

Scientific Basis of the Effectiveness of Drip Irrigation

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Abstract

Due to global climate change, the demand for irrigation water is growing all over the world, and in this regard, there is a shortage of available water resources, and the careful use of available water resources is a pressing issue today. Analysis of data on the rational management and efficient use of limited water resources in the country, improving the efficiency of field water use, the widespread use of modern water-saving irrigation technologies and their application in production, analysis of problems, elimination of excess water loss is the main function.

Keywords: global climate, cotton, irrigation regime, water, resource saving, technique, technology.

Introduction: 46 billion cubic meters of water are used to irrigate 4,280,000 hectares of irrigated land in the Republic of Uzbekistan, but more than 60% of the water used is used by plants, and the remaining 40% is wasted in various ways. In this regard, the transition to advanced irrigation methods is one of the important tasks in the development of scientific technology for the production of abundant water at low consumption and its application in practice. Also, the decisions of the President of the Republic of Uzbekistan Sh.M.Mirziyoev dated February 24, 2021 No PP-5005 "On approval of the Strategy for water resources management and development of the irrigation sector in the Republic of Uzbekistan for 2021-2023" set the task of developing and implementing methods. It is also planned to organize drip irrigation of cotton on 46,382 hectares in the country in 2021.

Due to the growing population of Surkhandarya region, the growing demand for basic agricultural products and raw materials, the demand for water resources today and in the future will continue to grow. It is necessary to expand the use of innovative irrigation systems. To do this, the development of irrigation standards, irrigation procedures, irrigation elements, techniques and technologies is a very important task. The use of drip irrigation technology in the cultivation of cotton, as well as additional yields, rational use of land and water resources and the effective use of new innovative techniques and technologies in the cultivation of cotton in the region are very important. During the study period, scientific and practical research field experiments were carried out on the cultivation of cotton in the natural conditions of the region through innovative drip irrigation technologies, the order of irrigation in the "bioclimate" method, irrigation time, creation of resource-saving techniques and technologies.

Jarkurgan district of Surkhandarya region is located in the south-east of Surkhan-Sherabad oasis and covers an area of 27.6 thousand hectares. The area of irrigated land in the region is 2009.9 thousand hectares. In particular, the area of land used in agriculture is 1139426 hectares. 239,181 hectares of arable land were cotton and grain, 39,776 hectares were lalmi, 33,647 hectares were perennial forests, 29,078 hectares were forests, 19,744 hectares were lands of complex reclamation status and other agricultural crops. Preparing the land for sowing is one of the most important agro-technical measures. Along with the southern districts of the region (Sherabad, Muzrabat, Qizirik, Angor, Termez, Jarkurgan), the northern districts (Uzun, Sariosiyo, Denov, Oltinsoy and Shurchi),

where the weather is cooler and more rainy, will be fully planted. to meet the demand for water until the cotton is harvested and, ultimately, to save water.

Table 1: Irrigated areas in the districts of Surkhandarya region in 2019-2020 hydrological year and the actual water consumption mln.m³

Name of irrigation system departments and districts	2019 y From October 1st 2020 y Water received before October 1, mln.m ³		Water received in the irrigation season of 2020, mln.m ³		Water received in the non-irrigation season 2019-2020, mln.m ³		Total irrigate d area, ha	Including	
	Limit	In practice	Limit	In practice	Limit	In practice		Cotton, ha	Grain, ha
Angor	186,3	207,0	132,1	141,5	54,2	65,5	18161	7000	4136
Boysun	54,6	48,7	35,9	34,1	18,8	14,6	1992	0	408
Denov	307,4	334,9	214,2	241,2	93,2	93,7	40896	10538	8279
Jarkurgon	288,9	333,6	211,1	247,4	77,8	86,2	29470	7540	8700
Qiziriq	447,9	497,0	325,2	348,9	122,7	148,1	41222	9171	16600
Qumkurgon	315,9	332,7	238,8	244,1	77,1	88,6	29326	8742	8785
Muzrobod	490,9	522,8	382,1	398,0	108,8	124,8	37750	6868	17445
Oltinsoy	181,7	172,6	125,8	126,8	55,9	45,8	19925	3221	3943
Sariosiyo	140,3	143,1	97,5	101,9	42,8	41,2	14310	2650	2899
Termiz	172,9	187,6	116,0	120,5	56,9	67,1	14888	2441	3100
Uzun	139,5	162,1	96,9	118,1	42,6	43,9	16403	4000	3808
Sherobod	407,0	372,7	291,2	242,1	115,8	130,6	41645	9258	14300
Shurchi	193,8	214,0	136,3	151,3	57,5	62,7	20012	7100	5597
Totil	3327	3528,9	2403,0	2516,0	924,0	1012,9	326000	78529	98000

In the districts of the region in 2019-2020, the irrigated area is 326,000 hectares, and we can see that the water consumption of water consumers in the districts from October 1, 2019 to October 1, 2020, actually exceeded the limit by 201.9 million m³ or 106%. We can see that the amount of water received in the off-season actually exceeded the limit by 113 million m³ or 104.7%, and the amount of water received in the non-irrigation season in 2019-2020 exceeded the limit by 88.9 million m³ or 109.6% (Table 1). the amount of water we need to consume is increasing year by year rather than our water consumption. With this in mind, the use of water-saving technologies is a modern requirement, and the application of technologies is of great importance.

In all districts of the region the seeds are sown in puddles, if the pits are low in moisture, it is recommended to provide wet collection water with 1100-1300 m³ of water per hectare before planting. In order to avoid the traditional method, a number of measures are being taken to use modern innovative drip irrigation systems in order to avoid the traditional method. The total amount of water available in 2019 is 3 billion cubic meters. 680 thousand m³, 3 billion for irrigation. 421 million m³. In particular, 9708.m³ of water was used per hectare per season. For the first time in the natural economy of Surkhandarya region in the conditions of medium sandy soils in the development of drip irrigation systems, resource-saving, irrigation standards, irrigation procedures, techniques and technologies in the cultivation of "Sultan" cotton was carried out theoretical and practical field research.

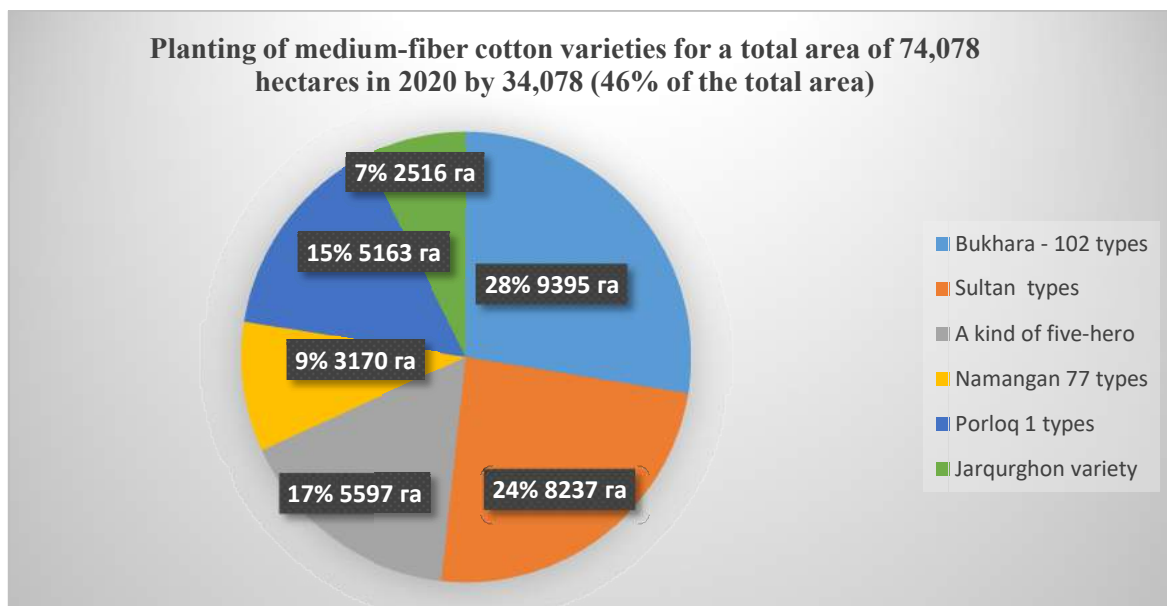


Figure 1. Planting area of medium-fiber cotton varieties

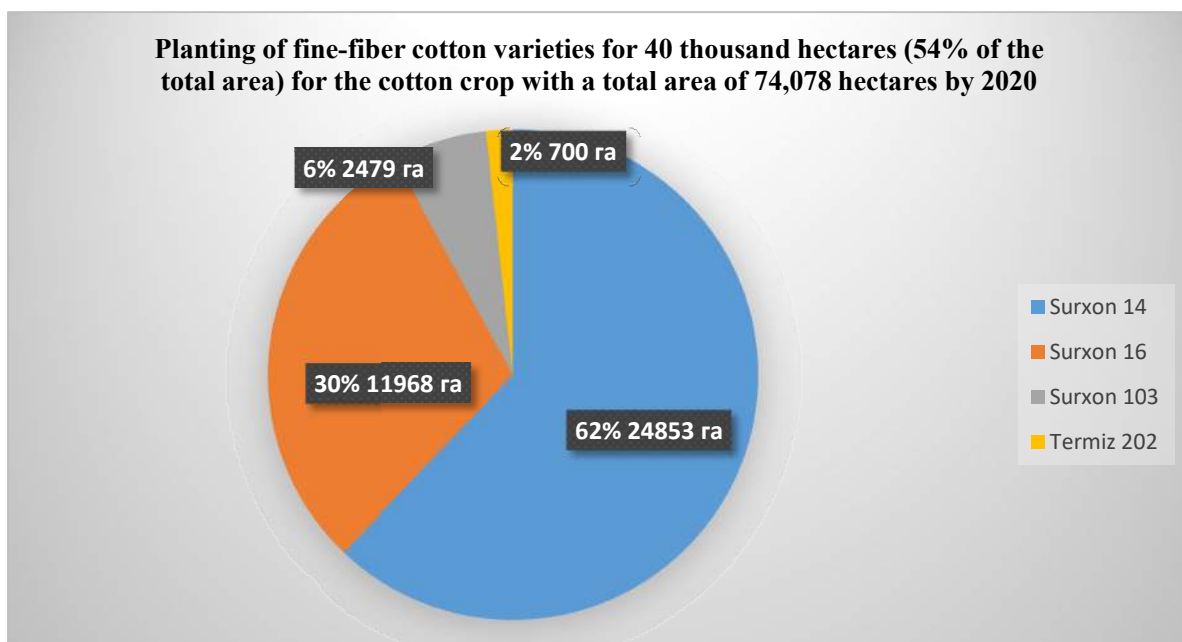


Figure 2. Planting area of fine-fiber cotton varieties.

In order to get a quality cotton crop in 2019, 244,800 tons of raw cotton were planted on 74078 hectares of land in the region. , “Sultan variety” 8237 hectares, “Beshqahramon” variety 5597 hectares, “Namangan 77” variety 3170 hectares, “Porloq-1” variety 5163 hectares, as well as new varieties were planted on 2516 hectares. The main varieties for the region are Bukhara-102 and Sultan.

New promising varieties of cotton grown in the region can fully meet the requirements and standards of world standards of productivity and fiber quality. In addition to the individual characteristics of new varieties, many shortcomings in the care of the variety. In modern times, the study of advanced, innovative practices and scientifically based agro-measures in the fight against

pests and insects in the cultivation of cotton and, most importantly, innovative irrigation technologies, special attention to the irrigation system and the cultivation of cotton in accordance with international standards is achieved.

A drip irrigation system is an irrigation network designed to deliver an amount of water equal to a plant's need for water to the root layer of cotton. The difference between drip irrigation and other irrigation methods is that the water is distributed evenly across the field according to the needs of the crop. The crop areas of the field are uniformly moistened. Excess moisture does not occur in the soil. In drip irrigation, the moisture of the root layer is kept constant and the crop uses all its energy to produce its own crop.

Result: Advantages of irrigation: Weeds grow less in the field., Costs of weed control measures are reduced., Equipment is easier to enter and leave the field. Soil erosion is eliminated.

Drip irrigation saves water: Water is supplied only to the part of the field where the roots of the crops are located, other parts of the field remain dry; The irrigation regime is in line with the plant's need for water and no excess water is provided; Water evaporates less from the soil; Water does not spread across the field; Water does not seep into the soil; Water does not flow out; Drip irrigation saves 30% to 70% of water compared to other irrigation methods, depending on the type of crop and soil.

Drip irrigation reduces material resources and manual labor: In drip irrigation, only the part of the field where the crops are located is moistened, as a result, the field soil does not harden. There is no need to loosen the soil (cultivate) and dig ditches. The uncultivated field is easily plowed at the end of the season. Since the fertilizer is given along with the water, no fertilization technique is used.

As a result, fuel and lubricants are saved. As the fertilizer is applied with water, the amount of fertilizer is reduced to 35-45%. In the field, watermen do not carry a hoe and straighten the ditch, which means that manual labor in irrigation is sharply reduced. Water and nutrients are evenly distributed over the crop area; The crop develops uniformly and the crop ripens at the same time; It is easier to harvest the same ripe crop; The fact that the field is half dry allows the cotton crop to be harvested easily; There is no soil erosion as there is no water flow in the field; Groundwater levels do not rise due to low water absorption into the soil; The soil is not saline;

Conclusion: In the process of conducting research on irrigation technology, the order of irrigation through drip irrigation, which is one of the most innovative methods of irrigation in the Republic of different natural and economic conditions, the following were identified: As a result of theoretical research, it is expedient to use bioclimatic methods in determining the resource-efficient irrigation regime in today's global climate change, water scarcity. In the process of drip irrigation, the entire length of the calculated layer is provided with a uniform humidification along the ridge, reducing water wastage by 52-56% compared to the control option, increasing cotton yield by 7.1-8.2 ts / ha, reducing ash cocktail resource by 33%, fuel lubrication up to 45% We believe that the use of an innovative medium-pressure drip irrigation system is of great importance in order to reduce costs, save 33-46% of mineral fertilizers, and ensure that water reaches the roots of cotton in moderation. In the southern regions of the country, in the changing continental climate of the "Sultan" variety of cotton using modern drip irrigation systems, ie using less water resources, more mulch, filtration of the cotton contour and the duration of the same moistening curve throughout the field from beginning to end. low water consumption, low consumption of mineral fertilizers in the feeding process, the simplification of the direct flow of nutrients to the root, leads to the reduction of slave labor.

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