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Grain Yield From Mung Bean and Soybean Crops Grown as Cotton Composite Crops

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Abstract

This article provides information on the cereal yield acquired from soybeans and mung beans as a companion crop to cotton on the overgrazed light gray soils of the Syrdarya region.

Keywords: *Irrigated Grazed Light Gray Soils; Mung Bean and Soybean Intercropped with Cotton; Irrigation Regimes; Mung Grain Yield*

Introduction

The extreme scarcity of water resources is presently one of the ten global challenges of the 21st century. Uzbekistan ranks sixth among the countries of the world in cotton cultivation area (more than 1 million hectares) and the volume of cotton cultivation (1 million 400 thousand tons), eighth in cotton fiber cultivation (838 thousand tons), and fifth in the export of cotton fiber (283 thousand tons) based on data from the most recent 2018/2019 cotton production season. In the past 60 years, the global consumption of potable water has increased eightfold. By the middle of the twenty–first century, many nations will be compelled to import water. Water is a scarce resource, and competition for its resources is already one of the leading causes of global tension and conflict. According to the International Commission on Irrigation and Drainage, there are 299,488 billion hectares of irrigated land in the globe. The world's agriculture consumes 2,800 km^3 of pure water annually. It accounts for 70% of the world's pure water consumption, which is seven times greater than the amount of water used by global industry. This water is almost entirely used to irrigate crops. About forty percent of the world's food and sixty percent of its cereals are produced on irrigated lands. The plant absorbs a maximum of 35–40% of the given nitrogen fertilizers and 18–20% of phosphorus. A portion of the remaining nitrogen passes into the molecular state of nitrite and escapes into the atmosphere, while another portion is washed away by irrigation water. Experiments

demonstrate that the use of co–crops with cotton in the same field to maximize the use of valuable mineral fertilizers will increase crop yield per hectare and, as a result, significantly reduce agrochemical–related environmental contamination.

Increasing soil fertility and satisfying the population's demand for agricultural products is, therefore, a pressing and important issue in our nation.

At the same time, the prevention of salinity flows, the maintenance and improvement of soil fertility, and the production of high–quality crops are the most essential issues.

The Level of Study of the Problem

At present, in our republic, a classification of land erosion has been developed and a map has been drawn up, irrigation erosion prevention and control, soil fertility improvement, cotton inter–row cultivation, crop rotation systems, irrigation methods, stratified fertilizing (V.B. Gussak, Q.M. Mirzajonov, H.M. Makhsudov, Sh.N. Nurmatov, L.A. Gafurova, K.M. Muminov, G.N. Abdalova, A.M. Dehkanov and others), cotton in different soil and climate conditions planting thickness of seedlings of varieties, norms of fertilizing them (M.V. Mukhammedjonov, A.E. Avliyokulov, G.M. Satipov, N. Orazmatov, A.A. Avtonomov, M.M. Khasanov, A.B. Koldaev, O.M. Sulaymonov and others), cultivation of companion crops with cotton (Q.M. Mirzajonov, I.E. Ruziev and others), terms of planting winter wheat, irrigation and fertilizing norms (B.M. Khalikov, N.Kh. Khalilov, T.K. Khojakulov, R.I. Siddiqov, N.M. Ibragimov, S.O. Abdurakhmonov, B.M. Kholmirzaev, Z.K. Mominova and others), cultivation of repeated crops (B.M. Khalikov , R.Sh. Tillyaev, F.B. Nomozov, A.A. Iminov, A. Kh. Rakhimov and others) have conducted scientific research. However, the slope level of the land affects the drastic reduction of leaching processes in irrigation–eroded lands, the cultivation of compatible crops with cotton in different irrigation–eroded soil conditions, soil tillage, seeding and mineral fertilizer rates on grain yield of winter wheat, and repeated cropping irrigation methods and feeding rates. There are no scientific studies conducted in the areas of optimal planting thickness of cotton varieties, effective use of land, water, and mineral fertilizers, and development of complex technologies for high–quality crop cultivation.

Purpose of the Research

In the light gray, low–fertility, salinity–prone soils of the Syrdarya region, the effect of simultaneously growing two types of crops using the same agrotechniques, effectively utilizing land, water, fertilizers, and other resources, obtaining a high–quality harvest, and enhancing the soil fertility of partner crops will be determined.

Research Subject

The agrophysical and agrochemical characteristics of grazed light gray soil, in addition to cotton and co–irrigation rates and seasonal irrigation rates.

Research Methodology

The placement, calculations, and observations of field experiments were conducted in accordance with the methodological manuals "Methods of conducting field experiments" and "Methods of agrochemical, agrophysical and microbiological studies in irrigated cotton areas". In the mathematical–statistical analysis of the obtained results, mathematical statistical analysis was conducted using the method of B.A. Dospehov's "Methodology of field experience" based on the Microsoft Excel program,

"Guidelines for determining the quality of plant products", and the method of N.A. Baranov was used to determine economic efficiency.

Results of the Research

The cereal yield of cotton planted with mung bean as a companion crop was determined after harvest based on the options and returns. In three years, we obtained an average grain production of 4.7 centners/ha from the second option with no irrigation during the season, i.e., 65–65–60% irrigation, when we analyzed the data on the grain yield obtained over three years.

The average three–year grain yield in our version of 70–70–60%, which was irrigated once during the growing season, was 5.0 centners per hectare, according to the results of the conducted studies. It was discovered that our variant of 75–75–60% pre–irrigation soil moisture increased grain yield by 5.0 centners/ha compared to limited field wet capacity (LFWC) when cotton was planted as a companion crop, which was 0.3 centners/ha more than option 1.

According to the studies, its productivity is much lower compared to the classification of mung bean, and the main reason for this is that cotton and mung bean are planted together in one field, and the height of cotton is longer compared to mung bean, and it has a negative effect on the growth, development, and productivity of mung bean. This is shown in Figure 1.

The main reason for the lower yield of soybean compared to the description of the "Nafis" variety was that soybean was taller than cotton in our experiment because soybean was planted with cotton as a partner crop, cotton and soybean together, or as a partner crop. It has been determined that planting has a negative impact on their growth, development, and productivity. In spite of this, the results of research conducted on the yield of soybean as a co–crop with cotton in the experimental field indicated that soybean was planted as a co–crop with cotton, i.e. the soil moisture before irrigation was in the range of 65–65–60% compared to LFWC, i.e. it was not watered at all during the season. 2– and in our option 3, the three–year average yield was 7.3 quintals per hectare. In our experiment, cotton was planted as a companion crop with soybeans, and the pre–irrigation soil moisture was 75–75–60% in the irrigated option, compared to our option that was irrigated twice during the season. In our version of 70-70-60% irrigation, the average yield was 0.3% lower, at 9.4 and 9.1 centners per hectare, respectively. In our variant 3, which was irrigated in the range of 65–60%, the productivity was found to be 1.8 and 2.1 centners/ha lower than in variants 5 and 7, respectively.

Consequently, according to the results of our research, it is possible to achieve high productivity by cultivating cotton and grain crops by sowing mung beans and soybeans as companion crops for the efficient use of mineral fertilizers on the cotton field. This is shown in Figure 2.

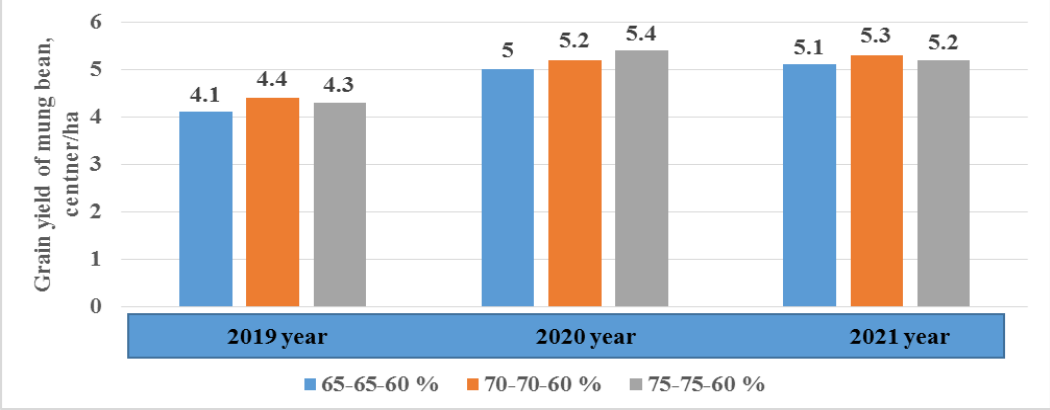

Figure 1

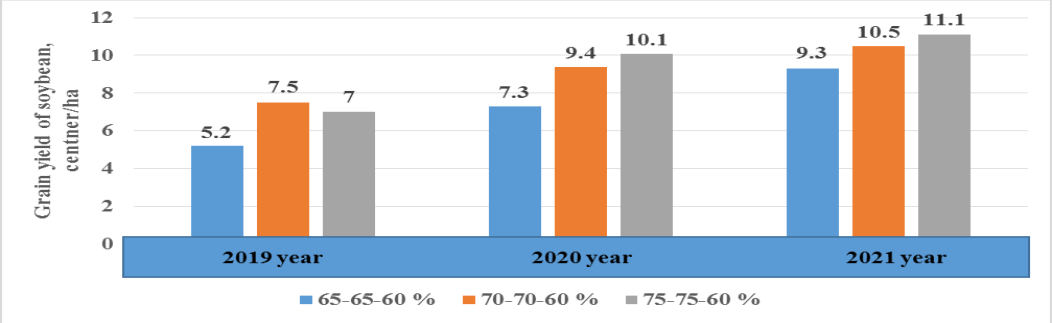

Figure 2

Conclusion

In order to effectively use land, water, and mineral fertilizers, growing mung beans and soybeans as a companion crop to cotton in the light gray soils of the Syrdarya region that are being overgrazed:

When sorghum and soybeans are planted as co–crops with cotton, the average grain yield of sorghum is 4.9 centners per hectare, and the average grain yield of soybeans is 8 centners per hectare, when irrigation is applied as follows: 65–65–60%, 70–70–60%, 75–75–60%. It was determined that a cereal yield of 6 centners per hectare was obtained.

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