IMPROVEMENT OF THE TECHNICAL ELEMENTS OF COTTON DRIP IRRIGATION AND STUDYING THE AMOUNT OF MOISTURE IN THE FIELD

[1]Urazkeldiev Abduvohid Bakhtiyarovich, [2]Erkinov Azamat Jamoldin ogli
[1]Head of Research Institute of Irrigation and Water Problems, candidate of agricultural sciences, senior researcher
[2]Doctoral student of Research Institute of Irrigation and Water Problems
https://doi.org/10.5281/zenodo.8193482

Abstract. *In order to increase productivity, the use of water-saving irrigation technologies remains one of the important factors, in this sense, the installation of drip irrigation system and its correct use are important for irrigating the cotton crop. In the implementation of these tasks, in order to develop optimal irrigation procedures using the drip irrigation method, it is necessary to carry out irrigation soil moisture in relation to ChDNS in different irrigation procedures. Taking this into account, it is now necessary to prepare the field for drip irrigation based on the conditions and processes in the cotton fields, the soil melioration conditions and the correct distribution of water resources. The main criteria for this are proper phenological observation, proper irrigation system, and control of the level of seepage water.*
Keywords: *soil conditions, drip irrigation, salinity, envelope method, tensiometer, pond clarifier, marginal field moisture capacity, geomembrane, pumping device, sand filters, disc filters, distribution pipes.*

Introduction. In our republic, special attention is paid to the efficient use of water-saving technologies, especially the drip irrigation technology, and the cultivation of crops. According to the Decree of the President of the Republic of Uzbekistan dated July 10, 2024 No. PD-6024 “On approval of the concept of water management development of the Republic of Uzbekistan for 2020-2030”, the areas where water-saving irrigation technologies are used in our country will be increased to 2 million by 2030. per hectare, according to the Presidential Decree No. PD-5005 of February 24, 2021 “On approval of the strategy for the management of water resources and the development of the irrigation sector in the Republic of Uzbekistan for 2021-2023”, the tasks of rapidly expanding the cultivated areas where the drip irrigation system will be introduced and reaching 800 thousand hectares in 2023 have been set [1].

On the basis of these privileges and opportunities created, water-saving technologies were introduced in 433 thousand hectares of land in 2021, and their 13 total indicators make up 17% of the irrigated areas, 290,300 areas are irrigated based on drip irrigation technologies, 13,500 are sprinkler irrigation technologies, and 13,500 are discrete irrigation technologies. 10.6 thousand, irrigation with the help of flexible pipes 299.7 thousand, 92 thousand using film irrigation technology, land leveling with the help of laser equipment reached 185.8 thousand hectares [2].

Problem of research. Most of the operations in overhead irrigation are carried out manually, most importantly, the water needed for agricultural crops is consumed by 25-30% more than the required norm in this method, besides, it is not possible to evenly moisten the active layer of the soil (70-100 cm) on the irrigated crop area. The mineral fertilizers placed in the bottom of the Egat are washed away by water or absorbed into the lower layers, and the level of their use

decreases, excessive irrigation has a negative effect on the meliorational and ecological condition of the soil, and on the work of the collector and drainage networks. In the developed countries of the world, the most modern economical, computerized drip irrigation method has been widely used for irrigation of agricultural crops for many years. According to the results of the scientific research carried out so far, it has been found that drip irrigation can save up to 40-55% of water, reduce labor costs by 1.5-2 times, save mineral fertilizers by 35-40%, and increase cotton yield by 8-10 s/ha.

Research method. In this case, the method of work was carried out in the field, phenological observations were carried out based on Agrotechnology of care of cotton varieties planted in Fergana region (Research Institute of Breeding, Seed Production and Agricultural Technology of Cotton Growing 2017) and ("Research Institute of Cotton Growing 2007). Design work was carried out on the introduction of drip irrigation technology to 4 hectares of cotton area of the "Sultonbek Yunus Ali ogli" farm, located in the 3 contours of the Dashtpandigon massif, Rishton district, Fergana region (Fig. 1).

A filtering device is a device designed to clean large and small particles in the water used for irrigation to the level required by the water irrigation technology.

The main (main) pipe is an underground or above-ground pipe designed to carry the necessary amount of water from the system pumping device to the distribution pipes.

Distribution pipe - pipes that are laid underground or above the ground to deliver and distribute water from the main pipe to drip irrigation hoses or to distribute water between rows. Drip irrigation hoses are drip hoses that are laid between the rows of crops and are designed to deliver water to the plant root system at a specified rate. The hoses were placed in rows at a distance of 60 cm in soils with medium and heavy mechanical composition, and in each row in soils with light mechanical composition.

In the experiment, the variety of cotton "Namangan-77" was carried out in order to develop optimal irrigation methods using the drip irrigation method, in different irrigation methods, irrigated soil moisture was carried out in 70-70-60 percent, 75-75-65 percent, 80-80-70 percent irrigation methods in relation to ChDNS. In the control options, irrigated soil moisture was irrigated using the conventional irrigation method with 75-75-65 percent of ChDNS in irrigation regimes. Also, in determining the moisture content of the irrigated soil and determining the duration of irrigation, it was established by drying the soil in the calculation layer in a thermostat (105^0C) for 8 hours in laboratory conditions, and in the 40- and 80-cm layers in the control variants with drip irrigation, and in the drip-irrigated variants with a length of 50 cm.

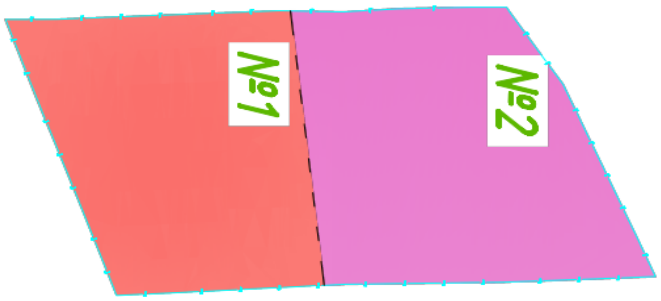

Figure 1

Research results. During the research, soil samples were taken to determine the initial agrochemical condition of the soil. In order to determine the amount of humus, total nitrogen and total phosphorus in the soil before drip irrigation, soil samples were taken from 0-30 and 30-50

cm layers of plowed and under-plowed soil at 5 points in the spring. According to the samples taken, the composition of soil humus in two parts of the field is as follows:

I-part
1.42% in the 0-30 cm section;
1.25% in 30-50 cm section

II-part
1.65% in the 0-30 cm section;
1.31% in 30-50 cm section

Amount of chlorine and dry residue in the soil up to 1 m (Table 1)

№	Depth, cm	Dry residue	Chlorine
1	10	0,071	0,016
2	20	0,93	0,014
3	30	0,132	0,011
4	40	0,151	0,012
5	50	0,151	0,014
6	60	0,202	0,010
7	70	0,346	0,011
8	80	0, 434	0,011
9	90	0,451	0,014
10	100	0,522	0,008

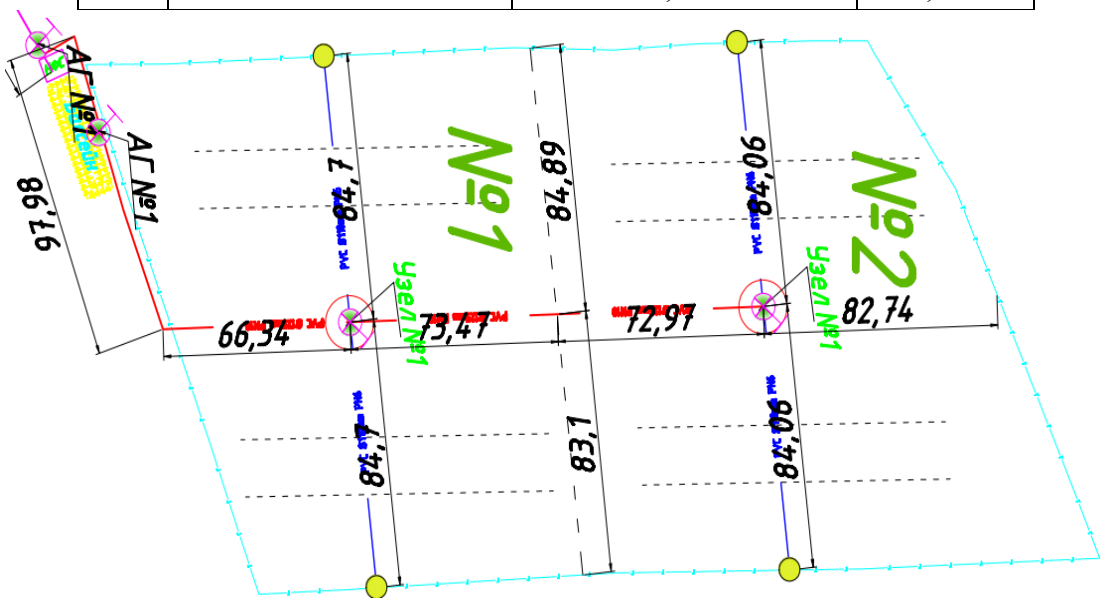

Figure 2

The average moisture content of the soil taken from the field by the envelope method according to the 1st repetition in % (Fig 2)

Sequence	The depth of the soil obtained (cm)	Container serial number	Weight (grams)					Moisture (%)
			Total weight of soil	Weight after drying	Net weight of the container	Evaporation of water	Net weight of dried soil	
1	2	3	4	5	6	7=4-5	8	9=7/8*100

I	10	1	72,0	66,0	22,0	6,0	44,0	13,6
	20	2	64,0	58,0	22,0	6,0	36,0	16,7
	30	3	68,0	60,0	22,0	8,0	38,0	21,0
	40	4	74,0	68,0	22,0	6,0	46,0	13,0
	50	5	68,0	60,0	22,0	8,0	38,0	21,0
	60	6	72,0	68,0	22,0	4,0	46,0	8,7
	70	7	68,0	64,0	22,0	4,0	42,0	9,5
	80	8	72,0	68,0	22,0	4,0	46,0	8,7
	90	9	70,0	64,0	20,0	6,0	44,0	13,6
	100	10	66,0	58,0	22,0	8,0	36,0	22,2

In order to determine the terms and norms of cotton watering in the experimental field, irrigation was carried out according to the amount of moisture in the layer, 0-50 cm before flowering, 0-50 cm during the flowering period, and 0-50 cm during the ripening period.

In order to determine the terms and norms of cotton irrigation in the experimental field, irrigation was carried out according to the amount of moisture in the layer, 0-50 cm before flowering, 0-50 cm during the flowering-bud period, and 0-50 cm during the ripening period in the considered layer of the soil with drip irrigation (Fig. 2).

Conclusion

One of the most optimal methods is to apply the drip irrigation technique in the case where the soil samples from each crop field have been studied by the previous envelope method. The level of absorption of mineral fertilizers in cotton fields irrigated by the traditional method is 30 percent on average. When crops are drip-irrigated, the level of absorption of mineral fertilizers is 90-95 percent. Optimum humidity for the plant is provided in all areas of the field and conditions are created for its uniform development. In the drip-irrigated options, it was established based on the readings of a 50 cm long tensiometer, and the first irrigation of cotton was carried out. The first cotton picking was done by hand. In the first harvest, 38 centners of cotton were collected. In the second harvest, 2 centners of cotton were picked, and in total, 40 centners of cotton were grown in the season. Only 36 quintals of cotton were picked in the first harvest in our control variant with constant irrigation.

REFERENCES

1. O‘zbekiston Respublikasi Prezidentining 2022 yil 1 martdagi PQ-144-son “Qishloq xo‘jaligida suvni tejaydigan texnologiyalarni joriy etishni yanada takomillashtirish chora-tadbirlari to‘g‘risida”gi qarori.
2. Sh.R.Xamraev. “Natijalar salmoqli, rejalar ulkan”. “O‘zbekiston qishloq va suv xo‘jaligi” jurnali, №1. 10-11 Bet. 2022
3. “Dala tajribalarini o’tkazish uslublari” metodik qo’llanma.Toshkent-2007
4. https://www.rivulis.com
5. https://www.yulinirrigation.com