



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

EFFECT OF NEW BIOSTIMULANTS ON NET PHOTOSYNTHETIC PRODUCTIVITY OF COTTON

Dildora Q. Ibragimova

Fergana State University, Fergana, Uzbekistan

Barnoxon U. Mannobova

Fergana State University, Fergana, Uzbekistan

E-mail: mannobova.barno@mail.ru

Abstract

The article presents an assessment of the effect of new biostimulants on the net photosynthetic productivity of cotton. Gulliver, Avangard Start and Antikolorad Max were applied individually and in different combinations, and their effects were evaluated during the budding–flowering and boll-setting stages. In the control treatment, net photosynthetic productivity was 8.1 and 7.9, respectively, whereas the highest values were recorded in the Gulliver treatment (10.8 and 10.3). The results indicate that the use of biostimulants can enhance photosynthetic activity and improve the physiological performance of cotton plants.

Keywords: cotton, biostimulant, photosynthesis, net photosynthetic productivity, Gulliver, Avangard Start, Antikolorad Max.

Introduction

Yield formation in cotton largely depends on the intensity of photosynthesis, development of the leaf apparatus, and the efficient redistribution of assimilates to reproductive organs. Net photosynthetic productivity is an important



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

physiological indicator characterizing the amount of dry organic matter formed per unit leaf area over a given period. Higher values of this indicator generally reflect more active functioning of the photosynthetic apparatus and a greater potential for biomass accumulation and yield formation.

In recent years, considerable attention has been paid to the use of biostimulants to increase photosynthetic activity, improve nutrient uptake, and support the formation of reproductive organs in cotton. Properly selected biostimulants may enhance root activity, leaf development and the functional efficiency of the photosynthetic apparatus.

According to the studies of Sh. Abdualimov, Sh. Karimov and T. Islomov, the application of different stimulants increased net photosynthetic productivity and was accompanied by an increase in cotton yield of 4.9–5.9 centners ha⁻¹. Therefore, evaluating the response of cotton photosynthesis to new biostimulants at different developmental stages is of both scientific and practical importance.

The aim of this study was to determine the effect of Gulliver and Avangard Start biostimulants, used individually and in combination with Antikolorad Max, on the net photosynthetic productivity of cotton during key growth stages.

Materials and Methods

Net photosynthetic productivity was evaluated during the budding–flowering and boll-setting stages of cotton development. The experiment included a mineral-fertilizer control and treatments involving Gulliver, Avangard Start and Antikolorad Max applied individually, in combinations, and according to separate application schedules. The obtained values were compared with those of the control treatment.

The assessment of net photosynthetic productivity was based on changes in dry matter accumulation in relation to leaf area over the corresponding growth period.



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

The treatments were compared across the two developmental stages in order to evaluate the physiological effectiveness and stability of the applied preparations.

Results

The experimental results showed that net photosynthetic productivity was higher than the control in almost all treatments involving biostimulants. In the control treatment, the values were 8.1 during the budding–flowering stage and 7.9 during the boll-setting stage, representing the lowest values among the treatments compared in both stages.

During budding–flowering, the highest value was recorded with Gulliver (10.8), which was 2.7 units or approximately 33.3% higher than the control. High values were also observed for Avangard + Gulliver + Antikolorad (10.7) and Gulliver + Avangard + Antikolorad (10.6). Avangard Start applied alone produced a value of 10.2, approximately 25.9% above the control.

Antikolorad Max applied alone resulted in a value of 8.6 during budding–flowering. Although this exceeded the control, it remained below the values obtained with the principal biostimulant treatments. This may be related to the fact that the primary function of Antikolorad Max is crop protection rather than direct stimulation of plant growth and photosynthetic activity.

At the boll-setting stage, Gulliver again produced the highest value, 10.3, which was 2.4 units or approximately 30.4% above the control. Avangard Start showed a relatively stable effect, with a value of 9.8 compared with 10.2 at budding–flowering. In the separate Avangard/Gulliver/Antikolorad application treatment, net photosynthetic productivity increased from 9.5 at budding–flowering to 9.9 at boll setting.

In some combined treatments, however, net photosynthetic productivity decreased at the boll-setting stage. In the Gulliver + Avangard + Antikolorad



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

treatment, the value decreased from 10.6 to 9.6, while in the Avangard + Gulliver + Antikolorad treatment it declined from 10.7 to 9.1.

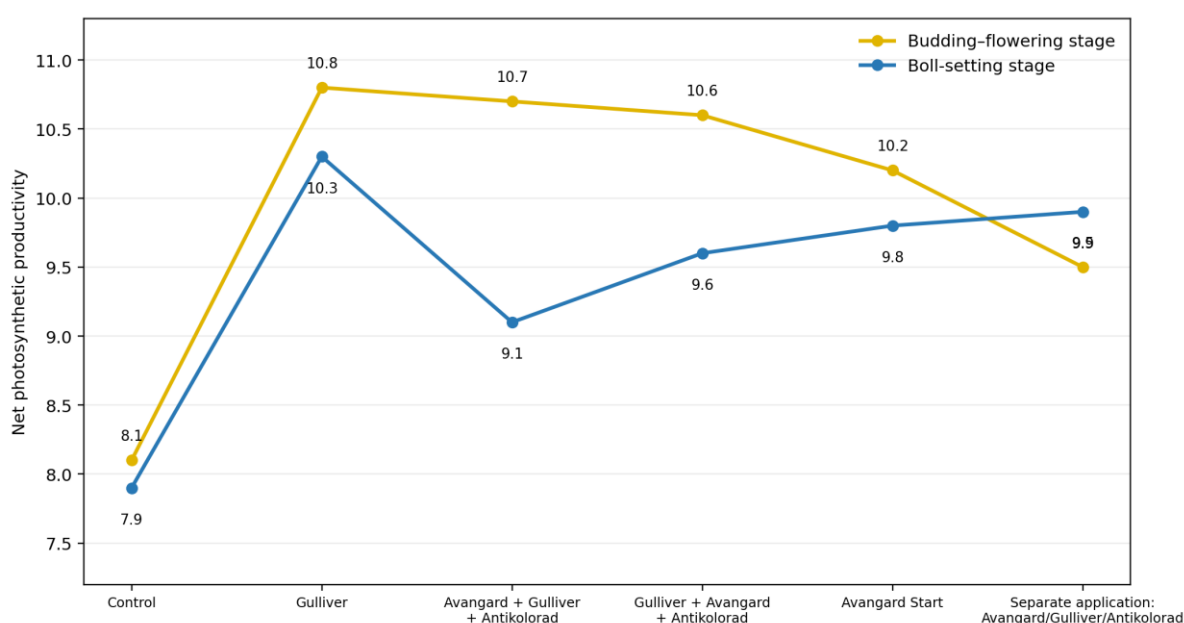


Figure 1. Effect of new biostimulants on net photosynthetic productivity of cotton

Discussion

The results demonstrate that the applied biostimulants enhanced the physiological activity of the cotton leaf apparatus and promoted greater net photosynthetic productivity relative to the control. Gulliver was particularly effective because high values were maintained at both developmental stages, indicating that its effect was not limited to vegetative growth but continued during reproductive development.

The favorable response to Gulliver may be associated with biologically active humic and organic compounds that can stimulate root activity, improve nutrient



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

uptake and support the functional state of leaves. These processes may create more favorable conditions for dry-matter accumulation and sustained photosynthetic performance.

Avangard Start also showed a balanced response. The relatively small difference between 10.2 during budding–flowering and 9.8 during boll setting indicates that its physiological effect remained comparatively stable throughout the studied period. By contrast, the smaller response obtained with Antikolorad Max alone is consistent with its primary protective function against pests rather than direct growth stimulation.

The decline observed at boll setting in some three-component combinations suggests that the physiological response to simultaneous application may vary with the developmental stage. One possible explanation is a change in assimilate distribution between vegetative and reproductive organs. However, this interpretation should not be considered definitive on the basis of net photosynthetic productivity alone. A more rigorous explanation requires integrated analysis of leaf area, dry biomass, number and retention of reproductive organs, boll formation, and final yield.

The increase from 9.5 to 9.9 in the treatment where Avangard, Gulliver and Antikolorad were applied separately suggests that stage-specific application may help maintain photosynthetic activity for a longer period. Overall, the findings are consistent with earlier reports indicating a positive influence of plant stimulants on cotton photosynthetic activity and productivity [19, pp. 131–136].

Conclusion

The application of new biostimulants had a positive effect on the net photosynthetic productivity of cotton. The control treatment produced values of 8.1 and 7.9 during the budding–flowering and boll-setting stages, respectively, while the corresponding values in the Gulliver treatment reached 10.8 and 10.3.



World Conference on Agricultural and Earth Sciences

Hosted Online from Istanbul, Turkey

Date: 20th October, 2026

Website: <https://econferencia.com>

Gulliver provided the strongest and most stable response among the evaluated treatments, exceeding the control by approximately 33.3% during budding–flowering and 30.4% during boll setting. Avangard Start also demonstrated a stable positive effect at both growth stages.

Although some combined applications produced high values during budding–flowering, a reduction was observed during boll setting in certain treatments. Therefore, the composition, timing and sequence of biostimulant application should be optimized according to the developmental stage of cotton. The results identify Gulliver as one of the most promising treatments for increasing and maintaining net photosynthetic productivity during cotton growth and reproductive development.

References

1. Sidikov S., Saydullayeva Z., Yunusova S. Effect of combined application of mineral fertilizers and liquid suspension complex fertilizers on cotton growth, development, and formation of yield components.
2. Karimov Sh., Abdualimov Sh. Effect of the Albit biostimulant on cotton yield and fiber quality indicators under saline soil conditions.
3. Davronov Q., Teshaboyev N. Effect of mineral fertilization and foliar application of liquid NPK fertilizers and micronutrients on cotton growth, development, and formation of yield components.
4. Abdualimov Sh. Application of the Entojean biostimulant for regulating cotton growth and development. – pp. 122–126.
5. Chen W. et al. Effects of drought conditions on cotton plants and the development and feeding activity of *Aphis gossypii*. – pp. 2886–2998.