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SOIL FERTILITY AND SECONDARY CROPS

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ABSTRACT
The soil-climatic conditions of the country create favorable conditions for obtaining grain and nutritious food for livestock twice a year from irrigated lands, sowing of secondary crops after winter wheat creates favorable conditions for improving soil fertility. Especially from legumes, mash, beans and soybeans not only increases soil fertility, but is also a nutritious fodder for livestock. In other words, in the experiment, it was revealed that in mash grain there is (15,2 c/ha) 1991.1 kg/ha, in mash hay – (32.2 c/ha) 1032.3 kg/ha, a total of 3023.4 kg/ha of the nutrient unit, and it was also determined 443.8 kg/ha and 89.8 kg/ha of protein, respectively, and a total of 533.6 kg/ha of protein.

KEYWORDS: *legumes, fertility, mash, soybeans, root and stubble residues, nutrient elements, nutrient unit, winter wheat, digestible protein, mobile nitrogen, mobile phosphorus, mobile potassium, gross nitrogen, corn, yield, meadow soil, hay harvest*

INTRODUCTION

As we know, from the first years of independence in our country, the land issue has risen to the level of state policy. Because the land is the greatest wealth of the people, the state, the source of our livelihood, the continuity of our descendants, the backbone of our country. At the same time, one of the most important factors in strengthening the independence of the republic, increasing its economic potential, bringing it into the ranks of strong developed countries is the efficient use of available land resources, maintaining, increasing and restoring soil fertility.

In order to use irrigated lands efficiently, it is necessary to develop and introduce into production agro-techniques for resowing a large number of grain, fodder, oilseeds and other crops.

Planting legumes as a secondary crop is important because these plants solve the problems of grain, protein and oil. In addition, the high annual temperatures in the country, the use of accelerated soil cultivation during cultivation of crops, as well as the cultivation of crops under irrigation conditions leads to the rapid depletion of the natural reserves of humus accumulated in the soil. As a result, the biological properties of the soil deteriorate, the microorganisms that cause bacterial and fungal diseases increase in the soil, and the yield of crops decreases. The role of alfalfa in maintaining and improving soil fertility, in obtaining high yields from crops, in effective crop rotation is endless. However, the area under alfalfa has declined sharply in recent years.

Therefore, the introduction of intermediate, secondary grain, leguminous crops into crop rotation systems serves to maintain and increase soil fertility.

In addition, the widespread introduction of intensive technologies (winter wheat sowing after repeated sowing) is a guarantee of high-quality grain production on irrigated lands. Growing grain on the basis of this technology requires the simultaneous growth and development of the plant to provide all the factors. The effective use of irrigated land throughout the year allows not only to increase

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productivity, but also to increase soil fertility, improve the dangerous conditions associated with this. However, agro-technical measures in the agriculture of the republic, in particular, the nutritional standards of cereals, are not determined depending on the amount of residual roots left by secondary crops in the soil. Therefore, we conducted field experiments to study the productivity of secondary crops (corn, mash, beans and soybeans) in the conditions of meadow soils of the Ferghana region and the effectiveness of the application of fertilizer norms in winter wheat planted after them.

The content of the issue. Field experiments were conducted at the Fergana branch of the Uzbek Cotton Research Institute. In the field experiment with repeated sowing, there are 5 options, each option with a total area of 720 sq. m and the estimated area of 360 sq. m, in the field experiment with winter wheat, 15 options were planted, the area of each plot is 240 sq. m, the calculation area is 120 sq. m. Experimental options were performed in 4 repetitions in 1 tier.

The soil-climatic conditions of the country create favorable conditions for obtaining grain and nutritious food for livestock twice a year from irrigated lands, sowing of secondary crops after winter wheat creates favorable conditions for improving soil fertility. [3,18 p]

In our study, we determined the nutrient units and the content of the digested protein in the grain, green mass (corn) and hay (mash, soybeans) repeated crops. It was revealed that in three years in corn grain there is (38,2 c/ha) 5042,2 kg/ha, in corn stem – (307,3 c/ha) 4837,3 kg/ha, a total of 9879,5 kg/ha of the nutrient unit, and 297,5 kg/ha and 338,9 kg/ha of protein, respectively, and a total of 636,4 kg/ha of protein.

It was revealed that in mash grain there is (15,2 c/ha) 1991.1 kg/ha, in mash hay – (32.2 c/ha) 1032.3 kg/ha, a total of 3023.4 kg/ha of the nutrient unit, and it was also determined 443.8 kg/ha and 89.8 kg/ha of protein, respectively, and a total of 533.6 kg/ha of protein.

Nutrient units and the content of digestible protein in grain (kg/ha), stems and hay of secondary crops

Option	Secondary crops	Grain yield, centner/ha	Hay yield c / ha	Feed unit per 1 ha		Total	Amount of digestible protein, kg		Total
				In grain	In stem and hay		In grain	In stem and hay	
1	Control	-	-	-	-	-	-	-	-
2	Corn	38,2	307,3	5042,2	4837,3	9879,5	297,5	338,9	636,4
3	Mash	15,2	32,2	991,1	1032,3	3023,4	443,8	89,8	533,6
4	Beans	12,3	12,3	1611,2	393,4	2004,6	357,9	39,3	397,2
5	Soybean	23,5	33,5	3078,4	1071,6	4150,0	687,2	93,5	780,7

It should be noted that during the growing season the corn plant absorbs 200-250 kg/ha of nitrogen from the soil, so its nutrient content and digestible protein content in grains and stems were found to be 6856.1 kg/ha and 102.8 kg/ha higher, respectively, than that of mash. This means that corn is a nutritious food for cattle.

The nutritional unit content in bean grain was 1611.2 kg / ha, and in hay (393.4 kg / ha), and the amount of digestible protein was 357.9 kg / ha and 39.3 kg / ha, respectively.

It should be noted that among the secondary crops, beans were characterized by low yields and low nutrient content, protein content.

It was revealed that in soybean grain there is (23.3 c/ha) 3078.4 kg/ha, in hay (33.5 c/ha) 1071.6 kg/ha, a total of 4150.0 kg/ha of nutrient units and,

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respectively, 687, 2 kg/ha and 93.5 kg/ha - a total of 780.7 kg/ha of digestible protein.

This means that for livestock, soybeans rank 2nd after corn in terms of nutritional value, but it is not possible to draw a complete conclusion without studying the stubble and roots residues that left in the soil.

It is known that any agricultural crop removes a significant amount of nutrients from the soil during the growing season. Once the plants have been harvested, a certain amount of nutrients remain in their root and stubble residues. In addition, the remnants of secondary crops quickly decompose and become inorganic matter. [2.20]

In our study, when we studied the amount of stubble and root residues in the soil of secondary crops planted for 3 years, after corn, an average of 17.2 c/ha of stubble residues and 35.0 c/ha of the root residues (a total of 52.2 c/ha) were found in a layer of 0-50 cm of soil.

It was found that mash plant can leave an average of 11.8 c/ha of stubble residues in 3 years and 29.8 c/ha and 3.9 c/ha of root (total 45.5 c/ha) residues, respectively, in layers of 0-30 and 30-50 cm of soil.

A relatively smaller number of indicators were obtained for bean residues - 8.9; 21.5 (0-30 cm) and 2.5 kg / ha (30-50 cm), a total of 32.9 kg / ha.

From soybean, an average of 10.4 c/ha of stubble, 32.0 c/ha of roots and a total of 42.4 c/ha of residues were observed per hectare.

When the amount of nutrients accumulated in the mass of these residues was studied, 20.8 kg of nitrogen, 9.5 kg of phosphorus and 12.8 kg of potassium were left after one hectare of corn. However, the corn plant absorbs 200-220 kg / ha of nitrogen. It is therefore necessary to pay attention to the norms of fertilization of the plant to be planted later. But it has been written before that corn is a great food crop for livestock.

It was found that the root and stubble residues of the mash plant accumulated an average of 71.0 kg/ha of nitrogen, 51.0 kg/ha of phosphorus and 60.9 kg/ha of potassium in an average of 3 years. This creates good nutritional conditions for the winter wheat that is then planted.[4,20 p]

So, among the secondary crops, the one that leaves the most nutrients is the mash plant. It was followed by soybeans, beans and finally corn.

In addition, there are reports in the literature that legumes accumulate biological nitrogen in the soil under the influence of nodule bacteria.

It was found that the root and stubble residues of beans and soybeans leave 30.7 kg of nitrogen, 11.8 kg of phosphorus, 21.0 kg of potassium and 45.7 kg of nitrogen, 16.7 kg of phosphorus, 30.5 kg per hectare of land potassium, respectively.

When we determine the nutrient content in the stubble and root residues left over from winter wheat sown after repeated sowing, it was found that more stubble and root residues were 15.5 and 19.3 kg/ha, respectively, compared to the control variant, when fertilizers N -200, P-140, K-100 kg/ha were used in moderate amounts, and the amount of NPK in them, respectively, 1570; 0.930 and 2.130%.

The root and stubble residues of winter wheat sown after corn were 35.3 c/ha. 1.715% of total nitrogen, 1.080% of phosphorus and 2.180% of potassium were found in them.

High results in this regard were obtained from winter wheat sown after mash. In the variant where fertilizers N-150, P-105, K-75 kg/ha were applied normally, the root and stubble residue was 39.8 c/ha. They were found to contain 2,000% total nitrogen, 1,200% phosphorus and 2,280% potassium.[6, 10p]

These values were 5.0 c/ha, 0.430%, 0.720% and 0.90%, respectively, compared with the control and 4.5 c/ha 0.285%, 0.130% and 0.100%, respectively, in wheat after corn.

In winter wheat grown after re-sowing mash, the fertilizer rate of N-150, P-105, K-75 kg/ha was acceptable, and a relatively large number of root and stubble residues were collected, which contained the more common NPK forms.

One of the main factors in maintaining and increasing soil fertility is the rotation of these crops. In addition, the application of optimal standards of organic and mineral fertilizers is also important in this regard. Therefore, the main goal of our research is to determine the effect of mineral fertilizer application rates on soil fertility on repeated plantings and winter wheat.

If the humus content in the (plowed) soil layer of 0–30 cm was 1.940% before the start of the experiment and 1.670% by 30–50 cm, then in the control variant (wheat planted after wheat) at the end of the experiment (after 3 years), the humus content was 1770 ; 1780 and 1760%, respectively (N-150, P_2O_5-105, K_2O-75 kg/ha; N-200, P_2O_5-140, K_2O-100 kg/ha and N-250, P_2O_5-175, K_2O-125 kg/ha). Relatively high values (1,780 %) were observed with the use of N-200, P_2O_5-40, K_2O-100 kg/ha. This is 0.160% less than the initial state. This means that if wheat is planted after wheat, the amount of humus in the soil is found to decrease from year to year. Even in the underlying plowing layer, a slight decrease in the humus content was observed, which is mainly associated with the mineralization of humus and the assimilation of plants.

In the variant in which winter wheat was planted for three years after corn, a decrease in the amount of humus from the initial state was observed, regardless of fertilizer norms. These fertilizer norms were observed when N-250, P_2O_5-175, K_2O-125 kg/ha were applied, but this was also 0.110% less than the initial condition and 0.05% higher than the control.

In the experiments, relatively high values of humus content were observed when winter wheat was planted after mosh plant and fertilizers N-150, P_2O_5-105, K_2O-75 kg/ha were applied. This is 0.050% higher than the initial state and 0.210% higher than the control; 0.160% higher than the corn variant.

As a result of planting winter wheat after soybean, the amount of humus was found to be higher than in the control, corn and bean planted options, but lower than in the mash planted options.

In the variant planted after soybean, the humus content was 0.009% higher than in the initial case (0-30cm), 0.169% higher than in the control, 0.119% higher than in the corn variant, and 0.026% higher than in the bean variant..

Changes in total nitrogen and phosphorus were also found to replicate humus data on variants.

This means that when moss is planted as a secondary crop and then winter wheat is sown, when fertilizers were applied in quantities of N-150,P_2O_5-105,K_2O-75 kg/ha, it was found that soil fertility improved compared to the initial state, this situation was also observed after soybean planting, when wheat was sown after corn (wheat), and a relative decrease in soil fertility was found.

Secondary crops also had a positive effect on the mobile nutrients in the soil. Studies have shown that the amount of nitrate nitrogen in the soil at the end of the growing season of winter wheat in 2013 (June) was 17.0 mg/kg in the initial state of nitrate nitrogen in the plowed layer (0-30 cm), whereas in the control version at the end the period of application of winter wheat, N-150, P_2O_5-105, K_2O-75 kg/ha and N-200, P_2O_5-140, K_2O-100 kg/ha and N-250, P_2O_5-175, K_2O-125 kg/ha were 17,8; 18,0 and 19.2 mg/ha, respectively, when used in moderation. In 2014 and 2015, these figures were 18.2; 19.5; 19.8 and 19.0, 20, 21.2 mg/kg, respectively. Thus, it was found that the amount of nitrate nitrogen increased slightly, even with increasing fertilizer standards, even when winter wheat was sown again after winter wheat, instead of re-sowing crops. In these options (1-3), relatively high amounts of nitrates in the norm of N-250, P_2O_5-175, K_2O-125 kg/ha used in option (2015) are 21.2 mg/kg, it was noted that assimilation for plant development increased by almost 4.2 mg / kg from the initial state.

In the case of winter wheat planted after corn (4-6), optimal conditions were created when N-250, P_2O_5-175, K_2O-125 kg/ha were used in moderation, and the nitrate content according to the years of research was 18.1, 19.0 and 21.8 mg/kg, respectively. This last (2015) figure was only 0.6 mg/kg higher than the control.

From the above data, we can conclude that if winter wheat is planted again after winter wheat, the nutritional conditions will be created as if it was planted after corn. In both cases, high amounts of nitrate nitrogen were detected when applied N-250, P_2O_5-175,K_2O-125 kg/ha. However, it should be noted that in the control, the norms of fertilizers N-200, P_2O_5-140, K_2O-100 kg/ha had an optimal effect. In all other variants, relatively large amounts of nitrate nitrogen were observed when high fertilizer standards were applied.

When we analyzed humus, a key indicator of soil fertility, it was concluded that the most favorable conditions were observed in winter wheat planted after the mash plant. However, a relatively high amount of nitrate nitrogen was observed at the end of the growing season of winter wheat planted after soybean production and in 2015 it was 25.5 mg/kg. In winter wheat planted after mash, the figure was 24.5 mg / kg. We express this situation by the fact that the plants assimilate more nitrate nitrogen in this (9 var.) variant.

To maintain and increase soil fertility, it is advisable to plant mash or soybean as a secondary crop in meadow loam soils, and then to plant winter wheat using optimal fertilizer standards.

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