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Abstract. *The article presents the results of theoretical studies and field trials of the author, conducted in ancestral - economic conditions. Field experiments were carried out on the territory of the Khuzhayakshanba IGC of the Kagan fog of Bukhara region. The technology of garden irrigation with clay water using drip irrigation has been developed. With the introduction of drip irrigation technology in intensive gardens, water resources are saved by 20-60%, mineral fertilizers up to 50% and fuel and lubricants up to 30%, the results of the work are analyzed and presented. In addition, the irrigation regime corresponds to the water needs of plants and excess water is not used, while water evaporation in the soil is insignificant, moisture will collect only near the root system of plants, as a result, water does not disperse throughout the field, due to the small absorption of water by the soil, the level of subsoil water will not rise.*

Key words: *irrigation, drip irrigation, irrigation methods, clay water, subsoil water, water resources, salinization, root, evaporation.*

Today, the shortage of water resources is increasing year by year as a result of climate change. Due to such negative processes and the problem of water shortage in 80 countries of the world, as a result of the loss of 7 mln hectares of cultivated land from agricultural use, the problem of food security is emerging in the world.

Vital processes in the plant - photosynthesis, cell division at the point of growth and other processes take place only when there is enough water in the cells. Sufficient water supply is ensured by the mutual adaptation of two processes, i.e. the processes of providing water to the root system and evaporation of the surface of the leaves.

How much water fruit trees consume is determined by climatic factors, the nature of the trees, their age, the amount of the crop and the agrotechnical system. Irrigation not only provides gardens with moisture throughout the year, but is also a factor that positively affects the microclimate of the garden.

When intensive or semi-intensive apple orchards are irrigated from a ditch in the old way, excessive soil moisture is harmful to the orchard. In this case, the soil becomes waterlogged, its physical properties, especially the air environment, deteriorate, and unfavorable conditions for the functioning of the root system appear. Delays autumn growth and reduces frost tolerance of trees in contaminated orchards.

The results of a research study of the norms of drip irrigation of orchards showed that the regime of drip irrigation of orchards (watering rate and number) depends on the type of garden drip irrigation system (beside each bush, along the strip of rows of trees).

Large-scale works are being carried out in Uzbekistan regarding the introduction of drip irrigation technology, which is considered one of the advanced methods of crop irrigation. The drip irrigation method is distinguished by its high efficiency, that is, it allows to obtain a stable high yield by consuming less water in conditions of limited water resources.

In 2019-2021, field experiments were conducted with the aim of developing a procedure for irrigating gardens using localized drip irrigation technology. The similarity of the experimental field was chosen according to the method of V.V. Shabanov and Ye.P. Rudachenko.

According to the granulomere composition of the soil of the experimental area, it is a medium sand meadow alluvial, weakly saline soils. Subsoil waters are 1-3 g/l less mineralized according to mineralization of 2.1-3.0 m.

The area of the experimental field is 2.04 hectares. It is a rectangular area of 200x36 m, 250x24 m, 300x24 m, each variant of the rows and the distance between the rows is 3 meters, and the distance between the apple seedlings is 2 meters.

Field research studies were carried out to study the method of watering "Golden" apples based on the methods of TIAME, IWPSRI, CSSGASRI based on the improvement of localized drip irrigation technology.

Table 1

Experimental system

options	Irrigation technologies	Elements of irrigation technique	Soil moisture before irrigation, relative to LFMC, %
		Furrow irrigation, control	The length of furrow is 200 m
	Localized drip irrigation	The length of the irrigation pipe is 200 m	70-75-60 70-80-65
		The length of the irrigation pipe is 250 m	70-75-60 70-80-65
		The length of the irrigation pipe is 300 m	70-75-60 70-80-65

The following observations, measurements and analyzes were carried out in the experimental area:

– the morphological structure of the soil was studied before the experiment. For this, a section of the soil was dug up to the level of the seepage waters, and the morphology of the soil was determined according to the genetic layers.

– mechanical composition of the soil by genetic layers 1 m. was determined by the N.A.Kachinsky method in samples taken from the soil section to depth.

– volume mass of the soil was determined by taking undisturbed samples. Each year, at the beginning and end of the growing season, in 3 repetitions, each 10 cm soil layer of the experimental options was studied at a depth of up to 1 meter.

– water permeability of the soil for 6 hours was studied every year at the beginning and end of the experiment for all options.

– soil limited field moisture capacity LFMC was studied at the beginning of the experiment by placing a frame on a 2x2 meter area.

– soil moisture was systematically determined by drying in a thermostat before irrigating. Soil samples were taken from every 10 cm layers of the 1.0 meter layer in 3 replicates in each option and analyzed.

– calculated according to the S.N.Rijov formula according to the difference between LFMC and moisture of the soil before irrigation according to the experimental scheme for determining the duration and norms of irrigation.

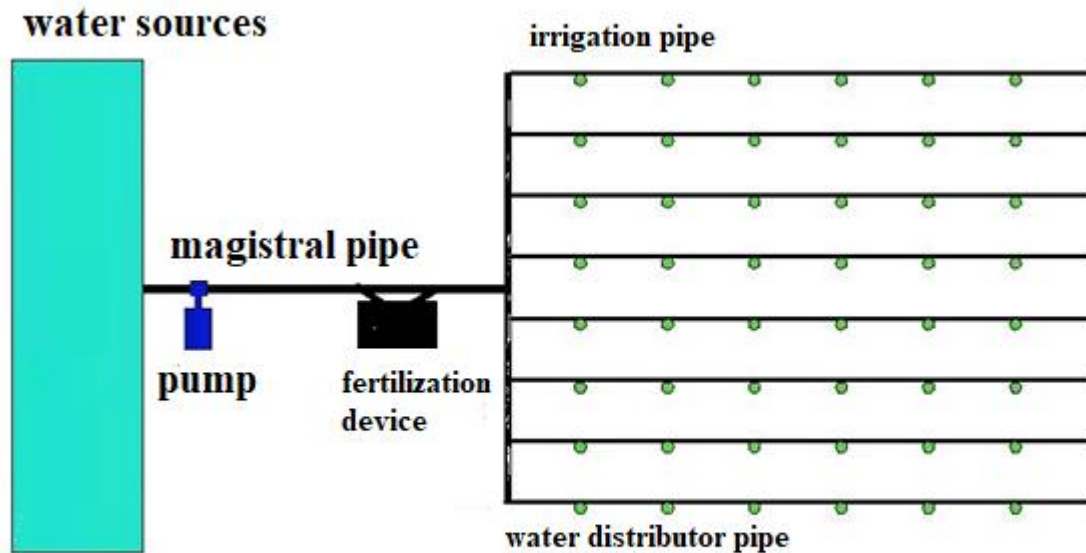
– the amount of water supplied to the experimental field was taken into account using the control option Chippoletti (VCH–50) water meters.

– the change of the subsoil water level was determined using 3 monitoring wells installed in the experimental area. Pipes have a diameter of 40 mm and are installed at a depth of 2.5 meters. The lower 1.2-meter part of the pipes consists of bubble holes, which are surrounded by a filter (kapron material). Subsoil water level was measured 1 time every 10 days.

– the level of mineralization of subsoil water was determined. For all observation wells, salinity was determined before and after complete salinization and at the end of the growing season.

– determination of the salt regime of the soil. At the beginning of the research, at the beginning and at the end of the growing period of the garden, soil samples were taken for each field and options, and the amount of dry residue, chlorine ion and sulfate was determined (0–30; 30–50; 50–70 and 70 –at 100 cm).

– before the experiment, the amount of humus in the 0-30, 30-50 cm layers of the soil was determined by the I.V.Tyurin method, the total amounts of nitrogen and phosphorus were determined by the L.P.Gritsenko, I.M. Malseva method, nitrate nitrogen by the calorimeter method, mobile phosphorus by B.P.Machigin, and exchangeable potassium by the P.V.Protasov method.



Picture 1. Irrigation system.

Structural parameter indicators of localized drip irrigation system.

- 1-The number of droppers on the seedling is 1 piece
- 2-The thickness of hoses is 1 mm
- 3-Water consumption of the dropper is 4.8 in l/h
- 4-In system the working pressure is 20 m.
5. The permissible amount of suspended solids is 25 g/l
6. The permissible particle size is 4-5 microns
7. The usage principles of slope indicators $0.0003 < i > 0.003$

The economic efficiency of the localized drip irrigation of the apple tree is the best in the 3rd option, the net income is 47022000 sums/ha and the yield is 30.1%, i.e. the soil moisture before irrigating the apple orchard in the localized drip irrigation technology is 70-80- 39.6 m³/ha irrigation at 65% retention and 2215 m³/ha seasonal irrigation rates were achieved.



Summary. When apple orchards are drip-irrigated in a 2x3 scheme, the length of the pipe is 200 m, the distance between the drippers is 2 m, the diameter of the irrigation pipe is 16 mm, and the working pressure of the system should be 20 m.

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