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INFLUENCE OF CROPS, WHICH ARE INCLUDED IN THE SYSTEM OF SHORT-TERM CROP ROTATION ON THE AMOUNT OF NUTRIENT IN THE SOIL

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ABSTRACT

Soils of the Republic of Karakalpakstan are salty and low in fertility. In such soils, measures should be taken to improve the meliorative condition of soils and increase soil fertility for receiving high yield from agricultural crops. In order to increase soil fertility, it is better to use organic fertilizers.

Field experiments have been carried out to determine the influence of crops which are included in the system of short-term crop rotation on the amount of nutrients in the soil. In this case, in determining the influence of mung bean, sesame and soybean, which were sown before winter wheat, on the amount of nutrients in the soil, in the system of crop rotation 1: 2, cotton: past crop + mung bean for siderate + 20 t / ha of manure + winter wheat, when it was sown in the method of winter wheat the amount of humus in the soil was determined to increase by 0.40 %.

KEYWORDS: ***crop rotation, nutrients, past crops, humus, winter wheat, fertility, soil salinity, agrochemical properties.***

INTRODUCTION

Soils of the Republic of Karakalpakstan is characterized by salinity and low soil fertility. In these areas, high yields from agricultural crops are achieved through the use of mineral fertilizers in high standards. Application of mineral fertilizers at high amounts has a negative impact on the ecological condition of the soil and reduces its agrochemical and geophysical properties. Therefore, it is necessary to increase the fertility of the soil, by using organic and siderate crops, and to add to the crop rotation system, crops which have remaining roots and residues. Increasing the amount of organic matter in the soil at the expense of plant residues is the most economically and ecologically efficient way.

Methods of the research. Used for the field, the experiment includes 9 variants, repeated 4 times, one layer, systematic. “Krasnodarskaya-99” variety of winter wheat, “Durdona” variety of mung bean, “Karshyga” variety of sesame and “Orzu” variety of soybean were used in the experiment.

1st variant of the experiment, control, continuous sowing winter wheat, 2-4th variants, sowing mung bean, sesame and soybean as past crops before sowing winter wheat, 5-7th variants, sowing mung bean, sesame, soybeans, before winter wheat and additionally 10 t/ha manure was used, 8th variant, mung bean was sown for grain before winter wheat and additionally manure added in the amount of 2 t/ha, 9th variant, mung bean was sown for grain as a past crop, the it was sown for siderate and additionally 2 t/ha manure was used, then winter wheat was sown.

THE RESULTS OF THE RESEARCH AND ANALYZING THEM

Samples were taken from 0-30 and 30-50 cm layers of soil to determine their effect on the amount of nutrients in the structure of crop rotation.

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The productivity of agricultural crops depends on the meliorative condition of the land and soil fertility. The more organic mass in the soil, the higher the humus content. For this, it is necessary to increase the amount of plant residues in the soil.

In the experiment, it was determined at the beginning and at the end of the experiment how to influence the fertility of the soil, when winter wheat and cotton were sown before winter wheat.

In the control variant (var. 1) of 2019, winter wheat was grown (sown in autumn 2018), mung bean, sesame and soybean were sown as past crops.

At the beginning of 2019, the amount of humus in the 0-30 cm layer of soil was 0.720-0.730%, at the end of the season it was 0.720-0.740%, and the amount of humus increased by 0.010%. As can be seen from the data, the amount of humus in the control variant of the experiment, i.e. in the control variant of sowing winter wheat, decreased by 0.010% at the end of the season. In other variants, the amount of humus did not decrease due to the presence of legumes, but increased by 0.010%.

The total and active amount of nutrients: nitrogen, phosphorus and potassium decreased in the control variant at the end of the season. In variants 2-9 of the experiment, these indicators differ slightly.

In the autumn of 2019, winter wheat was sown in all variants. In order to determine the influence of past crops on soil fertility, samples were taken from 0-30 cm to 30-50 cm layers of the soil at the beginning and end of the 2020 season.

At the beginning of the season, the amount of humus in the soil in the layer of 0-30 cm was 0.720-0.760%, with the lowest values in the control variant. Past crops, sown before winter wheat, norms of used organic fertilizers and interval crops influence differently on the amount of humus in the soil differently.

At the end of the season the amount of humus in the control variant decreased by 0.010 % comparing to the beginning of the season, it should be mentioned that due to sowing winter wheat in all variants the amount of humus decreased by 0.005-0.010 % at the end of the season comparing to the beginning, but the total amount of humus was 0.720-0.730 % in autumn 2019, 0.710-0.755 % in autumn 2020, and in variants of crop rotation it was 0.730-0755 %.

Past crops, the norms of applied organic fertilizers allowed to increase soil fertility. When winter wheat was sown after legumes, which was sown for grain in the variants of short crop rotation (var. 2-4), the amount of humus at the end of the season in 2020 was 0.730-0.735%, when manure was used in the amount of 10 t / ha after legumes (var. 5-7) – 0.740 %, when 20 t/ha manure was used – 0.760 % and in the variant 9, when mung bean for grain + interval crop mung bean + 20 t/ha manure + winter wheat was sown it was 0.775%.

This means that when winter wheat was sown after past crops in order to keep the soil fertility and increase it short crop rotation systems should be used as the following: 1: 2, cotton: mung bean for grain + 20 t / ha manure + winter wheat, or 1: 2, cotton: mung bean for grain + mung bean for siderate + 20 t/ha manure winter wheat: winter wheat.

When we determined the amount of nutrients in the soil in 2021, we found out the following on the second year of the past crops. At the beginning of the vegetation period in the 0-30 cm layer of soil it was average 0.700-0.755% and at the end of the season - 0.700-0.750%.

At the end of the season, the amount of humus in the winter wheat sown control variant decreased by 0.010% compared to the amount in the spring. There was no decrease in the amount of humus when the past crops were sown for grain + winter wheat in variants 2-4 it was 0.715-0.730% in the spring, and 0.715-0.735% in the autumn.

Grains of legumes and cereals + 10 t / ha of manure + winter wheat. In variants 5-7 when in the 0-30 cm layer of soil the amount of humus was 0.730 % at the beginning of the season and 0.720-0.725 % at the end and the decrease of humus was 0.005-0.010 %. In variant 8, it was 0.750% and 0.755%, and when mung bean for grain + mung bean for sidearate + 20 t / ha manure + winter wheat was used, it was 0.750% at the beginning of the season and 0.760% at the end of the season, and the amount of humus increased by 0.10% at the end of the season.

The agronomic measures to increase soil fertility and winter wheat yield is the rotation of crops, sowing legumes (mung bean, sesame, soybeans) as the past crops, application of

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manure in the amount of 20 t / ha, sowing mung bean as siderate.

CONCLUSION

In order to increase soil fertility and winter wheat yield in the conditions of saline soils of the Central region of the Republic of Karakalpakstan the following methods should be used: short-term crop rotation, 1: 2, cotton: wheat: wheat, sowing legumes as a past crop before wheat, winter wheat + 20 t/ha manure + winter wheat, or 1: 2, cotton: wheat: wheat, mung bean for grain before winter wheat + mung bean for siderate + 20 t / ha manure + winter wheat: winter wheat.

Influence of crops in short-term crop rotation on the amount of nutrients in the soil, 2020

Variants	Layers of soil, cm	Humus, %	Total amount, %			Active amount, mg/kg		
			N	P	K	$N\text{-}NO_3$	P_2O_5	K_2O
Spring								
1	0-30	0,720	0,020	0,065	0,075	5,0	37,5	170
	30-50	0,580	0,015	0,020	0,035	4,5	20,5	140
2	0-30	0,740	0,030	0,075	0,080	5,2	42,0	180
	30-50	0,600	0,025	0,040	0,035	5,0	21,5	140
3	0-30	0,745	0,025	0,075	0,075	5,3	43,0	185
	30-50	0,600	0,030	0,045	0,035	4,8	22,5	135
4	0-30	0,730	0,030	0,080	0,080	5,2	39,5	190
	30-50	0,600	0,020	0,040	0,040	4,6	30,0	140
5	0-30	0,750	0,040	0,080	0,080	5,3	40,5	210
	30-50	0,600	0,025	0,040	0,045	5,0	37,5	160
6	0-30	0,750	0,045	0,085	0,075	5,5	41,5	200
	30-50	0,610	0,030	0,045	0,040	4,5	36,5	160
7	0-30	0,740	0,045	0,080	0,075	5,6	41,6	200
	30-50	0,600	0,025	0,040	0,035	4,8	37,0	150
8	0-30	0,765	0,050	0,085	0,075	5,6	43,0	210
	30-50	0,625	0,030	0,045	0,040	5,2	36,5	160
9	0-30	0,780	0,055	0,090	0,080	6,0	42,5	230
	30-50	0,630	0,030	0,045	0,040	5,8	40,0	180
Autumn								
1	0-30	0,710	0,015	0,060	0,070	4,8	36,0	160
	30-50	0,570	0,012	0,015	0,030	4,3	18,5	120
2	0-30	0,730	0,025	0,070	0,075	5,0	40,0	170
	30-50	0,590	0,020	0,035	0,030	5,0	20,5	130
3	0-30	0,735	0,025	0,070	0,070	5,0	41,0	175
	30-50	0,580	0,025	0,040	0,030	4,3	20,5	130
4	0-30	0,730	0,025	0,075	0,075	5,0	37,5	180
	30-50	0,590	0,015	0,035	0,035	4,4	27,0	120
5	0-30	0,740	0,035	0,070	0,075	5,0	38,0	200
	30-50	0,580	0,020	0,020	0,035	4,6	35,5	160
6	0-30	0,740	0,040	0,080	0,070	5,1	40,5	180
	30-50	0,600	0,025	0,040	0,030	4,2	35,0	160
7	0-30	0,740	0,040	0,075	0,075	5,2	40,0	200
	30-50	0,590	0,020	0,035	0,030	4,2	35,0	160
8	0-30	0,760	0,045	0,080	0,070	5,5	42,0	210
	30-50	0,620	0,030	0,040	0,035	5,0	35,0	160
9	0-30	0,745	0,050	0,080	0,075	5,8	43,0	240
	30-50	0,620	0,025	0,040	0,035	5,6	40,0	180

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