

Improving the technology of irrigation of cotton on the basis of interpolymer complex

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Abstract. The use of water-saving irrigation technologies and technical means for irrigating agricultural crops and cotton is one of the leading in the world. "Given the global production of 119.3 million tons of cotton,"† requires the introduction of irrigation technologies that will reduce water consumption and waste in the irrigation of cotton. In this regard, the widespread use of water-saving drip, irrigation, subsoil irrigation methods and discrete irrigation technologies is important in irrigating cotton.

1 Introduction

Water-saving irrigation technologies are now the main principle of the transition to integrated water resources management and the basis for the rational use of water. The main tasks of water conservation are: efficient use of irrigation water, maximum saving of irrigation water, increase of water use coefficient. Resource-efficient irrigation techniques and technologies lead to saving irrigation water, improving soil fertility and addressing the following tasks.

The issue of water conservation requires the involvement of all the research of specialists in the field of irrigation agriculture and water management in the use of promising and well-tested methods, techniques and technologies of irrigation. At present, the interactions of interpolymers with synthetic polypeptides and the properties and characteristics of the thermodynamic parameters of their fields of application can be fully presented. Simultaneously with the increase in productivity, these interpolymers were used in the formation of soil structure, as well as in their irrigation and prevention of wind erosion. The thin layer of the interpolymer complex formed in the soil layer does not destroy the particles of the dispersed phase under the influence of strong climatic events.

Irrigation techniques and technology primarily affect the quality of irrigation. Irrigation techniques and technologies based on natural conditions and varieties of agricultural crops provide effective irrigation. Improperly selected elements of irrigation techniques and technology lead to excessive consumption of irrigation water, high costs, low quality of irrigation and deterioration of the reclamation of irrigated lands.

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2 Materials and methods

The research was conducted on the basis of generally accepted methods: V.V. Shabanov and E.P. Rudachenko used the methods in the manual "Methods of field experiments" to determine the representativeness of the field experiment, and the software "Analysis of changes in soil moisture before and after irrigation based on the use of interpolymer complexes in cotton irrigation". The reliability of research results is based on the fact that field and laboratory research is performed in generally accepted research methods, and practical, theoretical results are confirmed in practical data, experimental results are compared using developed software and research results are put into practice. In the discrete irrigation technology, the dynamics of soil moisture along the length of the irrigated cotton, the growth, development and yield of cotton, and the mineral used in the active layer of soil explained by the fact that the effect on the effectiveness of fertilizers has been identified. According to the natural and economic conditions of irrigated lands of Tashkent region, the issue of determining the specific area of the field in question was considered. In comparing the lands according to their reclamation properties, V.V. Shabanov and E.P. The method proposed by Rudachenko was used.[1,2,4].

3 Results and discussion

«OmadKelajak Baraka» farm is located in the south-western part of O'rtachirchik district of Tashkent region and covers an area of 0.56 thousand km². Occupies the plains of the middle reaches of the Angren River. These numerous factors and different conditions lead to the stratification of the elements of irrigation techniques. All factors affecting irrigation are correlated and stochastic. So we can talk about the most common combinations of them. Field experiments were conducted in 2017-2019 on the fields of the farm "OmadKelajak Baraka". The area of the experimental field is 1.0 ha and the area of the control field is 1.1 ha, located near the Angren River. Due to the fact that these fields are located on the banks of the Angren River, the groundwater level decreases to 3-5 m. During the irrigation of cotton, changes in groundwater variability were observed across regions. For this purpose, observation wells consisting of a three-section perforated pipe with a diameter of 0.05 m and a length of 15 m were used. [3-7].

Ten trenches with a depth of up to 1.7 m were opened in the experimental plot for stratigraphic analysis of the soil (the results of the analysis are presented in the following sections). Chipoletti and Tomson water flow meters were installed to account for the amount of water supplied to the field, and water metering rails were also used. In order to improve irrigation technology, it is known that research is being conducted to measure the absorption of water into the soil, the decrease in flow, the time and uniformity of soil moisture distribution. In the introduction of irrigation technology using the interpolymer complex, these parameters and indicators of cotton irrigation were taken into account in the study of its optimal elements. We conducted laboratory experiments to study the effect of interpolymer complex-based screens on soil filtration. Research was conducted at the «OmadKelajak Baraka» farm using Wagner pots. Laboratory experiments were conducted in Wagner vessels to study the methods of water retention in the surface and subsurface layers using a screen based on an interpolymer complex. For the experiments, we used two Wagner vessels measuring 0.57x0.57x1.1 m. Filling them with the sandiest soil, the upper part of one of the festivities was covered with an IPK solution..[2,3].

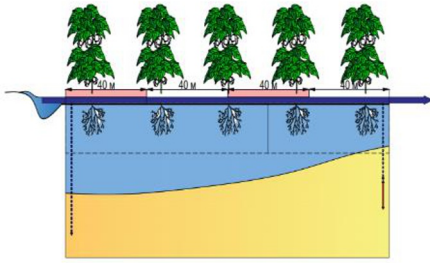


Fig. 1. Soil moistening diagram (using an IPC above-soil screen)

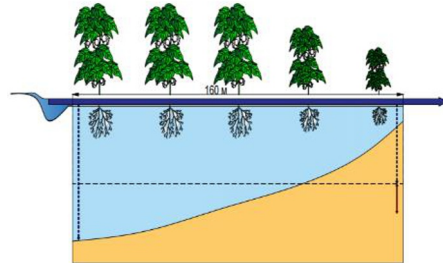


Fig. 2. Soil moisture diagram (traditional watering method)

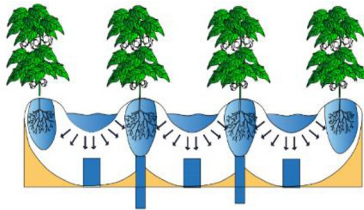


Fig. 3. The spread of moisture in the root of cotton (using a above-soil screen from IPC)

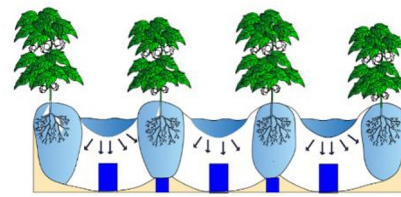


Fig. 4. The spread of moisture in the root of cotton (traditional watering method)

Table 1. Conducted in Wagner vessels on horizons experimental results

Mineral fertilizers						
Layer, sm	Nitrogen, from the amount transferred In%			Phosphorus, from the amount transferred in%		
	Exper ience	Cont rol	Difference of mineral fertilizers in experimenta l and control containers in the layer of 0 - 40 cm,%	Exper ience	Cont rol	Difference of mineral fertilizers in experimenta l and control containers in the layer of 0 - 40 cm,%
0-10	16.6	3.2	38.3	14.3	3.2	38.0
10-20	15.3	3.8		13.9	3.5	
20-30	13.5	4.7		12.7	4.0	
30-40	10.4	5.9		11.2	3.4	
40-50	8.3	7.1		9.9	7.6	
50-60	8.5	8.3		8.7	8.1	
60-70	8.3	9.1		8.4	9.2	
70-100	18.6	57.9		20.9	61.0	

Field research was conducted to improve irrigation water saving technology by improving irrigation water saving methods and to reduce irrigation water consumption and achieve

optimal irrigation performance by using discrete irrigation technology in screen fields formed on the basis of interpolymer complex in irrigating fields. The tests were performed in two variants (A, B, C, D) with a 4-repetition method according to the scheme, where the row spacing for all variants was 0.6 m. In options A and B, irrigation was carried out using discrete irrigation technology along each row. Option C and D were selected as controls, respectively. In options "A" and "S" the field length was 160 m, and in options "V" and "D" 220 m. In variants "A" and "V" the edges were divided into 4 equal parts, and in parts 1 and 3 were held on the screen edges formed on the basis of IPK. In options "A" and "S" water consumption was 0.4 - 0.2 l / s, and in options "V" and "D" - 0.6 - 0.4 l/s.[8,10].

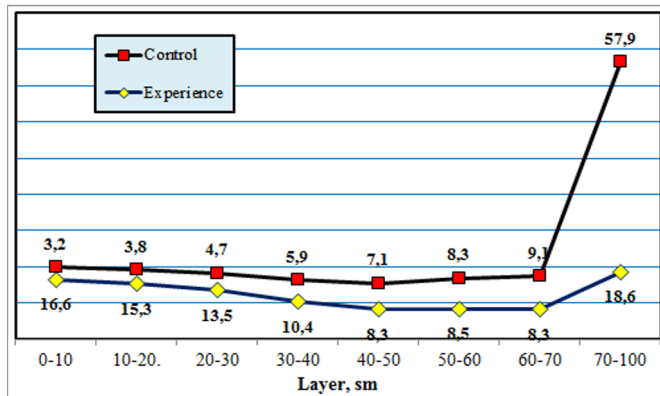


Fig. 5. Difference of nitrogen mineral fertilizers in experimental and control containers,%

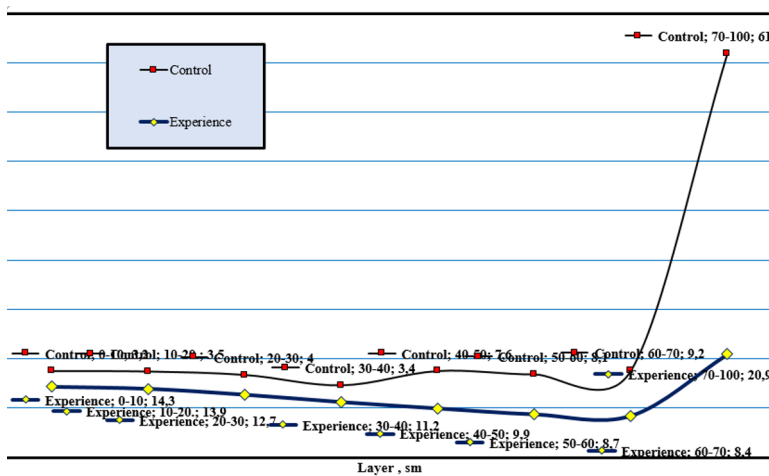


Fig. 6. Difference of nitrogen mineral fertilizers in experimental and control containers,%

Studies conducted using Wagner vessels were conducted in experimental and control options. In the experimental vessel, an underground shield based on an interpolymer complex was formed at a depth of 40 cm, and a surface shield was formed on the soil surface with a mixture of 23 g of nitrogen. In the control variant, 23 g of mineral (nitrogen) was sprayed at the rate of 220 kg per hectare. In the experiments of the second series, instead of nitrogen, phosphorus mineral was applied at the rate of 225 kg per hectare (N-220, P-224, K-160).

4 Conclusion

In the technology of discrete irrigation of cotton on the screen edges formed on the basis of interpolymer complexes, the coefficient of flat moisture along the length of the soil edge increased by 0,18 compared to control and mounted to 0,82, saving water resources by 22-29% and yield by 4.3 ts/ha. Irrigation of cotton from screened (subsoil and surface) fields based on interpolymer complexes in discrete irrigation technology retains 32.0-38.7% more mineral fertilizers in the active layer of the soil than irrigation from conventional non-screened fields, resulting in cotton yield 5.3 ts / ha allowed to be many.

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