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INFLUENCE OF BIOSTIMULATORS BM-86 AND MOBE MAX ON THE QUALITY AND QUANTITY OF HARVEST INDICATORS OF DIFFERENT MUNG BEAN VARIETIES

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Abstract: In this article, BM-86 and Mobe MAX biostimulants were used in different vegetation periods (3-4 true leaves, budding, and flowering) of 5 different mung bean varieties. According to the results of the conducted research, due to the biologically active substances, macro- and microelements contained in the biostimulants, it was established that the experimental variants showed higher quantitative and qualitative indicators of fruiting elements compared to the control variants, and the most positive result was observed in the varieties "Baraka" and "Zilola," where the Mobe Max biostimulator was used.

Keywords: "Andijan" mung bean variety, "AVMU-2001" mung bean variety, "Barqaror" mung bean variety, "Baraka" mung bean variety, "Zilola" mung bean varieties, BM-86 biostimulator, Mobe MAX biostimulator, pod length, grain weight and pod count.

Introduction. Due to the progressive growth of the world's population, the importance of the agricultural sector is growing day by day. Indeed, providing the population with high-quality agricultural products and increasing yields was considered one of the urgent tasks.

Also, the impact of various pests and diseases on plants is increasing due to global environmental problems such as soil degradation, increased salinity, and changes in abiotic and biotic factors. Indeed, the development of methods for increasing the resistance of plants to stressors, improving their growth and development is one of the urgent tasks.

In modern agriculture, stimulants are used to improve plant growth and development, increase resistance to unfavorable environmental factors, improve resistance to various diseases, and obtain high, quality, and abundant yields[1-2].

Currently, leguminous crops are sown as a repeated crop on an area of 135 million hectares worldwide, with an average grain yield of 12,0 c/ha and a gross yield of 206,4 million tons. In the world, mung bean ranks second after soybeans in terms of the area of leguminous crops. It is also cultivated annually as a repeated crop on more than 200,000 hectares in our republic [3].

The mung bean plant (Vigna radiata) is one of the most widespread fodder and green manure crops in the world. Also, mung bean grain contains 24,8% protein, 1% oil, 3,5-4,5% fiber, 62-65% carbohydrates, 50,4% carbohydrates, 1,5% fatty acids, vitamins A, B1, B2, B3, B6, C, E, K, minerals of sodium, phosphorus, potassium, magnesium, iron, copper, zinc, and antioxidants [3]. Mung bean is not only a drought- and salt-tolerant plant, but also a crop that does not require high agrotechnical treatments, and it is of great importance in crop rotation [3]. Also, this plant is planted as a repeated crop after cereals, potatoes, and other vegetables and plays an important role in increasing soil fertility.

Biostimulants are used to improve plant growth and development, dry matter and photosynthesis productivity, and economic and biological yields [4]. Among foreign scientists, Jardin D.P. developed the first concepts about the role of plant biostimulants in biochemical and physiological functions and nutrient movement [4].

In the scientific works of D.Traon and other scientists, it is indicated that "plant biostimulants are formed from any substance or a combination of microorganisms, which, when used in all vegetative and generative organs of the plant, increase the efficiency of nutrient assimilation by the plant and ensure its resistance to abiotic stresses." [5].

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To improve plant resistance to various diseases and harmful environmental conditions, immunostimulants and biostimulants composed of various biologically active substances are used [6].

Among the biostimulants, BM-86 (Goemar BM-86) activates the flowering and fruiting of fruits and vegetables, and is a high-quality biostimulant consisting of seaweed (Ascophyllum nodosum) extract, essential amino acids, vitamins and phytohormones, as well as various macro and microelements (sulfur (S) - 123,3 g/l; magnesium (Mg) - 61,6 g/l; boron (B) - 26,0 g/l; molybdenum (Mo) - 0,25 g/l; total nitrogen 24,1 g/l) [6].

This biostimulant also protects plants from stress, increases yield, reduces flower shedding, improves fruit formation, and stimulates the synthesis of anthocyanins and polyphenols in the fruit. This biostimulant increases the plant's resistance to unfavorable abiotic factors (drought, temperature fluctuations) [7].

Currently, Mobe MAX biostimulants are used in agriculture to protect agricultural crops from stress, increase plant resistance, accelerate growth, improve soil fertility and immunity to fungal diseases, and have a synergistic effect with other fertilizers and chemicals. This biostimulant contains 30% organic matter, 10,2% organic carbon, 10,8% free amino acids, phytohormone, 1,08% water-soluble potassium, and trace elements. Therefore, this biostimulant is used for long-term crop care, the development of generative organs in crops, protecting plants from stress, and improving the quantity and quality of fruits [8].

The climate of the Bukhara district is sharply continental, and mung beans are grown as a repeated crop in conditions of high humidity. In order to prevent the shedding of fruit elements in the mung bean plant under the influence of the harmsel stressor, the influence of BM-86, Mobe MAX biostimulants was studied.

Object and methods of research. The object of the research was the application of BM-86, Mobe MAX biostimulants at a rate of 2 l/t before sowing and 2 l/ha at a rate of 2 l/ha (ha) in the phenophases of 3-4 true leaves and flowering of mung bean varieties "Andijan," "AVMU-2001," "Barqaror," "Baraka," "Zilola," belonging to the species Vigna radiata, in different periods of vegetation (before sowing, 3-4 true leaves, flowering). Morphological, field observation, phenological, and statistical analysis methods were used in the research process [9].

In the soils of the Bukhara region, salts have a predominantly sulfate type of salinity, which negatively affects the growth and development of plants and yield indicators. The main goal of our research is to determine the influence of BM-86, Mobe MAX biostimulants on the preservation, quantity, and quality of yield elements in relation to various stress factors in the mung bean plant.

The research was conducted during 2024-2025 at the natural sciences and agrobiotechnology agro-section of the Bukhara district. The experimental system consisted of 15 variants, of which in variants 1-5 seeds of 5 different mung bean varieties were treated with ordinary water, and control variants were determined. As experimental variants, BM-86 was used in variants 6-10, Mobe MAX biostimulants were used in variants 10-15 at a rate of 2 l/t during the sowing period, and 2 l/ha during the growing season (3-4 true leaves, flowering).

Results and Discussion

In order to determine the influence of BM-86 and Mobe MAX biostimulants on the quantity and quality of yield indicators of various mung bean varieties, the conducted research was analyzed. As a result, according to the experimental system, different quantitative indicators of the quality and quantity of yield elements were recorded in 15 variants of different mung bean varieties (Table 1).

Table 1

	Variatio	Seed	per plant	1000

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	ns	with cultivation period	Number of pods, pcs.	Pod length, cm	Number of grains per pod, units	seeds weight, g
	Andijon	Control (simple water) 2 l/t, 2 l/ha	18,0	6,0	9,0	92,0
	Avmu-2001		14,2	5,5	8,1	104,0
	Baraka		15,4	6,8	8,3	109,0
	Barqaror		15,7	7,0	8,5	102,0
	Zilola		20,3	7,5	9,0	108,0
	Andijon	BM-86 2 l/t, 2 l/ha	18,7	6,5	8,0	94,0
	Avmu-2001		14,8	6,0	9,3	106,0
	Baraka		15,6	7,0	8,0	115,0
	Barqaror		17,9	7,5	10,3	110,0
0	Zilola		22.4	8,0	10,6	108,0
1	Andijon	Mobe MAX 2 l/t, 2 l/ha	20,4	8,8	12,0	98,0
2	Avmu-2001		24,3	8,5	11,5	110,0
3	Baraka		25,4	9,4	12,5	121,0
4	Barqaror		22,0	8,0	12,4	116,0
5	Zilola		29,4	9,7	12,6	119,0
	Sx					0,45
	HCP05					1,3

In the study, although the number of pods per plant is less than the number of flowers, there is a positive correlation between them, and the number of pods per plant in the control variants was: 18,0; 14,2; 15,4; 15,7; 20,3 units. Also, when analyzing the number of pods per plant in the experimental variants, from 6 to 15 variants, according to the experimental system, the number of pods was: 18,7; 14,8; 15,6; 17,9; 22,4; 20,4; 24,3; 25,4; 22,0; 29,4 units were noted. Thus, the most positive result in terms of the number of pods per plant was observed in the 15th variant, which was 9,1 units more compared to the control variant.

In the study, when analyzing the legume length on one plant, different results were observed in 15 different variants, and it was found that the results in the experimental variants were higher than in the control variants. In particular, in the varieties "Baraka" and "Zilola," treated with the Mobe MAX biostimulator, compared to the control variant, the legume length was: 2,6 cm; It was found to be higher than 2,2 cm. The high yield indicators in these variants are explained by the presence of biologically active substances, free amino acids, water-soluble potassium, and trace elements in the biostimulant.

During the conducted research, when determining the number of grains in one pod in the experimental variants, the most positive results were observed in the 13th variant and the 15 th variant with the Mobe MAX biostimulator. In these variants, due to the fact that most of the

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flowers were pollinated and fertilized under the influence of the Mobe MAX biostimulator, without falling under the influence of the harmsel wind, high results were shown in the number of pods on one plant and the number of grains on one pod. Also, positive results were noted in these varieties treated with BM-86 compared to the control variants.

Consequently, the biostimulants used in the experiments showed positive results compared to the control variants, the presence of amino acids, vitamins and phytohormones, as well as various macro and microelements necessary for the plant, plays an important role in increasing the resistance of plants to various stressors, improving the quantity and quality of yield indicators [10].

The results obtained in the study are consistent with the research conducted by Taiz and Zeiger in 2018 and the conclusions stated that biostimulants play an important role in enhancing the process of photosynthesis in plants, directing assimilation products to generative organs, and preserving fruiting elements under the influence of stressors [11].

In the study, when determining the weight of 1000 seeds in all variants, the results in the control variants were: 92.0; 104.0; 109.0; 102.0; 108.0 g. Also, in the experimental variants, that is, from 6 to 15 variants, the weight of 1000 seeds was respectively: 94.0; 106.0; 115.0; 110.0; 108.0; 98.0; 110.0; 121.0; 116.0; 119.0 g were noted. Thus, the most positive results for the weight of 1000 seeds were observed in the 13th and 15th variants, which, compared to the control variant, were 12 g and more than 11 g, respectively.

Conclusions. Consequently, the biostimulants used in the study play an important role in improving the growth and development of mung bean plants, increasing their resistance to various stress factors, and improving the quantity and quality of yield elements.

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