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Short Communication

Usage Of Irrigation Elements By Means Of Water-Efficient Technology In Irrigating Intensive Apple Gardens Through Soil And Dynamics Of Seeping Moisture

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Abstract

In this article we are on the side created gardens irrigation water thrifty methods one soil from within irrigation improved technology parameters and in the soil the dynamics of the movement of moisture learn on experiments results were showed. Created soil from within irrigation of the element to the horizon relatively installation corner α=30°,40° inclined installed in the scheme of the soil active layer wetting of moisture capillary and gravitational forces affected movement studiedand the height of the wetting contour over time H, the radius of the width L, the contour area 3 values of the irrigation norm Wm^3/ha were determined accordingly.

Keywords: Wood; Installation angle; Soil; Humidifier; Height; Width; Size; Pipe; Humidity

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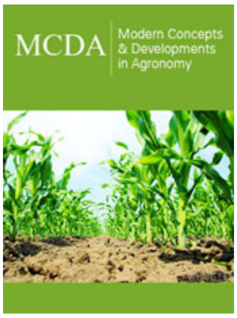

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Introduction

One of the most effective methods of irrigation is in-soil irrigation. The peculiarity of this irrigation method is the fact that water enables to improve the optimal water, air, heat and nutrient regimes by moistening the soil where the roots of the plant are located, not directly on the soil surface, but on the active layer of soil. The first experiments on irrigation from the soil (in-soil irrigation) were conducted in 1849 in France, and in 1913 in the United States for the first time, using humidifier pipes from ceramic drainage pipes for irrigation. In Russia research on sub-irrigation began in the 1920s with the idea of a vacuum and automatic irrigation from the soilsystem by VG Kornev. In-soil irrigation systems differ mainly in the following principles: the principle of water infiltration into the soil and the method of construction of in-soil humidifiers [1-3]. According to productive work techniques it can be divided into three subgroups.

A. Vacuum soil irrigation.

B. Irrigation from unpressurized soil

C. Irrigation from under the soil under pressure.

Not only availability of irrigation system, nature of soil moisture, and the amount of items expenditure are highly dependable to the device of sub-irrigation drippers such as ceramic pipers, hollow bricks, tiles, woods and so on; but also it highly differs in terms of discharge [3].The development of industry has allowed the widespread use of polymeric materials. Due to the sub-irrigation equipment being made from polyethylene and its availability of installing special water drippers, in-soil irrigation could give the opportunity of using polyethylene pipes which charge reasonable price.

Many Russian and foreign researchers have studied the nature of sub-irrigation, its technique and effectiveness in their research. The scientists are VP Ostapchik, MS Grigorov, NR Khamraev, VG Laboda, VG Karpiy, VG Kornev, J Philip, W Mitchell, G Toumon, D Edwards, J Robins, W Gardner and others [4-7]. All studies carried out by them have proven that using this technique much more agricultural crops and fruits have been yielded compared to the other types of irrigation methods. Soil moisture reserves in the soil are formed as a result of its interaction with plants and weather conditions [8,9]. Quantitative indicators of the amount and movement of moisture in the soil among the most essential factors characterizing the water regime that is formed in the soil. Extensive work on the study of the laws of moisture distribution in irrigation from the soil was carried out by VG Kornevym, AA Bogushevskim, VP Ostapchikom, VI Bobchenko, VR Ridigerom, LE Chernyshevskoy, AA Alesashenko and other researchers [10-14].

Purpose and Materials of the Study

The proposed irrigation technology is the latest science-based innovation in the organization of intensive garden irrigation from the ground, water-saving technology, which has given its positive effect in its application. Based on the fact that there is almost no technology of local irrigation of the root system with intensive irrigation of gardens in the country, and the purpose of the study, a schematic diagram of irrigation from the soiltechnology was developed (Figure 1). In this case, surface or groundwater is pumped into the pool, after a certain time it is cooled, filtered, sucked with the help of the 2nd pump, mineral fertilizers are mixed using a separator, sent to the main pipe under atmospheric pressure 1.5-2, then to the irrigation element from the soil An average of 3-3.5 liters of water per hour leaks from irrigation element from the soil.

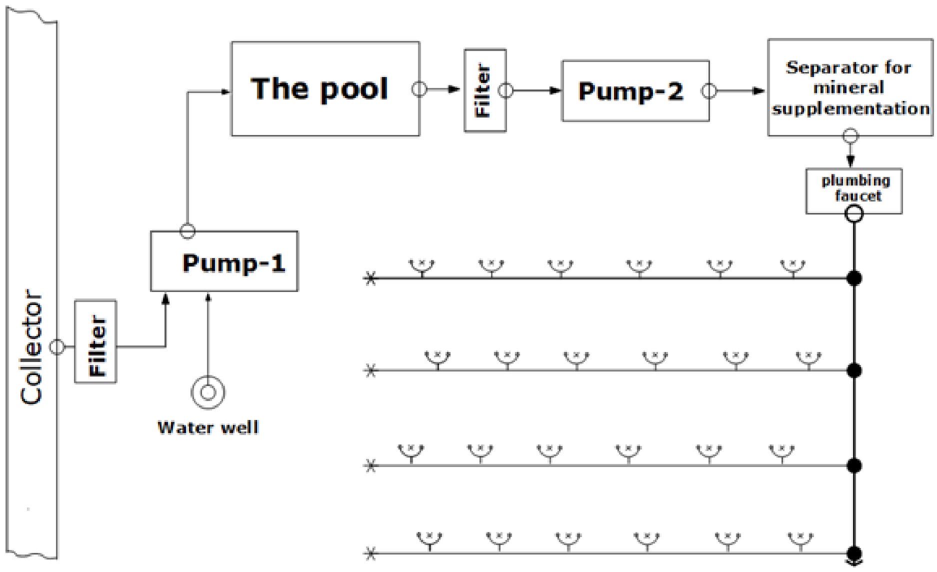
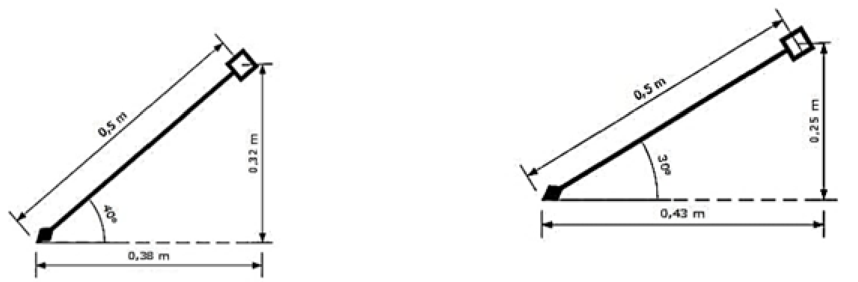


Figure1: The design scheme and main parameters of the irrigation element from the soil working part work in the following order: Irrigation element from the soil is made of polyethylene pipe,ensures that the water coming from the main pipe leaks at the same rate.



a) *Of irrigation element from the soil to the horizon relative to 40 ⁰ corner under install*

b) *Of irrigation element from the soil to the horizon relative to 30 ⁰ corner under install*

Figure2: Constructive angles and dimensions when installing an in-soil irrigation device.

When using irrigation from the soil technology, it is possible to install 2 to 4 irrigation element from the soil around a tree, depending on soil-climatic conditions, garden seedling species, and tree age. Studies have shown that at different values of the installation angle relative to the irrigation element from the soil horizon, the α size limits of the soil moisture area may vary. In order to achieve an optimal wetting area, the contours of wetting under laboratory conditions of the irrigation from the soilelement were studied in the variants with mounting angles α=30° ,40° (Figure 2). The recommended dimensions for installing around a irrigation element from the soil tree are as follows (Figure 2).

Installation of irrigation element from the soil around the tree

a) The figure shows a structural drawing of an irrigation element installed opposite each other in a straight line, with a total irrigation length of 0.8m when installed around the tree on both sides

b) Irrigation element from the soil in parallel at a distance of 0.2m from the tree trunk is installed on both sides so that the wetting area is wider than the gap (Figure 3a & 3b).

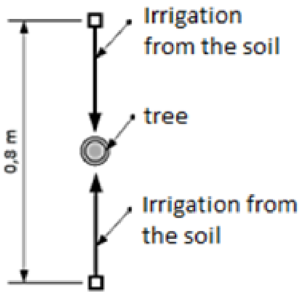


Figure.3 a) View of irrigation element from the soil mounted opposite each other on a straight line.

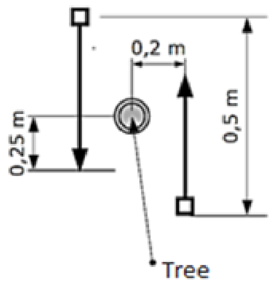


Figure.3 b) View of irrigation element from the soil mounted in parallel.

Figure3: Dimensions for installing irrigation element from the soil around a tree.

Results and their Analysis

When irrigation element from the soil is the recommended installation angle around the tree α=30°and α=40°when, the values of the wetting contour height H, width radius L, contour area Sm3 and the irrigation norm Wm3/ha were determined over time.In the irrigation options given in the table , the soil pre-irrigation moisture in option 1 was 180 m3/ha at an installation angle of 70% relative to the ChDNS α=30°. In option 2, the soil pre-irrigation moisture, 70% relative to the ChDNS, at the installation angle α=40°, the s irrigation rate was 175m3/ha. In option 3, the soil pre-irrigation moisture, 80% of the ChDNS, at the installation angle α=30°, the s irrigation rate was 125m3ha. In variant 4, the soil pre-irrigation moisture content was 80% relative to the ChDNS, and the irrigation rate at the installation angle α=40° was 115m3/ha. It can be seen that the irrigation element from the soil, installed at a small angle to the horizon, has a wide wetting area and low water consumption [15-17] (Table 1).

Table 1:

Soil irrigation moisture,% of ChDNS	Moisture Contour Formation							
	Time after watering, milk	Contour height (H), m	Contour width (L), m	Contour area (S), m^2	Time after watering, milk	Contour height (H), m	Contour width (L), m	Contour area (S), m^2
Option 1α=30°					2-variantα=40°			
Irrigation norm 180m^3/ha					Irrigation norm 175m^3/ha			
70	0	1.21	0.62	0.72	0	1.2 2	0.6 3	0.7 3
	0.5	1.35	0.71	0.85	0.5	1.3 6	0.7 0	0.85
	1	1.45	0.82	1.04	1	1.4 6	0.82	1.04
	3	1.81	0.45	0.33	3	1.81	0.45	0.33
	5	0.4	0.18	0.06	5	0.4	0.18	0.06
Irrigation norm 125m^3/ha					Irrigation norm115m^3/ha			

80	0	0.68	0.35	0.21	0	0.6 9	0.3 4	0.2 2
	0.5	0.85	0.48	0.39	0.5	0.85	0.4 9	0.39
	1	1.01	0.6	0.54	1	1.0 2	0.6	0.54
	3	0.43	0.21	0.11	3	0.43	0.21	0.11
	5	0.28	0.11	0.02	5	0.28	0.11	0.02

Results and Discussion

Intensive irrigation of gardens is intended to save water, that is, to meet the plant's demand for water with low water consumption, not to use too much water, to prevent water evaporation.

Conclusion

Researchers have proven that in-soil irrigation can reduce water consumption by 2-3 times compared to surface irrigation and by 15-20% compared to drip irrigation. Also, rows of seedlings in intensive orchards prevent the growth of weeds, ensuring the normal growth and development of seedlings, creating conditions for harvesting, as well as preventing them from various diseases [18,19].

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