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Importance of techniques and technology in cotton irrigation

Shaymanov Sharofiddin Quvondiq o'g'li – Independent researcher of Termiz Institute of Engineering and Technology.
Butayarov Abduqodir Tuxtayevich – Associate Professor of Termiz Institute of Engineering and Technology
Address: 288, I. Karimov Street, Termiz city, 100028.

Abstract: Today, due to climate change, the demand for water is increasing day by day everywhere in the world, the effective use of limited water resources, and the demand for irrigation water is increasing. In this regard, the available limited water resources are becoming scarce. Economical use of existing limited water resources and sources is considered one of the most urgent tasks of today. Analysis of data on the rational management of limited water resources in our province and their effective use, increasing the efficiency of water resources use in the field, the wide use of modern water-saving irrigation technologies and the possibilities of their application to production, analyzes on solving problems, Ending excessive water loss is the main task of today.

Key words: Drip irrigation, water, cotton, use of resources, global climate, resource efficient, technique, technology

Introduction: The techniques and technologies of drip irrigation of agricultural crops are being introduced in the Republic of Uzbekistan and developed countries such as the USA, Israel, Canada, China, South Korea, Russia and other countries.

According to the types of drip irrigation systems in the rational use of land and water resources, they are divided into the following.

-low pressure; - medium pressure; -high pressure;

Elements, parts of these systems, required pressure systems, geomorphological, soil, geological, hydrogeological, hydrological conditions and economic conditions are accepted.

In the conditions of the Republic of Uzbekistan, drip irrigation of gardens, vineyards, cotton, vegetables, grain crops is developing.

According to R.R. Schroeder, the lowest limit of acceptable moisture for cotton maintained in vegetation work was 60 percent to the limit field moisture capacity (ChDNS), and A. Studentov said that this moisture is 70 percent for light sandy soil and 60 percent for heavy sandy soil. classified. Similar experiments were conducted by M.F. Peresco, G.S. Zaitsev. Therefore, such studies were also conducted by a number of scientists.

In order to keep the pre-irrigation order of the soil in the same order, it is necessary to set the number of irrigations differently and give water at different rates. This leads to different watering rates.

A.N. Kostyakov, S.F. Averyanov, V.V. Kolpakov, E.S. Markov, M.F. Natalchuk, A.I. Golovanov, I.P. Aidarov, I.A. Sharov, Blaney- Kriddle, M.H.Penman are supporters of frequent watering with a small rate, and in their opinion, increasing the rate of irrigation does not increase the amount of the crop, but ripening is delayed.

The development of irrigation techniques and technology is of great scientific and practical importance for even distribution of water to the field in drip irrigation and quality irrigation.

Therefore, the theory of A.N. Kostyakov, B.F. Kambarov, N.T. Laktaev is the main one in determining the parameters of the elements of irrigation technology, and in order to use it on a large scale, it will be necessary to make changes to some of its cases. Observations show that excessive wetting of the head part of the soil during irrigation, and lack of moisture in the lower part of the soil, leads to an aggravation of soil degradation. Therefore, it is appropriate to correct this theory when choosing an irrigation method based on geomorphological, relief, soil type. A.M. Maod emphasized the change of the theory of wetting on the length of the field depending on the type of soil, geological and hydrogeological and climatic conditions when determining the irrigation regime.

The main task of the new irrigation technologies is to determine the elements of the irrigation technique. Because the correct setting of the elements of irrigation technology leads to the uniform distribution of water along the length of the irrigation system, the efficiency of the operation of the irrigation system and the coefficients of water use increase. The main factor in this is the change in the rate of water absorption into the soil over time (S.F. Averyanov, I.G. Aliev, N.F. Bonchkovskiy, J.S. Mustafaev).

The use of new technologies in irrigation leads to an increase in its quality (N.R.Khamraev, V.Ya. Grigorev). These scientific researches were carried out in the irrigation of the field mainly when the field was supplied with a constant and variable amount of water (B.F. Qambarov, N.T. Laktaev, V.A. Surin, N.K. Nurmatov, B.S. Serikbaev).

Bezborodov G.A. and others (2012) on the basis of the experiments carried out in the gray-meadow soils of Mirzachol state that irrigating cotton 2 times in the 0-2-0 irrigation technology by laying a film on the edge, in the first irrigation 500 m3/ha in the first ten days of July, the second time 1000 m3/ha in the first ten days of August. He recommends the length of the egate to be 200m, water consumption with a flow of 0.75l/s.

The rational use of water in surface irrigation, the technologies of efficient use of water reserves, the rational use of water in watering plants, and the uniform distribution of moisture along the length of the egate have aroused the interest of scientists of foreign countries.

D.A. Goldhamer (USA) and others conducted research on fields with light and heavy sand soil and showed that in the field with light sand soil, constant flow irrigation was 2800 m3/ha, and 1770 m3/ha when given with pulses. Loss of water seepage into deep layers was 1220 m3/ha and 635 m3/ha, respectively. Water distribution efficiency was equal to 35% and 60.4%.

Many mathematical models were developed in the USA to find an effective option for irrigation with discrete technology (D.G. Keller, U.R. Walker and others, A.S. Humphreys, F.T. Izuno and T.H. Podmore, B. Izadi and D.F. Heerman, N.M. Alemi, and D.A. Goldhammer,). One of the main ones is the kinematic wave model, which assumes that it is changed (to the flow) during the period until the end of the flow, that is, the reduced flow is kept constant during the period of moisture saturation, or, according to the model of B.I. Izadi and D. Herman, during this period, irrigation continues with pulses. will be delivered.

In irrigation, fixed, portable irrigation pipes are used, adjustable with pneumatic and hydraulic valve types with chambers and throttles (A. Humphreys), the system that controls irrigation based on temporary programs given to a programmer with electronic control is the most common. More than 10 companies have mastered the production of equipment.

The concept of pulsating water to the egates was proposed by Strinham and A. Keller at the American Society of Civil Engineers' Irrigation and Drainage Conference. In Russia, it was proposed by B.B.Shumakov, V.A.Arefev, N.L.Stepanenko.

Allen and Poll experimented with a pulse irrigation system in Dorylfunu, Utah, USA. It consists of pipelines, valves and a control device. The cotton field is irrigated with the system. The slope of the fields is 1.5%, the field consists of medium loamy soil. Efficiency in pulse irrigation was 87%, and in constant flow irrigation was 59%.

N. Coolidge et al.'s work shows the influence of suction speed on the speed of water flow and the amount of runoff. With an initial water flow of 0.3 l/s and a pulse period of 20 minutes, the average absorption rate after several pulses was 1/4 of that of constant flow irrigation. N. Coolidge came to the following conclusion: - the period of watering significantly affects the operation of the pulse irrigation system, while the break does not. Surprisingly, the rate of absorption is greatly reduced after egates are filled with water. As a result of this experiment, the water is confirmed by dozens of experiments conducted in different field conditions. (Walker et al., Podmore et al., Evans et al.).

Drip irrigation system and installation technology: Drip irrigation system is a pressure irrigation network designed to deliver the amount of water equal to the water needs of the plant to its root layer in the required period. In drip irrigation, the cultivated crop is irrigated, not the field. Only the part of the field around the root of the crop gets wet.

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A drip irrigation system is an irrigation network designed to deliver the same amount of water to the root layer of cotton as the plant needs. The difference between drip irrigation and other irrigation methods is that the water is supplied evenly across the field according to the needs of the crop. Crop areas of the field are moistened uniformly. Excess moisture does not occur in the soil.

In drip irrigation, the humidity of the root layer of the crop is kept uniform and the crop uses all its energy to create its crop.

The following advantages arise from the use of this irrigation technology:

- weeds rarely grow in the field;
- costs of anti-weed measures are reduced;
- it is easier to get the equipment into the field;
- soil erosion is stopped;
- crop yield increases and quality improves;
- water is saved during drip irrigation;
- water is given only to the part of the field where the roots of crops are located, other parts of the field remain dry;
- the watering regime corresponds to the water demand of the plant and does not give excess water;
- water does not soak into the soil;
- water does not go to the drain;
- drip irrigation saves 30% to 60% of water depending on the type of crop and soil compared to other irrigation methods;
- consumption of material resources and manual labor is reduced during drip irrigation;
- during drip irrigation, only the part of the field where the crops are located is moistened, as a result, the soil of the field does not harden;
- there is no need to soften the soil (cultivation) and take a ditch;
- the unhardened area is easily plowed at the end of the season;
- since the fertilizer is given together with water, no equipment is used for fertilizing, as a result, fuel and lubricants are saved.
- due to the fact that the fertilizer is given together with water, the amount of fertilizer is reduced to 35-45%;
- irrigators in the field do not straighten ditches with hoes, that is, manual labor in irrigation is drastically reduced;
- water and nutrients are evenly distributed over the crop area;
- the crop develops uniformly and the crop ripens at the same time;
- it becomes easier to harvest the same ripe crop;
- the fact that the crop field is half dry makes it possible to pick the cotton crop easily;
- there is no soil erosion because there is no water in the field;
- the level of underground water does not rise due to low absorption of water into the soil;
- the soil is not saline.

Table 1 shows the productivity of crops under drip and drip irrigation.

Natural and climatic conditions have a great impact on improving land reclamation and applying new irrigation technologies in the cultivation of agricultural crops, obtaining abundant harvests from crops, using resource-efficient irrigation techniques and technologies, and preventing wastage of water resources.

Table 1

Weather data of the Termiz city weather station in 2021-2023 during the field experiment period are presented

Termiz weather station data -2021

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
pointer	Januar	Februa	March	April	May	June	July	August	Septembe	October	Novembe	Decem ber	**Annual average**	**Annual total**
Air temperature, C	5.0	5.0	12.4	18.2	27.7	30.4	31.5	28.1	23.9	17.3	11.9	5.6	18	217
Relative air humidity, %	74	79	61	56	38	30	30	30	37	45	63	57	50	600
Moisture deficiency, mm	21.6	2.5	6.5	11.7	26.9	33.7	35.4	29.7	21.6	13.2	6.7	5.0	17.9	214.5
Precipitation, mm	20.7	132.7	25.6	26.0	6.4	-	-	-	-	-	7.2	0.0	9.8	118.6
Termiz weather station data -2022														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
pointer	January	February	March	April	May	June	July	August	September	October	November	Decembe r	**Annual average**	**Annual total**
Air temperature, C	4.5	8.2	17.8	19	24.2	29.4	32.9	28.6	23.3	15.8	9.6	7.8	18.4	221.1
Relative air humidity, %	61	59	54	46	42	27	23	28	34	53	69	61	46.4	557
Moisture deficiency, mm	4.1	5.3	11.8	14.5	20.4	33.7	41.8	30.9	21.7	10.8	4.3	3.7	16.9	203
Precipitation, mm	8.2	14.8	20.8	14.9	12.4	-	-	-	-	22.1	17.9	10.9	12	144.4
Termiz weather station data -2023														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
pointer	January	February	March	April	May	June	July	August	September	October	November	Decembe r	**Annual average**	**Annual total**
Air temperature, C	6.2	8.9	18.0	19.4	24.5	30.9	33.2	29.2	24.4	16.7	10.1	8.6	19.1	230.1
Relative air humidity, %	66	63	59	53	51	38	37	41	45	53	69	71	53.8	646
Moisture deficiency, mm	4.2	5.0	10	12.9	17.2	29.6	34.3	25.5	18.6	11.0	4.3	5.0	14.8	177.6
Precipitation, mm	8.8	22.6	15.8	12.9	29.4	-	-	-	-	14.0	18.5	24.9	10.7	128.4

Increasing the productivity of cotton crops grown on drip-irrigated land depends not only on avoiding the traditional optimal irrigation system, but also on the mineral fertilizers feeding in the drip irrigation system, but also on the soil temperature, drought tolerance, relative humidity of the air, and the surface location of water. In addition, certain economic factors, in particular, the lack of labor, the level of water supply, the lack

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of wastage of water, the technology of care, including the procedures of drip irrigation and feeding of plants, are also important.

The peculiarity of the climate of our country is that it is arid, with plenty of light and heat, and it is sharp and unstable. Here there is an unstable change of climate from year to year.

Table 2

Precipitation and air temperature indicators for the region in 2023 according to the data of the Termiz weather station

Months	Indicators	2021 year	Perennial
January	Level, degree	3,0	0.4
	Precipitation, mm	20,7	46
February	Level, degree	5,0	1.7
	Precipitation, mm	32,7	58.3
March	Level, degree	12,4	7.7
	Precipitation, mm	25,6	68.2
April	Level, degree	18,2	15.2
	Precipitation, mm	26,0	58.4
May	Level, degree	27,7	19.4
	Precipitation, mm	6,4	39.4
June	Level, degree	30,4	24.3
	Precipitation, mm	-	8
July	Level, degree	31,5	38
	Precipitation, mm	-	0.3
August	Level, degree	28,1	37.2
	Precipitation, mm	-	0.3
September	Level, degree	23,9	30.4
	Precipitation, mm	-	1.4
October	Level, degree	17,3	20.1
	Precipitation, mm	-	2.2
November	Level, degree	11,9	18.3
	Precipitation, mm	7,2	6.8
December	Level, degree	5,6	15.7
	Precipitation, mm	0,0	18.4
By province	Level, degree	15,74	19.1
	Precipitation, mm	118,6	307.7

The southern part of the territory of Uzbekistan is characterized by a subtropical climatic region, and the northern part is characterized by a desert. The circulation of arctic, temperate and tropical air currents takes part in the formation of climate.

According to the description of the lowland cotton growing region, the climate is characterized by hot and dry summers, mild spring and autumn, and often cold winters.

The average temperature of the air in the region of gray meadow soils during the cotton season is 19.10 - 29.70^{0}C. The average air temperature in April is 19.40^{0}C, in July it is 33.20^{0}C, and in October it is 16.70^{0}C.

The average air temperature will increase from 19.40^{0}C on April 10, and from 29.70^{0}C on April 20. The total temperature useful for cotton reaches 59960^{0}C from April 10 to October 10.

During the field experimental research, the climatic conditions in the territory of the experimental site differed from the annual values: air temperature 18.1 degrees, air humidity - 44%, precipitation amount -50 mm, annual evaporation 1208 mm, including 992 mm during the growing season. In 2021-2023, these values were as follows: air temperature 12.03, 12.63 and 11.85 degrees, air humidity 59, 91, 58.5 and 54.83%, precipitation amount 121.2, 145.2, 78.4mm. These identified limitations have a significant impact on the

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duration of irrigation and the value of the irrigation rate. In the years of research, evaporation during the growing season was 1080 mm in 2021, 1057 in 2022, and 1070 mm in 2023.

According to the long-term data provided by the opposite weather station, the average air temperature in the region in 2021 was 19.7 C, while the long-term data shows 22.1 C. We can analyze that the air temperature during the year is 21.6% compared to the long-term, or We can see that 3.4 S0 significantly lowers the air temperature.

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