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EFFECTS OF SALINE SOILS ON RICE PRODUCTIVITY

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Abstract. In the ongoing experiments 2021-2023. The task was set to study the effect of flooding of rice paddies on the dynamics of the content of water-soluble salts and the salt regime on the value of rice yield. Analysis and dynamics of the soil salt regime shows that in the rice development phase after tillering until the beginning of waxy rice ripeness, the most optimal from the point of view of ensuring a favorable soil salt regime is a flood layer with a depth of 17-22 cm.

Keywords: rice, number of points, depth of paddock flooding, rice paddies, dynamics of water-soluble salts.

Аннотация. В текущих экспериментах 2021-2023 гг. Была поставлена задача изучить влияние затопления рисовых полей на динамику содержания водорастворимых солей и солевого режима на величину урожая риса. Анализ и динамика солевого режима почвы показывает, что в фазу развития риса после кущения до начала восковой спелости риса наиболее оптимальным с точки зрения обеспечения благоприятного солевого режима почвы является слой затопления глубиной 17-17 см. 22 см.

Ключевые слова: рис, количество точек, глубина затопления выгонов, рисовые поля, динамика водорастворимых солей.

INTRODUCTION

Rice is an exotic crop for farming in the conditions of the Tashkent region, imported from tropical countries characterized by an abundance of heat and moisture.

Built in the river delta. Syr-Darya rice irrigation systems and farming on them are an example of proper environmental management, basically the dynamic equality of the inflow and outflow of energy, matter and information has been formed, the balance of environment-forming components and natural processes modified by man has been preserved.

MATERIALS AND METHODS

In the experimental farm of the Tashkent Research Institute of Rice Growing 2021-2023. Field experiments were carried out to study the influence of the water layer, salt regime and the dynamics of water-soluble salts on rice yield. The climatic

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conditions of the experiment site are quite suitable for rice cultivation: summer is hot, long, the amount of precipitation is about 400-40 mm, air humidity is 50-60 mmHg.

In the experimental farm of the Rice Research Institute in 2021 and 2023. On the rice map of the third field of the rice crop rotation plot, consisting of 6 checks, field research was carried out. In each check, the flood depth was measured at 9 fixed points. At each point, rice yield was determined by 3 meters. Thus, the rice yield in each check was determined by 27 meters. During the period of complete rice ripeness, rice plants were cut from all 27 meters from every 6 checks. Then the rice was threshed from the meters by hand. The mass of rice grains from each meter was weighed on technical scales.

RESULTS AND DISCUSSION

The minimum yield is typical for shallow (6-10 cm) flooding of rice. This can be explained by the shortcomings of the water and associated salt and thermal regimes. With a water depth of 11-15 cm, the increase in yield is 151 g, in relative terms this is 27.7%. Such a significant increase in yield is explained by an improvement in water and thermal conditions, which can be clearly seen from Table 3, which reflects the daily variation of water temperatures.

The results are presented in Table 1.

The data is grouped by water depth in checks. The number of harvest accounting points is 18-31. Therefore, our samples are small. Calculation of statistical parameters shows that the relative error of the average or “experimental error” is in the range of 8.2-12.6%. Taking into account a certain scatter of soil indicators in the area, due to the large area of the rice map on which the studies were carried out, we can speak of quite satisfactory accuracy of the studies [1].

Table 1

Rice yield depending on the depth of the water layer in the check, 2021.

Water depth in check, cm	Check numbers	Amount of points	Average yield of meters, g/m2	Relative error of the average, %	Yield increase	
					g/m2	%
6-10	2 , 3, 6	18	394	8,2	-	-
11-15	1, 3, 5	22	545	10,5	151	27,7
16-20	3, 4, 5, 6	28	586	9,7	192	32,8
21-25	2, 3, 4	31	614	8,9	220	35,8
26-30	1, 4, 5	27	548	12,6	154	28,1
31-35	2, 4, 6	26	483	9,4	86	18,4

A further increase in the water layer to 16-20 cm caused an increase in yield by 192 g. The maximum yield was established at a depth of 21-25 cm, then rice

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productivity decreased. At the maximum depth, the meter crop yield is 483 g. Here, the increase in productivity is only 86 g compared to the option where the very minimum layer of water was maintained. Consequently, increasing the water depth to more than 25 cm significantly reduces the rice yield compared to the option where the water level is maintained at a depth of 16-20 cm.

With a layer of 21-25 cm, the yield was 614 g/m2. However, here the difference with the previous version is only 28, which is 4.6%. We have a minimum relative error of the mean of 8.2%. Therefore, the indicated difference between the two options is within the experimental error. This suggests that 16-20 cm is the optimal flooding layer for rice.

In comparison with the optimal layer with a thickness of 11-15 cm, it is characterized by a slight decrease in yield. This decrease is equal to 41 g, which is 7.5%. Thus, the difference between these options is relatively small, except for the better dynamics of salt and thermal regimes at a water depth in the check of 16-20 cm.

The dynamics of the content of water-soluble salts in the meter-long soil horizon is presented in Table 2.

Table 2

Dynamics of the content of water-soluble salts in a meter-long soil horizon (in the numerator - the salt content at the beginning of the growing season, in the denominator - at the end of the growing season)

Water depth in check, cm	Check number	Point number	Salt content, %			Washing out salts from dense residue, %
			Dense residue	Chlorides	Sulfates	
6-10	3	5в	0,548	0,034	0,361	0,044
			0,504	0,024	0,375	
11-15	3	6в	0,481	0,048	0,294	0,075
			0,406	0,026	0,274	
16-20	4	1г	0,513	0,061	0,368	0,111
			0,402	0,038	0,286	
21-25	3	7в	0,380	0,039	0,211	0,079
			0,301	0,019	0,174	
26-30	4	5г	0,491	0,046	0,285	0,106
			0,385	0,022	0,244	
31-35	4	4г	0,441	0,063	0,245	0,087
			0,354	0,035	0,216	

The desalinization of the dense residue at a layer depth of 6-10 cm was 0.044%. This indicator at depths of 11-15 and 16-20 cm, respectively, is 0.075 and 0.111%. An

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increase in water depth to 26-30 cm also caused a noticeable decrease in salt content to 0.106%. With a water layer of 21-25 and 31-35 cm, respectively, the amount of salt leaching is 0.079 and 0.087%. Apparently, such a relatively low value of salt removal at the indicated depths is explained by the low initial salt content at the beginning of the growing season.

On the experimental site in 2022, sweet clover was cultivated in the previous 2 years. Groundwater in this area lay on average at a depth of 1.5-2.2 m from the surface. The mineralization of groundwater was 5-7 g/l. Usually, when the level of mineralized groundwater lies relatively close to the earth's surface, salt accumulation occurs. Under these conditions, as shown by the results of chemical analyzes of soils, the degree of soil salinity is generally average. The type of salinity is chloride-sulfate.

CONCLUSION

Analyzing the dynamics of the salt regime of soils over the years of research, it can be argued that in the period after tillering until the beginning of waxy ripeness of rice, the most optimal from the point of view of ensuring a favorable salt regime of soils is a flood layer with a depth of 17-22 cm.

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