



EFFECTS OF SHORT-TERM CROP ROTATION SYSTEMS ON THE GROWTH AND DEVELOPMENT OF COTTON

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Article history:	Abstract:
Received: 6 th March 2022 Accepted: 6 th April 2022 Published: 20 th May 2022	In the Republic of Karakalpakstan, field experiments were conducted to determine the impact of short-term crop rotation systems on the growth and development of the soil. According to the results of the experiments, the methods of sowing short-term crop rotation and the introduction of winter wheat, repeated and interval crops, the positive effects of applied organic fertilizers were determined. In this case, the crop rotation is 1:2, grain: cotton: in the cotton system, after the winter wheat, repeated crop (corn) + interval (mung bean) + 20 t / ha of manure, which is positive for the growth and development of cotton during the next two years.
Keywords: Short-term crop rotation systems, cotton, winter wheat, repeated and interval crops, fertility, saline soils, yield.	

In the Republic of Karakalpakstan, the cultivation and increase of crop yields is mainly due to the high use of mineral fertilizers. Due to the drying up of the Aral Sea, the salinity of the soils of our region, the increase in the mineralization of groundwater has a negative impact on the yield and quality of cotton and cotton complex crops and soil fertility.

In recent years, the development of promising agricultural technologies for the production of abundant and high-quality crops, their modernization, the gradual increase in production, the development of short-term crop rotation systems that maintain and increase soil fertility of agricultural crops are the demand of today.

METHODOLOGY OF THE EXPERIMENT. The experiment was conducted at the experimental farm of the Nukus branch of Tashkent State Agrarian University in Khojeli district.

The following options were studied in the experiment: Option 1, cotton (control); Option 2, 1: 2, winter wheat + repeated crop (mung bean): cotton: cotton; Option 3, 1: 2, winter wheat + repeated crop (sesame): cotton: cotton; Option 4, 1: 2, winter wheat + repeated crop (corn): cotton: cotton; Option 5, 1: 2, winter wheat + repeated crop (corn) + 20 t / ha manure: cotton: cotton; Option 6, 1: 2, winter wheat + repeated crop (mung bean) + interval crop (mung bean): cotton: cotton; Option 7, 1: 2, winter wheat + repeated crop (corn) + interval crop (mung bean): cotton: cotton; Option 8, 1: 2, winter wheat + repeated crop (corn) + interval crop (mung bean) + 20 t / ha manure: cotton: cotton. The area of each option was 240 m², carried out in four repetitions.

RESULTS OF THE EXPERIMENT AND ANALYSIS. In 2-8 options of the study of the effect of crop rotation systems and crops included in it, compared to the control variant, the plant height on July 1 was 7.7-12.9 cm and the number of crops increased by 0.7-2.1, the yield elements - 1.2-2.1. The following were found from the observations made on 1 August: in option 1, where cotton was planted after cotton, the plant height was 78.0 cm, the number of fruiting branches was 10.5 and the number of pods was 4.6. The extent to which a plant is supplied with nutrients determines its growth and development.

This indicates that favorable conditions are created for the growth and development of the plant when winter wheat, repeated and interval crops are planted before cotton and an additional 20 t / ha of manure is applied.

After winter wheat + repeated crop of crops (mung bean, sesame, corn), then cotton planted in 2, 3 and 4 options plant height was 86.0-88.5 cm, number of fruitful branches was 10.1-11.5 and number of pods was 4, 6-5.2 pcs., respectively, the plant height was 8.0-10.5 cm and the number of pods was 0.6 pcs more than in the control variant. After winter wheat + repeated crop (corn) + 20 t / ha fertilized in variant 5 the plant height was 93.0 cm, the number of fruitful branches was 12.5 and the number of pods was 5.7, the height was 15 cm compared to the control variant, the fruitful branches 1.0 and the number of pods was more by 1.1, in the 1: 2 crop rotation system after sowing winter wheat + repeated crop (mung bean) + interval crop (mung bean) next year when sowing cotton, plant height was 91.5 cm, number of fruitful branches was 11.5 and the number of pods was 5.0. At the same time, it was

observed that all indicators were higher than the control option. In the 8: 1 crop rotation system, after winter wheat + repeated crop (corn) + interval crop (mung bean) + 20 t / ha manure, the plant height was 98.2 cm, the number of fruitful branches was 13.0 and the number of pods was 6, 0, which is higher than all other variants in terms of phenological observations, and compared to the control variant, the plant height was more by 20.2 cm, the number of branches - 2.5 and the number of pods - 1.4.

Phenological observations on 1st September showed that plant height remained almost unchanged during this period compared to 1st August.

In option 1, where cotton was planted after cotton, the number of pods was 8.7.

In the 1: 2 system of crop rotation, after winter wheat + repeated crops (mung bean, sesame, corn) planted in 2, 3 and 4 options, the number of fruitful branches was 13.1-13.7 and the number of pods was 9.8-10.5, the number of pods was 1.1-1.8 more than in control option.

In the 1: 2 system of short-term crop rotation, after winter wheat + repeated crop (corn) + 20 t / ha of manure, the number of pods was 11.5, which is 2.8 more than the control variant.

In the 1: 2 system of crop rotation, after winter wheat + repeated crop (mung bean, corn) + interval crop (mung bean) was sown and the next year when cotton was sown (opt. 6 and 7), the number of pods increased by 1.9-2.4. After winter wheat + repeat crop (corn) + interval crop (mung bean) + 20 t / ha of manure was applied and the next year when cotton was sown, the number of pods was 12.5 and it was 3.8 more than in the control option.

In the crop rotation system, it was found that even when cotton was sown in the second year after the past crops, it had a positive effect on its growth and development. In all crop rotation systems (opt. 2–8), cotton growth and development were better than in the control variant (opt. 1).

It is possible to draw conclusions based on the data obtained. In the saline soils of the Republic of Karakalpakstan, the level of soil fertility in sowing cotton after cotton did not ensure good growth and development of the plant.

For good growth and development of cotton, it should be introduced into the crop rotation system, in 1: 2 system, winter wheat + repeated crop, in 1: 2 system, winter wheat + repeated crop + 20 t / ha manure, in 1: 2 system, winter wheat + repeated crop + interval crops and in 1: 2, winter wheat + repeated crops + interval crops + 20 t / ha manure, it is expedient to sow cotton next year.

Among crop rotation systems, a 1: 2 system, after sowing grain: cotton: cotton, i.e. after winter wheat + repeated crop (corn) + interval crop (mung bean) + 20 t / ha manure, and then sowing cotton is effective.

Table 1
Influence of crop rotation systems on the growth and development of cotton, 2019.

Options	Crop rotation systems	years 2017 - 2018	in 2019	1.07			1.08			1.09	
				Height, cm	Fruitful branch, piece	Yield element, piece	Height, cm	Fruitful branch, piece	Pods, piece	Pods, piece	Opened pods, piece
1	Cotton (control)	Cotton	Cotton	48,6	6,0	13,7	78,0	10,5	4,6	8,7	4,7
2	1:2	Winter wheat + repeated crop (mung bean)	Cotton	56,3	6,7	14,9	86,0	11,5	4,6	10,5	4,2
3	1:2	Winter wheat + repeated crop (sesame)	Cotton	55,4	7,1	14,3	86,0	11,5	5,2	10,0	3,7
4	1:2	Winter wheat + repeated crop (corn)	Cotton	55,0	7,0	14,7	88,5	10,0	4,8	9,8	3,5
5	1:2	Winter wheat + repeated crop (corn) + 20 t/ha manure	Cotton	58,7	7,6	14,9	93,0	12,5	5,7	11,5	5,2
6	1:2	Winter wheat + repeated crop (mung bean) + interval crop (mung bean)	Cotton	56,8	7,8	14,9	91,5	11,5	5,0	10,6	4,3
7	1:2	Winter wheat + repeated crop (corn) + interval crop (mung bean)	Cotton	59,3	8,0	15,3	91,5	12,0	5,3	11,1	4,8
8	1:2	Winter wheat + repeated crop (corn) + interval crop (mung bean) + 20 t/ha manure	Cotton	61,5	8,1	15,8	98,2	13,0	6,0	12,5	6,2

As of August 1, 2020, the height of the plant in the 1st option, where cotton was sown after cotton, was 72.5 cm, the number of fruitful branches was 10.0 and the number of pods was 4.3. In the 2-4 options when only repeated crops (corn, mung bean, soybean) were sown for this period after winter wheat plant height was 80.1-83.0 cm, number of fruitful branches - 12.0-12.5 and the number of pods - 4.9-5.0 and plant height was more than in this

control option by 7.6-10.5 cm, the number of fruitful branches - 2.0-2.5 and the number of pods - 0.6-0.8. In option 5, where the repeated crop of corn was planted after winter wheat and then fertilized with 20 t / ha manure, the plant height was higher by 6.5–10.4 cm, the number of fruitful branches was more by 1.5 compared to the option in which only repeated crops were sown (opt. 2-4). and the number of pods was more by 0.5-0.7.

When repeated and interval crops were sown after winter wheat (opt. 6 and 7), plant height, number of fruitful branches, and number of pods were almost the same as in option 5.

When after winter wheat, repeated and interval crops were sown in option 8, which was fertilized with an additional 20 t / ha manure, the plant height was 96.4 cm, the number of fruitful branches was 14.0, and the number of pods was 6.1. which means a relatively high figure among all options (opt. 1-7).

As of September 1, plant height and number of fruitful branches did not differ much from August 1. However, the number of pods has doubled. In all crop rotation systems, the number of pods was higher than in the control option. Only in the options planted with repeated crops (opt. 2-4) the number of pods is 1.6-1.9, in the option 5 with fertilizer 20 t / ha after repeated crops - 3.5, in the options planted with repeated and interval crops (opt. 6 -7) increased by 2.4-2.8 and 4.5 in 8 option with 20 t / ha of manure after repeated and interval crops. This indicates that higher yields are possible in all crop rotation systems than in the control option.

Table 2
Influence of crop rotation systems on the growth and development of cotton, 2020.

Options	Crop rotation systems	years 2017 - 2018	in 2020	1.07			1.08			1.09	
				Height, cm	Fruitful branch, piece	Yield element, piece	Height, cm	Fruitful branch, piece	Pods, piece	Pods, piece	Opened pods, piece
1	Cotton (control)	Cotton	Cotton	47,1	5,9	12,3	72,5	10,0	4,3	8,2	4,9
2	1:2	Winter wheat + repeated crop (mung bean)	Cotton	57,0	6,6	13,5	80,1	12,0	4,9	10,1	4,2
3	1:2	Winter wheat + repeated crop (sesame)	Cotton	58,0	7,0	12,9	82,3	12,5	5,1	10,2	4,3
4	1:2	Winter wheat + repeated crop (corn)	Cotton	58,0	7,0	13,3	83,0	12,5	5,0	9,8	3,9
5	1:2	Winter wheat + repeated crop (corn) + 20 t/ha manure	Cotton	61,0	7,5	13,5	90,5	13,5	5,6	11,7	5,8
6	1:2	Winter wheat + repeated crop (mung bean) + interval crop (mung bean)	Cotton	59,0	7,7	13,8	88,5	13,0	5,7	10,6	4,7
7	1:2	Winter wheat + repeated crop (corn) + interval crop (mung bean)	Cotton	60,5	7,9	13,9	90,1	13,4	5,5	11,0	5,1
8	1:2	Winter wheat + repeated crop (corn) + interval crop (mung bean) + 20 t/ha manure	Cotton	62,5	8,1	14,3	96,4	14,0	6,1	12,7	6,8

CONCLUSIONS. In the saline soils of the Republic of Karakalpakstan, the level of soil fertility when planting cotton after cotton did not ensure good growth and development of the plant.

For good growth and development of cotton, it should be introduced into the crop rotation system and it is expedient to sow according to the following methods and sow cotton next year, 1: 2 system, winter wheat + repeated crop, 1: 2 system, winter wheat + repeated crop + 20 t / ha manure, 1: 2 system, winter wheat + repeated crop + interval crop and in the 1: 2 system, winter wheat + repeated crop + interval crop and 20 t / ha manure.

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