

# Effect of irrigation regimes, fertilizer quantity, and bush number conservation on cotton yield

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## ABSTRACT

Optimizing cotton yield is crucial for enhancing agricultural productivity, particularly in regions facing resource constraints. This study investigates the combined effects of different irrigation regimes, varying fertilizer quantities, and bush number conservation on cotton (*Gossypium spp.*) yield. Field experiments were conducted to assess how these variables influence key agronomic traits such as plant height, boll number, and overall yield. Three irrigation regimes (low, moderate, and high), three levels of fertilizer application (low, medium, and high), and bush number conservation strategies were evaluated. The results demonstrate that both irrigation and fertilizer levels significantly impact cotton yield, with moderate irrigation and optimal fertilizer application producing the highest yield, bush number conservation was found to improve resource utilization and increase yield per hectare. These findings provide practical insights for farmers aiming to maximize cotton productivity while conserving water and soil nutrients.

**Keywords:** cotton, leaf, nutrition, element, soil, agrotechnics, fertiliser, accumulation, irrigation

## Introduction

Cotton (*Gossypium spp.*) plays a pivotal role in global agriculture, contributing significantly to the textile industry and the livelihoods of millions of farmers, the sustainability of cotton production is increasingly challenged by resource limitations, particularly in arid and semi-arid regions where water scarcity and soil nutrient depletion are prevalent [1-3]. Effective management of irrigation and fertilization practices, along with bush number conservation, are essential strategies for improving cotton yield and ensuring long-term productivity. Previous studies have highlighted the importance of optimizing water and nutrient inputs to enhance crop performance, but limited research has focused on the integrated effects of these factors on cotton growth [4]. This study seeks to evaluate how varying irrigation regimes, fertilizer quantities, and bush number conservation strategies interact to influence cotton yield, offering valuable insights for sustainable cotton farming practices. Further development of cotton and grain branches of agricultural production, creation of the new modern and perfect, scientifically grounded system of farming and its introduction in conditions of all-natural soil-climatic (provincial) regions is important. It is necessary to further develop breeding and seed breeding work on creation-population of fast-ripening, early-ripening, promising medium-fibre varieties of cotton and cereal crops with high indicators, adapted to certain natural soil-climatic conditions, giving coordinated, fertile, high-quality fibre.

In cotton growing, only if all regions, districts, and farms of all kinds, farmers carry out timely, moderate, and qualitative measures arising from the specifics of the farming system, conditions, and opportunities are created for growing a marketable fibre crop meeting the requirements of world

standards and satisfying the needs of domestic and foreign markets [5]. Therefore, the determination of the optimal order of irrigation, fertilization and number of bushes for the created new and zoned cotton varieties occupies an important place in the general agrotechnical complex, since one or another cotton variety differs from each other to some extent depending on the requirements to the external environment.

## Literature Analysis

The vital activity of a plant organism is the result of a complex biological development. On the other hand, this developmental process is directly dependent on the quantitative and qualitative aspects of the external environment. The main external factors affecting the growth and development of a plant are temperature, humidity, light, and nutrition. It follows that the study of these important agronomic measures has been the subject of great controversy among scientists. [6-15] summarised the results of research of the Republic of Uzbekistan in different soil and climatic conditions and came to the following conclusions. From our observations over the years, it was learned that the growth of all the studied medium maturing, thin-fibre acorn varieties, development, harvesting, and maturity were found to be directly dependent on the adherence to irrigation rules with water nutrition (NPK) rates per standing density.

[16-18] Scientific Research Institute of Cotton Production Andijan Branch light grey soils. in conditions of soils with medium mechanical composition of sand, where groundwater is 4-5 m below the ground surface, soil moisture increases by 65-65-60% compared to PV, and with 70-70-60% procedures the amount of dry matter (organic matter), accumulated from 1 plant Especially Andijan-35 NPK ore fertilizers

per hectare-200-140-100 due to obtaining 9-10% more compared to the scheme 90x13-1-2 variants fed in kilogram rates, the average yield from 1 plant at total weight was 144.9 and 150.1 grams for 3 years.

According to the results obtained by Avliyokulov and co-authors (2010), the application of cotton from medium maturing variety Bukhara-8 in conditions of heavy loamy typical loamy soils of Tashkent region was of the order of 70-70-60% compared to PV of the order 1-3(4)-2 in the systems using ore fertilizers in the rate of N-200, P-140, K-100 kg/ha, leaving 80-90 thousand bushes per hectare. bushes per hectare at 70-70-60% in order 1-3-1 was carried out in the system that applied moderately N-220, P-155, K-110 kg/ha, leaving a seedling density of 80-90 thousand bushes per hectare, And on the soils of Bukhara region irrigation is 75-75-65% to achieve high and high quality yield. 0(1)-3(4)-1(2) with system and moderate application of N-250, P-175, K-125 can achieve high and high quality yield. kg/ha, leaving seedling thickness as shown above.

In particular, important issues are irrigation regimes of new cotton varieties grown in different soil and climatic conditions of our republic, maintenance of the optimal number of roots depending on fertiliser rates, and determination of their efficiency. Proceeding from the above mentioned, in conditions of meadow-grey soils of Samarkand region, scientists of Samarkand Scientific Experimental Institute are gradually planning to conduct scientific experiments to determine the efficiency of irrigation regimes of new cotton variety s-278, optimal number of bushes depending on the amount of fertilizers. The application of harmonized agro-technique with the use of mineral fertilizers to increase cotton yield at low content of humus, nutrients in soils of our republic, and gross yield is of great importance.

The cotton plant is considered to be quite demanding of nutrients such as nitrogen, phosphorus and potassium. Experiments have shown that cotton plants consume nutrients in different amounts at different times of the growing season. Knowing this requirement of the plant and providing it with favourable nutritional conditions during the growing season gives an opportunity to influence the cotton yield to some extent both quantitatively and qualitatively.

### Productivity of the experimental field by itegration kg/ha

Table-1

варианты	stand density b/ha	repetition			3-average repetition kg/ha
		I	II	III	
1	89.0	34.3	34.8	35.3	34.8
2	103.0	35.7	34.6	36.3	35.5
3	87.0	34.3	34.1	36.5	35.0
4	92.0	38.1	38.6	39.2	38.6
5	94.0	38.8	40.1	40.3	39.7
6	102.0	40.9	42.6	42.8	42.1
7	96.0	41.3	42.0	41.6	41.6
8	105.0	42.1	43.1	44.0	43.1

$E=1.01s/ga$

$P=2.60\%$

As is evident from the above data, phenological processes were fully carried out in our experiment to determine the effect of irrigation regime, amount of fertilizer and number of bushes on cotton yield. During the experiment, it was observed that the yield elements that accumulate in the plants change as they mature, depending on the water regimes and the amount of fertilizer applied, which leads to Data obtained in the experimental field on cotton yield shown in Table 1 of the report, and as can be seen, in the current weather conditions of 2023, it was observed that the average yield of the variants ranges from 34.1 to 44.0 quintals.

In the experimental field, the amount of fertiliser in variants with a given moisture content of 65-65-60% in relation to PV, at a given water regime in the amount of N-200 kg/ha, P<sub>2</sub>O<sub>5</sub>-140 kg/ha, K<sub>2</sub>O-100 kg/ha, the yield was 34.8-35.5 kg/ha, when the amount of fertilizer in variants N-250 kg/ha, P<sub>2</sub>O<sub>5</sub>-175 kg/ha. kg / ha, K<sub>2</sub>O-125 at increasing up to 35,0-38,6 centners / ha.

Pre-irrigation moisture of cotton at 70-70-60 percent water regime in relation to PV quantity of fertilizers N-200 kg / ha, P<sub>2</sub>O<sub>5</sub>-140 kg / ha, K<sub>2</sub>O-100 kg / ha at cotton yield 39.7-42.1 kg / ha quantity of fertilizers N-250 kg / ha, P<sub>2</sub>O<sub>5</sub>-175 kg /

ha, K<sub>2</sub>O-125 in variants with an increase of 125 kg / ha was observed with an increase in yield up to 41.6-43.1 kg / ha. Apparently, if according to the data on pre-glacial moisture at 65-65-60 per cent water regime in relation to PV, the amount of fertilizers applied provided an average yield increase of 0.2-3.1 kg/ha for the variants, then at 70-70-60 per cent water regime in relation to PV the pre-glacial moisture was 1.9-2.0 kg/ha. Based on the data obtained, we saw that the amount of fertiliser applied in the experiment affects the level of water supply to the plant, the uptake of fertiliser in the soil and, ultimately, the degree of change in cotton yield. In the conducted experiment, an increase in cotton yield up to 7.2-8.2 quintals was observed at increasing the amount of fertilizers up to N-200 kg/ha, P<sub>2</sub>O<sub>5</sub>-140 kg/ha, K<sub>2</sub>O-100 kg/ha. At the increase of pre-watering moisture of cotton in relation to PV from 65-65-60 per cent water regime to 70-70-60 per cent at increase of quantity of fertilizers up to N-250 kg/ha, P<sub>2</sub>O<sub>5</sub>-175 kg/ha, K<sub>2</sub>O-125 kg/ha it was observed that this index is 5.5-11.3 centners/ha. From the data obtained during the experiment, it can be seen that the degree of water supply of the field is important for the assimilation of nutrients from the dwelling by the plant.

## Conclusion

Based on the data obtained during the field experiment at the Samarkand Scientific Experimental Institute on the weather conditions of the current 2023, the conclusions were made. The amount of fertilizers applied in the water regime 65-65-60 percent of pre-emergence PV moisture gives an average yield of 0.2-3.1 at 70-70-60 percent water regime relative to PV, these yields were 1.9-2.0 kg / ha. Cotton yields up to 5.6-8.2 kg / ha when increasing pre-emergence moisture to 70-70-60% of 65-65-60% irrigation regime relative to PV, the amount of fertiliser N-200, P<sub>2</sub>O<sub>5</sub>-140, K<sub>2</sub>O-100 kg / ha, the amount of fertilizer N-250, P<sub>2</sub>O<sub>5</sub>-175, K<sub>2</sub>O-125 kg / ha when increasing this cursor 5.6-marked 9.8 c / ha. In the experiment, the irrigation regime provided for an increase in the proportion of runoff from 88.9% to 91.5% with an increase in pre-irrigation moisture from 65-65-60% to 70-70-60% relative to PV providing a decrease in the amount of water used from the soil stock from 463 m<sup>3</sup> / ha to 359 m<sup>3</sup> / ha.

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