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USE OF WATER SAVING TECHNOLOGIES IN GARDEN IRRIGATION

Fazliyev Jamoliddin Sharofiddinovich
Raxmatova Maftuna Jamshid qizi
Bukhara Institute of Natural Resources Management of the National Research University of Tashkent Institute of Irrigation and Agricultural Mechanization Engineers
jamolliddinfazliyev@gmail.com

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.

Keywords: irrigation, drip irrigation, irrigation methods, clay water, subsoil water, water resources, salinization, root, evaporation, agricultural technology, water scarcity, water saving technologies, irrigation rate, marginal field moisture capacity (FMC), pre-irrigation moisture capacity, mineralization, irrigation technique, vegetation period.

Introduction

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.

THE MAIN PART

Scope of works to be undertaken in these directions and mechanisms of their imlementattion are clearly determined in these documents. Task of introduction of drip irrigation on 25 thousand ha, ririgation through polyfilm laying on 46.5 thousand has and systems of irrigation using mobile flexible pipes on 34 thousand ha of land nationwide by 2018 had been set. During 2018-2023, introduction of the drip irrigation system on 21.5 thousand ha of land areas of the farms and other land users and provision of concessional loans with interest rate of 6% to agricultural producers by commercial banks from the resources of the Fund for Improvement of Irrigated Land under the Ministry of Finance. In addition, amendments and addenda to the

Tax Code were introduced as to exemption of legal entities, which introduce drip irrigation techniques, from the Single Land Tax associated with land area covered by such techniques for the period of 5 years.

According to the International Irrigation and Drainage Committee, areas under crops, where drip irrigation systems were introduced, had grown from 436 thousand ha to 3.2 million ha globally over 1981-2000. Namely, such areas increased by 1 million ha in the USA and by 200 thousand ha in each oog India, Australia, Spain, Israel, and China. Currently, drip irrigation technology has been introduced on the lands with total area of 4.5 million ha globally. Great attention is paid in our country to wide introduction of the drip irrigation system. Over the last 3 years, the drip irrigation technology has been introduced on the lands with total area of 5.5 thousand ha. In 2013, this system was introduced on the lands with total area of more than 2.2 thousand ha. Namely, this system is applied on 255 ha of lands in Samarkand Region, 250 ha in Namangan Region and nearly 170 thousand ha in Ferghana Region.

Cotton growing technology under the drip irrigation system includes the following key indicators: Use of high-yield and fast-ripening varieties adapted to various soil climate conditions; rational system of main, pre-ploughing and interrow soil tillage; planting of high-quality cottonseeds, classified introduction of mineral fertilizers; a system, which helps in full automation of irrigation process and efficient use of water resources; harmonized system of plant protection from siseases, pests and weeds; mechanized calking and defoliation of cotton plants; and mechanized cotton harvesting. Main difference of the drip irrigation system lies in the possibility of partial introduction of mineral fertilizers and herbicides to thenpant through water and lack of interrow tillage during vegetation period.

EXPERIMENTAL RESULTS

Research studies had been undertaken at the Training and Research Center of the Bukhara Branch of Tashkent Institute of Irrigation and Melioration with the view of complex academic study and mass introduction of the drip irrigation technology. Soil of the experimental field was medium loamy, with the depth of ground waters of 2.2-2.5 metres, and 1.9-2.2 metres during the cotton vegetation period and was mildly saline. Irrigation was performed using the turbid water directly from the aryk (canal) without filtration. According to the experimental results, drip irrigation system has a number of advantages over the interrow irrigation and studies identified the saving of 45-50% of water and 40-50% of fuels and lubricants and mineral fertilizers. In addition, reduction of the number of interrow tillage by 6 times, and spending of 85 cubic metres of water per 1 ha for growing of 1 centner of cotton were observed.

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We can observe the positive improvement of hydrophysical properties of the soil in the field under drip irrigation as compared with traditionally irrigated field; namely, reduction of volume mass, improvement of the soil's water conduction property. It was established that in case of drip irrigation productivity grew by 7.4 centners/ha. In addition, due to continuous maintenance of mositure on the areas under drip irrigation, salinity level increased just slightly and plants didnot suffer the vilt disease. Soil at the experimental fields was medium loamy, and medium-fiber Bukhoro-6 cotton variety was planted with cotton interrow space of 60 cm. At the ploughed layer of the soil (0-30 cm) the soil volume mass was 1.38-1.41 g/cm^3, and in the under plough layer (30-50 cm) this indicator somewhat increased to 1.49-1.58 g/cm^3, and relative mass and total porosity indicators in these layers were correspondingly 3.14-3.21 g/cm^3 and 51.3-47.1%.

Hydrophysical properties of the soil were as follows: limited field water capacityy at the soil layer of 0-100 cm was 20.3-21.4; natural moisture at ploughed layer was 17.2-18.5%, and under plough layer – 18.3-20.8%; cotton irrigation regime was formed based on the pre-irrigation moisture level and estimated soil layer of 0-50 cm as established in the experimental system. Obtained data evidence high efficiency of the drip irrigation as compared with furrow irrigation. For instance, while 5,200m^3/ha brutto water is spent per season in case of furrow irrigation, we can observe that 2,280 m^3/ha of water in scenarios 2 and 3, and total of 2,760 m3/ha of water in the fourth scenaruio is spent in case of drip irrigation. Thus, upon drip irrigation under the 70-75-70% scheme water was saved by 53%, and upon drip irrigation according to 70-80-65% scheme water saving was 47%.

Features of agrotechnical case of cotton plants and crops included in its complex taking into consideration the tradionally irrigated meadowy alluvial soil conditions and use of new technologies and drip irrigation system have been provided above. High water saving efficiency achieved in the course of these experiments has also demonstrated its ecologically positive properties. Regionally widespread irrigation erosion and wash-off of mineral fertilizers in meadowy alluvial soils are prevented. Through this method, there is a good opportunity for continuous moisture supply to the plant's root level and efficient utilization of water and nutrients. Advantage of drip irrigation is primarily demonstrated in saving of water resources. At the same time, a unique irrigation mode, low evaporation and prevention of water waste are achieved. Most importantly, since water is delivered to the plant through the pipes in drip irrigation, the surface of field soil is not dried and, as a result, there is no need for performance of interrow tillage.

Upon irrigation of cotton plants using the traditional method, i.e. through the rows, it was determined that part of water was wasted as a result of its partial ingress into lower soil layers in the main canals and its evaporation. Studies identified that 1.5-2.5 thounsand cubic meters of water are wasted per one hectare due to evaporation and ingress. Development of moden land improvement nd irrigation methods for the cotton and other plants grown on the rows and thir introduction into practice with the view of preventing the negative aspects are among the urgent issues nowadays. Technique of irrigation through laying the polyfilm between the cotton plant rows serves as a factor, which enables the reduction of the demand for irrigation water and energy costs as well as increase of soil fertility.

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.

CONCLUSION AND FUTURE WORK

Saving of water by 15-20%, even water distribution along furrows and increased of useful area under crops by 1.5-2.5% and easening of irrigation works and reduction of manual labor by 2 times as compared with tradition irrigation methods has been observed as a result of irrigation of cotton field using the mobile flexible pipes instead of main irrigation channels. Such manufactured mobile fexible pipes are intended for a land site of 4 ha, this area is irrigated simultaneously using the hoses. Since the land plot is irrigation for a short period, soil preparation occurs evenly in all parts of the field. Since water is supplied to the field for a short time, normal growth of cotton plants and increase of productivity by 2.5-3.0 centners as compared with traditional irrigation method are observed.

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