THE EFFECT OF GREEN MANURE OR SIDERATE CROPS INCLUDED IN SHORT-ROTATION CROP ROTATION SYSTEMS ON COTTON GROWTH AND DEVELOPMENT

Tolibekov Islambek Makhsetovich
Assistent teacher, Institute of Agriculture and agrotechnologies of Karakalpakstan
email: islamtollibekov@gmail.com
https://doi.org/10.5281/zenodo.19090571

ARTICLE INFO

Received: 14th March 2026
Accepted: 16th March 2026
Online: 18th March 2026

KEYWORDS

soil, winter wheat, cotton, siderate crops, beans, shadow, barley, stem, leaf, branch and crop elements

ABSTRACT

The article discusses the impact and significance of the effects of green manure crops included in short-rotation crop rotation systems on cotton growth and development in saline soils. The significance of the research results is that in conditions of saline soils, the introduction of mung bean, soybean, and barley as siderate crops into short-rotation crop rotation systems has been scientifically proven to have a positive effect on the growth, development, yield, and productivity of cotton due to the improvement of soil fertility as a result of the development of a crop rotation system such as winter wheat + siderate (mung bean+soybean+barley) crop:cotton:cotton and a 1:2 crop rotation system such as winter wheat + siderate (mung bean+soybean+barley) crops + 10 t/ha fertilizer:cotton:cotton 1:2. The article discusses the effective use of areas freed from grain in saline soils, the importance of introducing siderate crops into the cotton and grain crop rotation system, and the effectiveness of using additional organic fertilizers. Sideration helps to increase soil fertility and increase the yield of crops planted in the coming years.

Introduction: The use of sideration is important in maintaining and increasing soil fertility. This not only increases soil fertility, but also increases crop yields in the coming years. Scientific studies have shown that in order to maintain and increase the fertility of typical gray soils that are subject to irrigation erosion, it is scientifically proven that when winter wheat is followed by legumes, beans, mung bean, and soybean, the agrophysical and water-physical properties of the soil improve, leading to a decrease in irrigation erosion [5; 80-p., 6; 48-51-p].

The highest indicator in terms of green mass yield, which was plowed into the soil as siderate through intercrops, was in the triticale + clover planting variant: green mass was 270.6 t/ha, dry mass was 40.4 t/ha, root and legume residues in the 0-50 cm layer of the soil were 5.76 t/ha, and total root and legume residues from soybean and intercrops were 8.22 t/ha, through which a total of 113.2 kg/ha of nitrogen, 91.4 kg/ha of phosphorus, and 94.7 kg/ha of potassium were returned to the soil. [1; 67-69-p.].

In the short rotation system, the highest indicators in terms of plant height, yield spike and number of cotyledons per plant were recorded when clover (red clover) was cultivated after a separate repeated crop of soya beans. In the variants where the intercrops were plowed leaving 15-20 cm and plowed without mowing, the plant height was 100.0; 101.1 cm, yield spike 16.2; 16.7 units and number of cotyledons 14.9; 15.6 units, respectively, and the dry mass was 133.2; 141.3 g, which was 6.2; 7.3 cm higher than the control variant, yield spike 2.7; 3.2 units, cotyledons 2.7; 3.4 units, and dry mass 20.9; 29.0 g higher than the control variant. [2; 97-99-p., 4; 18-19-p].

Material and Methods.

The experiment was conducted using the field method. The dispersion analysis of cotton growth and development was carried out based on Dospekhov's "Method of field experiment" [3]. The experimental field consisted of 9 variants, 4 rotations, and was arranged in one layer. The study selected mung bean, soybean, and barley as siderate crops for the 2022 harvest in short-row crop rotation systems in the areas vacated by grain sown in the fall of 2021.

In the 1st variant of the experiment, only plowing was done in the autumn season without sowing siderate crops, while in the 2nd-4th variants, mung bean, soybean, and barley crops were sown separately. Also, in the 5th variant, a two-component mung bean+barley crop was grown, in the 6th variant, a two-component mung bean+barley crop, in the 7th variant, a two-component mung bean+soybean+barley crop, in the 8th variant, a three-component mung bean+soybean+barley crop, and in the 9th variant, a three-component mung bean+soybean+barley crop, and in the 9th variant, a three-component mung bean+soybean+barley crop were grown, and an additional 10 t/ha of manure was applied to it, which was added during plowing in the autumn season before harvesting as green fertilizer.

A study was conducted to study the effect of siderate crops on one, two and three-component (mixed and separate) background and the application of manure at a rate of 10 t/ha, applied as green manure during autumn plowing, on soil fertility and on the growth, development and yield of cotton planted two years later.

Results And Discussions.

In the experiment, observations were made on the growth, development, and yield of cotton according to the program options in order to determine the effectiveness of sideration applied in the conditions of meadow alluvial and saline soils.

In the research, phenological observations were conducted on June 1, July 1, August 1, and September 1 of 2023 and 2024 to study the effects of crops included in the crop rotation system and organic fertilizers applied to them on the growth and development of cotton.

It was found that in variants 2-9, where the effect of crop rotation systems and crops included in them was studied, the plant height increased by 3.7-9.6 cm on July 1, the number of crop branches by 0.2-1.6 units, and the number of crop elements by 0.7-2.1 units compared to the control variant, and the observations made on August 1 were also higher.

In the control variant, where cotton was planted without siderat, the height of the main stem of the plant on August 1 was 78.2 cm, the number of branches formed was 10.6, and the number of seeds was 4.9.

The level of nutrient supply to a plant determines its growth and development. This indicates that favorable conditions for plant growth and development are created when

siderate crops are planted in the area cleared from winter wheat before cotton and an additional 10 t/ha of fertilizer is applied.

In variants 2, 3 and 4, where winter wheat was followed by siderate crops (mung bean, soybean, barley) and then cotton, the plant height was 87.6; 88.3 and 89.2 cm, the number of crop branches was 11.4; 11.6 and 11.2, and the number of cobs was 5.0; 5.2 and 5.5, which was proportionally 9.4-11.0 cm higher and the number of cobs was 0.1-0.6 higher than the control variant. In option 5, where siderat (mung bean + barley) was planted after winter wheat, the plant height was 90.2 cm, the number of crop branches was 11.5, and the number of cobs was 5.3, which was 12 cm higher than the control option, the number of crop branches was 1.1, and the number of cobs was 0.4. In option 6, where siderat (soybean + barley) was planted after winter wheat in a 1:2 crop rotation system, the plant height was 92.3 cm, the number of crop branches was 11.7, and the number of cobs was 5.4. In the 1:2 crop rotation system, in option 7, where winter wheat is followed by siderat (mung bean + soybean) and cotton is planted the following year, the plant height is 93.2 cm, the number of crop branches is 11.9, and the number of cobs is 5.6. In option 8, where winter wheat is followed by siderat (mung bean + soybean + barley), the plant height is 94.2 cm, the number of crop branches is 12.3, and the number of cobs is 5.8. In option 9, where winter wheat is followed by siderat (mung bean + soybean + barley) and 10 t/ha of manure is applied, the plant height is 96.1 cm, the number of crop branches is 12.6, and the number of cobs is 5.9. This is higher than all other options in terms of phenological indicators, and the plant height is 96.1 cm, the number of crop branches is 12.6, and the number of cobs is 5.9, compared to the control option. 17.9 cm, the number of branches increased by 2.0 and the number of cobs increased by 1.0.

Conclusion. In the conducted research, different indicators were observed in the growth and development of cotton depending on the types of siderat crops used. At the end of the research, it was found that among the types of siderat crops used in the experimental scheme, when using option 9, in which an additional 10 t/ha of organic fertilizer was applied to the optimal siderat crops (mung bean + soybean + barley), the height of the main stem of cotton as of August 1, 2023-2024, compared to the control, was 17.9 and 17.3 cm, the number of yield branches and total cobs was 2.0; 2.1 and 1.0; 2.8 units higher.

For good growth and development of cotton, it is advisable and most effective to plant it in a 1:2 crop rotation system, i.e. winter wheat + siderat:cotton:cotton or 1:2, winter wheat + siderat + 10 t/ha gung:cotton:cotton.

References:

1. Bozorov X., Xalikov B., Yakubov F. The amount of root and shoot residues left in the soil by the main crop, soybean, and subsequent cover crops, and the amount of nutrients they contain. "Agro Ilm" scientific application of the Journal of Agriculture and Water Management of Uzbekistan. Tashkent, 2023 year, №6. [95]
pp. 67-69.
2. Bozorov X.M., Xalikov B.M., Karaev G‘.R. The effect of repeated and intercropping on the growth and development of cotton. Bulletin of Agrarian Science of Uzbekistan. Scientific and Practical Journal. Tashkent, 2023. № 3 (9) pp. 97-99.
3. Dospekhov, B.A. (1985). “Методика полевого опыта” (with basics of statistical processing of research results). Moscow: Agropromizdat. - 351 p.

4. Namozov F.B., Ismailov D.U. The impact of repeated and intercropping on cotton yield //“ Agro Science” (Scientific appendix of the Journal of Agriculture and Water Management of Uzbekistan). Tashkent. 2020. № 3 (66). pp. 18-19.
5. Xolmurzaev B., Yadgarov Sh., Nurbaev S., Mo‘minov K. The effect of repeated and intercropping on the fertility of eroded gray soils and winter wheat and cotton yields. Agro-science. Uzbekistan Agricultural Journal App. – Tashkent, 2017; №5(49) – 80 p.
6. Satipov G.M., Raximbaeva I.A., Jumaniyazova N.B., Farhodova K.S., Jumanazarova A.M. Efficient use of resources through mixed cropping. "Agro Ilm" scientific appendix of the Journal of Agriculture and Water Management of Uzbekistan. Tashkent, 2025 year, №4. [114] –pp. 48-51.