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Research on the Study of Soil Protective Water-Saving Technologies of Agricultural Crops Treatment on Eraded Soils

RaxmonovDilshod Ilxomjonovich, MuradovRustamAnvarovich

Doctorant, Tashkent Institute of Irrigation and Agricultural Mechanization, 10000,Tashkent city, Republic of Uzbekistan.
Dsc, professor,Tashkent Institute of Irrigation and Agricultural Mechanization, 10000,Tashkent city, Republic of Uzbekistan.

ABSTRACT: The article presents an analysis of long-term theoretical, operational and reclamation studies conducted in various climatic conditions of the Republic of Uzbekistan. For operational water use in water user associations and farms, a methodology has been developed for compiling a water use schedule taking into account the irrigation regime and the economic efficiency of agricultural plants in conditions of water scarcity: modeling of operational water use between crops; The dependence of the crop on the irrigation norm for various crops and their optimal irrigation norms in the Zangiata district of Tashkent region were established. The use of the developed measures will make it possible to develop scientific research in the field of saving water on irrigated lands in farms. Using the developed methods and software modules will allow farmers with a high degree of reliability to share irrigated water between crops.**[7, p. 1-2]**

KEY WORDS: land reclamation studies, erosion, fertile soil layer, lack of water resources, optimal irrigation rate

1. INTRODUCTION

Many years of research on the study of soil-protective water-saving technologies for the cultivation of agricultural crops on eroded soils. The use of research results in farms engaged in irrigated agriculture on hilly lands subject to erosion will make it possible to increase crop productivity and irrigation productivity, crop productivity and irrigation water productivity by preventing erosion of the fertile soil layer and fertilizers applied.**[3, p. 91-101].**

II.MATERIALS AND METODS

Research of furrow irrigation technique during wheat irrigation. Measurements of elements of irrigation technique using light furrows, 3-4 cm deep, were carried out during irrigation. At the same time, measurements were taken of soil erosion along the grooves of +10.50,100 m in a time period of 0.5; 2; 8; 24 hours with the selection of turbidity along the groove section in a container of 0.5-1.5 L, the contents of which were filtered, weighed and determined in g / l with the analysis of these turbidity in the chemical laboratory.**[2, p. 55-56].** The progress of the jet along the furrow was measured on soils with pre-irrigation moisture of 85, 80, 70, 60% of the lowest moisture capacity (LMC). The advance of the jet was recorded at various costs of 0.025-0.8 l / s and on various slopes from 0.01 to 0.1. The costs were established on Thomson's weirs, the difference in costs at the beginning of the furrow and at the end determined the absorption of water during irrigation. The hydraulic parameters of the furrow were measured: speed, jet cross section, groove slope. The difference in the pre-irrigation soil moisture and the lowest water capacity determined the irrigation rate, which had to be poured onto the experimental field$\mathbf{m = 100 * G * H * (W_{LMC} - W_{PISM})}$ (1) **where: G** - volumetric mass, g / cm^3; **H**- depth of soil moisture, m; $\mathbf{W_{LMC}}$ - the lowest moisture capacity,% of the mass of soil; $\mathbf{W_{PSIM}}$ - pre-irrigation soil moisture,% of soil mass.

Fig.1. In hilly land irrigation erosion ((in the farm “Diyora fayz gulshani” Zangiata district of Tashkent region)

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Fig.2.Analysis of soil washout in the furrow (in the farm "Diyora fayz gulshani" Zangiata district of Tashkent region)

A. METHODS

The methodology for the study of dairy (zigzag) furrows for winter grain crops. The principle of cutting joystick grooves is based on the creation of horizontal sections (segments) of furrows connected to each other along the slope in the form of zigzag grooves when the tractor moves first along the horizontal line, and then at a distance of 2; 2.5; 3 m furrows along the slope of the field were connected by agricultural hoe furrows located on the aisles of 1.4 m, which were then sown with wheat in the month of November without additional irrigation for seedlings, but with the maximum use of autumn-winter-spring precipitation, since in furrows cut along the largest slope 0.07 - 0.12 during precipitation, water flow forms.**[6, p. 26-35].** Joint furrows completely absorbed water flow from precipitation due to horizontal sections of furrows. After sprouting and tillering due to atmospheric precipitation by soil moisture, irrigation was carried out with the determination of water absorption parameters and sizes of elements of irrigation technique. For the selection of soil moisture, pre-irrigation moisture was monitored in the row-spacings of the experimental joinery furrows and in the control - irrigation according to the largest slope, according to the need for water of Russian wheat of the **"Kroshka"** variety. After irrigation, irrigation patterns were determined by development phases. In the previous description of the experience of studying irrigation according to the largest slope and on joinery furrows, the regime of soil moistening for optimal soil moisture creation for plants was controlled by harvesting and analysis of seed quality by protein and starch content in grains, as well as by the ratio of grain weight to straw weight.**Agrucultural watering technology economic methods with Polimer K-9:**

1.Testing the polymer-structure-forming soil K-9. The K-9 polymer is diluted with water in a ratio of 1:10 by volume and sprayed onto the groove section, after which the groove section is increased by increasing water-resistant aggregates, which are determined by the method of G.I. Pavlov by fractions 1; 1-0.25; more than 0.25 mm in% of the weight of the soil, if in the natural state it is 7-12%, then after processing the soil with polymer up to 32-35%, thus the cross section of the furrow is strengthened by aggregates and the roughness of the cross section of the furrows increases, which increases lateral moisture between furrows and infiltration.

2.This allows you to increase costs in the furrow, and to extend their length without intermediate output furrows in the middle of the field on a slope with a steepness of 0.07-0.12. The experiments were accompanied by phenological observations of crumb wheat plants, as well as by harvesting and analyzing the grains for protein and starch quality.**[4, p. 39-41]**

III. STUDY OF THE AGRICULTURAL IRRIGATION TECHNOLOGY.

Objects of research.To disseminate the positive results of research under production conditions, experiments for the period 2017 - 2019 were carried out on the territory of the "Diyora fayz gulshani" farm.

ISSN: 2350-0328
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Vol. 8, Issue 1 , January 2021

Table 1. Scheme of field experiments on the irrigation regime

Option Number	Pre-irrigation soil moisture, (low moisture capacity) %	Calculation layer for determining pre-irrigation soil moisture, cm		
		shoots - before exiting the tube	exit to a tube milk ripeness	In the phase of full ripeness
1	Production (control)	0-70	0-100	0-100
2	60-70-60	0-70	0-100	0-100
3	70-70-60	0-70	0-100	0-100
4	80-80-60	0-70	0-100	0-100
5	70-70-60	0-70	0-100	0-100
6	60-70-60	0-70	0-100	0-100

Table 2. Elements of agricultural irrigation technology

Option number	Row spacing 0.7 m	
	Water consumption in the furrow, l / s	Furrow length, m
1	0,4	100
2	0,4	150
3	0,4	200
4	0,5	100
5	0,5	150
6	0,5	200

Table 3. Options for improving the technology of irrigation of winter wheat on the furrows

	Experiment Options	**Test conditions**		
		Irrigation rate	Pre-irrigationactive humiditysoil layer,%	**Biases**
1	**1-control(regular furrow irrigation)**	3050	70-70-60	0.07
2	**2-Experience (furrow- 3m)**	1660	70-70-60	0.07
3	**2-Experience (furrow- 2,5m)**	1950	65-65-60	0.10
4	**4-Experience (furrow- 2,5m)**	2495	70-65-70	0.11
5	**5-Experience (K-9)**	3050	70-70-70	0.12
6	**6-Experience(without K-9)**	3050	70-70-70	0.0.7
7	**7-Experience(furrow-2,8m)**	1800	70-70-70	0.10
8	**8-Experience(furrow-1,4m)**	1700	60-60-60	0.12

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Vol. 8, Issue 1 , January 2021

Table 4. The results of experiments on soil and water management in winter grain crops (wheat) in 2017-2019. in the farm "Diyora fayz gulshani" Zangiata district of Tashkent region.

№ п	Name indicators	the control	BO-GA-RA	Control with various irrigation norms, m3 / ha			Poly-mer K-9
				1	2	3	
	Number of irrigations	3	-	2	2	2	3
	Watering dates	19.04; 22.04; 12.05	-	12.11; 19.04	12.11; 19.04	12.11; 19.04	16.04; 8.05; 25.05
	Irrigation rate, m3 / ha	3050	-	1660	1950	2495	3050
	Precipitation, m3 /ha	4158	4158	4158	4158	4158	4158
	Soil erosion, t / ha	34,8	5,8	1,2	1,5	1,7	0,05
	Humidity mode for options,% of LOWEST MOISTURE	70-70-60	-	60-60-60	65-65-60	70-65-70	70-70-70
	Soil moisture uniformity	0,94	-	0,85	0,86	0,88	0,83
	Efficiency of irrigation technology	0,80	-	0,90	0,88	0,83	0,89
	Productivity, t / ha	28,4	16,5	33,1	45,4	53,6	47,4
	The cost of water per 1 centigrade of crop, m3	107,4	-	50,2	42,9	46,5	64,3

Table 5. Actual irrigation regime of winter wheat of the "Kroshka" variety (2017-2019) farm "Diyora fayz gulshani" of the Zangiata district of Tashkent region

Options	Moisture Preset Mode	watering			irrigation norms (net), m^3 / ha	YIELD, C / HA	Costs per 1 m^3 / c
		Autumn		Spring			
		06.09.18	19.09.19	26.04.19			
Polymer-free furrows	80-80-70	850	900	750	2500	32,4	77,16
Furrows with K 9 polymer	80-80-70	850	900	540	2290	44,2	51,81
Furrow 2.0 m	80-80-70	900	900	610	2410	37,2	64,78
Furrow 2.5 m	80-80-70	900	900	650	2450	41,1	59,61
Furrow 3.0 m	80-80-70	900	900	580	2380	45,4	52,42
Furrow 2.8 m	80-80-70	900	850	650	2400	46,5	51,61
Furrow 1.4 m	80-80-70	900	850	600	2350	35,4	66,38

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Vol. 8, Issue 1 , January 2021

IV. RESULTS

In 2017-2019 furrows of 2,8 m and 1,4 m were mechanically cut to a depth of 25 cm to increase the capacity for precipitation and for the infiltration of water between the furrows. **[1, p. 45-46].**From the above materials it can be seen that under the conditions under consideration, with the optimal elements of the irrigation technique, the efficiency of the irrigation technique can be achieved:

- for traditional irrigation along the largest slope of 0.65-0.67;

- when using polymer K-9 0.71-0.80;

- with an optimal size of 2,8 x 1,4 m, the efficiency of irrigation equipment is 0.71-0.81;

V.CONCLUSION

More exactly method of a compiling of scheduling the water using plan considering an irrigation regime and economic efficiency mode of the agricultural plants in the conditions of deficiency of water resources has been developed for operative water use in associations of water consumers and farms.With the optimal elements of the irrigation technique, soil flushing was observed in the range of 0,12-1,1 t / ha per year. In the conditions of traditional irrigation, 2,7 t / ha per year (control), which is practically acceptable to minimize damage to soil fertility. With the optimal irrigation regime for pre-irrigation soil moisture from the lowest moisture content of 80-80-70%, 2 autumn and 1 irrigation were carried out spring. **[5, p.97]**The largest yield was obtained on a 2.8 x 1.4 m furrow – 46,5 c/ha. The cost of water in cubic meters per 1 centner of wheat grain was spent 51-61 m^3/centner. Furrows with polymer under the same irrigation regime of 44,2 c/ha of grain and water consumption 51,81 m^3/c. The control furrows with the same irrigation regime showed a yield of 32,4 c/ha, and the highest water consumption was 77.16 m^3/c.

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