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INFLUENCE OF REPEATED AND INTERMEDIATE LANDS ON SOIL WATER PERMEABILITY

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ABSTRACT:

The article provides information on the influence of repeated and intermediate crops, introduced into short-rotation crop rotation systems, and the application of organic fertilizers after them, on soil water permeability when growing cotton.

Research work was carried out in two periods, i.e., at the beginning of the season and at the end of the season, for 6 hours in the furrow section. In the control variant with cotton sown after cotton, the water permeability was 705.3 m3/ha, while in the crop rotation system, this indicator was 764.9 m3/ha. Therefore, to improve soil water permeability, crop rotation and the application of organic fertilizers are necessary.

INTRODUCTION. Currently, as a result of the development of science, many innovative projects are being implemented in agriculture. The daily increase in the population increases the demand for food. From this point of view, the effective use of land and increasing crop yields is relevant. To increase soil fertility and crop yields, it is necessary to apply crop rotation, introduce grain and leguminous crops into crop rotation systems, and apply organic fertilizers.

Soil permeability is directly related to its fertility, and soils with good structure have good permeability. If the soil's water permeability is good, the water regime will also be good, creating favorable conditions for plants. With a good water regime, in turn, its nutritional regime improves. As a result, the plant grows, develops well, and yields a high yield.

Literature Analysis and Methodology. The introduction of crop rotation in agriculture, maintaining and consistently increasing soil fertility, is the main basis of agricultural science. In previous years, many scientific studies were conducted to increase soil fertility and improve the melioration state through crop rotation, efficient land use, and obtaining high and quality yields of agricultural crops.

According to E.Sadikov [1] in the conditions of saline meadow soils of the Republic of Karakalpakstan, in the conducted research work, it was established that in cotton crop rotation systems, to intensify the cultivation of fodder crops in fodder fields, it is possible to obtain high-nutritional, abundant feed for livestock by combining annual fodder and leguminous crops (triticale+rye+beans+peas) and increasing the number of plants. In this case, a green mass yield of 158.0-252.0 c/ha was obtained. 25.0-38.0 c/ha of root and stubble residues were left in the soil. From the green manure crops sown after this, a green mass yield of 30.5-31.4 c/ha was obtained.

B.M. Khalikov [2] in the irrigated typical sierozem soils of the Tashkent region, in short-rotation (1:1, 2:1) crop rotation systems, due to the sowing of mung bean as a repeated crop, triticale from intermediate crops, 9-10 tons of organic residue per hectare accumulates in the soil during one rotation, and the amount of humus in the soil increases by 0.020-0.035%, total nitrogen by 0.018-0.022%.

According to U. Ismailov [3], E.P. Sadikov, [4] when sowing annual fodder crops, cereals, legumes, and green manure crops as preceding crops before cotton, favorable conditions are created for good growth and development of cotton, and due to increased soil fertility, it is possible to obtain an additional yield of 3.4-8.0 c/ha.

B.Turdishev, [5] found that agricultural crops have different effects on soil fertility under the conditions of saline soils of the Republic of Karakalpakstan. This depends on the cultivation technology and the plant's root and stubble residues. The reduction of soil fertility and its replenishment with root and stubble residues is directly related to the cultivation technology. Organic substances play an important role in increasing soil fertility and crop yields.

Methods of Agrophysical Soil Research of Central Asia [6].

Research methods. All observations, measurements, and analyses during the research were carried out using the methodological manuals "Methods of Conducting Field Experiments," "Methods of Agrochemical Analysis of Soils and Plants," and "Methods of Determining the Amount of Nutrients in the Soil."

Research results. In order to determine the influence of repeated and intermediate crops sown after cotton, winter wheat, and winter wheat, as well as organic fertilizers on soil permeability when sowing cotton the following year, we determined soil permeability in a one-meter furrow section for 6 hours, and the determination of water permeability was carried out in two periods: spring and at the end of the growing season.

In the variant with sowing cotton in spring after cotton (control), the water permeability for 6 hours was 705.3 m3/ha, in variants 2, 3, and 4 with sowing repeated crops mung bean, sesame, and sorghum after winter wheat - 736.9-742.0 m3/ha, in the variant with sowing repeated crops sorghum after winter wheat and applying 20 t/ha of manure - 764.9 m3/ha, in variants 6 and 7 with sowing repeated crops mung bean and sorghum after winter wheat and sowing mung bean as an intermediate crop - 750.0-746.4 m3/ha, and in variant 8 with sowing after winter wheat + repeated crop (sorghum) + intermediate crop (mung bean) + 20 t/ha of manure - 773.4 m3/ha.

Soil permeability, m^3/ha 2019 **Table 1**

Var. №	Watch hours						Total in 6 hours	On average in 1 hour
	1	2	3	4	5	6		
In spring								
1	220,0	120,5	110,0	104,5	90,0	70,3	705,3	117,6
2	210,0	130,0	120,5	110,6	90,5	75,3	736,9	122,8
3	220,5	115,0	121,6	113,4	91,5	80,0	742,0	123,7
4	218,5	116,5	117,5	114,5	100,6	70,5	738,1	123,0
5	220,5	123,5	120,0	120,0	100,4	80,5	764,9	127,5
6	215,5	118,5	120,5	110,0	95,5	90,0	750,0	125,0
7	220,0	120,0	118,8	105,5	100,6	81,5	746,4	124,4
8	230,5	121,3	110,5	110,5	110,0	90,6	773,4	128,9
End of season								
1	14	90,	87,	80,5	80,0	65,0	479,1	79,8

	0,5	5	5					
2	160,6	91,5	80,5	75,7	75,0	65,6	548,9	91,5
3	165,6	90,0	90,7	73,5	72,5	67,5	559,8	93,3
4	170,5	95,5	76,7	75,0	71,0	65,5	554,3	92,4
5	180,0	90,5	90,5	87,1	82,1	69,1	589,3	98,2
6	180,5	91,7	90,4	85,0	81,5	70,0	599,1	99,8
7	180,1	100,5	85,6	85,0	80,7	71,5	603,4	100,5
8	190,5	110,5	88,6	80,5	80,5	74,3	624,9	104,1

As can be seen from the table data, in the 2nd, 3rd, and 4th variants, where repeated crops (mung bean, sesame, and sorghum) were sown after winter wheat, followed by cotton, the water permeability was 31-37 m3/ha higher compared to the control variant, where cotton was sown after winter wheat + repeated crops (sorghum) + 20 t/ha of manure, followed by cotton (variant 5). 60 m3/ha, in variants 6 and 7 with the sowing of repeated crop sorghum + intermediate crop (mung bean) after winter wheat and subsequent sowing of cotton 41-45 m3/ha, and in variant 8 with the application of winter wheat + repeated crop (sorghum) + intermediate crop (mung bean) + 20 t/ha of manure and subsequent sowing of cotton 38 m3/ha more water was passed. From this it can be seen that the more the soil is cultivated, the more types of crops there are, and with an additional application of 20 t/ha of organic fertilizer, the amount of organic matter in its composition increases and its water permeability increases.

At the end of the growing season, water permeability decreased in all variants compared to spring. However, the difference between the variants remained the same as determined in the first period. The decrease in water permeability is due to the introduction of inter-row cultivation, irrigation, the amount of organic matter in the soil, and other mechanisms into the field.

Soil permeability, m^3/ha 2020 **Table 2**

Var. №	Watch hours						Total in 6 hours	On average in 1 hour
	1	2	3	4	5	6		
In spring								
1	205,5	110,0	95,0	90,5	75,5	65,5	642,0	107,0
2	212,5	131,5	110,5	108,5	85,5	70,5	719,0	120,0
3	210,5	110,5	115,5	110,5	90,5	70,5	708,0	118,0
4	215,3	110,0	112,5	110,5	100,0	68,5	717,0	119,0
5	215,0	120,5	110,5	110,0	95,0	75,5	726,5	121,1
6	210,5	120,5	115,0	105,0	90,0	85,5	726,5	121,1
7	220,0	110,0	115,3	100,5	95,5	90,0	730,8	121,8
8	228,5	120,3	105,0	107,3	105,0	86,5	752,6	125,4
End of season								
1	120,5	76,0	70,5	66,0	66,0	62,0	461,0	76,8
2	156,5	90,0	76,5	72,0	70,0	63,5	528,5	88,1
3	160,0	87,0	85,5	70,5	70,0	65,5	538,5	89,8
4	165,5	92,5	76,0	76,0	70,5	55,0	545,5	90,9
5	175,5	87,5	85,0	82,5	80,0	65,0	575,5	95,9
6	176,5	90,5	80,5	80,0	76,0	65,1	568,6	94,8
7	180,0	90,5	81,6	82,0	70,5	65,3	570,0	95,0
8	190,0	100,5	85,3	76,0	75,0	70,5	597,3	99,6

When sowing cotton in the second year (2020) after preceding crops in the grain:cotton crop rotation system, the soil permeability at the beginning of the growing season averaged 107.0-125.4 m3/ha per hour. In the control variant, where cotton was sown after cotton, it was 107.0 m3/ha, and in the crop rotation scheme it was 118.0-125.4 m3/ha. The greater the organic mass in the soil and the more organic fertilizers applied to it (var. 2-8) the water permeability of the soil was higher compared to the control variant.

Conclusion. With a short-rotation crop rotation scheme of 1:2, winter wheat + repeated crop (mung bean, sorghum) + intermediate crop (mung bean) or 1:2, winter wheat + repeated crop (sorghum) + intermediate crop (mung bean) + 20 t/ha of manure with subsequent sowing of cotton, soil water permeability was improved. By improving soil permeability, favorable conditions have been created for plant growth, development, and high yields.

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