

IMPACT OF WATER CONSUMPTION INDICATORS ON THE YIELD OF COTTON VARIETIES CULTIVATED UNDER DIFFERENT ROW SPACINGS AND IRRIGATION REGIMES

Gaziyev Umirzoq Lapasovich

Lecturer at Gulistan State University.

E-mail: umrzoq.goziyev@gmail.com

Abstract: This article presents information on the total and seasonal water consumption rates per 1 centner of cotton of the varieties “Sulton” (control), “Guliston” and “C-8290” under the conditions of gray-meadow soils in the Syrdarya region, as well as their effect on yield.

Keywords: irrigation, cotton, total water consumption, seasonal water consumption, yield, “Sulton” variety (control), “Guliston” variety, “C-8290” variety.

INTRODUCTION

Worldwide, there are approximately 5 billion hectares of agricultural land, of which 1.6 billion hectares are arable land used for cultivation. Of this land, 28.4% is very high-yielding land, 39.5% is high-yielding, 12.9% is medium-yielding, 7.7% is below medium-yielding, 6.7% is low-yielding, and 4.8% is very low-yielding. High and very high-yielding lands are mostly attributed to countries with developed agriculture. The largest cotton-producing countries are India (11.6 million ha), China (3.0 million ha), the United States (3.54 million ha), Brazil (1.587 million ha), Pakistan (2.950 million ha), and Uzbekistan (1.05 million ha). One of the global problems of the 21st century is the scarcity of water resources, with drinking water consumption increasing 8 times globally in the last 60 years. Water resources on Earth are extremely limited, requiring rational use of its reserves. Globally, 2.8 thousand km³ of fresh water is used annually for agricultural purposes, and this figure accounts for 70 percent of total fresh water consumption. According to the International Commission on Irrigation and Drainage, the world's irrigated area is 299.488 million hectares. The water balance of an irrigated area consists of the inflow and outflow components of the water

supplied throughout the year. The inflow component includes water used for irrigating crops, groundwater, rainwater, and water flowing from other fields. In the cotton varieties where the water balance was determined in the research field, all irrigation and various inter-row cultivation practices were studied. The experiment revealed that with an increase in the irrigation regime, the amount of water used per ton of cotton yield also increased across the variants. It was observed that the higher the cotton yield, the greater the water use efficiency.

According to the studies of S. Mamadaliyeva et al. [1], when irrigating cotton inter-rows with black film mulch at soil moisture levels of 70-75-60% relative to Field Moisture Capacity (FMC), the soil's water absorption capacity decreased by 161.1 m³/ha, or 27.3%.

In the scientific works of B. Mambetnazarov and J. Oteuliyev [2], irrigating medium-staple cotton varieties Sulton and Omad at pre-irrigation soil moisture levels of 80-80-60% relative to FMC, with a single irrigation rate of 600-700 m³/ha and a seasonal irrigation rate of 2800-3500 m³/ha in a 1-4-0 system, recommended one or two more irrigations compared to the northern region.

According to the observations of R.S. Nazarov, I. Khamroqulov, and F. Yakubov [3], world experiences show that in recent years, 4-5 thousand m³/ha of water is used to produce cotton in Israel and Spain, while in our country this figure is 12 thousand m³/ha, taking into account water lost to evaporation before reaching the field through dams, irrigation systems, and canals. In our republic, on average, 57.781 km³/ha of water has been taken annually for all water-demanding works in recent years. It was stated that 93 percent of this water is used for growing agricultural crops.

When studying the optimal irrigation regime and fertilization rate for the Bukhoro-102 cotton variety in the conditions of the Samarkand region by X. Shukurullayev [4], it was noticed that the cotton variety experienced a moisture deficit when the pre-irrigation soil moisture was 65-65-60% relative to FMC, which negatively affected cotton yield. It was observed that a high cotton yield (38.4 ct/ha) was obtained when irrigating with a 1-3-1 system at pre-irrigation soil

moisture levels of 70-70-60% relative to FMC, using 4935 m³/ha of water per season and applying N-200; P-140; K-100 kg/ha of fertilizer.

In the 2023 experiment, the field water balance and the minimum water consumption per centner of cotton yield were studied for the cotton varieties "Sulton" (control), "Guliston," and "C-8290." It was found that when irrigating at pre-irrigation soil moisture levels of 70-75-70% relative to FMC, the soil moisture reserve at the beginning of the growing season was 6450 m³/ha, and at the end of the growing season, it was 3900 m³/ha, with plants using 2550 m³/ha from the soil's natural moisture reserve. At pre-irrigation soil moisture levels of 65-70-65% relative to FMC, the soil moisture reserve at the end of the growing season was 3750 m³/ha, with 2700 m³/ha being used from the soil's natural moisture reserve during the growing season. In the "Sulton" (control) cotton variety, the minimum water consumption for producing one centner of cotton yield was determined in the variants where pre-irrigation soil moisture levels were 65-70-65% relative to FMC and a row spacing of 76 cm was used. The total water used per centner of cotton was 123.5 m³/ct, the seasonal water used per centner of cotton was 46.1 m³/ct, and the yield was 40.8 ct/ha.

A similar trend was observed in the "Guliston" cotton variety compared to the "Sulton" control variety. The minimum water consumption for producing one centner of cotton yield was observed in the variants where pre-irrigation soil moisture levels were 65-70-65% relative to FMC and a row spacing of 76 cm was used. The total water used per centner of cotton was 118.6 m³/ct, the seasonal water used per centner of cotton was 44.2 m³/cwt, and the yield was 42.5 cwt/ha.

In the "C-8290" cotton variety, the total water used per centner of cotton at pre-irrigation soil moisture levels of 70-75-70% relative to FMC was 129.6 m³/ct, the seasonal water used per centner of cotton was 60.3 m³/ct, and the yield was 43.4 ct/ha.

CONCLUSION

As mentioned above, in the cotton varieties tested, the highest yield was obtained in the "Guliston" variety with a row spacing of 76 cm and pre-irrigation

soil moisture levels of 65-70-65% relative to FMC, and in the "C-8290" variety with a row spacing of 90 cm and pre-irrigation soil moisture levels of 70-75-70%.

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