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TURLI SUG‘ORISH TARTIBLARI HAMDA TEXNOLOGIYALARINING G‘O‘ZA HOSILDORLIGIGA TA’SIRI

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Annotatsiya. Ushbu maqolada Buxoro viloyatining o‘tloqi allyuvial tuproqlari sharoitida Buxoro-10 va C-8290 g‘o‘za navlarini tomchilatib hamda plyonka ostidan tomchilatib sug‘orish texnologiyalarida, turli sug‘orish tartiblarida sug‘orilganda ularning hosildorlik ko‘rsatkichlari haqidagi ma’lumotlar keltirilgan. Eng yuqori hosildorlik ko‘rsatkichi Buxoro-10 g‘o‘za navida sug‘orish oldi tuproq namligi ChDNSga nisbatan 70-75-70% da plyonka ostidan sug‘orilgan 7-variantda kuzatilib gektariga 52,2 sentnerni tashkil etdi.

Kalit so‘zlar. G‘o‘za, tomchilatib sug‘orish, plyonka ostidan sug‘orish, sug‘orish oldi tuproq namligi, ChDNS, hosil, sug‘orish rejimi.

ВЛИЯНИЕ РАЗЛИЧНЫХ РЕЖИМОВ И ТЕХНОЛОГИЙ ОРОШЕНИЯ НА УРОЖАЙНОСТЬ ХЛОПЧАТНИКА

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Аннотация. В данной статье приведены сведения о показателях урожайности сортов хлопчатника Бухара-10 и С-8290 при различных режимах орошения с применением капельного полива и капельного полива под пленкой в условиях лугово-аллювиальных почв Бухарской области. Наивысший показатель урожайности был зафиксирован у сорта хлопка Бухара-10 в варианте №7, при поливе под пленкой при влажности почвы до полива на уровне 70-75-70% от ППВ, и составил 52,2 центнера с гектара.

Ключевые слова: хлопчатник, капельное орошение, орошение под плёнку, предполивная влажность почвы, ППВ, урожай, режим орошения.

EFFECTS OF VARIOUS IRRIGATION REGIMES AND TECHNOLOGIES ON COTTON YIELD

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Abstract. This article provides information on the yield indicators of cotton varieties Bukhara-10 and C-8290 under various irrigation regimes using drip irrigation and drip irrigation under film, in the conditions of meadow-alluvial soils of the Bukhara region. The highest yield was observed in variant 7 for the Bukhara-10 cotton variety, irrigated under film when the pre-irrigation soil moisture was at 70-75-70% of field capacity, amounting to 52.2 centners per hectare.

Keywords: cotton, drip irrigation, irrigation under film, pre-irrigation soil moisture, field capacity (FC), harvest, irrigation regime.

INTRODUCTION

Uzbekistan is a country located in an arid climate zone, and its dependence on external water resources gives rise to serious political and environmental challenges. In particular, the volume of water taken from transboundary rivers such as the Amu Darya and Syr Darya constitutes the main share of the country's annual water resources, with approximately 80% originating outside its borders, and only 20% being formed within the republic itself.

At the same time, due to climate change, population growth, and inefficient use of resources, water scarcity in Uzbekistan is intensifying year by year. It is projected that by 2030, the annual water deficit will reach 7 billion cubic meters, and by 2050, this figure will rise to 15 billion cubic meters [6].

The agricultural sector plays a central role in the economy, with irrigated lands covering a total of 4.3 million hectares, and accounting for 90% of the country's water consumption. However, the efficiency of water use remains low due to the prevalence of traditional furrow irrigation methods. In addition, it has been recorded that up to 36% of water is lost annually within the natural earthen irrigation networks themselves [6].

Taking these circumstances into account, comprehensive measures are being developed at the state level. In particular, the Resolution of the President of the Republic of Uzbekistan "On the Approval of the Program for the Management of Water Resources and Development of the Irrigation Sector in Uzbekistan for 2025–2028" was adopted. The program outlines objectives such as reconstructing 2,551 km of irrigation networks, allocating at least 1.3 trillion UZS annually from the state budget, utilizing 300 million USD from international financial institutions, expanding the area under water-saving technologies from 2.1 million hectares to 3.5 million hectares, and increasing the area under drip irrigation technology from 560 thousand hectares to 853 thousand hectares [1].

MATERIALS AND METHODS

The experiments were conducted on slightly saline meadow-alluvial soils in the Bukhara region. The study consisted of a total of 15 variants, arranged in three replications, within a single tier. Irrigation was carried out under two conditions: with and without black polyethylene film covering the drip irrigation pipes. The drip irrigation system used was based on Turkish technology.

Each plot consisted of 8 rows with a row spacing of 60 cm, giving a total area of 480 m² per plot, of which 240 m² was designated as the accounting area. Two cotton varieties, Bukhara-10 and C-8290, were studied under three pre-irrigation soil moisture regimes relative to field capacity: 65–70–65%, 70–75–70%, and 75–80–75% [2].

RESULTS AND DISCUSSION

Cotton yield under furrow, drip, and mulched drip irrigation technologies in meadow-alluvial soils of the Bukhara region. For the cotton variety Bukhara-10, under furrow irrigation with a pre-irrigation soil moisture regime of 65–70–65% relative to field capacity (Variant 1), the yield reached 39.8 centner ha^{-1}, with an average of 34.9 centner ha^{-1} harvested during the first picking and 4.9 centner ha^{-1} during the second picking. Under Variant 2, with a pre-irrigation soil moisture regime of 70–75–70%, the total yield reached 45.1 centner ha^{-1}. In Variant 3, under furrow irrigation at 75–80–75% soil moisture, the yield amounted to 42.3 centner ha^{-1}.

Among the furrow-irrigated treatments, the highest yield was observed in Variant 2 (70–75–70%), with 38.3 centner ha^{-1} harvested in the first picking and 6.8 centner ha^{-1} in the second picking, giving a total of 45.1 centner ha^{-1}. The total water consumption per centner of seed cotton in this variant was 116.5 m^3.

Under drip irrigation, the highest yield for the Bukhara-10 variety was also obtained at a pre-irrigation soil moisture regime of 70–75–70% relative to field capacity, with an effective soil layer depth of 50–50–50 cm. The total yield reached 48.2 centner ha^{-1}, including 40.3 centner ha^{-1} from the first picking and 7.9 centner ha^{-1} from the second picking. Compared to the control, the yield was 3.1 centner ha^{-1} higher, while the total water consumption per centner of seed cotton was 97.7 m^3.

Thus, despite using 18.8 m^3 less water per centner compared to furrow irrigation under Variant 2, drip irrigation resulted in a 3.1 centner ha^{-1} higher yield (Fig. 1).

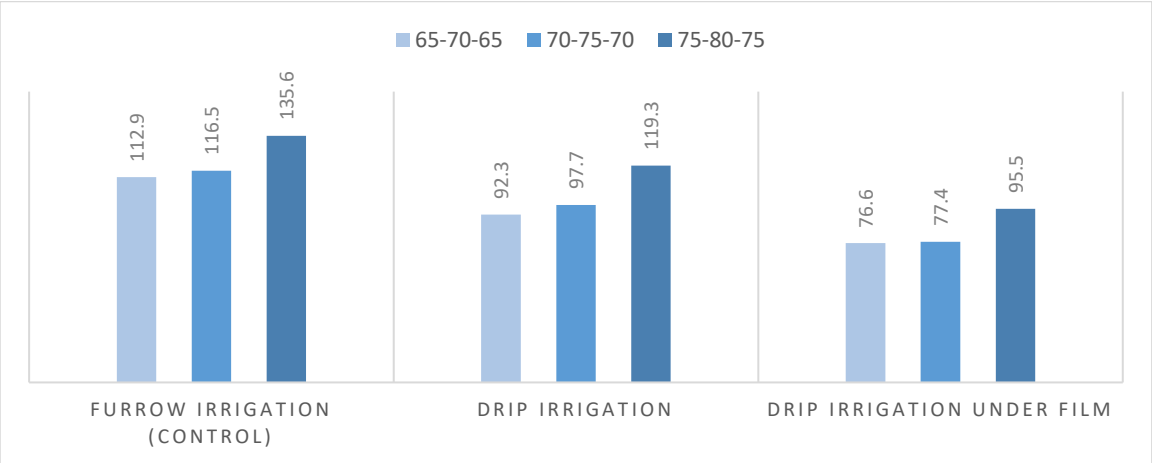

Figure 1. Total water consumption required to produce one quintal (100 kg) of seed cotton for the Bukhara-10 variety, m^3 $center^{-1}$.

According to the experiments conducted by Sh. Botirov, under the conditions of typical gray soils of the Tashkent region, when the medium-fiber cotton variety *Ibrat* was irrigated with 5980 m3 ha^{-1} of water at a pre-irrigation soil moisture regime of 70–70–65% relative to field capacity (i.e., the 1-4-2 scheme), and fertilized at the rates of N-220, P-154, and K-110 kg ha^{-1}, a high yield of 41.5 centner ha^{-1} was achieved [3].

For the *Bukhara-10* variety under drip irrigation, the lowest yield was observed in Variant 4, irrigated at a pre-irrigation soil moisture regime of 65–70–65% and moistening the effective soil layer of 50–50–50 cm. The yield in this treatment amounted to 42.8 centner ha^{-1}, which, although lower compared to other drip treatments, still exceeded the control by 3 centner ha^{-1}.

Under drip irrigation with plastic mulch, the highest yield of *Bukhara-10* was recorded in Variant 7, where the total yield reached 52.2 centner ha^{-1}—7.1 centner ha^{-1} higher than the control and 4 centner ha^{-1} higher than the drip irrigation without mulch. In this variant, the water

consumption per centner of seed cotton was 77.4 m³, which saved 39.1 m³ compared to the control, while ensuring an additional 7.1 centner ha^{-1} in yield.

In Variant 5, irrigated under a pre-irrigation soil moisture regime of 65–70–65%, the lowest yield under mulched drip irrigation was obtained, amounting to 46.4 centner ha^{-1} in total (38.6 centner ha^{-1} in the first picking and 7.8 c/ha in the second picking). Nevertheless, this still exceeded the control by 6.6 centner ha^{-1} (Table 1).

Table 1.

Yields of Cotton Varieties under Different Irrigation Regimes, centner ha^{-1}

Var	Cotton Varieties and Irrigation Methods	Pre-irrigation soil moisture relative to FC, %	First picking, centner ha^{-1}	Second picking, centner ha^{-1}	Total cotton yield, centner ha^{-1}	Additional yield compared to furrow, centner ha^{-1}
1	Bukhara-10 Furrow irrigation (control)	65-70-65	34.9	4.9	**39.8**	
2		70-75-70	38.3	6.8	**45.1**	
3		75-80-75	33.3	9.0	**42.3**	
4	Buxoro-10 Drip irrigation	65-70-65	36.9	5.9	**42.8**	3.0
5		70-75-70	40.3	7.9	**48.2**	3.2
6		75-80-75	38.5	6.9	**45.4**	3.1
7	Buxoro-10 Drip irrigation under film	65-70-65	38.6	7.8	**46.4**	6.6
8		70-75-70	43.3	8.9	**52.2**	7.1
9		75-80-75	41.3	7.9	**49.2**	6.9
10	C-8290 Drip irrigation	65-70-65	30.4	10.1	**40.5**	0.7
11		70-75-70	31.8	11.7	**43.5**	-1.6
12		75-80-75	34.8	12.2	**47.1**	4.8
13	C-8290 Drip irrigation under film	65-70-65	31.3	10.6	**41.9**	2.1
14		70-75-70	32.6	12.5	**45.2**	0.1
15		75-80-75	35.4	13.2	**48.6**	6.2

According to the experiments conducted by I. Islomov and G.P. Tukhtayeva on alluvial-meadow soils of the Bukhara region, when the cotton variety Bukhara-8 was irrigated at a pre-irrigation soil moisture regime of 70–70–70% relative to field capacity, following the 1-2-2 irrigation scheme, the average irrigation norm was 683 m³ ha^{-1}, with a seasonal irrigation norm of 3,413 m³ ha^{-1}. Under these conditions, the seed cotton yield reached 40.5 centner ha^{-1} [4].

For the C-8290 variety, under drip irrigation at a pre-irrigation soil moisture regime of 65–70–65% relative to field capacity, the yield amounted to 40.5 centner ha^{-1}. At 70–75–70%, the yield increased to 43.5 centner ha^{-1}, while the highest yield of 47.1 centner ha^{-1} was obtained at 75–80–75%. This was 4.8 centner ha^{-1} higher than the control.

Among the treatments with drip irrigation under plastic mulch, the highest yield was recorded in Variant 15, where total yield reached 48.6 centner ha^{-1}. In this treatment, the water consumption per quintal of seed cotton was 95.9 m³, which was 39.7 m³ less compared to the control, and 17.1 m³ less compared to Variant 14 (drip irrigation). The lowest yield was observed

in Variant 11, with a pre-irrigation soil moisture regime of 65–70–65%, where the yield was 41.9 centner ha^{-1} (Fig. 2).

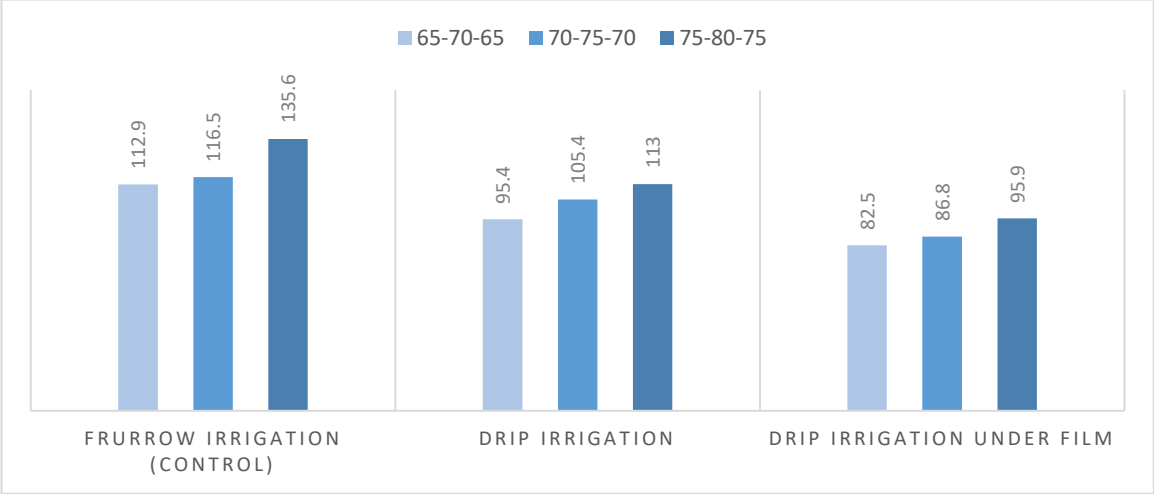

Figure 2. Total water consumption for producing one centner of seed cotton in C-8290 variety, m³ center^{-1}

In the experiments conducted by B. Serikbayev and A. Butayarov, it was observed that compared to furrow irrigation, drip irrigation saved up to 75% of irrigation water while increasing cotton yield by 7–9%. These results are explained by the fact that the irrigation regime met the plant's water requirements, evaporation from the soil surface was reduced, no weeds were present, and water was used exclusively by the crop without spreading across the field or being lost through runoff [5].

For the Bukhara-10 cotton variety, the highest yield was obtained in the 7th variant, where soil moisture before irrigation was maintained at 70-75-70% of field capacity and the calculated soil layer of 50-50-50 cm was moistened under mulched drip irrigation. The total yield reached 52.2 centner ha^{-1}, which revealed that the water requirement of Bukhara-10 is lower compared to the C-8290 variety.

However, when pre-irrigation soil moisture was maintained at 75-80-75% of field capacity in Bukhara-10, especially when the calculated soil layer was 70-100-70 cm, excessive vegetative growth and reduced generative development were observed, ultimately leading to a decrease in yield.

CONCLUSION.

For the studied C-8290 and Bukhara-10 cotton varieties, it was determined that under drip irrigation and mulched drip irrigation, the most optimal calculated soil layer was 50-50-50 cm. In contrast, under furrow irrigation, when the calculated soil layer was 70-100-70 cm, excessive soil moisture was observed, which led to intensive vegetative growth, a lower accumulation of yield components, and reduced boll weight, ultimately decreasing productivity.

In addition, for the Bukhara-10 variety, the optimal pre-irrigation soil moisture was found to be 70-75-70% of field capacity under all three irrigation methods (furrow, drip, and mulched drip irrigation). Under these conditions, the highest yield was obtained in the 9th variant, where mulched drip irrigation produced 52.2 centner ha^{-1}, with a water consumption of 77.4 m³ per centner of cotton.

For the C-8290 variety, a relatively higher water requirement was identified. The optimal pre-irrigation soil moisture was 75-80-75% of field capacity, with the highest yield observed in the 15th variant, under mulched drip irrigation, reaching 48.6 centner ha^{-1}.

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