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## THE EFFECT OF BIOSTIMULANT APPLICATION ON THE YIELD OF OILSEED SUNFLOWER

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### Abstract

The study revealed that the highest average yield, 36.6 q/ha, was obtained in the variant where the Fitovak 20% immunostimulant was applied at the rate of 0.6+0.7+0.8 L/ha. This yield was higher than those recorded in the variants treated with the Biodux and MERS biostimulants. In the variants where the MERS biostimulant was applied at three different rates, the yield was 0.5, 0.8 and 1.0 q/ha lower than in the variants treated with the Fitovak 20% immunostimulant at three different rates. However, compared with the variants treated with the Biodux biostimulant at three different rates, the MERS biostimulant provided an additional yield increase of 3.7, 4.4 and 4.1 q/ha.

**Keywords:** Sunflower, biostimulant, application rate, seed, yield.

### Introduction

Under the specific soil and climatic conditions of our country, there is an opportunity to obtain a second, and even a third crop in the southern regions, by cultivating repeated, stubble and autumn intermediate crops on the fields released after harvesting autumn-sown cereal crops. According to the available data, when



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the Zerebra Agro stimulant was applied to sunflower at the rate of 100 ml/t + 100 ml/ha, seedling emergence accelerated, plant growth and development intensified, the diameter of heads increased by 1.4–3.4 cm, the number of seeds per head increased by 36–66, and seed yield increased by 2.5–3.2 q/ha compared with the control variant [1].

In the cultivation of high and high-quality sunflower yield, the use of stimulants such as Ecosil and Terra-Sorb Foliar has been shown to improve not only yield indicators, but also seed productivity. Seed yield reached 45.2–46.2 q/ha, which was 0.5–1.5 q/ha higher than the control, while oil content increased by 3.2–3.3% [3].

Furthermore, the results of scientific studies have shown that the proper organization of agrotechnological practices in sunflower cultivation, including fertilization, sowing scheme, irrigation and plant protection measures, is an important factor in increasing yield [4].

In experiments where sunflower seeds were treated before sowing with growth-regulating stimulants such as Melafen + Heteroauxin, seedling emergence reached 91.3–95.8%. The seed yield amounted to 1.69 t/ha, while yield increased by 7.6–13.1% and oil content increased by 0.578–1.51% compared with the control [5], [2].

**Experimental Conditions and Methods.** The study was conducted under the soil and climatic conditions of Tashkent region to determine the effect of different rates of biostimulants on the growth, development, yield and seed quality of the Dilbar sunflower variety, as well as to identify optimal application rates.

The soil of the experimental farm was old-irrigated, non-saline typical sierozem soil. In 2022, analysis of the 0–30 cm arable soil layer showed that the humus content was 1.187%, total nitrogen was 0.112%, phosphorus was 0.181%, and potassium was 1.33%.

**Results of the Experiment.** The influence of different rates of various biostimulants on the yield of the Dilbar sunflower variety was studied (Table 1).



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Yield varied over the three years of the experiment. It was found that the yield obtained in 2022 was higher than those recorded in 2021 and 2023.

In the control variant, where the seeds were treated with ordinary water, the yield was 26.6 q/ha in 2021, 27.8 q/ha in 2022 and 27.2 q/ha in 2023. The average yield over three years was 27.2 q/ha. In the variant where the Uzgumi biostimulant was studied as the standard, yields of 29.1, 30.6 and 29.7 q/ha were obtained, with an average of 29.8 q/ha. Due to the microelements and biologically active substances contained in the biostimulant, an additional yield of 2.6 q/ha was obtained compared with the control variant.

In the three variants where the Fitovak 20% immunostimulant was applied, the yield obtained over three years, as well as the average yield, was higher than that recorded for the other biostimulants tested in the experiment. In 2022, depending on the application rate of the immunostimulant, seed yields of 35.1, 37.7 and 36.8 q/ha were obtained. The average yields over three years were 34.4, 36.6 and 35.7 q/ha, respectively.

Increasing the application rate of Fitovak 20% immunostimulant to 0.7+0.8+0.9 L/ha did not result in a yield increase. On the contrary, compared with the variant where it was applied at 0.6+0.7+0.8 L/ha, yield decreased by 0.9 q/ha. This can be explained by the fact that excessive application of biostimulants may cause plant toxicity and disrupt physiological processes, ultimately reducing yield.

The highest yield was obtained in the variant where Fitovak 20% immunostimulant was applied at the rate of 0.6+0.7+0.8 L/ha. The average three-year yield in this variant was 9.4 q/ha higher than the control variant and 6.8 q/ha higher than the standard variant.

In the three variants treated with the Biodux biostimulant, seed yields in 2022 were 31.6, 32.8 and 33.0 q/ha, depending on the application rate. The average yields over three years were 30.7, 32.2 and 31.6 q/ha, respectively.

Increasing the rate of Biodux biostimulant to 4.0+5.0+6.0 ml/ha did not increase yield. On the contrary, compared with the variant where it was applied at 3.0+4.0+5.0 ml/ha, yield decreased by 0.2 q/ha in 2022 and by 0.6 q/ha on average over three years. In the variant where Biodux was applied at 2.0+3.0+4.0 ml/ha,



yield was relatively low. However, the average yield over three years was 3.5 q/ha higher than the control and 0.9 q/ha higher than the standard variant. Nevertheless, this variant produced 1.5 and 0.9 q/ha lower yield compared with the variants where higher rates of the biostimulant were applied.

**Table 1 Yield of oilseed sunflower, 2021–2023**

Variant	Name of biostimulant	Application of rate, ml or L/ha	Yield by year, 2021 q/ha	Yield by year, 2022 q/ha	Yield by year, 2023 q/ha	Three-year average yield, q/ha	Difference compared with standard, q/ha
1	Control	—	26.6	27.8	27.2	27.2	—
2	Uzgumi, standard	0.8+0.7+0.8	29.1	30.6	29.7	29.8	+2.6
3	Fitovak 20%	0.5+0.6+0.7	33.8	35.1	34.3	34.4	+7.2 / +4.6
4	Fitovak 20%	0.6+0.7+0.8	35.8	37.7	36.3	36.6	+9.4 / +6.8
5	Fitovak 20%	0.7+0.8+0.9	34.9	36.8	35.4	35.7	+8.5 / +5.9
6	Biodux	2.0+3.0+4.0	30.5	31.6	30.0	30.7	+2.9 / +0.3
7	Biodux	3.0+4.0+5.0	31.5	32.8	32.3	32.2	+5.0 / +2.4
8	Biodux	4.0+5.0+6.0	30.8	33.0	31.0	31.6	+3.9 / +1.3
9	MERS	3.0+0.2+0.4	33.2	34.6	33.9	33.9	+6.7 / +4.1
10	MERS	4.0+0.3+0.5	35.3	36.4	35.7	35.8	+8.6 / +6.0
11	MERS	5.0+0.4+0.6	34.1	35.2	34.8	34.7	+7.5 / +4.9

The highest yield among the variants treated with Biodux was obtained when it was applied at the rate of 3.0+4.0+5.0 ml/ha. The average three-year yield in this variant was 5.0 q/ha higher than the control and 2.4 q/ha higher than the standard variant.

The application of the MERS biostimulant to sunflower was observed to increase plant resistance to various external factors and to have a positive effect on yield formation at the end of the growing season. In 2022, depending on the application rates of the biostimulant, yields of 34.6, 36.4 and 35.2 q/ha were obtained. During 2021–2023, average seed yields of 33.9, 35.8 and 34.7 q/ha were achieved.



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When MERS was applied at the rate of 3.0+0.2+0.4 L/ha, the average three-year yield was 1.9 and 0.8 q/ha lower compared with the variants where higher rates were applied. The highest yield, 35.8 q/ha, was obtained when the application rate was set at 4.0+0.3+0.5 L/ha. In this variant, the yield was 8.6 q/ha higher than the control and 6.0 q/ha higher than the standard variant.

The variants treated with the Fitovak 20% immunostimulant produced higher yields than the variants treated with the Biodux and MERS biostimulants. In the variants where MERS was applied at three different rates, the yield was 0.5, 0.8 and 1.0 q/ha lower than in the variants where Fitovak 20% immunostimulant was applied at three different rates. At the same time, compared with the variants treated with Biodux at three different rates, the MERS biostimulant provided yield increases of 3.7, 4.4 and 4.1 q/ha.

### **Conclusion**

Based on the results obtained, it can be concluded that the application of Fitovak 20% immunostimulant to sunflower increases yield more effectively than the MERS and Biodux biostimulants. The rate of 0.6+0.7+0.8 L/ha was scientifically substantiated as the optimal application rate.

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