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Effect of Repeated Oilseed Crops on Soil Fertility in The Southern of Uzbekistan

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Annotation: The article presents data from a field laboratory experiment conducted in the south of Uzbekistan in 2017-2020. Before sowing, soil moisture in the 0-30 cm layer averaged 13.6-14.3%, and in the arable layer 16.4-16.9% and the volumetric mass in the arable layer was 1.26-1.28 gramm cm^3, and in a layer of 30-50 cm 1.30-1.32 gramm cm^3.

Soil moisture at the end of the growing season in the layer was 16.0-16.5% and the volumetric mass in the arable layer was 1.28-1.30 gramm cm^3 and in the sub-arable layer 1.38-1.40 gramm cm^3. The water permeability of the soil before sowing oilseeds is 520-550 m^3 ha^{-1}, in the initial state of the soil the humus content in the 0-30 cm layer was 0.669%, in the sub-arable soil layer 0.597%, total nitrogen, respectively, 0.054-0.059%, and gross phosphorus 0.124- 0.100%. The general state of nutrients after repeated (oilseed) crops showed a slight increase in their content.

The humus content in the arable soil layer was 0.663-0.785%, the total nitrogen content in the 0-30 cm soil layer was 0.663-0.785%, the total nitrogen content in the 0-30 cm soil layer was 0.088-0.080%, in the under arable soil 0.050-0.069 %, and gross phosphorus, respectively, 0.130-0.139, and 0.124-0.127%, the content of humus, total nitrogen and gross phosphorus increased more after the cultivation of soybeans, peanuts and sunflowers, and a relatively low content was noted in the control (var. 1, 2) options.

Key words: winter wheat, soybeans, peanuts, sunflower, cotton, growth, development and yield of raw cotton, re-seeding, humidity, bulk density, water permeability, humus, total nitrogen and total phosphorus, nitrate, mobile phosphorus and exchangeable potassium

The Government of the Republic of Uzbekistan pays great attention to the further development of agriculture in the country. To solve the food security of the population, each hectare of irrigated arable land is used effectively and yields 2-3 times the yield within one year. In this case, special attention is paid to repeat crops - legumes, oilseeds, vegetables and fodder crops. Obtaining two or three harvests with irrigation is a pressing problem in the south of Uzbekistan. Oilseeds under re-seeding have not been sufficiently studied in the short-rotation crop rotation system on soil fertility. Our research will complement these problems in the cotton crop rotation system.

Enormous harm to soil fertility in the main grain-producing regions of Russia is caused by the routine use of pure fallow without the application of organic and mineral fertilizers [3].

According to scientists from the Don Research Institute of Agriculture, during the period of soil fallow in pure fallow, up to 2 tons of humus, the main guardian of fertility, are lost per 1 hectare [5].

Back in the late 19th - early 20th centuries, practical scientist I.E. Ovsinsky [8] developed a new farming system in the arid conditions of southern Ukraine, in which he showed the futility of moldboard plowing, since intensive deep cultivation leads to a decrease in soil fertility.

Highly efficient resource-saving farming systems in many advanced countries provide for the natural principle of soil conservation with the mandatory preservation of plant residues on the surface, the use of ground cover green manure crops in combination with direct sowing technology - no-till [9].

An important direction in the development of domestic agriculture is optimizing the diversity of cultivated crops in crop rotation with maximum saturation of legumes [10]. Long-term studies indicate that one of the main directions in agriculture will be the creation of multi-species crops of agricultural crops in field crop rotations [1].

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For the vital activity of soil biota and the normal development of plants, the constant presence of fresh organic matter in the soil is necessary [2].

According to A.S. Kudrin [4], on gray soil cultivated soils, 80-160 t ha^{-1} of humus is retained in a meter layer of soil. K.M.Mirzajonov, Kh.Makhsudov [6], K.M.Mirzajonov, K.M.Yusupaliev [7] note that the reserves of humus in the Andijan region in the soil layer of 0-60 cm, in the variant without fertilizers amounted to 58 tons /ha, with the application of mineral fertilizers 67 t ha^{-1} and with crop rotation options 74 t ha^{-1}.

Research methods. Field experiments to study the influence of winter wheat, secondary (oilseed) crops on soil fertility were carried out using the method developed at the Uzbek Scientific Research Institute of Cotton Growing (1976), "Methods for conducting field experiments with cotton" (2007) and the methods of "State variety testing" were also used agricultural crops" (1981).

Field and laboratory studies were carried out in 2017-2020 in the experimental farm of the Surkhandarya scientific-experimental station NIISSAVKh in conditions of takyr-like low-humus and slightly saline soils. The soils of the experimental plot, in terms of their mechanical composition, are heavy loamy, with close groundwater (1.5-2.0 m), slightly saline, poorly supplied with humus and other nutrients, and rich in carbonates (8-10%). The experiment was carried out in triplicate. The area of one plot is 240 m^2, with a length of 33.3 m and a width of 7.2 m. The total occupied area of the experimental plot is 1.5 hectares.

Research findings and discussion. The results of the studies show that the winter wheat grain yield amounted to 7.07 t ha^{-1}, root and crop residues in the layer of 0.50 cm of soil 4.35-4.56 t ha^{-1}, soybean, sunflower, sesame, ground pear harvest (peanuts) and safflower 1.70-2.35 t ha^{-1} and plant remains of repeated crops 2.25-3.25 t ha^{-1}, for two crops per hectare of winter wheat and repeated crops, plant remains in the layer of 0-50 cm of soil amounted to 7.50-7.98 t ha^{-1}.

The results of the studies are shown in Tables 1, 2, 3 which show that repeated cultures have different effects on the agrophysical properties of the soil, especially

Table 1

The influence of winter wheat and repeated oilseeds on the agrophysical properties of soil

№	Option name	Before sowing				At the end of the crop growing season				Soil water permeability m^3/ha	
		humidity,%		volumetric mass, g/cm^3		humidity,%		volumetric mass, g/cm^3		in 6 hours	
		0-30 см	30-50 см	0-30 см	30-50 см	0-30 см	30-50 см	0-30 см	30-50 см	before sowing	at the end of the growing season
1	Cotton (control)	10,5	12,5	1,26	1,32	14,2	16,8	1,33	1,41	85,7	43,1
2	Winter wheat (control)	12,0	13,9	1,26	1,32	14,2	17,1	1,33	1,41	93,4	46,4
3	Winter wheat after harvesting soybeans	13,0	14,5	1,24	1,31	14,5	17,4	1,29	1,40	107,5	48,7
4	Winter wheat after harvesting sunflower sowing	12,5	13,0	1,25	1,31	14,2	16,8	1,33	1,42	97,0	42,8
5	Winter wheat after harvesting sesame seeds	12,9	14,8	1,24	1,31	15,7	17,9	1,29	1,41	107,1	48,6
6	Winter wheat after harvesting sowing of peanuts	12,2	14,2	1,25	1,32	15,0	17,0	1,33	1,40	92,0	44,5

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7	Winter wheat after harvesting sowing safflower	12,0	15,3	1,24	1,32	15,5	17,7	1,29	1,41	106,8	54,2

Table 2
The influence of winter wheat and secondary (oilseed) crops on the agrochemical properties of soil (2017)

№	Option name	Soil layer, cm	Initial state content of total nutrients, %			General state of nutrient content after repeated cultures, %		
			humus	nitrogen	phosphorus	humus	nitrogen	phosphorus
1	Cotton (control) Winter wheat (control)	0-30	0,669	0,059	0,124	0,663	0,058	0,130
		30-50	0,597	0,054	0,100	0,623	0,050	0,124
2	Winter wheat after harvesting soybeans Winter wheat after harvesting sunflower sowing	0-30	0,669	0,059	0,124	0,716	0,062	0,134
		30-50	0,597	0,054	0,100	0,646	0,054	0,127
3	Winter wheat after harvesting sesame seeds Winter wheat after harvesting sowing of peanuts	0-30	0,669	0,059	0,124	0,740	0,068	0,135
		30-50	0,597	0,054	0,100	0,705	0,058	0,125
4	Winter wheat after harvesting sowing safflower Cotton (control)	0-30	0,669	0,059	0,124	0,740	0,068	0,137
		30-50	0,597	0,054	0,100	0,667	0,060	0,125
5	Winter wheat (control) Winter wheat after harvesting soybeans	0-30	0,669	0,059	0,124	0,762	0,068	0,137
		30-50	0,597	0,054	0,100	0,700	0,060	0,125
6	Winter wheat after harvesting sunflower sowing Winter wheat after harvesting sesame seeds	0-30	0,669	0,059	0,124	0,762	0,067	0,139
		30-50	0,597	0,054	0,100	0,700	0,060	0,120
7	Winter wheat after harvesting sowing of peanuts	0-30	0,669	0,059	0,124	0,785	0,080	0,139
		30-50	0,597	0,054	0,100	0,700	0,069	0,123

Table-3
The influence of winter wheat and secondary (oilseed) crops on the agrochemical properties of soil (2018)

№	Option name	Soil layer, cm	General state of nutrient content after repeated cultures, %			Contents of mobile nutrients after repeated cultures, mg/kg		
			humus	nitrogen	phosphorus	$N\text{-}NO_3$	P_2O_5	K_2O
1	Cotton (control)	0-30	0,693	0,054	0,130	2,925	13,8	125

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	Winter wheat (control)	30-50	0,620	0,050	0,124	1,550	12,0	125
2	Winter wheat after harvesting soybeans Winter wheat after harvesting sunflower sowing	0-30	0,693	0,056	0,133	2,350	14,0	127
		30-50	0,622	0,050	0,120	2,550	12,5	125
3	Winter wheat after harvesting sesame seeds Winter wheat after harvesting sowing of peanuts	0-30	0,739	0,077	0,135	2,925	18,0	125
		30-50	0,705	0,058	0,125	2,300	15,2	125
4	Winter wheat after harvesting sowing safflower Cotton (control)	0-30	0,740	0,068	0,130	5,790	18,0	175
		30-50	0,660	0,060	0,125	4,96	19,1	125
5	Winter wheat (control) Winter wheat after harvesting soybeans	0-30	0,762	0,067	0,139	9,01	15,8	100
		30-50	0,690	0,060	0,125	4,96	19,1	125
6	Winter wheat after harvesting sunflower sowing Winter wheat after harvesting sesame seeds	0-30	0,762	0,067	0,139	9,01	15,8	100
		30-50	0,700	0,062	0,120	2,54	15,0	100
7	Winter wheat after harvesting sowing of peanuts	0-30	0,775	0,076	0,139	9,180	18,8	125
		30-50	0,760	0,069	0,125	2,36	13,5	125

on the moisture content, bulk mass and water permeability of the soil. After repeated cultures, the agrophysical properties of the soil improved.

The results of agrochemical soil analyses after repeated crop cultivation show that repeated oilseeds in sowing after winter wheat positively affect the agrochemical properties of the soil (2-Table). After growing pcontributed to an increase in the total content and mobile nutrients in the soil.

For example, the humus in the 0-30 cm soil layer was 0.693%, total nitrogen 0.054% and gross phosphorus 0.130%, and after repeated soy culture, respectively, humus 0.739%, total nitrogen 0.077% and gross phosphorus 0.135% and mobile nutrients nitrate nitrogen 2.925 mg/kg and mobile phosphorus 18.0 mg/kg soil.

In conclusion, repeated oilseeds have improved the agrophysical and agrochemical properties of the soil compared to the control variants. Which turned out to be the best predecessors of the main cotton culture.

Bibliography

1. Zelensky N.A., Avdeenko A.P., Bezlyudsky A.L. Cultivation of winter grain crops using fallow-mulching steam // Agriculture. 2008. No. 2. pp. 14-15.
2. Zelensky N.A., Zelenskaya G.M., Mokrikov G.V., Shurkin A.Yu. Soil fertility: the present and future of our agriculture // Agriculture No. 5, 2018. – P.4-6
3. Kapinenko I.G. About the present and future of our agriculture // Agriculture. 1990. No. 9. pp. 13-16.
4. Kudrin A.S. Chemistry of serozems // J. Soil Science, 1947, No. 8, -P. 46-80
5. Listopadov I.N., Shaposhnikova I.M. Soil fertility in intensive agriculture. M.: Rosselkhozizdat, 1984. 205 p.
6. Mirzajonov K.M., Makhsudov H. Soil protection in Central Asia and the further development of cotton growing in the USSR // – M: Kolos, 1979, -P. 400-402
7. Mirzajonov K.M., Yusupzhanov K.M. The influence of green manure crops on increasing the fertility of soils confirmed by wind erosion // SoyuzNIXI, -1981, issue. 46. 46–S. 76
8. Ovsinsky I.E. New farming system. M., 1911. 217 p.

ISSN NO: 2771-8840
Date of Publication: 21-09-2023

9. Orlova L.V., Proskurin A.V., Kharchenko A.G. Direct sowing. Practical recommendations for the transition period. Samara: Ministry of Agriculture and Food of the Samara Region, 2007. 24 p.
10. The state of organic matter and nitrogen compounds of leached chernozems depending on the methods of crop cultivation / N.F. Ganzhara, V.V. Verzilin, R.F. Baibekov and others // News of the Timiryazev Agricultural Academy. 2005. No. 3. pp. 1-13.