Volume 4, Issue 6, June - 2026
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

DEVELOPMENT OF AN IRRIGATION REGIME FOR THE INTENSIVE "CRIPPS PINK" APPLE VARIETY

Sarimsakov Maksudkhon Musinovich
Amonov Dilshod Hasanovich
Murodov Otabek Ulug'bekovich
Ruziyeva Mavluda Anvarovna
Bukhara State Technical University, Uzbekistan,
Bukhara Region, 200100, Bukhara, Q. Murtazaev Street, 15
E-mail: murodovou@gmail.com

Abstract
This article presents the results of studies on drip irrigation of intensive orchards aimed at obtaining high and high-quality yields under conditions of water scarcity and improving the reclamation condition of agricultural lands. The study was conducted under the conditions of meadow alluvial soils in Bukhara Region, where the groundwater table is located at a depth of 1.5–2.0 m. The research focused on determining the effect of different irrigation regimes on the productivity of the intensively cultivated "Cripps Pink"| apple variety grown as a repeated crop.

Keywords: Cripps pink, Datura innoxia, plant, different irrigation regimes, agrotechnical measures, fertilizers, economy, growth, development, care, cost, leaf, seed.

Introduction

Approximately 51–53 billion m³ of water resources are currently used annually in the agricultural sector of the Republic of Uzbekistan. According to available data, the water deficit is projected to reach 7 billion m³ by 2030 and 15 billion m³ by 2050. Under such conditions, it is of great importance to widely introduce water-saving irrigation technologies in agricultural production and provide state support for their implementation, attract foreign investments and grants to the sector, train qualified specialists for the water management sector, strengthen cooperation among education, science, and production, and widely implement scientific achievements in agricultural practice.

In the context of increasing global water scarcity, the scientific planning of water resource use and the development of modern agro-reclamation and water-saving irrigation technologies that ensure the sustainable maintenance of the ecological and reclamation condition of agricultural areas in both the short and long term are becoming increasingly important.

From this perspective, the development of scientific and practical approaches to reducing the impact of water scarcity, improving the reclamation condition of irrigated lands, ensuring stable and high crop yields, increasing the efficiency of irrigation water use, and effectively utilizing collector-drainage water as an additional water source represents one of the most urgent issues.

Volume 4, Issue 6, June - 2026
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

Research objective

The objective of the study was to compare irrigation methods and irrigation techniques and technologies for intensive apple orchards, particularly the 'Cripps Pink' variety, under the conditions of meadow alluvial soils in the Bukhara oasis, and to determine the most appropriate irrigation method, irrigation rate, and irrigation timing suitable for the prevailing soil conditions.

Research object

The research object was the intensive 'Cripps Pink' apple variety. The experiments were conducted under the conditions of meadow alluvial soils belonging to "GARDEN BUKHORO AGROKLASTER" LLC, located in Vobkent District, Bukhara Region.

Materials and Methods

Field experiments were conducted in 2023–2024 in intensive apple orchards belonging to the "Garden Bukhoro Agroklaster" cluster farm, Vobkent District, Bukhara Region.

Research methods

The research was conducted according to the methodologies developed by the Scientific Research Institute of Cotton Breeding, Seed Production and Agricultural Technologies (PSUEITI), "TIIAME" National Research University, and the Scientific Research Institute of Irrigation and Melioration (ISMITI).

Table 1. Experimental design

Variant	Irrigation method	Irrigation regime, % of FC	Annual fertilizer rate, kg/ha
1	Furrow irrigation	70–70–65	N150 P105 K75
2	Drip irrigation	75–75–70	N150 P105 K75

FC — field water-holding capacity.

Results and Discussion

The meadow alluvial soils in the experimental area receive approximately 200–300 mm of annual precipitation, while annual evaporation from the land surface reaches approximately 1,300–1,600 mm. Under such conditions, maintaining an optimal soil moisture level through irrigation is of particular importance.

The development of scientifically based irrigation rates for specific climatic and soil-reclamation conditions is essential for increasing crop productivity while ensuring economical and efficient use of water resources.

In the experiment, the apple orchard was irrigated through furrows and by drip irrigation, taking into account the pre-irrigation soil moisture content. The irrigation regimes were maintained at 70–70–65% and 75–75–70% of field water-holding capacity, respectively.

In the first treatment, where the orchard was cultivated under the 70–70–65% irrigation regime, the orchard was irrigated six times during the growing season. The individual irrigation rates ranged from 545 to 1,233 m³/ha, while the seasonal water consumption amounted to 4,779 m³/ha. In the field where drip irrigation was applied, irrigation was carried out 16 times, with individual irrigation rates ranging from 180 to 240 m³/ha. Total seasonal water consumption amounted to

Volume 4, Issue 6, June - 2026
ISSN (E): 2938-3781

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

3,180 m³/ha. Compared with the control field, the drip-irrigated field resulted in a 33.5% saving of irrigation water.

Calculation of irrigation rates

The irrigation rates were determined according to the methodology developed by PSUEAITI (formerly UzPITI), based on the methodology described in Methods of Field Experiments with Cotton (1981), using the following formula:

$$\mathbf{M = (W_n - W_m) \times 100 \times d \times h + K}$$

where:

• M – irrigation rate, m³/ha;

• W_n – soil moisture corresponding to field water-holding capacity, expressed as a percentage of soil weight;

• W_m – soil moisture content before irrigation, %;

• d – soil bulk density, g/cm³;

• h – calculated soil layer, cm;

• K – water losses during irrigation, including evaporation (10%).

For the first irrigation, the amount of water required to moisten the 0–50 cm soil layer was calculated as follows:

$$\mathbf{M = (W_n - W_m) \times 100 \times d \times h + K}$$

$$\mathbf{M = (20.5 - 14.5) \times 100 \times 1.38 \times 0.5 + 10\% = 455.4\ m^3/ha}$$

For the second irrigation, the amount of water required for the same soil layer was calculated as follows:

$$\mathbf{M = (W_n - W_m) \times 100 \times d \times h + K}$$

$$\mathbf{M = (20.5 - 15.4) \times 100 \times 1.38 \times 1 + 10\% = 774.2\ m^3/ha}$$

The number and rates of irrigations carried out in the experimental field are presented in Tables 2 and 3.

Table 2. Number and rates of furrow irrigations in the apple orchard

Irrigation regime, % of FC	Indicator	1st	2nd	3rd	4th	5th	6th	Seasonal, m³/ha
70–70–65	Gross	472	944	944	944	944	531	4779
	Net	400	800	800	800	800	450	4050
	Drainage/runoff	72	144	144	144	144	81	729

For the field where drip irrigation was used, the irrigation rates were determined as follows:

$$\mathbf{M = (W_n - W_m) \times 100 \times d \times h + K}$$

$$\mathbf{M = (20.5 - 14.5) \times 100 \times 0.5 \times 1.38 + 10\% = 455.4\ m^3/ha}$$

Table 3. Number and rates of drip irrigations in the apple orchard

Irrigation regime, % of FC	1st	2nd	6th	7th	8th–15th	16th	Seasonal, m³/ha
75–75–70	180	180	240	240	240	260	3180

Volume 4, Issue 6, June - 2026
ISSN (E): 2938-3781

The data presented in the tables demonstrate a significant difference in irrigation rates between the irrigation regimes and irrigation methods.

In the traditionally furrow-irrigated field, the irrigation water requirement was 33.5% higher than in the drip-irrigated field.

Conclusions

Based on the experimental results obtained under the conditions of long-term irrigated meadow alluvial soils in the Bukhara Region, the following conclusions can be drawn:

• For the cultivation and maintenance of intensive apple orchards, maintaining pre-irrigation soil moisture at 75–75–70% of field water-holding capacity makes it possible to reduce irrigation water consumption and obtain an additional yield of 1.6 t/ha.

• To obtain high and high-quality yields from intensive apple orchards, it is recommended to apply drip irrigation 16 times during the growing season at a 75–75–70% soil moisture regime relative to field water-holding capacity, using approximately 240–280 m^3/ha per irrigation. This irrigation regime makes it possible to obtain an additional 1.6 t/ha of yield and save approximately 33.5% of irrigation water compared with traditional furrow irrigation.

References

1. Murodov Otabek Ulugbekovich, Kattayev Bobir Sobirovich, Saylixanova Maftuna Komiljonovna, & Ibodov Islom Nizomiy o`g`li. (2020). Smart irrigation of agricultural crops. Middle European Scientific Bulletin, 3, 1-3. https://doi.org/10.47494/mesb.2020.3.16
2. Murodov O U, Kattaev B S, Saylixanova M K. // The use of sprinkler irrigation in the cultivation of agricultural crops // " Proceeding of The ICECRS.Conference of Management of Islamic Education Leadership In The Era of Revolution 4.0 "conference. - Indonesia 2020.
3. Murodov O. U., Kattaev B. S., Saylikhanova M. K. Efficiency use low pressure drip irrigationof in small gardens //Школа Науки. – 2020. – №. 2. – С. 6-9.
4. Murodov Otabek Ulugbekovich, Saylixanova Maftuna Komiljonovna, Kattayev Bobir Sobirovich, Muzaffarov Muxriddin Murodovich. Determination of efficiency of groundwater use in irrigation of millet planting, Euro-Asia Conferences, 2021/3/31, 131-134.
5. Ro'Ziyeva M. A., Najmiddinov M. M. Sho'rlik darajasi turlicha bo'lgan suvning jamadon tipidagi ko'chma quyosh suv chuchiktgich qurilmasining unumdorligiga ko'rsatadigan ta'siri //Science and Education. – 2022. – Т. 3. – №. 4. – С. 218-221.
6. Муродов О. У., Каттаев Б. С., Сайлиханова М. К. Қишлоқ хўжалигида томчилатиб суғориш технологияларидан фойдаланиш самарадорлиги //Science and Education. – 2020. – Т. 1. – №. 1. – С. 177-184.
7. Ulugbekovich, M. O., Sobirovich, K. B., & Komiljonovna, S. M. (2025). EFFICIENCY USE LOW PRESURRE DRIP IRRIGATIONOF IN SMALL GARDENS. Лучшие интеллектуальные исследования, 58(2), 175-182.
8. O U Murodov, U O Teshayev, O I Amrulloev, S U Islomov. Determining the efficiency of the use of underground water in irrigation of tarik. Ekonomika i sotsium, 2021, 187-191.

Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8