g; 1.1 mm; 2.5%.

Figures 1 and 2 show the accumulation of yield per plant with untreated immunostimulants "Zerox" (control variant) and treated with immunostimulants "Zerox" when applied to 2 l/t and 2 l/ha + surfactants 0.15 l/ha during the growing season of cotton and with a density of 80-90 thousand bush/ha.

## 5 Conclusions

Summing up the brief results of the conducted research, it can be emphasized that the use of "Zerox" as a stimulant in various norms and terms with different plant density contributes to the better development of cotton, forms a larger number of fruit organs and, as a result, the number of boxes per bush / ha, the weight of one root, 1000 pcs. seeds and fiber quality, oil content of seeds and yield of raw cotton. At the same time, the drug accelerates the maturation of cotton pods, which determines the receipt of a larger amount of early harvest, characterized by a more valuable fiber.

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