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**EFFECT OF BIOSTIMULATOR NORMS ON STEM GROWTH AND LEAF
FORMATION IN SESAME CULTIVARS PLANTED IN THE SUMMER
PERIOD**

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Abstract: This article examines the effects of various biostimulants on stem growth and leaf formation in sesame varieties during the flowering and boll formation phases. The study found that treating the seeds of the Qora Shahzoda (Qora shahzoda) sesame variety with the Tandem 10% biostimulant at a rate of 0.4 l/t + 0.6+0.8 l/ha during the growing season promoted better stem growth and increased leaf formation. For the Sadaf variety, treating the seeds with the Immunoactive biostimulant at a rate of 30 ml/t + 35+40 ml/ha during the growing season yielded superior results compared to the use of Tandem 10% biostimulant and Fitovak 20% immunostimulator.

Keywords: sesame, cultivar, biostimulant, standard, rate, stem, leaf

INTRODUCTION. Today, “in more than 80 countries of the world, sesame is grown on an area of about 13.0 million hectares, producing 6.7 million tons of gross seed annually.” The growth of the world's population is also leading to an increase in the need for sesame oil. According to the open source data of the international statistics website Helgi Library, “the volume of sesame production in the world has increased by 2.59 percent compared to 1961.” However, considering that today the world's population is growing by 87 million people per year, the expansion of sesame cultivation areas cannot be considered satisfactory. This, in turn, is one of the urgent issues of the present day for agricultural scientists to create fast-ripening, productive, disease and pest-resistant varieties of sesame, as well as to develop and produce agrotechnology for growing a high seed yield from them.

Sesame is one of the oldest oilseed crops used as a medicine and food. Sesame seeds have antioxidant, cholesterol-lowering, blood lipid-regulating, liver and kidney-



protecting, anti-inflammatory, and other beneficial effects, and in addition to sesame oil, sesame paste, sesame milk, and tahini, along with oil, contain about 180 phytochemical components [5].

N.V.Kishlyan et al. reported that the oil content of sesame seeds is 59-63% and the protein content is 24-28%, and the oil content in the seeds does not change from north to south, but the protein content reaches 27-28% when grown in southern regions [2].

In the experiments of P.C.Stanwood, the effect of liquid nitrogen (LN₂) on the preservation of plant seed germination was studied. When seeds of 29 plant species were stored in liquid nitrogen conditions (temperature -196°C) for 180 days, it was noted that all species were preserved without damage to the germination of sesame (*Sesamum indicum.L*) and flax (*Linum usitatissimum.L*). It was reported that although the skin of sesame seeds was damaged by cold temperatures, root germination was not damaged [4].

Sesame seeds contain a large amount of oil, vitamins A, B₂, B₁, PP, potassium, magnesium, phosphorus, iron, and 100 g of unrefined sesame seeds contain about 970 mg of calcium, making them a valuable food, and sesame oil has the ability to be stored for up to 9 years due to antioxidants [3]. V.N. Dobrynychenko and others write that sesame is a bad plant for itself, and that it can be replanted in a field planted for one year after at least 4 years. They studied legume crops in irrigated areas, and in arid conditions, peas, watermelon, and melon are good predecessors for sesame [1].

MATERIALS AND METHODS. The scientific research work was carried out in 2023 at the experimental scientific research and educational experimental farm of Tashkent State Agrarian University.

The soil of the experimental farm is a typical non-saline gray soil that has been irrigated since ancient times. This soil contains 0.972-1.187% humus, about 0.098-0.112% nitrogen, about 0.169-0.181% phosphorus and about 1.21-1.33% potassium. The mobile forms of nutrient elements of the experimental field are N-NO₃ 13.7-16.1 mg/kg, P₂O₅ 38.9-45.4 mg/kg and K₂O 358.3-374.5 mg/kg.

The seeds of sesame varieties planted as a repeated crop were planted in the third decade of June in 16 variants, four repetitions of Qora Shahzoda and Sadaf sesame varieties, totaling 20 hectares. Before planting sesame, Fitovak 20% (standard) immunostimulant was applied in the amount of 300 ml/t, and during the growth period it was sprayed in the amount of 300 and 400 ml/ha. Tandem 10% biostimulant was applied to seeds in the amount of 0.3, 0.4, 0.5 l/t and sprayed in the amount of 0.4+0.6,

0.6+0.8 and 0.8+1.0 l/ha during the growing season. The immunoactive biostimulant was treated with seeds at a rate of 25, 30, 35 ml/t and sprayed during the growing season at a rate of 30+40, 35+40 and 40+40 l/ha. Based on the goals and objectives of the experiments, phenological observations and calculations were carried out on the Kara Shahzoda and Sadaf sesame varieties.

RESULTS AND DISCUSSION: The control variant was treated with plain water and planted. The growth regulators were taken as a reference, Fitovak 20% immunostimulant. Growth regulators were treated with seeds before planting and sprayed on the plants twice during the growth period. The effect of different doses of biostimulants on the growth of the stem and the formation of leaves in sesame varieties was studied in terms of growth phases, and the following results were obtained:

Table 1

Stem height and number of leaves by developmental stages of sesame cultivars, 2023

№	Variety name	Name of growth regulators	Rate of growth regulators, ml,l/t/ha	Developmental Phases			
				Flowering		podding	
				height, cm	number of leaves, pcs	height, cm	number of leaves, pcs
1	Qora Shahzoda	Control	-	71,7	56,2	86,3	66,6
2		Fitovak 20% (standard)	0,3 l/t+ 0,3+0,4 l/ha	82,8	72,6	111,6	89,3
3		Tandem 10%	0,3 l/t+0,4+0,6 l/ha	90,7	74,3	116,5	100,4
4		Tandem 10%	0,4 l/t+0,6+0,8 l/ha	93,6	78,1	121,8	105,1
5		Tandem 10%	0,5 l/t+0,8+1,0 l/ha	101,8	80,3	125,4	110,5
6		Immunoaktiv	25 ml/t+30+40 ml/ha	85,6	68,4	114,6	98,1
7		Immunoaktiv	30 ml/t+35+40	91,1	75,3	119,1	102,7

		v	ml/ha				
8		Immunoakti v	35 ml/t+40+40 ml/ha	97,7	78,1	121,9	109,2
9	Sadaf	Control	-	78,9	43,9	87,4	68,8
10		Fitovak 20% (standard)	0,3 l/t+ 0,3+0,4 l/ha	84,4	75,6	113,3	92,3
11		Tandem 10%	0,3 l/t+0,4+0,6 l/ha	89,9	78,4	118,6	103,6
12		Tandem 10%	0,4 l/t+0,6+0,8 l/ha	94,3	81,8	124,1	107,1
13		Tandem 10%	0,5 l/t+0,8+1,0 l/ha	99,8	85,2	126,8	112,9
14		Immunoakti v	25 ml/t+30+40 ml/ha	92,3	80,9	120,5	105,7
15		Immunoakti v	30 ml/t+35+40 ml/ha	105,7	84,5	127,6	108,9
16		Immunoakti v	35 ml/t+40+40 ml/ha	108,4	89,9	131,3	115,3

It was found that in Qora Shahzoda variety, the stem of the plant grows rapidly after the branching phase, doubles in height during the flowering phase, and produces a large number of leaves. In the control option, the sesame stalk was 71.7 cm and the number of leaves was 56.2 pieces. In the case where Fitovak 20% (standard) immunostimulant was used, compared to the control case, the height of the plant was 11.1 cm, and the number of leaves was 16.4 more.

Tandem 10% biostimulant was applied in the amount of 0.4+0.6 l/t during the growth period of the Qora Shahzoda variety, the stem of the plant grew to a height of 90.7 cm and the number of leaves was 74.3. If the amount of biostimulant was increased in the amount of 0.6+0.8 l/ha and 0.8+1.0 l/ha, the number of leaves was 93.6 and 101.8 cm. It was found that it increased by 78.1 and 80.3 units. In these variants, compared to the standard version, the sesame stem was 7.9, 10.8, 19.0 cm high and the number of leaves was 1.7, 5.5, 7.7 more. Compared to the control variant, the stem height was 19.0, 21.9, 30.1 cm higher and the number of leaves was 18.1, 21.9, 24.1 more.



Application of Tandem 10% biostimulant at three different rates was found to double the plant stem and two and a half times the number of leaves. The use of immunoactive biostimulant in three different doses repeated the above pattern.

Immunoactive biostimulant during the growth period of the Qora Shahzoda variety was treated in the amount of 25, 30 and 35 ml/t in the seed treatment at different rates. 97.7 cm and the number of leaves was 68.4, 75.3, 78.1 pieces. In these options, the sesame stem was 5.1, 2.5, 4.1 cm lower, and the number of leaves was 5.9, 2.8, 2.2 less than the options using Tandem 10% biostimulant, while the sesame stem was 2.8, 8.3, 14.9 cm higher, and the number of leaves was 4.2, 2.7, 5.5 less than the reference option. it was too much. Compared to the control variant, the stem height was 13.9, 19.4, 26.0 cm higher and the number of leaves was 12.2, 19.1, 21.9 more.

It was found that the number of stems and leaves of the plant doubles during the flowering phase in both the control and standard varieties of Sadaf. Tandem application of 10% immunoactive biostimulants in three different rates to the seeds, spraying the plant during the growth phase doubled the number of leaves, but due to the rapid growth of the plant during the branching phase, the height of the stems increased by 29.5-40 cm during the flowering phase. During the budding phase, the control variant of the Qora Shahzoda cultivar grew to a height of 86.3 cm and produced 66.6 leaves. In the case of Fitovak 20% standard, compared to the control case, sesame stems were 25.3 cm higher and the number of leaves was 22.7 more.

It was observed that in the variants where Tandem 10% biostimulant was applied in three different rates, the stem of the plant grew a little higher and the number of leaves was relatively higher compared to the reference variant. Increasing the rate of biostimulant to the amount of 0.5 l/t+ 0.8+1.0 l/ha ensured the growth of the stem to a height of 125.4 cm and the formation of leaves up to 110.5 pieces. It was found that in the options with reduced biostimulant rate, the stem of the plants was 3.6 and 8.9 cm lower, and the number of leaves was 5.4 and 10.1 less.

When immunoactive biostimulant was applied to the Qora Shahzoda variety, it was found that the stem of the plant grew 4.1, 4.5, 2.1 cm lower, and the number of leaves was 1.9, 2.7, 3.5 less compared to the Tandem biostimulant.

As observed in the branching phase, the Sadaf variety maintained its advantage over the Qora Shahzoda variety in terms of the height of the plant stem and the production of relatively more leaves, and in the control variant, the height of the plant stem was 87.4 cm, which was 1.1 cm higher than the control variant of the Qora Shahzoda variety, and it was observed that the number of leaves was 2.2 more. In the

variant using Fitovak 20% immunostimulator, the plant stem was 113.3 cm, the number of leaves was 92.3 pieces, compared to this variant of the Qora Shahzoda variety, the plant stem grew 1.7 cm higher, and the number of leaves was 3.0 less.

It was observed that in the variants where Tandem 10% biostimulant was applied in three different rates, the stem of the plant grew a little higher and the number of leaves was relatively higher compared to the reference variant. Increasing the rate of biostimulant to the amount of 0.5 l/t + 0.8+1.0 l/ha ensured the growth of the stem to a height of 126.8 cm and the formation of leaves up to 112.9 pieces. It was found that in the variants with reduced biostimulant rate, the stem of the plants was 8.2 and 2.7 cm lower, and the number of leaves was 9.3 and 5.8 less.

When immunoactive biostimulant is applied to the Sadaf variety, it was found that the stem of the plant grows 1.9, 3.5, 4.5 cm higher, and the number of leaves increases by 2.1, 1.8, 2.4, compared to the variants with Tandem 10% biostimulant.

CONCLUSION. The following conclusions were drawn from the above data: the treatment of sesame seeds of the Kara Shahzoda variety and during the growth period with the Tandem 10% biostimulant at a rate of 0.4 l/t + 0.6+0.8 l/ha ensures the growth of the stem and the formation of relatively more leaves in the plant. The treatment of seeds of the Sadaf variety and during the growth period with the Immunoactive biostimulant at a rate of 30 ml/t + 35+40 ml/ha provided a higher result than the use of the Tandem 10% biostimulant and Fitovak 20% immunostimulants.

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