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AUTUMN WHEAT TO FERTILITY PAST TENSE OF CROPS SOIL PRODUCTIVITY AND EFFECT

Бўриев Абдивахоб Абдираззақович
1Phd, доцент professor Термиз давлат муҳандислик
ва агротехнологиялар университети
abduvaxob.boriyev@bk.ru +99891-526-27-07

Abstract
In order to maintain and increase soil fertility in areas vacated from winter wheat, intercropping with cotton, corn, mung bean, peas, and rapeseed was studied, and their effect on winter wheat yield was studied. As a result of planting these intercropping crops, including plants that have a positive effect on soil fertility, such as mung bean, peas, and rapeseed, it was observed that winter wheat yield indicators also changed in a positive direction.

Keywords: Companion crop, soil fertility, mung bean, chickpea, rapeseed, winter wheat, root and shoot residues, growing season, biological nitrogen, sideration, yield.

Introduction

Substantiates the relevance and necessity of the research conducted. The goals and objectives, objects and subjects of the research are described, their correspondence to the priority areas of development of science and technology of the republic is indicated, the scientific novelty and practical results of the research are stated, the scientific and practical significance of the results obtained is revealed, information on the implementation of the research results in practice, published scientific works and the composition of the dissertation are provided.

The experiments were conducted in the conditions of typical irrigated loamy soils of the Yakkabag district of the Kashkadarya region, with a groundwater level of 8-10 meters, a mechanical composition of medium loam, and non-saline.

In this region, the humus content of the soil is up to 0.9-1.3%, and the parent rocks begin after a depth of one meter. The bulk density of the soil in the arable layer is up to 1.34 g/cm ^{3}, and the porosity is up to 52-55%. As a result of many years of irrigated farming, humus and carbonate salts have spread to the lower layers of the soil, and the amount of humus in the soil layers has decreased somewhat.

Yakkabag district is typical of the foothills of the region, with an average annual rainfall of 293.3 mm, an average annual temperature of 16.9 ^{0}C, and a useful temperature range of 2450-2800 ^{0}C. The average relative humidity of the air is 31-46%, the average daily temperature during the vegetation period is 22.2-24.5 ^{0}C, and the maximum temperature rises to 42-45 ^{0}C.

Scientific research work was conducted in 2014-2017 in the typical gray soil conditions of the "Razzaq ota Meiliyev" farm in the Yakkabag district of the Kashkadarya region, and field experiments were conducted to study the soil fertility of cotton, corn, peas, mung beans, and rapeseed crops, their agrophysical and agrochemical properties, and the yield and quality of winter wheat.

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Field experiments were conducted in 6 variants with 4 replications. Each plot in the experiment was 60 m long and 7.2 m wide, and the surface area of each plot was 432 m^2, of which 288 m^2 was taken into account . The experimental variants were systematically arranged in one tier.

The articles of the National Agrochemical, Agrophysical and Microbiological Research Institute of Tajikistan " Methods of Agrochemical, Agrophysical and Microbiological Research in Irrigated Cotton Regions" (1963) , " Workshop on Agrochemistry " (1985) , " Workshop on Agronomic Chemistry " (1968) , "Agrochemical Research of Soils" (1965), "Methods of Agrochemical Research" (1980) were published.

The following agrophysical analyses were conducted in the experiment. Soil water-resistant aggregates (%) were measured in 4 replicates from each variant in the 0-30 and 30-50 cm layer, at the beginning and end of the winter wheat vegetation period, using the N.A. Kachinsky method; soil bulk density (g/cm^3) in 4 replicates using the cylinder method according to N.A. Kachinsky; specific gravity (g/cm^3) in 4 replicates using the pycnometric method; soil porosity (%) was measured using the method of calculation based on soil bulk density and specific gravity; soil water permeability (m^3/ha) was measured in 4 replicates from each variant using the integral method.

In microbiological analyses of the effect of companion crops on soil microorganisms, bacteria were grown on meat peptone agar (HPA), fungi on Čapek's medium (Sreda Čapek's), and actinomycetes on starch-ammonia agar (KAA).

Agrochemical analyses of the experimental field soils were carried out using the following methods: the amount of humus in the soil composition was determined by the method of I.V. Tyurin (GOST-26213), GOST-13496-10; total nitrogen, phosphorus and potassium by I.M. Maltsev, L.P. Gritsenko, the amount of nitrogen in the form of nitrate by Grandval-Lyaju, the amount of nitrogen in the form of ammonium by Nessler reagent, mobile phosphorus by B.P. Machygin and exchangeable potassium by P.V. Protasov.

In the study, in the variant where cotton was planted as a companion crop, the average height of the main stem at the end of the growing season was 88.1 cm, the number of yield branches was 12.4, the number of panicles was 9.2, the number of cobs was 10.6, and the number of opened cobs was 3.8, and the average yield was 31.5 c/ha. When corn was planted for silage, it was found that the average plant height before harvesting was 215.3 cm, the number of leaves was 14.5, and the yield was 337.0 c/ha. When chickpea was planted for grain, the average height of the plant was 68.7 cm, the number of pods per plant was 43.7, the number of grains per plant was 59.3, the mass of 1000 grains was 312.3 g, and the yield was 17.5 c/ha. When planted, the average height of mush was 64.3 cm, the number of pods was 12.8, the number of grains per pod was 12.0, the mass of 1000 grains was 42.3 g, and the yield was 15.3 c/ha. It was determined that the average height of the previous rapeseed was 70.5 cm, the number of branches was 10.2, and the yield was 270 c/ha. under the conditions of typical irrigated gray soils of the Kashkadarya region, intercrops were placed on areas cleared from winter wheat, and that the amount of granular soil aggregates changed positively under the influence of appropriate intercrops.

At the beginning of the vegetation period of the previous crops, when samples were taken from the 0-10, 10-20, 20-30, 30-40, 40-50 cm layers of soil, the aggregates with a strong structure constituted 61.3-60.1-56.8-58.4-56.2%, while in the control variant, the aggregates in the sampled layers constituted 55.4-53.8-49.6-50.6-49.1%, which is 5.9-7.1% compared to the beginning of the

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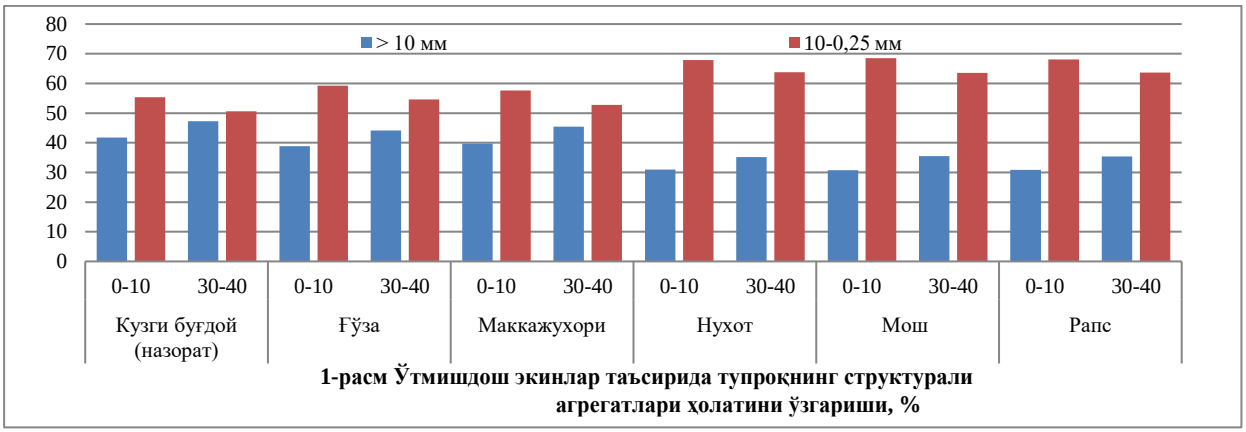
vegetation period, and decreased from 2.1-3.5% when cotton and corn were the predecessors to 3.7-5.6% at the end of the vegetation period. The optimal predecessor crops were chickpeas 67.9-67.2-64.3-63.8-63.0%, mung beans 67.9-67.2-64.3-63.8-63.0%, 68.3-67.5-64.7-63.5-62.5%, and after rape it was 68.1-67.3-64.6-63,762.9% and increased by 5.3-7.9% at the end of the growing season, compared to the control option, it increased by 1.2-15.1% at the end of the growing season observed



1-расм Ўтмишдош экинлар таъсирида тупроқнинг структурали агрегатлари ҳолатини ўзгариши, %

According to the results of our research, the structural aggregates of the soil in the 0-10 cm layer in the control version are >10 mm and 10-0.25 mm size aggregates are 41.8-55.9%, and in the 30-40 cm layer 47.2-50.6% reached, under the influence of acceptable predecessor crops (peas, mash, rape) >10 in the 0-10 cm layer mm size aggregates decrease to 11.1%, and 10-0.25 mm increase to 15.1%, and in the 30-40 cm layer, it is found to decrease by 11.7% and increase to 13.2% (1 - picture).

B.M.Kholikov, R.Tillaev, S.Chaldonboev [119; 67-70 b.] ma'lumotlariga karaganda, tajribada dastlab 0-30 cm kajm mass 0.03-0.05 g/cm ^{3} oshgan bolsa, kuzgi bugdoydan sung takrori ekin don – dukkakli ekinlardan sung amal boshiga nisbari 0.01-0.02 g/cm ^{3} silver.

The bulk density of the soil varied depending on the type of previous crop. When samples were taken from the 0-30 and 30-50 cm layers of soil, the bulk density of the soil in the arable layer before the previous crops was planted was 1.33-1.34 g/cm ^{3} , but after the winter wheat was planted, the bulk density varied depending on the type of previous crops, increasing by 0.03-0.05 g/cm ^{3} in the variants with wheat, corn and cotton , while in the areas cleared of peas, mung beans and rapeseed, the bulk density decreased by 0.01-0.04 g/cm ^{3} compared to the initial amount (Fig. 2).

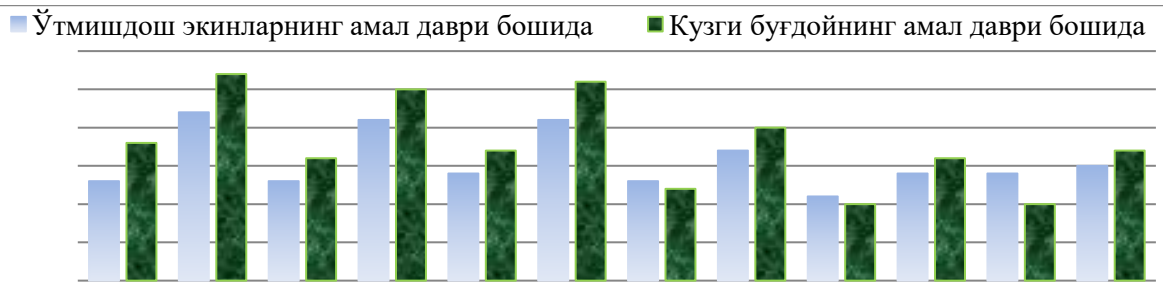


Fig. 2. He saw the cannon of neighboring crops Effect of volume on mass, g/cm ^{3}

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When soil porosity was studied in the 0-30 cm and 30-50 cm layers under the influence of intercrops, it was observed that, in the control variant, before intercrops were planted, the 0-30 cm layer had a porosity of 50.2%, while after wheat planting it had a porosity of 48.7%, a decrease of 1.5% in soil porosity (Figure 3).

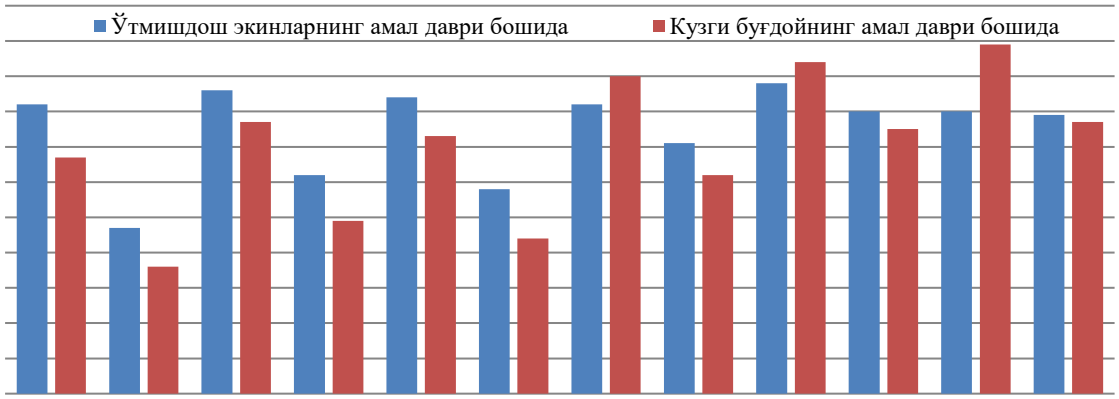

Figure 3. Soil compaction under the influence of intercropping the change in the porosity , %

The experiment found that in the 30-50 cm layer, the control variant had a relative abundance of 46.7% before planting, while after planting winter wheat it had decreased to 45.6%, i.e. by 1.1%. In variants 2-3 of the experiment, when cotton and corn were intercropped, a decrease in the 0-30 and 30-50 cm layer before the intercrops was observed from 0.9-1.1% to 1.3-1.4. This was observed after the intercrops of peas and mung beans in the 0-30 cm layer by 0.8-0.6%, after rapeseed by 1.9%, and in the 30-50 cm layer by 0.9-0.5-0.2%. Under the influence of intercrops, depending on the amount of nutrients left by their root and shoot residues, the porosity of the soil changed positively in the variants with leguminous-grain and rapeseed intercrops.

The water permeability of soil is directly dependent on its mechanical composition, porosity, and most importantly, its bulk density, as well as the terrain of the land.

In the researches, the initial indicators of the previous crops at the beginning of the growing season were 533 m^3/ha, while in the winter wheat (control) option, at the end of the growing season, this indicator was 430 m^3/ha for 6 hours, and it was found that 103 m^3/ha less water was transferred. in the planted version, the water permeability is slightly higher, 624 m^3/ha in 6 hours , and transferred 91 m^3/ha more water than the control option, while at the beginning of the growing season it was 533 m^3/ha. When autumn wheat was sown after wheat, towards the end of the growing season, it was observed that 77 m^3/ha of water was used less (Fig. 4).

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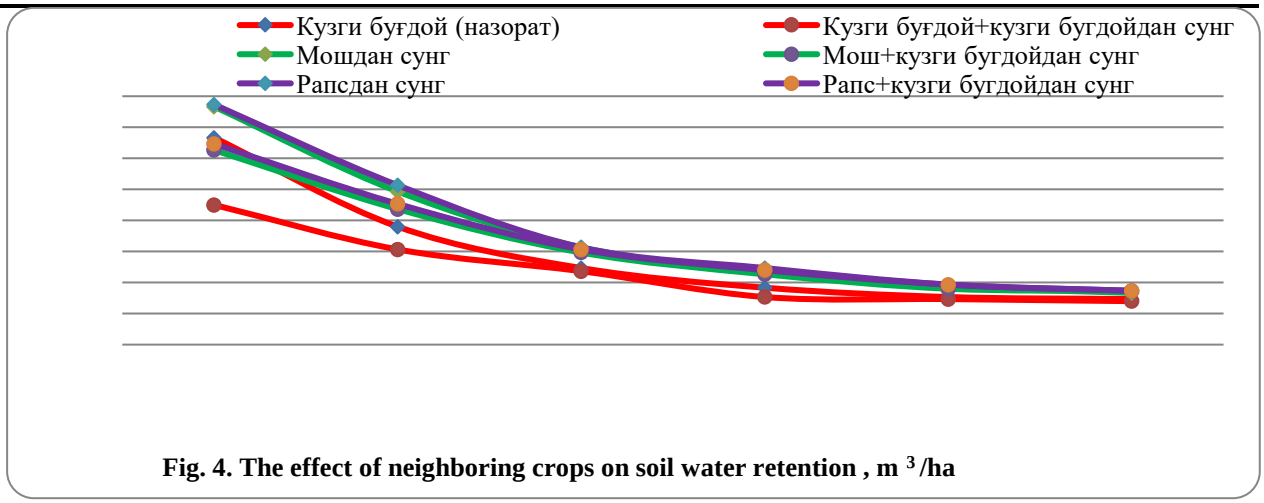

Fig. 4. The effect of neighboring crops on soil water retention , m ^{3} /ha

that the corn-planted variant had a water permeability of 617 m3/ha over 6 hours , but it also had a water permeability of 84 m3/ha more than the control .

Also, in the experimental variants planted with chickpeas and mung beans, a positive change in this indicator was observed, and it was found that 626-648 m ^{3} /ha of water was passed within 6 hours, that is, 93-115 m ^{3} /ha more water was passed than in the control. In the variant planted with rapeseed, the water permeability also changed significantly in the positive direction, and it was found that 664 m ^{3} /ha of water was passed within 6 hours, that is, 131 m 3 /ha more water was passed at the end of the growing season than at the beginning of the growing season .

In the studies, it was observed that in the control variant planted with winter wheat, the amount of root and shoot residues was 3.56 t/ha, when the previous crop was cotton, it was 3.73 t/ha, when the previous crop was corn, it was 4.27 t/ha, when peas and mung beans were planted, it was 2.55-2.14 t/ha, and in rapeseed, the total amount was an average of 5.14 t/ha (Figure 5).

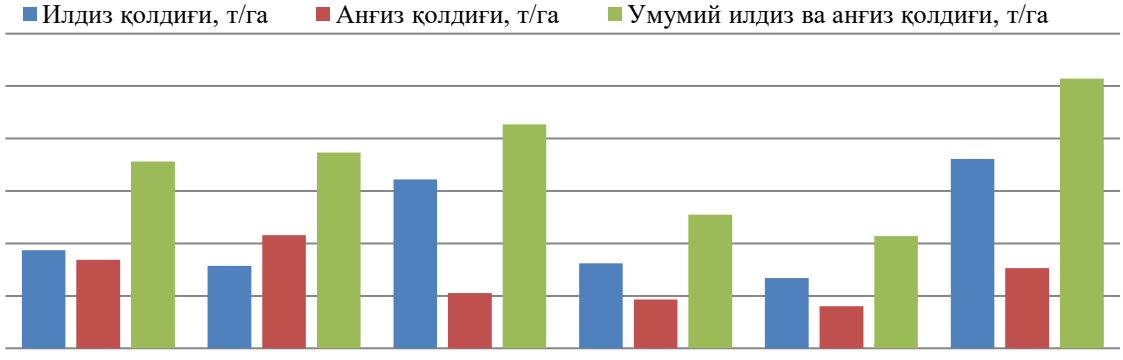

Figure 5. Amount of root and shoot residues from previous crops, t/ha

In the studies, in the winter wheat (control) variant, the average root and shoot residues were 3.56 t/ha, and the return of nutrients was observed: N-20.47 kg/ha, P-11.30 kg/ha, and K-30.05 kg/ha. When cotton and corn were planted from the previous crops, the average total root and shoot residues were 3.73-4.27 t/ha.

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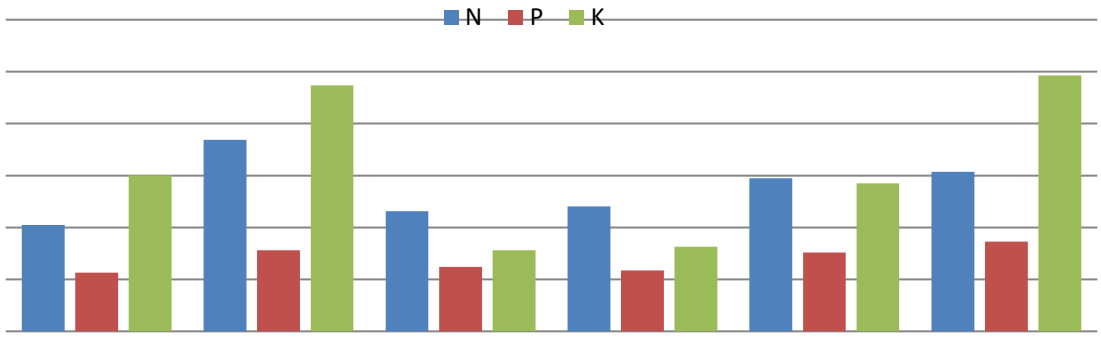

Figure 6. Past crops Amount of nutrients returned to the soil due to root and shoot residues, kg/ha

The residues accumulated and returned nutrients to the soil in the amount of N-36.89-23.11 kg/ha, P-15.62-12.40 kg/ha, and K-47.37-15.61 kg/ha. After the previous crop, legumes and grains, peas and mung beans, it was observed that nutrients were returned to the soil in the amount of N-24.03-29.48 kg/ha, P-11.71-15.18 kg/ha, and K-16.27-28.47 kg/ha.

In the rapeseed-planted version of the experiment, it was found that the root and shoot residues left in the soil amounted to 5.14 t/ha, returning nutrients N-30.72 kg/ha, P-17.26 kg/ha, and K-49.27 kg/ha (Figure 6).

The data show that, regardless of the differences in crop types, the positive effect of previous crops on soil fertility was evident.

In the experiment, when the taxonomic groups of soil microorganisms in the 0-30 and 30-50 cm soil layers were studied, bacteria, nitrogen fixers, nitrifiers, and physiological groups of fungi and actinomycetes were found in the fields that were previously cleared of winter wheat. The number of bacteria was 35.5-23.2 million/g, nitrogen fixers 23.5-17.3 million/g, nitrifiers 48.3-37.0 thousand/g, fungi 36.4-22.2 thousand/g, and actinomycetes 29.3-17.6 million/g.

In the 0-30 and 30-50 cm layers in the Nazorat variant, bacteria soni 41.4-26.2 million/g, nitrogen fixers 35.1-24.3 million/g, nitrifiers 46.6-34.1 thousand/g, fungi 38 ,9-25.1 mm/g, actinomycetes 24.5-18.2 million/g. Leguminous crops 53.3-50.3 million/g, nitrogen fixers 48.0-50.2 million/g, nitrifiers 65.6-64.8 thousand/g, larvae 50.8-50.8 mm/g, actinomycetes with an abundance of 31.4-32.8 million/g.

The number of bacteria in the 0-30 and 30-50 cm layers of the 0-30 and 30-50 cm layers was 76.8-70.0 million/g, nitrogen fixers were 78.7-78.1 million/g. 8 million/g 44.7 to 43.3 million/g, nitrifiers from 86.5 to 82.2 thousand/g, 62.8 to 60.7 thousand/g, straws from 68.1 to 66.3 thong/g, 54, 6-52.1 mm/g, actinomycetes from 58.7-54.4 million/g 38.6-36.2 million/g, compared to the Nazarene, the microorganisms of the 2-3 March were postponed. Bacteria 72.5-5.2.2 million/g, nitrogen fixers 71.4-41.6 million/g, nitrifiers 78.6-56.4 thousand/g, fungi 66.0-44.2 ping/g, actinomycetes 52.9-33.6 million/g, while the bacteria relative to nazarene were 31.1-26 million/g, nitrogen fixers 36.3-17.3 million/g, nitrifiers 32-22.3 million/g in the 0-30 and 30-50 cm layers. d, strawberries 27.1-19.1 thousand/g, actinomycetes 28.4-15.4 million/g.

of the dissertation, entitled "The influence of intercrops on the growth, development and yield of winter wheat" , the influence of factors on the germination, accumulation and growth, development, ripening of winter wheat sown in variants, yield and grain quality indicators were

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studied in detail. This work was carried out on the basis of phenological observations, biometric measurements, analytical analyses. Based on the results obtained, it was possible to draw appropriate conclusions.

In the experiment, it was observed that the germination period was 7-9 days in the variants planted with winter wheat (control) and all intercrops. The germination-heading period was 20-21 days, the tuberization period was from 162 to 164 days, and the period to full ripening was 222-226 days. In general, it was found that there was no significant difference in the development periods between the variants under the influence of intercrops.

that the leaf area of winter wheat at the beginning of the spring vegetation period was 9.9-13.6 thousand m2 / ha, at the beginning of the tillering phase it was 16.7-19.2 thousand m2 / ha, at earing it was 31.9-40.6 thousand m2 / ha, at milk ripening it was 6.6-9.6 thousand m2 / ha, and under the influence of relatives it was 0.1-3.0 thousand m2 / ha higher, which ensured higher grain yields from crops.

According to the results of the studies, in the control variant, the total number of stems was 526.1 units/m ^{2} , and the productive stems were 387 units/m ^{2} , and under the influence of the predecessors, the total number of stems increased from 535.3-587.4 units/m 2 to 9.2-61.3 units/m 2 compared to the control , and the number of productive stems increased from 394-452 units/m ^{2} to 7-65 units/m ^{2} compared to the control (Figure 7).

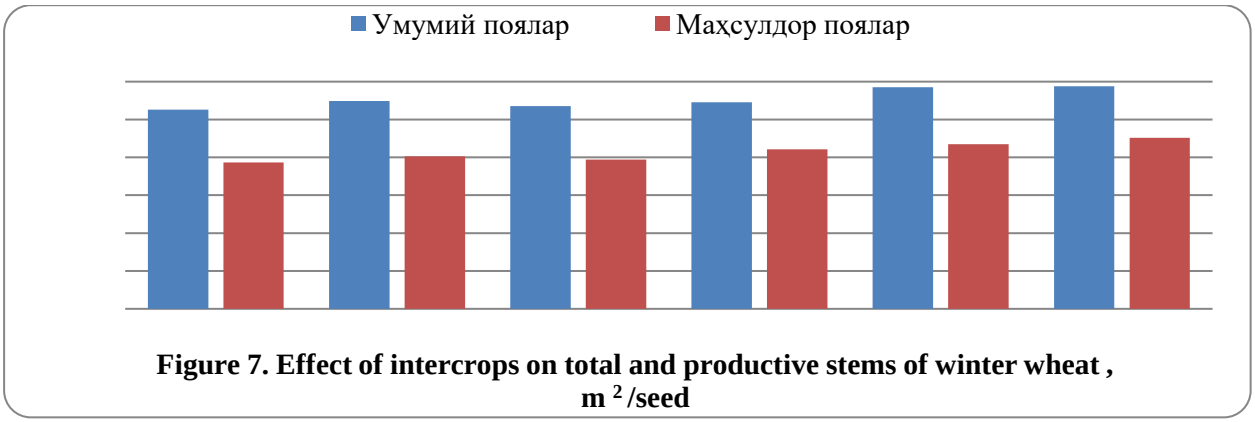

Figure 7. Effect of intercrops on total and productive stems of winter wheat , m ^{2} /seed

It was found that the plant height was 90.7 cm in the control variant, while under the influence of companion crops it was 94.5-98.1 cm, that is, 3.8-7.4 cm higher than the control.

In field experiments, due to the planting of the lodging-resistant winter wheat variety "Tanya" and favorable weather conditions, lodging of winter wheat by the end of the growing season was not observed in all variants.

In our studies, when the formation of the root system under the influence of intercrops was studied, it was found that in the control variant, the total was 185.64 g, while after intercrops cotton and corn, the root system was 199.09-197.41 g, which is 13.45-11.7 g higher than the control, and in the variants planted with legumes and rapeseed, it was 210.53-216.88-216.30 g, which is 24.89-31.24-30.66 g more than the control.

During the field experiments (2014-2017), the average grain yield of winter wheat after intercrops in the control variant was 49.7 c/ha, while the highest yield indicators were observed after intercrops with legumes, peas, mung beans, and rapeseed, reaching 60.0-65.1 c/ha, indicating an

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additional grain yield of 10.3-15.4 c/ha compared to the control (Table 1).

1- Table Effect of previous crops on grain yield of winter wheat, ts/ha

No.	Options	Years			Average
		2015	2016	2017	
1	Winter wheat (control)	48 , 6	49.3	51.2	49.7
2	Cotton	56.1	55.2	54.6	55.3
3	Corn	53.6	51.7	54.0	53.1
4	Nuts	58.7	59.8	61.5	60.0
5	Mash	60.5	62.1	64.3	62.3
6	Rapeseed	60.2	63.7	71.4	65.1
	EKF_{05} =	2.85	3.0	3.12	
	$S_{\bar{x}}$ (%)=	2.35	2.47	2.48	

In the variant planted with control winter wheat, the nature of grain was 762 g/l on average, vitreousness was 54.6%, protein was 12.1%, gluten was 26.3%, and the overall breadness score was 3.2 points, while under the influence of previous crops it was 772-795 g. /l, vitreous 58.8-63.1%, protein content 13.9-14.2%, gluten 27.1-27.5%, total bread quality was 3.6-3.8 points. The highest indicators were observed under the influence of intercrops, with grain quality increasing by 10-33 g/l, vitreous content by 4.2-8.5%, protein content by 0.6-2.1%, and gluten content by 0.2-1.2% compared to the control. It was determined that he had gone.

In the experiment, in the control variant, the spike length is 8.6 cm, the number of spikes in one spike is 14.2, the number of grains in one spike is 36.8, the mass of grain in one spike is 1.31 g, and the mass of 1000 grains is 35.6 g. was determined to be

Due to the influence of predecessors, compared to the control option, the spike length is 0.6-1.2 cm, the number of spikes in one spike is 0.9-1.5, the number of grains in one spike is 02-04, the mass of grain in one spike is 0.04-0.14 g , it was observed that the mass of 1000 grains increased to 0.5-36 g.

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