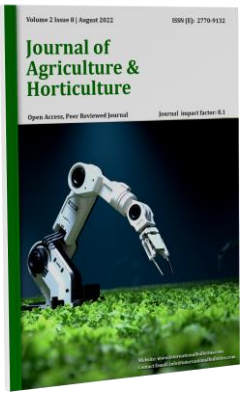

RELATIONSHIPS BETWEEN SOIL RESIDUES AND THE COLLECTION SYSTEM

Botirov Mirzokhid Ismonkhojaevich[1]
[1]Associate Professor of Fergana Polytechnic Institute
Sh. Akramov[2]
[2]Doctoral student of Fergana Polytechnic Institute
https://doi.org/10.5281/zenodo.7157213

Abstract. The preservation and improvement of soil fertility is an urgent task today. To do this, it is necessary to plant intermediate and secondary crops between and after the main crops. This allows a large amount of organic residue to remain in the soil after harvest. As a result of their decay, the amount of soil humus, total and mobile nutrients increase.

Keywords: main crop, secondary crop, intermediate crop, soil, humus, mobile nutrients, nitrogen, phosphorus, potassium, root, root.

INTRODUCTION

Today in the world it is becoming urgent to keep the soil fertility clean and increase its productivity. A growing world population will require greater yields from existing agricultural land to meet food demand. In many cases, this leads to a sharp decrease in humus and other organic substances in the soil. The main factor in solving these problems is the organization of alternating planting. It is an urgent task to include leguminous crops that leave nutrients in the soil and crops that leave a large amount of organic waste in the rotation system.

Such deficiencies are also present in our republic, increasing the production of crops in order to meet the needs of the population leads to a decrease in the amount of available humus and nutrients in the soil. A lot of work is being done by the state to solve this problem. Also, steps are being taken to further improve the current basic 1:1 crop rotation system. For this purpose, winter wheat is planted together with alfalfa, and after wheat grain is harvested, alfalfa is grown in the field as a repeat crop.

In addition, today it is recommended to switch to a 2:2 rotation system. In this case, if cotton is planted for two years in a row, wheat is planted for two years. This allows intercropping and repeated planting between main crops. As a result, a large amount of plant residue remains in the soil.

LITERATURE ANALYSIS AND METHODOLOGY

Kh. Baykabilov [1; 35-36-b] states that legumes and intermediate crops compact the soil less than alfalfa. Their small root systems increase a certain amount of humus and organic matter in the soil during the growth of the plant, and improve the water-physical condition of the soil.

In Egypt, a two-year rotation is generally accepted [9], in which 4 crops are planted - 2 winter and 2 summer: cotton is planted one year later. In this rotation, the following rotation of crops is used: cotton seeds are sown in March, cotton is plowed and wheat is sown in November. After the wheat ripens and is harvested (in May), the land is rested for a short time. At the end of July or beginning of August, corn is sown, after which the field is occupied by Egyptian beans (bersim) in November.

Bullock D. [5; 309-326-b], several types of crop rotation are used in the cotton growing regions of the United States, mostly without alfalfa. 1) In this case, cotton, spring legumes, then autumn legumes take turns with corn, soybeans, etc., the weight of cotton is 33.4%. 2) In this method, cotton occupies half of the cultivated land. 1st-2nd year cotton, 3rd year spring legumes and fall, 4th year corn partner spring legumes. In both cases, after cotton, winter wheat can be alternated with spring legumes or Japanese pea.

According to the data [10] in the People's Republic of China, depending on the natural and economic conditions, cotton is planted alternately with different crops. In most cases, in the north-western and northern regions of the country, the following planting rotation was adopted:

a) cotton is planted in spring (April), winter wheat is sown between the rows of cotton in late August and early September, after wheat, corn, soybeans and other legumes are grown as repeat crops.

b) cotton is sown in spring, legumes are planted in cotton in August, and chumiza is used after harvesting legumes the following year.

In the central cotton-growing regions of this country, cotton is planted between wheat fields as a repeat crop. In eastern China, before picking cotton, yellow clover is sown in the middle of cotton, which is plowed in as a green manure in the spring. After that, rice is grown. There are a number of other crop rotation methods.

Based on the results of the experiments conducted in the state of Iowa, D. Karlen, T. Berry and others [6; 22 p.], according to the information provided by the cultivation of fodder on the basis of crop rotation, increased the fodder base for livestock and improved the chemical properties of the soil. First of all, the soil environment has changed positively, the amount of NPK and other nutrients in the soil has increased.

The root system of alfalfa reproduces mycolytic bacteria, which suppress parasitic fungi and actinomycetes from the soil. According to scientists [7; 8] in the first old irrigated soil, they counted 12,400 fungal colonies, in the three-year alfalfa field, this indicator was only 700 colonies.

M.T. Tojiev [2; 340-342-b], winter wheat left behind 43.7-45.7 ts/ha of stem and root residues in the 0-50 cm layer of the soil, and 45.1 ts/ha in corn planted as a repeated crop. organized.

B.M. Khalikov [4; 102-104-b] in repeated crops, using mineral fertilizers in amounts of N60, P30, K30 kg/ha, created conditions for the optimal growth and development of mung beans, beans and soybeans, and the yield was proportionally 2.0; found that it increases by 3.2 and 2.9 ts/ha.

G.Sh. Orinboeva in his experiments conducted in the conditions of the grassland soils of the Fergana region [3; 165-b] of repeated crops-corn, mung beans, beans and soybeans in three years on average proportionally 38.2; 15.5; 12.7 and 23.3 tons/ha of grain and 307.3 (blue mass), 32.2; 12.3 and 33.5 ts/ha of hay yield can be obtained, the total amount of stubble and root residues is 52.2; 45.5; 32.9; 15.8 in composition, making 42.4 ts/ha; 65.2; Total nitrogen accumulation of 34.8 and 39.6 kg was determined.

RESULTS

Table 1

Experience system

№	Crop type	Intermediate and repeated crop type	Mineral fertilizer standards		
			N	P	K
1	In a 1:1 crop rotation system cotton: wheat	Corn	100	70	50
2			150	100	70
3		Soya	100	70	50
4			150	100	70
5	Cotton+intermediate harvest	Rye	100	70	50
6			150	100	70
7	Cotton+intermediate harvest	Rye+ green peas	100	70	50
8			150	100	70
9	Wheat + repeated cropping	Corn	100	70	50
10			150	100	70
11	Wheat + repeated cropping	Soya	100	70	50
12			150	100	70

Note: mineral fertilizers are calculated only for intermediate and repeated crops.

Table 2

Field experiment Agrochemical properties of field soil

№	Soil layer, sm	Gumus	Total nitrogen	Total phosphorus	Mobile form mg/kg		
					$N\text{-}NO_3$	P_2O_5	K_2O
	Initial (before experiment)						
1	0-30	0,964	0,118	0,156	26,2	33,2	240
2	30-50	0,764	0,084	0,092	22,4	26,4	220
3	50-70	0,484	0,056	0,084	14,3	19,6	160
4	70-100	0.476	0.052	0,068	13,7	18,4	140
	Post-Experience (after one rotation, 4 years)						
1	0-30	1,0234	0,176	0,178	29,8	34,7	250
2	30-50	0,8432	0,121	0,118	24,9	28,5	230
3	50-70	0,5467	0,078	0,095	15,2	20,6	180
4	70-100	0,5213	0,050	0,789	14,7	19,5	160

Table 3

The amount of roots and angiz remaining in the soil during one rotation period, t/ga

№	At the expense of intercropping			Repeat crop			Total by rotation
	root	angiz	total	root	angiz	total	
1	-	-	-	2,4	3,8	6,2	6,2
2	-	-	-	3,1	4,2	7,3	7,3
3	-	-	-	1,2	1,8	3,0	3,0
4	-	-	-	1,9	2,3	4,2	4,2
5	1,8	2,2	4,0	2,6	4,2	6,8	10,8
6	2,1	2,5	4,6	3,4	4,4	7,8	12,4
7	2,1	2,4	4,5	2,7	4,3	7,0	11,5
8	2,3	2,7	5,0	3,6	4,7	8,3	13,3

9	2,3	2,6	4,9	2,3	2,6	4,9	9,8
10	2,5	2,9	5,4	3,1	3,9	7,0	11,4
11	2,6	3,2	5,8	1,3	2,1	3,4	9,2
12	2,9	3,6	6,5	2,1	2,6	4,7	11,2

DISCUSSION

Field experiments were carried out using a 2:2 crop rotation system to maintain and increase soil fertility (Table 1). In order to study this, as a control, we controlled the 1:1 rotation system, which is currently widely implemented in our republic. Experiment options consist of 12 options and are arranged in one tier. If cotton is planted in it for two years, wheat is planted for two years. Between the first and second year of cotton, which is the main crop, rye and rye+green peas are grown as intercrops. For two years, the wheat plant is planted in this field in a row, after wheat, a repeat crop is planted for two years. Corn and soybeans were selected as repeat crops. Also, mineral fertilizers for intermediate and repeated crops are given in two different rates. For the main crops, mineral fertilizers were fertilized according to the annual rate.

We took soil samples from the 0-30, 30-50, 50-70 and 70-100 cm layers of the soil before and after the experiment and analyzed them agrochemically. These data are presented in Table 2, in which humus, total nitrogen, total phosphorus and mobile forms of nutrients (N-NO3; P205 and K2O) were determined. Analyzing these obtained data, we observed that proper crop rotation and intercropping between main crops and subsequent planting of repeated crops improved the soil agrochemically. For example, the amount of humus in all studied layers of the soil increased from the beginning, respectively 1.023; 0.843; We found that it was 0.546 and 0.521%. It was also observed that the amount of total nitrogen and total phosphorus increased. This was especially evident in the amount of mobile nutrients in the soil. We found that the content of nitrate nitrogen increased from 26.2 to 29.8 mg/kg, mobile phosphorus increased from 33.2 to 34.7 mg/kg, and exchangeable potassium increased from 240 to 250 mg/kg in the tillage (0-30 cm) layer of the soil. In the course of the experiment, we calculated the amount of roots and shoots remaining in the field after one rotation (4 years) of crops in the field, and after sowing and harvesting the crops in between and after the main crops. We present these data in Table 3. According to him, in the control options 1-4, since the rotation of crops was one year, no intermediate crop was planted and only a repeat crop was planted after winter wheat. This table shows the amount of roots and shoots remaining after repeated crops. In options 1 and 2, where corn was planted as a repeated crop and mineral fertilizer was applied to it in the amount of N100R70K50 and N150R100K70 kg/ha, the amount of roots and shoots in two years was 6.2 and 7.3 t/ha, respectively. In the 3rd and 4th options, where soybeans were planted as a repeated crop and mineral fertilizers were used as above, their amount corresponded to 3.0 and 4.2 tons.

In the 5th and 6th variants studied in the experiment, rye was planted as an intercrop between cotton and mineral fertilizer was applied in the amount of N100R70K50 and N150R100K70 kg/ha. As a result, 4.0 t/ha and 4.6 t/ha of roots and shoots were left after intercropping in the 5th option, and 4.6 t/ha in the 6th option. In the 3rd and 4th years of the experiment, winter wheat was planted in this field, only corn was planted as a repeat crop, and two types of mineral fertilizers were used as above. As a result, 6.8 and 7.8 t/ha of roots

and tubers were left in two years. In one rotation period, the amount of roots and roots left by plants in options 5 and 6 was 10.8 and 12.4 t/ha, respectively.

In the next 7th and 8th variants of the experiment, as an intermediate crop between cotton crops, green peas were planted with rye, and the rates of mineral fertilizers were set as those of the previous variants. As a result, it was determined that the amount of roots and roots remaining in the soil after intermediate crops was 4.5 and 5.0 t/ha, respectively. Even when two years of repeated cropping after winter wheat, roots and stalks remain, they are 7.0; It was 8.3 t/ha. During one rotation period (in 4 years), a total of 11.5 and 13.3 t/ha of roots and shoots were achieved in the 7th option and 13.3 t/ha in the 8th option.

Options 9, 10, 11, and 12, where winter wheat was previously planted in the rotation, were followed by corn and soybeans. It was observed that the amount of roots and shoots left after the harvest of the repeated crop was slightly less in the 11th and 12th variants than in the 9th and 10th variants. For example, in options 9 and 10, the amount of root and root is 4.9, respectively; As for 7.0 t/ha, in options 11 and 12 it was 3.4 and 6.3 t/ha. It was observed that in these variants, when intercrops were planted after cotton, the amount of root and stem remaining from them was more than in the previous variants. Because cotton and catch crops are grown well after repeated cropping. As a result, it was achieved that a large amount of organic residue remains. According to these options, the amount of roots and shoots remaining from intermediate crops is 4.9, respectively, according to the options; 5.4; It was 5.8 and 6.5 tons. The amount of roots and shoots left during the rotation period is 9.8, respectively; 11.4; It was 9.2 and 12.8 t/ha.

CONCLUSION

In order to increase the productivity of existing irrigated lands in our republic, it is necessary to organize the rotation of agricultural crops. In the experiment, the 2:2 crop rotation system was studied, in which the rotation of agricultural crops was studied on a scientific basis. Crops are grown in rotation for 4 years, the main crops are cotton and winter wheat. If cotton is planted in one field for two years, the catch crop is planted once. After that, two years of winter wheat are planted, and after they are harvested, they are replaced by two years of corn and soybeans as a repeat crop. As a result, an increase in the amount of humus and all kinds of nutrients in the soil is achieved. In particular, it was observed that it increased even more in the tillage (0-30 cm) and under-tillage (30-50 cm) layers of this soil.

When the amount of roots and shoots remaining in the soil after the main, intermediate and repeated crops was studied, it was 9.2 t/ha to 13.3 t/ha during one rotation. The highest amount of roots and tubers was 13.3 t/ha in option 8, where cotton was first planted for two years, rye and chickpeas were planted as intermediate crops, and mineral fertilizer was applied in the amount of N150R100K70 kg/ha. Also, in option 12, where winter wheat is planted for two years, then soybean is planted as a repeat crop, then cotton is planted for two years, and mineral fertilizer is applied in the amount of N150R100K70 kg/ha to the intermediate and repeat crops, a total of 12.8 t/ha of organic residue remains.

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