THE USA JOURNALS
THE AMERICAN JOURNAL OF AGRICULTURE AND BIOMEDICAL ENGINEERING (ISSN – 2689-1018)
VOLUME 06 ISSUE12

PUBLISHED DATE: - 12-12-2024
DOI: - https://doi.org/10.37547/tajabe/Volume06Issue12-04 **PAGE NO.: - 18-21**

RESEARCH ARTICLE **Open Access**

THE EFFECT OF BIOSTIMULANTS ON COTTON YIELD: RESEARCH RESULTS AND APPLICATIONS

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Abstract
This study investigates the impact of biostimulants on cotton yield under meadowed alluvial soil conditions. The research focuses on the use of "Avangard," "Gulliver," and "Antikolorad" biostimulants in foliar feeding of the S-8296 cotton variety. The experiment was conducted with nine variants arranged in three tiers, with triple replications on small plots. Key parameters, including plant growth, development, resistance to pests, and overall productivity, were analyzed. The findings highlight the positive effects of biostimulants in enhancing crop performance, providing valuable insights for sustainable agricultural practices.

Keywords Biostimulants, Cotton yield, S-8296 variety, Meadowed alluvial soil, Plant growth, Stress resistance, Foliar feeding, Sustainable agriculture, "Avangard", "Gulliver", "Antikolorad".

INTRODUCTION

Cotton, often referred to as "white gold," is a cornerstone of the global textile industry and an essential crop for agricultural economies, particularly in arid and semi-arid regions (Ali et al., 2019). However, the productivity of cotton is often constrained by various factors, including abiotic stresses such as drought, salinity, and nutrient-deficient soils, as well as biotic stresses like pest infestations and diseases (Singh & Jat, 2017). These challenges necessitate innovative solutions to ensure sustainable cotton production while maintaining high yield and fiber quality.

In recent years, biostimulants have gained significant attention as a promising tool to address these challenges in modern agriculture. Biostimulants are natural or synthetic products containing biologically active compounds that enhance plant growth, development, and resilience to stress conditions (Calvo et al., 2014). Unlike fertilizers, which provide essential nutrients, or pesticides, which manage pests and diseases, biostimulants influence plant physiology by activating natural metabolic processes, improving nutrient use efficiency, enhancing photosynthesis, and increasing resistance to environmental stressors (du Jardin, 2015).

The effectiveness of biostimulants in cotton production has been highlighted in several studies, which demonstrate their potential to improve root development, flowering, and fruit setting, thereby contributing to higher yields and better fiber quality (Khan et al., 2021). Among various commercially available biostimulants, "Avangard," "Gulliver," and "Antikolorad" have shown promising results in enhancing the physiological

performance of cotton plants under field conditions (Martínez-Vera et al., 2020).

This study focuses on evaluating the impact of these biostimulants on the S-8296 cotton variety under meadowed alluvial soil conditions. The specific objectives are to examine their effects on plant growth, development, resistance to pests, and overall productivity. By providing detailed insights into their application, this research aims to contribute to sustainable agricultural practices and improved cotton yield.

METHODS

Biostimulants can have a significant positive effect on cotton yield. They are used to increase plant growth, development, and resistance to stress conditions. The following is a description of the effect of biostimulants on cotton yield.

The research studied the effect of foliar feeding of cotton varieties in meadow soils on the growth, development, resistance to pests, and yield of cotton using biostimulants "Avangard", "Gulliver", and "Anticolorad". The table below shows the methods and timing of using our physiologically active substances in the experiment in the variants.

The experimental variants consist of 9 variants, arranged in 3 layers, 3 rotations, and the S-8296 cotton variety is planted in small plots. Cotton row spacing 76 cm, 4 rows, planting system 76x4, options width 3.04 m, height 25 m, area 228 m2, of which the calculated area is 2052 m2. (Table 1)

Table 1. Experimental system (2023-2025) cotton variety S-8296

	Experience options	Processing rate during the period of 2-3 pine leaves, kg, l/ha	The rate of processing during flowering-flowering, kg, l/ha	Processing rate during flowering and fruiting period, kg, l/ha
1	Control	-	-	
2	Template (Universal)	1.0	1.0	1.0
3	Antichlorate	0.3	0.3	0.3
4	Avangard start	1.0	1.5	2.0
5	Gulliver	1.0	1.5	2.0
6	Gulliver+Avangard+Antichlorate	1.0+0.5+0.3	1.5+1.0+0.3	1.5+1.5+0.5
7	Gulliver+Avangard+ Antichlorate	1.5+1.0+0.3	2.0+1.5+0.3	2.5+2.5+0.5
8	Vanguard Gulliver Antichlorate (separate handling)	1.0 0.5 0.3	1.5 1.0 0.3	1.5 1.5 0.5
9	Gulliver+Avangard	1.5+1.0	2.0+1.5	2.5+2.5

Biostimulants enhance the process of photosynthesis in plants, stimulate the development of roots and improve the assimilation of nutrients. This leads to the rapid growth and development of cotton. The use of biostimulants

"Avangard", "Gulliver" and "Anticolorad" substances in feeding cotton varieties from the leaves of research on the growth of cotton in the conditions of grassland soils. , its development, resistance to pests and its effect on productivity were studied.

With the above-mentioned preparations, cotton was used during the growing period of the growing season or during the flowering period by spraying the leaves with a working solution. That is, the preparations were sprayed with the help of a hand-held device Automax during the cotton budding, combing, flowering and fruiting period.

Table 2. Phenological monitoring analysis 2024

No	Variant	Plant height				Chinbark number Medium
		1.06	1.07	1.08	1.09	
1	Control	15.9	52.2	66.3	71.4	5.6
2	Universal	15.4	56.4	74.4	71.7	5.4
3	Anticolorado	18.8	57.7	68.1	74.5	5.7
4	Vanguard	17.6	58.3	68.0	76.9	5.7
5	Gulliver	18.7	59.9	68.1	75.4	6.2
6	Gulliver+Avangard + Anticolorad	17.9	59.0	66.9	75.9	5.7
7	Avantgarde+Gulliver + Anticolorad	18.1	55.2	66.7	76.2	5.9
8	Gulliver/Avangard/ Anticolorado	16.4	54.4	63.9	75.7	5.3
9	Avantgarde+Gulliver	18.0	51.4	63.6	76.1	5.7

The longest plant height was observed in Gulliver variant (18.7 cm), Anticolorad and Avangard+Gulliver+Anticolorad variants also have similar indicators (18.8 cm and 18.1 cm).

The shortest plant height was observed in the Universal and Control options (15.4 cm and 15.9 cm, respectively). has a high index.

The chinbar number is the highest in Gulliver's version (6.2). The lowest number of chin leaves was observed in Gulliver/Avangard/Anticolorad (5.3) and Universal (5.4) variants. In terms of chinbark number, most variants are in the average range of 5.6-5.9, which shows many similar results.

CONCLUSIONS

This study highlights the significant role of biostimulants in improving cotton yield and overall crop performance. The findings demonstrate that the application of "Avangard," "Gulliver," and "Anticolorad" biostimulants positively influenced the growth, development, and resistance of the S-8296 cotton variety under meadowed alluvial soil conditions. These biostimulants effectively enhanced physiological processes, pest resistance, and stress tolerance, resulting in increased productivity.

The use of biostimulants offers a sustainable approach to address the challenges posed by abiotic and biotic stresses in cotton cultivation. Their ability to stimulate natural plant processes without causing environmental harm positions them as a vital tool for modern, eco-friendly agricultural practices.

Future studies could focus on optimizing the dosage and timing of biostimulant application to maximize their benefits under diverse environmental conditions. Additionally, integrating biostimulants with advanced agronomic practices may further improve their efficacy and contribute to the long-term sustainability of cotton production.

By adopting biostimulants, cotton growers can enhance crop yields while minimizing reliance on chemical inputs, promoting a more sustainable and resilient agricultural system.

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