



## THE INFLUENCE OF THE WATER SOURCE ON THE GROWTH AND DEVELOPMENT OF APPLE TREES

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**Annotation:** *This article discusses the results of scientific research conducted in 2015-2018 in the conditions of light gray soils (Andijan region) Uzbekistan when watering intensive apple orchards using artesian and river waters, and their impact on the growth – development, and yield of intensive apple orchards.*

**Keywords:** *Intensive apple orchard, fruit tree seedlings, drip irrigation, river water, artesian water, irrigation norms, growth and development of trees, and the productivity of intensive orchards.*

**Introduction:** During the second half of the 20th century (the 70s-80s) and the beginning of the 21st century (2000 and 2015), the problem of shortage of fresh water worldwide worsened from year to year, which led to a significant reduction in irrigated land in the crop rotation system. This was mainly due to increased salinization, desertification, and wind erosion.

In his work, T.T. Watson and co-authors cite that trees that received drip irrigation had a larger trunk diameter than trees irrigated with micro sprinklers during the first four years of gardening, while the total fruit yield was also observed with drip irrigation in the fourth growing season. Populations of *P.penetrans* in soil and roots were smaller under drip irrigation than micro-sprinklers. Trees irrigated with drip irrigation had a higher percentage of root colonization than those irrigated with micro sprinklers and had a higher density of small roots in the soil. Drip irrigation also increased the volumetric water content in the soil in the root zone, and the moisture content in the soil often approached or exceeded the field moisture capacity compared to micro-sprinklers [6].

Many authors [2] have studied the influence of the number of droppers and the frequency of watering on yield, fruit quality, and water productivity in a high-density apple orchard.

Intensive gardening is the basis of modern intensive technologies aimed at the efficient use of land and water resources, increasing the productivity of irrigated lands and improving food supply [4, 5, 6].

Central Asia is a wonderful country in the world, one of the oldest and best in the world of horticulture, viticulture, and winemaking. Luxurious material culture and irrigated agriculture, the development of fertility in Asia were founded during the heyday of Persian culture in the ancient states of Bactria, Khorezm, and Sogdiana.

**Problem:** More than 90% of the existing water resources in the country are spent on irrigation. The main part of this amount (80-83%) will be spent during the growing season. During the non-growing season, it will be used as a moisture-charging, for washing saline



soils, and for watering before sowing crops. About 70 percent of the irrigated areas of the republic are provided with water using water pumps.

In Uzbekistan, fresh groundwater resources are concentrated mainly in the Ferghana Valley (34.5%), Tashkent Region (25.7%), Samarkand Region (18%), Surkhandarya Region (9%), and Kashkadarya Region (5.5%). Other regions have only about 7% of all fresh groundwater resources. Approximately 700 thousand hectares of crop rotation in the country are located in the foothills, where the processes of water erosion are highly developed.

**Scientific research:** Scientific research has been conducted on the influence of irrigation water sources on the growth and development of intensive apple orchards. Under various soil and climatic (Tashkent and Andijan regions) conditions of the republic is to develop and scientifically substantiate measures to ensure a high yield in intensive horticulture [4,5,6].

**Research results:** As a result of industrial field experiments, the optimal depth of moistening of the soil layer in intensive apple orchards (at 75-80-70% of PPV) was determined. Setting the depth of moistening of the soil layer of 0-50 and 0-80 cm with drip irrigation is optimal in the soil and natural conditions of the study area. The influence of soil moisture depth, irrigation norms, and timing on the growth and development of trees, apple yield, and physical properties of the soil in intensive gardens has been studied.

Phenological observations have shown that in intensive apple orchards where artesian water is used, relatively slow (5-12 days) tree growth is observed (Table 1). The water temperature from the Artesian well is +7+9 0C. Using water from a well for irrigation of crops, first of all, it is advisable to use two-chamber pools with a certain volume to heat water under the influence of solar energy.

*Table 1*

*The results of the conducted phenological observations at the experimental sites.*

Pilot site No	Irrigation water source	The number of new branches per stem, pcs..	Length of branches			The number of fruit falls, pcs./wood	Fruit ripening time	Weight of one fruit, g	Yield of apple trees, t/ha
			June	July	August				
1	Artesian water (Underground)	9.2	31.9	43.6	62.4	7.6	30.08.	103.7	23.2
2	River water	9.7	36.4	47.3	64.6	3.3	18.08.	124.3	26.3

Fertilizers, various pesticides, herbicides, and other substances can also be delivered to the fields via drip irrigation pipes in the same basin. It was also found that the agrophysical properties of the soil changed slightly with the use of artesian waters, the volume mass of the soil increased by 0.04-0.08 g/cm<sup>3</sup> compared to the irrigated area of river water. In this way, it is possible to preserve the agrophysical and agrochemical properties of the soil. The effect of irrigation water on fruit yield when growing intensive apple orchards with artesian (underground) and river water. The highest yield (26.3 t/ha) was observed in



a field irrigated with river water. In a field irrigated by artesian (underground) water, the yield of apples was 23.2 t/ha.

**Conclusions:** With the use of a drip irrigation system for the maintenance of intensive apple orchards in conditions of inclined soils subject to irrigation erosion, irrigation erosion processes are excluded, and soil fertility is maintained. To set the optimal depth of moistening of the soil layer by 0.5 m using drip irrigation technology at 75-80-70% of the maximum field moisture capacity will ensure and reduce water consumption by 1.5-1.6 times.

When growing intensive gardens, it is advisable to use river water instead of artesian water, which will preserve the agrophysical and agrochemical properties of the soil and ensure early ripening of fruits with high quality and high yield.

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