Modern American Journal of Biological and Environmental Sciences
ISSN (E): 3067-7920
Volume 2, Issue 5, May 2026
Website: usajournals.org

THE EFFECT OF IRRIGATION USING FLEXIBLE PIPES ON THE GROWTH AND DEVELOPMENT OF COTTON VARIETIES

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Abstract
Cotton is grown as one of the main crops in many countries around the world. In particular, 6.5 million tons of cotton are produced in China, 6.3 million tons in India, 4.0 million tons in Uzbekistan, 3.5 million tons in the USA, 2.4 million tons in Pakistan, and 1.4 million tons in Brazil. Cotton obtained from cotton plants provides the growing population with clothing, industry with raw materials, and livestock with feed.
Research on the use of different irrigation regimes and nutrient rates is important for obtaining high and quality cotton yields from cotton varieties. Under meadow-alluvial soil conditions, which occupy a certain part of irrigated areas, the relationship between irrigation regimes of cotton varieties and fertilization rates is one of the most important issues. This shows the importance of timely introduction of advanced agrotechnologies in cotton production.

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According to Resolution No. PQ-179 of the President of the Republic of Uzbekistan dated March 25, 2022, "On measures to improve soil fertility and productivity in cotton fields and support the introduction of new irrigation technologies", measures were established to maintain and increase soil fertility in cotton-growing areas, increase cotton yield, and introduce scientifically based crop rotation and new irrigation technologies.

For obtaining high and quality cotton yields from cotton varieties, irrigation regimes were 65-65-60% and 70-70-65% relative to FC, theoretical plant densities were 80-90, 100-110, and 120-130 thousand plants/ha, and fertilizer rates were N180P126K90, N220P154K110, and N260P182K130 kg/ha. [2.3] Scientists of the Scientific Research Institute of Cotton Selection, Seed Production and Cultivation Agrotechnologies (PSUEAITI) recommend applying 70-75 kg of pure nitrogen per hectare (210-225 kg of ammonium nitrate) and 40-50 kg of pure phosphorus (80-100 kg of ammophos, or 220-275 kg of ordinary superphosphate, or 170-215 kg of suprefos, or 100-125 kg of PS-Arpo). Studies have shown that when the cotton row spacing is 90 cm, mineral fertilizers should be applied 30-35 cm from the cotton row; with 60 cm row spacing, they should be applied in the middle of the row spacing at a depth of 14-16 cm [1.4].

Research Methods

During the field experiments, the agrophysical and agrochemical properties of the soil and phenological observations of plants were studied using the methodological manuals "Methods of Conducting Field Experiments" of the Uzbek Research Institute of Plant Industry and "Methods of Agrophysical, Agrochemical and Microbiological Studies in Irrigated Cotton Areas". The variation-statistical analysis of the obtained data was carried out according to the method of B.A. Dospekhov, "Methods of Field Experiment".

Research Results

In 2023-2025, under the meadow-alluvial soil conditions of Bukhara district of Bukhara region, research was conducted to develop irrigation regimes and

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fertilization rates for the cotton varieties “Bukhara-10 (Sardor-1)” and “Porloq-1”. Correctly determining irrigation dates according to the development phases of cotton varieties, irrigating crops on time, and carrying out fertilization agrotechnical measures are among the important issues.

The experiment showed that under the conditions of Bukhara region, the earlier the cotton varieties “Bukhara-10 (Sardor-1)” and “Porloq-1” were irrigated before the flowering stage, the more their height increased and side branches developed. Under the meadow-alluvial soil conditions of Bukhara region, irrigation of cotton varieties before the flowering stage was sufficient for optimal growth and development of the varieties and resulted in obtaining a high yield.

Along with the growth and development of the cotton varieties “Bukhara-10 (Sardor-1)” and “Porloq-1”, yield accumulation, the time of boll opening, and its quality were mainly determined by irrigation dates, number of irrigations, irrigation rate, duration, irrigation during the growing period, and seasonal irrigation rates.

The experimental results showed that the growth and development of cotton plants differed significantly depending on the mineral nutrition rates applied in the studied variants and the growing conditions. The table data showed a gradual increase during the vegetation period in plant height, true leaves, fruiting branches, fruiting elements, number of bolls, and number of opened bolls.

In the Bukhara-10 (Sardor-1) variety, a consistent increase in plant height was recorded from the initial observation period to the later periods. In particular, plant height increased from 19.3 cm to 85.3 cm in variant 1, from 19.8 cm to 86.7 cm in variant 2, and from 19.7 cm to 89.1 cm in variant 3. In variant 4, where the nutrition rate was N250P175K125 kg/ha, this indicator increased from 20.8 cm to 90.5 cm.

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Growth and development of cotton varieties under the influence of irrigation and fertilization rates (cm, number)

Var.	Plant height, cm				True leaves, pcs				Fruiting branches, pcs		Yield elements, pcs		Bolls, pcs	Open bolls (28.09)
	1.06	1.07	1.08	1.09	1.06	1.07	1.08	1.09	1.07	1.08	1.08	1.09	pcs	%
1	19.3	56.1	66.2	85.3	6.8	9.6	10.8	12.7	7.8	9.2	8.4	9.0	6.8	75.5
2	19.8	59.5	65.1	86.7	6.4	9.3	10.8	13.5	7.3	9.4	8.6	9.4	6.3	67.0
3	19.7	58.9	70.2	89.1	7.2	9.5	10.2	13.5	7.2	9.1	8.2	9.2	7.2	78.3
4	20.8	64.8	79.6	90.5	8.1	9.8	10.9	13.3	8.3	10.7	8.4	10.2	8.1	79.4
5	19.6	59.5	71.3	89.2	7.4	9.2	11.0	13.7	7.5	9.8	7.7	9.3	6.3	67.7
6	19.2	59.4	70.2	86.2	7.1	9.1	11.6	12.5	7.2	9.2	7.9	9.8	6.9	70.4
7	20.6	69.4	79.9	90.8	8.3	9.9	11.9	13.9	9.1	10.2	9.8	11.1	9.2	82.8
8	19.3	60.2	71.5	88.1	7.8	9.5	11.2	12.6	7.3	9.3	7.6	9.1	7.1	78.0
9	20.4	68.5	78.3	89.9	8.4	9.6	11.7	13.8	8.5	10.3	8.2	10.4	8.2	78.8

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In the Bukhara-10 (Sardor-1) variety, a consistent increase in plant height was recorded from the initial observation period to the later periods. In particular, plant height increased from 19.3 cm to 85.3 cm in variant 1, from 19.8 cm to 86.7 cm in variant 2, and from 19.7 cm to 89.1 cm in variant 3. In variant 4, with a nutrition rate of N250P175K125 kg/ha, this indicator increased from 20.8 cm to 90.5 cm. Comparison of variants 1-3 with the nutrition rate N200P140K100 kg/ha showed differences among the variants even under the same mineral nutrition background. For example, at the final observation date of the vegetation period, plant height in

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variant 3 was 89.1 cm, which was 3.8 cm higher than the 85.3 cm recorded in variant 1. At the same time, higher values were also observed for the number of fruiting branches, fruiting elements, and bolls.

A similar pattern was observed in the Porloq-1 variety. Plant height increased from 19.2 cm to 86.2 cm in variant 6, from 20.6 cm to 90.8 cm in variant 7, from 19.3 cm to 88.1 cm in variant 8, and from 20.4 cm to 89.9 cm in variant 9. In particular, the final plant height in variant 7 was 90.8 cm, which was the highest value among all variants in the table. In this variant, the number of fruiting branches reached 13.9, fruiting elements reached 9.1 and 10.2, and the number of bolls reached 9.8 and 11.1.

The advantage of variant 7 was characterized not only by the greater plant height, but also by the higher number of fruiting branches and bolls. Studies on cotton have also shown that the relationship among plant height, the number of fruiting branches, and the number of bolls is important for explaining yield formation. The boll opening indicator for different varieties is especially important for assessing the ripening process of the crop. An increase in the number of opened bolls at the end of the observation period indicates an increase in the physiological maturity of the crop. In cotton research, phenological observations, boll formation, and boll opening are used as important components of yield assessment.

Conclusion

In the Bukhara-10 (Sardor-1) variety, variant 4 with the rate of N250P175K125 kg/ha showed the highest result in terms of plant height, while in the Porloq-1 variety, variant 7 showed the highest values for plant height (90.8 cm), number of fruiting branches (13.9), and number of bolls (11.1).

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