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THE INFLUENCE OF AGROTECHNICAL FACTORS ON SOIL PROPERTIES CARRIED OUT IN THE 2:2 SYSTEM OF ROTATION CROPPING

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Annotasiya. Navbatlab ekishning 2:2 tizimida asosiy ekinlar kuzgi bug‘doy va g‘o‘za ikki martadan ekiladi. Shuningdek, kuzgi bug‘doydan keyin yozda tuproqqa turli usullarda ishlov berilib, ikki marta takroriy ekin ekiladi. Ikkinchi yilgi takroriy ekin hosili yig‘ishtirib bo‘linganidan keyin erta bahorda g‘o‘za ekilgunga qadar va ikkinchi yilgi g‘o‘za ekilgungacha sideratlar ikki marta ekiladi. Natijada, o‘simliklarning qoldirgan ildiz va ang‘izi tuproqning hajm massasini dastlabkidan 0-50 va 0-70 sm da bir xil 0,03 g/sm^3 ga, 0-100 sm qatlamda esa 0,02 g/sm^3 ga kamayishi ta’minlanadi. Shu bilan birgalikda tuproqning g‘ovakliligi ortib, uning miqdori 0-50 sm da 48,9%, 0-70 sm da 48,1 va 0-100 sm da 47,4% bo‘lishiga erishildi. Tuproqning bu xossalarini yaxshilanishi suv o‘tkazuvchanligini ham ortishiga olib keldi. Tajribaning 6-soat mobaynida tuproqning suv o‘tkazuvchanligi 619,3 m^3/ga ga yetishi ta’minlanadi.

Kalit so‘zlar: tuproq, hajm massa, g‘ovaklik, suv o‘tkazuvchanlik, kuzgi bug‘doy, g‘o‘za, takroriy ekin, makkajuxori, mosh, soya, sideratlar.

Аннотация. В системе севооборота 2:2 основные культуры озимая пшеница и хлопчатник высеваются дважды. Также после озимой пшеницы почву летом обрабатывают по-разному, а повторный посев высевают дважды. Сидераты высевают дважды ранней весной после сбора повторного урожая второго года и перед посевом хлопчатника второго года. В результате объемная масса корней и пахотного слоя, оставляемая растениями, уменьшилась с начала на те же 0,03 г/см^3 в слоях 0-50 и 0-70 см и на 0,02 г/см^3 в слоях 0-100 см. При этом увеличилась пористость почвы, и ее количество составило 48,9 % на 0-50 см, 48,1 % на 0-70 см и 47,4 % на 0-100 см. Улучшение этих свойств почвы привело и к увеличению водопроницаемости. В течение 6-го часа опыта обеспечивают достижение водопроницаемости почвы 619,3 м^3/га.

Ключевые слова: почва, объемная масса, пористость, водопроницаемость, озимая пшеница, хлопчатник, повторный посев, кукуруза, маш, соевые сидераты.

Annotation: In the 2:2 system of crop rotation, main crops winter wheat and cotton are planted twice. Also, after winter wheat, the soil is cultivated in different ways in the summer, and two repeated crops are planted. Siderates are planted twice in the early spring after the second year's repeat crop is harvested and before the second year's cotton is planted. As a result, it is ensured that the volumetric mass of the soil left by the plants is reduced by the same 0.03 g/cm3 in the 0-50 and 0-70 cm layers, and by 0.02 g/cm3 in the 0-100 cm layer. At the same time, the porosity of the soil increased, and its amount was 48.9% at 0-50 cm, 48.1% at 0-70 cm, and 47.4% at 0-100 cm. The improvement of these properties of the soil also led to an increase in water permeability. During the 6th hour of the experiment, the water permeability of the soil is ensured to reach 619.3 m3/ha.

Key words: soil, volume mass, porosity, water permeability, winter wheat, cotton, repeated crop, corn, mung bean, soybean siderates.

In our republic, in order to fully satisfy the population's needs for food and other agricultural products and raw materials for industry, comprehensive measures have been taken to rationally use the existing land and water resources, to continuously grow 2-3 times of high and quality crops from irrigated lands during the year, and to increase the volume of products. activities are being carried out. For this purpose, it is important to determine optimal methods

and periods of cultivation of irrigated soils and to restore, preserve and regularly increase soil fertility through the correct selection of repeated crop types, as well as effective use of available resources. In this regard, it is important to carry out research on the yield of repeated crops depending on the methods of summer soil cultivation, the changes in the aggregate composition of the soil, water-physical, agrochemical properties depending on the methods of cultivation, periods and types of repeated crops.

F.M.Khasanova and I.T.Karabaev [13; In experiments 248-250-b], the effect of summer tillage on soil moisture and water consumption was studied. According to the experimental results of the authors, in the observations after each irrigation of soybeans and corn planted after winter wheat, the longest retention of moisture in the 0-50 cm soil layer was observed in the options where the soil was worked with a rotor cultivator and the land was plowed to a depth of 28-30 cm. It was also determined that the soil of the fields planted with repeated soybeans and corn after wheat, regardless of the technology of tillage and planting method, was not compacted.

According to I.Zh.Sulaimonov and others [10; 140-144 б.] in order to increase the efficiency of irrigated land use as a second crop of succeeded suctions, it is best to plant 50-75% of its seeds with seeds (respectively, 84% and 89%), so as to obtain full seedlings of seeds.

M.Mukhammadjonov [9; p. 225] studied the influence of seed sowing methods on soil physical properties, in particular volume weight and porosity, agrophysical and water properties, and appropriate recommendations were developed.

F.Kh. Omanillaevich [12; p. 321-325] reports that micro-macroelements and calcium in chicken eggshells are appropriate to be applied to amaranth medicinal plants as various fertilizers and bioactive compounds. When applied to amaranth, it creates conditions for preserving the medicinal properties and obtaining a clean product.

Researcher K.D. Borskova [1; p. 20-25] in the experimental results (SO2) it is scientifically based that the concentration of carbon dioxide gas depends on soil density, humidity, and temperature. According to the author's conclusion, the plowing depth in the main soil tillage technology created a different structure of the plowed layer, led to different distribution of organic residues in the soil layers, and as a result created different air patterns. Also, during the entire growth period, carbon dioxide gas release and increase in the soil environment (SO2) occurred in the variants plowed in a double-layered plow at a depth of 30-40 cm, and in the variants that received powder and agate.

According to I. Zh. Sulaimanov et al. [11; 25-27 б.] after the winter wheat repeated sowing of beet crops will have a positive effect on the size of the soil and serve to increase its productivity. Although this crop, which has been studied in practice, yields relatively good results, it is important to select the optimal sowing standards for all repeated crops.

A.A. Joraev, I.J.Sulaimonov [4; 53–57 b], in order to increase the efficiency of the use of irrigated land, it is desirable to plant sugar beet as a repeat crop after harvesting winter wheat. 100% soaking and encapsulation of replanted sugar beet seed ensures full germination. In order to get a high yield from the obtained flat seedlings, it is necessary to set the norms of mineral fertilizers (N200P150K200 kg/ha). As a result, good growth and development of sugar beet is achieved, and the root fruit yield from one hectare is ensured to be 370 s/ha.

According to R.K.Kurvantoev and M.M.Turgunov [5], land leveling with laser devices leads to improvement of soil physical properties. In particular, it ensures that the volume mass of the soil decreases and its porosity increases.

Therefore, we planned to conduct scientific research in this regard. The experimental system is presented in Table 1, with 12 options arranged in 4 rows, in one tier. There are 48 plots in the experiment, the total area of each plot is 360 m^2, the area of consideration is 180 m^2, and the total area of the experiment is 17280 m^2.

Our research was conducted in the conditions of light gray soils of Fergana region. Gray soils are located at an altitude of 400-1300 m above sea level, and in the southern regions it reaches 1500-1600 m. As a result of long-term use of irrigated gray soils in irrigated agriculture, an agro-irrigation layer with a thickness of 0.6-1 m or more was formed, and the morphological features typical of gray soils have almost disappeared. According to the mechanical composition, the soils are mainly medium and light sandy loams, sandy loams are rare. In some places, from 0.5-1.2 m, pebbles or jagged limestones are laid, and in the submontane

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plains, they are sometimes skeletal. Depending on the diversity of the mechanical composition of the arable layer of soils and the diversity of agrotechnics, the amount of humus varies widely from 0.79 to 0.98%, sometimes up to 1.75%. Depending on the lower layers of the profile, its amount decreases by 0.5-0.6%, the amount of humus in washed soils is also 0.5-0.6%. The total nitrogen content of humus in gray soils is high, and the ratio of carbon to nitrogen (S:N) is 7:9. The experimental field consists of light gray soils with medium loam mechanical composition, old irrigated, non-saline.

The experimental system is presented in Table 1, 12 options are placed in 4 rows, in one tier, the total area of each plot is 360 m^2, and the area of consideration is 150 m^2. The total area of the experiment was 1,728 hectares.

In the experiment, winter wheat should be planted according to the rotation system (2:2), after harvesting the winter wheat crop, the soil is cultivated in different ways in summer and autumn. Corn, mung beans and soybeans were planted as a repeat crop on the summer tilled site. After the harvest of the repeated crops in the fall, winter wheat was planted again in the second year. After the second year's winter wheat crop was harvested, it was cultivated according to the previous year's system and a repeat crop was planted again. After their harvest in the fall, rye and rapeseed were grown together as siderate crops until early spring. In early spring, the siderates were crushed and thrown on the ground and plowed in the same way. Instead, the seed of first-year cotton was planted under the rotation system. After the cotton crop was harvested in the fall, rye and rapeseed were planted as siderates. In early spring, the siderates are crushed and thrown on the ground, plowed and replaced by seed for the second year's cotton crop.

Before and at the end of the experiment, volume mass, porosity, and water permeability were determined in the 0-100 cm layer of field soil. Also, in the experiment (winter wheat, repeated crops, siderates, cotton), monitoring of the growth and development of plants and calculations were carried out based on the tasks set on the basis of the plan. All observation, analysis and calculations were adopted in UzPITI «Methods of conducting field experiments» [2; p. 147], « Методика полевых опытов с хлопчатником» [7; 233-p.], « Методы агрохимических, агрофизических и микробиологических исследований в полевых хлопковых районах» [6; 187-p.] soil properties, agrochemical analysis was carried out. B.A. Dospekhov [3; p. 352] « Методика полевого опыта» application was used.

In the experiment, 100% of the planned phosphorus and potassium fertilizers were applied before plowing the field, since the mineral fertilizers were at the same rate. Here, phosphorus and potassium fertilizers planned for repeated crops were added to the winter wheat fertilizer rate in autumn. Nitrogen fertilizers were applied as fertilization before planting (20%) and the rest was given as feeding at different times depending on the plant's nutrient requirements.

Table 1

Experience System (2020-2022)

option	Tillage			Repeat crops (2020-2022)	Main crop (2021-2022)
	Method	Term	depth, cm		
1	Basic driving	In the summer	32-35	-	cotton
2	The main drive, take a nap	In the summer	32-35	-	-“-
3	Basic driving	In the fall	32-35	-	-“-
4	The main drive, take a nap	In the fall	32-35	-	-“-
5	Driving without tipping over	In the summer	20-25	-	-“-
6	Driving without tipping over	In the summer	20-25	Corn	-“-
7	Driving without tipping over	In the summer	20-25	Mosh	-“-

8	Driving without tipping over	In the summer	20-25	Shadow	-“-
9	Drawing	In the summer	15-18	-	-“-
10	Drawing	In the summer	15-18	Corn	-“-
11	Drawing	In the summer	15-18	Mosh	-“-
12	Drawing	In the summer	15-18	Shadow	-“-

In the summer before the experiment (plowing the land freed from winter wheat) and at the end of the second-year cotton period (after the cotton harvest) according to the 2:2 rotation system, bulk density, porosity and properties of water permeability were determined.

According to the results of the study (Table 2), the volume mass in the 0-50 cm layer of the soil during the initial observation (before the experiment) corresponded to 1.41 g/cm^3. We can see that the volume mass increased as the soil of the experimental field fell into the lower layer. This can be explained by the fact that the volume weight in the 0-70 cm layer is 1.42 g/cm^3 and in the 0-100 cm layer it is 1.44 g/cm^3. In our observations at the end of the experiment (after 4 years), it can be observed that the volume mass of this soil has decreased significantly. This is influenced by the amount of roots and shoots left in the soil during the experimental years. The soil is enriched with organic matter as a result of the rotting of the roots and roots of the plant. This causes the density of the soil to decrease as a result of the volumetric mass. Depending on how the plant root system is formed, the volume and mass of the soil layers have changed. According to the information obtained at the end of the experiment in the 0-50 cm layer of the soil, the volume mass of the soil decreased to 1.38 g/cm^3, and a reduction of 0.03 g/cm^3 was achieved from the beginning. In the next layer of the soil (0-70 cm) the decrease in volume and mass corresponded to 0.03 g/cm^3. This can be estimated by the change in the 0-50 cm layer of the soil and by the penetration of the roots of some plants (cotton, corn) planted in the experiment up to 0-70 cm. Also, the mass of the soil in the 0-100 cm layer has decreased by 0.2 g/cm^3. This reduction is mainly due to the reduction of previous layers. Because it can be seen from the table that the volume mass of the soil in the layers of 70-80, 80-90 and 90-100 cm has not decreased from the beginning.

Table 2

Bulk density and porosity properties of experimental field soil at the beginning and end of the experiment (before tillage)

Soil layer, cm	Initial		At the end of the experiment	
	Volume weight, g/cm^3	Porosity, %	Volume weight, g/cm^3	Porosity, %
0-10	1.37	49.3	1.36	49.6
10-20	1.39	48.5	1.37	48.9
20-30	1.41	47.8	1.37	48.3
30-40	1.43	47.0	1.40	48.2
40-50	1.45	46.3	1.41	47.8
50-60	1.44	46.0	1.40	47.2
60-70	1.46	45.9	1.43	47.0
70-80	1.45	45.3	1.45	46.3
80-90	1.50	44.5	1.50	44.8
90-100	1.55	43.6	1.55	43.3
0-50	1.41	47.8	1.38	48.9
0-70	1.42	47.4	1.39	48.1
0-100	1.44	46.7	1.42	47.4

During the study of the volume mass of the soil of the experimental field, we also studied its porosity level. In the initial observations before the experiment, it was observed that the porosity of the soil was 47.8% in the 0-50 cm layer. We can see that the porosity in the upper part of the soil (0-10 cm) is the highest at 49.3%, at 10-20 cm it has decreased to 48.5%, and at 20-30 cm it has decreased to 47.8%. It was found that the porosity in the 0-70 cm layer of the experimental field soil is 47.4%. Air permeability in this layer was slightly different from that in the 0-50 cm

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layer. However, the porosity of the 50-60, 60-70 cm layers corresponded to 45.9 and 45.3%, respectively, and the porosity was higher than that of the 0-50 cm layer. It should also be noted that the porosity in the 0-100 cm layer was 46.7%, while in the 90-100 cm layer it was 42.6%. In the studies after the experiment, we can see that the porosity of the soil has increased even more than before. It should be noted that the soil porosity is relatively low in the upper layers (0-10, 10-20 cm), respectively 0.3; We can see that it has increased by only 0.4%. This can be attributed to tillage methods and crop spacing. However, if the porosity in the 0-50 cm layer was 1.1% higher than the initial one, it can be started with a decrease of 1.2% in the 30-40 cm layer, and 1.5% in the 40-50 cm layer. Also, the porosity in the 0-70 cm layer of the soil is 48.1%, which is an increase of 0.7% from the beginning. It can be considered that it increased by 1.2% in the 50-60 cm layer and 1.1% in the 60-70 cm layer. It was found that the porosity in the 0-100 cm layer of the soil increased by 0.7% from the beginning to the end of the experiment. Nevertheless, its amount in the 70-80, 80-90 and 90-100 cm layers of the soil is 1.0, respectively; 0.3; increased by only 0.3%.

The agrotechnical measures and the amount of roots and roots left from the crops in the experiment also had an effect on the water permeability of the soil (Table 3). The water permeability of the soil is directly related to the density, volume mass and porosity of the soil. The density and volume mass of the soil decreases, and the increase in porosity increases its water permeability. Therefore, during the experiment, the influence of the agricultural crops planted in the experiment, the agrotechnical measures applied to them, and the roots and shoots left by them were studied. For this, the initial (before the experiment) water permeability of the experimental field was determined. According to the obtained data, initially the water permeability of the soil was 509.0 m^3/ha in the 6th hour. in which the water permeability decreased from the 1st hour (202.7 m^3/ha) to the following hours (32.0 m^3/ha at the 6th hour). This can be explained by the fact that the soil becomes denser as it goes to the lower layer of the soil. At the end of the experiment, we can see that the water permeability of the soil has increased significantly. It is also worth saying that water permeability increased in each of the experimental periods. We can see that it reached 619.3 m^3/ha and increased by 110.3 m^3/ha compared to what we determined before the experiment. Also, it was found that it increased by 4.1 and 7.6 m^3/ha in the 5th and 6th hours of the experiment.

Table 3

Water permeability characteristics of the soil of the experimental field at the beginning and at the end of the experiment, m^3/ha

Duration of experience	Кузатув соатлари						Total in 6 hours
	1st hour	2nd hour	3rd hour	4th hour	5th hour	6th hour	
Initial	202.7	90.8	77.6	56.9	49.0	32.0	509.0
At the end of the experiment	286.5	93.3	81.6	65.4	53.1	39.6	619,3
the difference	83,8.0	2.5	4,0	8,5	4,1	7,6	110,3

In conclusion, it can be said that in the 2:2 system of crop rotation, the methods of tilling the soil in the summer after harvesting the autumn wheat crop, planting repeated and siderate crops, followed by cotton, have an effect on the properties of the root and the soil remaining in the soil. It is ensured that the volume mass of the soil is reduced by the same 0.03 g/cm^3 in the 0-50 and 0-70 cm layers, and by 0.02 g/cm^3 in the 0-100 cm layer. At the same time, the porosity of the soil increased, and its amount was 48.9% at 0-50 cm, 48.1% at 0-70 cm, and 47.4% at 0-100 cm. The improvement of these properties of the soil also led to an increase in water permeability. During the 6th hour of the experiment, the water permeability of the soil is ensured to reach 619.3 m^3/ha.

List of references:

1. Борскова К.Ю. Влияние сложения пахотного слоя почвы на выделение CO2. Агротехника хлопчатника и культур хлопкового комплекса. Труды СоюзНИХИ, вып.39, – Ташкент, 1978. – С. 20-25.
2. Дала тажрибаларини ўтказиш услублари / Услубий қўлланма. – Тошкент, ЎзПИТИ, 2007. – 147 б.
3. Доспехов Б.А. Методика полевого опыта. – М.: Изд-во «Агропромиздат», 1985. – 352 с.
4. Jurayev A. A., Sulaymonov I. J. Formirovaniye urojaya saxarnoy sveklы povtornogo poseva v zavisimosti ot mineralnыx udobreniy //Peredovoye razvitiye sovremennoy nauki kak drayver rosta ekonomiki i sosialnoy sferы. – 2021. – S. 53-57.
5. Курвантоев Р. К., Турғунов М. М. Қишлоқ хўжалиги ерларидан самарали фойдаланиш, лазерли текислаш орқали тупроқ хоссаларини яхшилаш бўйича тавсиянома. – 2019.
6. Методы агрохимических, агрофизических и микробиологических исследований в полевых хлопковых районах – Ташкент, СаюзНИХИ, 1977. – 187 с.
7. Методика полевых опытов с хлопчатником. – Ташкент: СаюзНИХИ, 1981. – 233 с.
8. Методы агрофизических исследований. – Ташкент: Меҳнат. 1973. – 17 с.
9. Мухаммеджанов М.В. Суғориладиган ерлар унумдорлигини тубдан ошириш бўйича деҳқончиликнинг янги системаси. –Тошкент: ФАН. 1986. – 225 б.
10. Sulaymonov I. et al. Beetroot effect on the total mass of soil //Scientific Bulletin of Namangan State University. – 2021. – Т.: 2. – №. 2. – С. 140-144.
11. Сулаймонов И. Ж. и др. Repetitive cultivation of sugar beet seeds is associated with the sowing of planting seedlings //Міжнародний науковий журнал Інтернаука. – 2018. – Т.: 1. – №. 1. – С. 25-27.
12. Omonilloyevich F. X. et al. Fertilizers used in cultivation of medicinal amaranth plant and natural sources enriched with compounds obtained from chicken egg shells as natural bioactive fertilizer //Finland International Scientific Journal of Education, Social Science & Humanities. – 2023. – Т.: 11. – №. 1. – С. 321-325.
13. Хасанова Ф.М., Қорабоев И.Т. Такрорий экилган маккажўхорининг тупроқ агрофизик хоссаларига таъсири. Деҳқончилик тизимида зироатлардан мўл ҳосил олиш технологиялари, – Тошкент, 2010. – 248-250 бетлар.

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ТУПРОҚ ТАРКИБИДАГИ ОЗИҚА ЭЛЕМЕНТЛАР МИҚДОРИНИ ДОН ҲОСИЛИ ВА СИФАТИГА ТАЪСИРИ

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Тупроқшунослик ва агрокимё илмий тадқиқот институти

Аннотация. Тупроқ типларига боғлиқ ҳолда тупроқнинг кимёвий таркиби фарқ қилади. Тупроқ хоссаларига экин тури, нави, иқлим, рельеф, ўғитлар, агротехника ва агротадбирлар таъсир кўрсатади. Тупроқ таркибида озиқа элементлар миқдори, дон ҳосили ва сифатини ўзгартиради. Тадқиқотларда 10 т/га чиқинди ва қолдиқлар +N-154 P-112 K-35 кг/га ўғит фонида дон ҳосили ва сифати яхшиланган. Азотли элементлар буғдойни ўсиш-ривожланиши ва донда оқсил миқдорини, фосфор элементи доннинг тўлиқ шаклланиши ва вазнини, калий элементи эса донда крахмал кўп тўпланишига таъсир кўрсатган.

Калит сўзлар: суғориладиган сур тусли қўнғир ўтлоқи, суғориладиган ўтлоқи, азот, фосфор, калий элементлари, кузги буғдой дон ҳосили, сифат белгилари.

Аннотация. В зависимости от типа почв различается и их химический состав. На свойства почв большое влияние оказывали тип почв, сорт растений, климат, рельеф, удобрения, агротехника, агромероприятия.

Количество питательных элементов питания в почве изменяет урожайность зерна и в его качество. На фоне внесения 10 т/га отходов и остатков +N-154 P-112 K-35 урожайность и качество зерна улучшилось. Азотные элементы оказали влияние на рост и развитие пшеницы, увеличили количество белков, фосфор способствовал полному формированию зерна и веса, калий оказал виляние на высокое накопления крахмала в зерне.

Ключевые слова: орошаемые серо бурые луговые почвы, орошаемые луговые, азот,

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