Alinteri J. of Agr. Sci. (2021) 36(1): 131-137
e-ISSN: 2587-2249
info@alinteridergisi.com

http://dergipark.gov.tr/alinterizbd
http://www.alinteridergisi.com/
DOI:10.47059/alinteri/V36I1/AJAS21019

RESEARCH ARTICLE

Agrotechnology of Soil Enrichment with Organic Substance in the System of Crops of Cotton Crop Rotation

M.M. Tashkuziev[1*] • T.T. Berdiev[2] • S.K. Ochilov[3] • O.G. Karabekov[4]

[1*]*Research Institute of Soil Science and Agrochemistry, Tashkent, Uzbekistan.*

[2]*Research Institute of Soil Science and Agrochemistry, Tashkent, Uzbekistan.*

[3]*Research Institute of Soil Science and Agrochemistry, Tashkent, Uzbekistan.*

[4]*Research Institute of Soil Science and Agrochemistry, Tashkent, Uzbekistan.*

ARTICLE INFO

Article History:
Received: 06.01.2021
Accepted: 07.02.2021
Available Online: 10.03.2021

Keywords:
Irrigated Soils
Organic Matter
Mineral and Organic Fertilizers
Agricultural Technologies
Cotton
Winter Wheat
Maize
Mung Bean
Green Manure

ABSTRACT

The article deals with the issues of the state of soil fertility in the serozem and desert zones of the Republic of Uzbekistan, provides the results of research on the application of agricultural technology aimed at improving the basic properties of the soil, enriching it with organic matter and plant nutrients, and increasing the productivity of cotton crops. The developed and applied agricultural technologies for improving the properties of soils in the serozem zone and modifying them for soils in the desert zone, as well as for soils subject to secondary salinization, are described.

Please cite this paper as follows:

Tashkuziev, M.M., Berdiev, T.T., Ochilov, S.K. and Karabekov, O.G. (2021). Agrotechnology of Soil Enrichment with Organic Substance in the System of Crops of Cotton Crop Rotation. *Alinteri Journal of Agriculture Sciences, 36*(1): 131-137. doi: 10.47059/alinteri/V36I1/AJAS21019

Introduction

The soils of the republic are located in the gray earth and desert zones. In connection with their regional characteristics, differences in soil formation conditions associated with climate, terrain, the nature of use in agricultural production, they differ markedly from each other.

In the sierozem zone, irrigated soils are represented mainly by typical, light sierozem soils and, to a lesser extent, dark sierozem soils, as well as hydromorphic meadow, sierozem-meadow, meadow-sierozem soils formed on loess, loess-like loams and various alluvial soils. sediments. In the desert zone of the south of the republic, irrigated soils are mainly represented by light, typical gray soils, as well as meadow, takyr, takyr-meadow, meadow-takyr and, in small areas, dark gray soils, gray-brown, desert-sand and bog-meadow, formed on loess-like loams and various alluvial-proluvial deposits.

Recent studies have revealed a significant decrease in the fertility of the irrigated soils of the republic as a result of a decrease in the content of organic matter, nutrients in them, the development of such negative phenomena as degradation, salinization, etc. According to studies carried out in 1970-1980, in the arable layer of irrigated typical and light gray humus contained in the range 1.10-1.70 and 0.90-1.30%, respectively. And in the meadow soils of the belt of typical gray soils, its amount was 1.50–2.50%, in similar soils of the belt of light gray soils - 1.50–1.70% [1, 2, 3].

Currently, the arable layer of irrigated typical gray soils contains 0.70-1.20% of humus, meadow soils 1.20-1.60%, which is 1.3-1.5 times less and more compared to studies in 1980 year. According to the nature of the humus content in the genetic horizons of soils, according to the gradation

* Corresponding author: M.M. Tashkuziev

developed by us for the soils of the arid zone, these values are low and medium values [2].

This indicates that in the conditions of the republic's soils, it is necessary to make changes in the existing system of land use and agricultural technology for the cultivation of agricultural crops [4, 5].

Based on the studies carried out in the period 2003-2008, we have developed agricultural technology for non-saline soils of the serozem zone, aimed at enriching the soil with organic matter, increasing its fertility and productivity of cultivated crops [5, 6, 7].

The same agro-technology, with some modification, was developed for the non-saline serozem-meadow and slightly saline takyr-meadow soils of the Kashkadarya and Surkhandarya regions of the republic in the period 2008-2011 [8, 9].

Materials, Methods and Objects of Research

Technology characteristics: For the conditions of non-saline soils of the belt of typical gray soils (2003-2005), in the system of cultivation of crops "cotton-winter wheat" with sowing of repeated and catch crops, the following scheme of crop rotation is proposed:

1. In autumn (October) winter wheat is sown, in summer (June) wheat harvesting. A re-crop is grown, for example, corn or other crops combined with legumes - mung bean, soybeans, peas, etc. and etc.); the spring of next year, use them for animal feed or plowing-sideration;
2. Spring - sowing of cotton, in autumn (September - early November) harvest of raw cotton. Sowing winter wheat and further, as in paragraph 1. Also, experiments on this technology can be started with cotton, with the obligatory introduction of organic and mineral fertilizers.

For the proposed technology, it is necessary to take into account:

1. in addition to the harvest of the main crops, their vegetative mass is crushed and they are embedded in the soil (enriched with organic matter, return of nutrients), 2) taking into account the content of humus and basic plant nutrients in the soil, apply from 20 to 40 t / ha and above, one times per rotation, organic fertilizers in the form of manure, organic-mineral composts from local raw materials (low-grade phosphorites, phosphogypsum, brown coal, bentonites, glauconites, etc.), in certain proportions with organic fertilizers (cattle manure, bird droppings, etc.) At the same time, in experiments, the rate of mineral fertilizers is reduced by 35-40% or more.

With regard to weak and medium saline soils, the essence of the modification of agricultural technology is as follows: before sowing cotton, the soil is washed once from salts in accordance with the recommended norms with a well-functioning drainage system, organic and mineral fertilizers are applied. In the spring, sowing of cotton and subsequently diversification of crops in the following order: "cotton-winter wheat", repeated legumes (mung beans, chickpeas, peas) or corn - intermediate (rye, oats, barley, etc.) so that the soil surface is constantly covered plants, and the cycle (rotation) is repeated with the same sequence. Due to the year-round coverage of the soil surface with plants, the rise of moisture from the lower layers of the soil is reduced and thus the restoration of salts is significantly prevented.

As noted above, these technologies by setting up special experiments were tested on the fields of farms, taking into account the soil and climatic conditions.

With regard to the soil and climatic conditions of the desert zone in the south of the republic, with some modifications, this agrotechnology was applied on the irrigated serozem-meadow and takyr-meadow soils of the Kashkadarya and Surkhandarya regions, and some results were presented in [8, 9 and 10].

So, in the conditions of soils of the serozem belt on non-saline irrigated meadow and low-fertile conditionally irrigated typical gray soil in the Saidavul farms of the Srednechirchik district and Zhasur Agro business in the Akhangaran district of the Tashkent region on an area of 3-5 hectares. And also on weakly and moderately saline meadow-serozemic soil in the farms "Garasha" and "Abdurasul Suvonov" of the Bayaut district of the Syrdarya region on areas of 3 hectares, tests of this technology were carried out, some results of which are given in the above works [4, 6, 7, 11, 12, 13].

The main conclusions and results of research on agrotechnology of crop rotation in crop rotations. For the conditions of the soils of the serozem and desert zones of the republic, a system has been developed for changing the reduced crop rotation according to the scheme 2: 1 (autumn wheat + repeated - mung bean + intermediate crop - rye: cotton) and 1: 1: 1 (autumn wheat + repeated crop - mung + intermediate –Triticale: soybeans: cotton, which, along with obtaining two or three harvests in 1 year, allows you to leave (accumulate) in the soil (accumulate) from 12.4 to 16.8 t / ha of root and crop residues, which contributes to the improvement of agrophysical, agrochemical properties of soils and their fertility. All this contributes to better growth, the development of cotton due to previous crops and an additional yield of raw cotton of the order of 0.31-0.32 t/ha to 0.51-0.61 t/ha, depending on the soil conditions and schemes of crop rotation [14].

According to the results obtained by these authors, when applying a 10 half crop rotation of 3: 7 (alfalfa: cotton) after three years of alfalfa from cotton cultivation, for 1-3 years the yield averaged 30-32 t/ha and decreased for 4-7 years and amounted to 2.8-2.3 tonna / ha. And with a monoculture with cotton, when using the full norm of mineral fertilizers for 90 years, the yield of cotton was 29-35 t/ha, and in a monoculture without fertilizers 8-12 t/ha in the belt of typical gray soils and 14-16 t/ha on takyr soils of the desert zones of the south of Uzbekistan.

As a result of the studies, the authors come to the conclusion that, in comparison with the 3: 7 crop rotation, the transition to a short-term crop change according to the 2: 1 and 1: 1: 1 scheme is considered economically profitable, and at the same time due to the root and crop residues remaining in the soil, the latter is enriched with humus and the basic elements of plant nutrition, the law of return is positively resolved, and its fertility is preserved and increased.

Similar positive results were obtained when using our proposed agrotechnology of soil enrichment with organic matter, based on the cultivation of crops by alternating "cotton-winter wheat" with repeated and intermediate crops, which we will discuss in the research results of this article.

In the work [15], carried out by Uzbek scientists on the soil-reclamation state of irrigated lands in the Fergana Valley, in order to organize rational and efficient use of irrigated agricultural lands, preserve and increase soil fertility and obtain high yields of agricultural crops, it is necessary to take the following agro-reclamation measures:

- Soil leaching is one of the important measures to improve soil reclamation.
- To maintain the fertility of reclaimed soils, it is necessary to establish crop rotation systems, the correct use of fertilizers, and layer-by-layer cultivation.
- Use a crop rotation system on agricultural land in the Central Fergana region.
- To ensure the rational use of land in the first year, sow rice, legumes and food crops, in the second year - cotton and grain crops, in the third year - suitable crops.

The introduction of the proposed crop rotation system will lead to the rehabilitation (desalination) of these lands in a short time; will ensure economic stability of farms working in these territories in recent years, high yields of cotton, grain and other crops.

In work [16] it is shown that modern high-intensity farming is possible only on soils with a high level of fertility and scientifically substantiated doses of fertilizers. The productivity of agricultural crops, the state of agrochemical indicators of soils largely depends on the volume of application of organic and mineral fertilizers, the formation of a positive or deficit-free balance of humus and nutrients. On soils with a high level of fertility, in order to obtain the planned yield of agricultural crops, the consumption of mineral fertilizers is always lower than on soils with low indicators of agrochemical properties. Therefore, increasing the efficiency of fertilizer use are among the most important state tasks facing soil-agrochemical science and the agricultural industry. In the system of rational use of soils, constant monitoring of the state of their fertility is of great importance, which is the basis for the development of plans for the use of fertilizers for agricultural crops and a set of measures to preserve and increase it.

In the conclusion of this work, it is noted that the implementation of all factors of resource conservation in the system of fertilization of agricultural crops should be the determining strategic direction in the further development of agricultural technologies.

In [17], it is noted that for the production of competitive products, it is important to obtain a high yield of agricultural crops with a scientifically based reduction in production costs. In solving this problem, of undoubted interest is the optimization of the use of fertilizers and pesticides by mobilizing the natural resources of the agrophytocenosis as a result of placing crops in a crop rotation according to favorable predecessors, minimizing soil cultivation, using straw for fertilization, etc.

The results of the author's research showed that in terms of the effect on the yield of winter wheat grain, the studied predecessors and methods of soil cultivation were in a certain relationship, the nature of which changed depending on the level of nitrogen nutrition of plants. Against a nitrogen-free background, the yield shortage of this crop from the cruciferous predecessor in comparison with leguminous plants was in the range of 3.1–5.0%, and from the grain crop - 8.7–11.3%, increasing as the intensity of soil cultivation decreased. With the introduction of the optimal dose of nitrogen fertilizers (N70 + 70 + 20), the above indicators decreased and were equal to 1.5–2.6% and 4.0–5.6%, respectively. The smallest differences in grain yield of winter wheat between plowing and chisel-growing, disking, direct sowing were noted regardless of the level of nitrogen nutrition of plants when it was cultivated after peas, and the largest - after oats.

It was also noted that, on average, for the period of research, the highest grain yield of Augustine winter wheat (55.0–55.1 t/ha) was obtained during its cultivation of peas by plowing and chiseling with nitrogen at a dose of N70 + 70 + 20. The lowest this indicator (32.1 centner / ha) was in the variant where winter wheat was cultivated after oats using the technology of direct sowing in untreated soil without the use of nitrogen fertilizers. Consequently, under the influence of differences in the technology of cultivation of winter wheat, the variation in the grain yield of this crop reached 23.0 centner / ha on average over three years, i.e. 71.6%.

In the work [18] it is shown that the use of post-harvest stubble crops and crops, along with an increase in fodder production, contributes to an increase in soil fertility, enriching it with organic matter. Cold-resistant fast-growing crops of the cruciferous family, showing high responsiveness to the use of nitrogen fertilizer, are most suitable for stubble crops. In the experiments we carried out on the light loamy soil of the Research and Production Center for Agriculture, the yield of stubble crops (spring rape, winter rape, winter rape and oil radish), under which nitrogen fertilization was applied at a dose of 90 kg / ha a.i., ensured the yield of green mass depending on the culture, from 168 to 277 t/ha, or 2.9-3.1 times more in comparison with the nitrogen-free background (P60 K90).

With an increase in the yield of stubble and post-harvest crops, the supply of organic matter with root and stubble residues to the soil also increases.

In work [19] it is noted that the intensive technology of cultivation of agricultural crops provides not only an increase in the use of fertilizers, but also their use on a scientific basis, which should contribute not only to the formation of healthy plants with high productivity and good product quality indicators, but also to maintain a deficit-free balance of organic substances. The experimental basis for the scientific solution of these issues can be long-term agrochemical stationary field experiments with alternating crops in space and time, i.e. as close as possible to the real model of the applied farming system.

Different fertilization systems have a versatile effect on the productivity of the crop rotation. So, in the variant without the use of fertilizers, due to soil fertility, 26.5

centners / ha were obtained. The systematic use of only mineral fertilizers N62K96 and N62P30K96 ensured the productivity of arable land at the level of 39.1 and 45.8 t/ha equivalent unit.

According to S.K. Husan, W. Michlkin (1987) in England, much attention is paid to the cultivation of crops that leave behind as much organic remains as possible [20].

According to the German scientist V. Volger (1979), the constant inclusion of catch crops in the crop rotation system is of great importance in maintaining and increasing soil fertility. As a result of plowing catch crops, like green fertilizer, after decomposition in the soil, 30-60 kg per hectare of nitrogen accumulates in the arable layer, which creates positive conditions for the nutrition of the main crop. In addition, catch crops are an important food source for animals (unless they are plowed like green manure). Also prevents the leaching of nutrients from the lower soil layers as a result of autumn and winter precipitation [21].

Australian scientist K. Binder (1989) also believes that re-crops and catch crops are an important factor in agricultural intensification. They are not only additional and cheap fodder plants, but also contribute to improving the structure of the soil, increasing its fertility, as well as increasing productivity in the rotation of grain and leguminous crops [22].

Below we will focus on individual research results on the application of our proposed agrotechnology as applied to the soils of the desert zone of the republic in farms of the Kashkadarya and Surkhandarya regions.

Objects and Methods of Research

The object of research was irrigated non-saline serozem-meadow and slightly saline takyr-meadow soils in the Kashkadarya and Surkhandarya regions of the republic. So, in the Yakkabag district in 2010-2011 in the production conditions of the farm "Khusniddin Zhura bobo nabirasi" field experiments were carried out in 4 variants, 3-fold repetition, on an area of 3 hectares. The size of each plot is 167m x 20 row x 0.6m = 2004 m2. The soil is sierozem-meadow. In the Angora district of the Surkhandarya region in 2008-2011, experiments were carried out on slightly saline irrigated takyr-meadow soil in the farm “Bakhtiyar Narzulla” in 5 variants, 3-fold repetition. The size of each plot is 72 m2, the total area is 1080 m2.

Field experiments with the cultivation of main, secondary and intermediate crops were carried out according to the methodology of the Union of Research and Development Institute (1981) [23]. Soil analyzes were carried out according to the generally accepted methods described in the manuals Soyuz NIKHI (1977) [24] and E.V. Arinushkina (1970) [25].

In these experiments, in the fall for the cotton harvest, in accordance with the recommendations, a full rate of organic fertilizers (half-rotted manure), 60% of the annual rate of phosphorus and 50% of potash fertilizers were applied. In the experiment, cotton of the Bukhara-8 variety was sown on sierozem-meadow soil in spring. In autumn, after the harvest of raw cotton, organic and mineral fertilizers were applied and winter wheat of the "Babur" variety was sown. In the summer of the following year, after the wheat harvest, maize of the Karasuv 350 AMV variety was grown, combined with legumes (mung bean, soy). In the autumn of the same year, after the application of the main fertilizers (organic and mineral) for the cotton of the next year, they sowed catch crops (oats, rapeseed) so that the next year after harvesting the green mass of these crops, they plow the stubble and root residues and sow cotton in the spring. as at the beginning of the experience on the proposed agricultural technology. The rotation of the crop rotation for the proposed change and alternation of crops took place in the same order.

The same sequence of cultivation of crops and the introduction of organic and mineral fertilizers in a 3-year experience on slightly saline takyr-meadow soil. In this experiment, before sowing cotton, the soil is washed out of water-soluble salts once per rotation. In the spring, they sowed cotton varieties Bukhara-6, then winter wheat varieties "Kroshka", re-culture - mung bean, then intermediate (oats, rapeseed) and plowed their root and crop residues.

As a result of the application of the proposed agricultural technology aimed at enriching the soil with organic matter (the introduction of organic, mineral, microbiological fertilizers), as well as the return of alienated plant residues containing nutrients, soil fertility is improved, the restoration of salts is prevented, the rate of applied mineral fertilizers is reduced by 1.5 -2 times.

Research Results

In a field experiment on irrigated serozem-meadow soil, using the proposed agricultural technology for 3 years (for rotation of crop change) and external different rates of manure (20 and 40 t / ha) and vermicompost (5 t / ha) with a reduction in the rate of mineral fertilizers 1.5-2 times, the content of humus (Corg.) and nitrogen, as well as the main elements of plant nutrition, increased noticeably in the soil.

According to the data obtained, at the beginning of the experiment, before sowing cotton, the arable and subsoil horizons of all variants contained, respectively, 0.960-1.027% and 0.792-0.860% of humus, and nitrogen -0.118-0.124% and 0.088-0.106%, and they were close... The amount of humus and gross nitrogen during the growing season of cultivated crops naturally increases depending on the variant of the experiment, which is associated with the introduction of mineral, organic fertilizers and the entry into the soil of fresh organic residues from the vegetative mass of plants, as well as root and crop residues.

In the soils of the control variant of the experiment with mineral fertilizers, from the beginning of the growing season of cotton until the end of one rotation of the crop change, the content of humus (carbon of humic substances) and total nitrogen in the 0-50 cm soil layer increases, respectively, by 0.123 and 0.011% or by 4, 92 t / ha and 0.44 t / ha (Table 1).

Table 1. Change in the content of humus and nitrogen in the soil in the "cotton-winter wheat" system with sowing of repeated and catch crops for the rotation of their alternation, %

№	Variant	Depth cm	27.03.10 Before sowing cotton	14.09.10 Ripening of cotton	05.11.10 Before sowing wheat	07.07.11 Ripening wheat	19.10.11 After re-maize	Difference from original
1	$N_{200}P_{140}R_{120}$-control variant	0-30	0,972/0,118	1,000/0,122	1,000/0,139	0,942/0,146	1,050/0,122	0,078/0,004
		30-50	0,860/0,088	0,828/0,108	0,855/0,112	0,885/0,105	0,905/0,095	0,045/0,007
2	$N_{135}P_{95}K_{65}$+20 t/ha manure	0-30	0,984/0,124	1,156/0,128	1,214/0,137	1,262/0,140	1,305/0,144	0,321/0,020
		30-50	0,835/0,106	0,778/0,102	0,865/0,120	0,945/0,125	0,304/0,120	0,069/0,014
3	$N_{100}P_{70}K_{50}$-40 t/ha manure	0-30	0,960/0,121	1,109/0,135	1,192/0,138	1,258/0,144	1,305/0,145	0,345/0,024
		30-50	0,792/0,090	0,722/0,088	0,735/0,090	0,830/0,115	0,998/0,105	0,206/0,015
4	$N_{100}P_{95}K_{50}$+5 t/ha vermicompost	0-30	1,027/0,120	1,252/0,126	1,230/0,131	1,278/0,140	1,335/0,133	0,308/0,013
		30-50	0,827/0,094	0,855/0,092	0,888/0,095	0,945/0,122	1,090/0,105	0,263/0,011

On the variants of the experiment, where agricultural technology was used and manure was applied in the amount of 20 and 40 t / ha against the background of a reduced rate of mineral fertilizers by 1.5-2 times, the amount of humus carbon and total nitrogen increased in the 0-50 cm soil layer, respectively by 0.390 -0.551% and 0.034-0.039%, which is equal to 15.6-22.0 t / ha for humus and 1.56-1.36 t / ha for nitrogen. On the variant where vermicompost was applied at a rate of 5 t / ha with a 2-fold reduced rate of mineral fertilizers, an increase in humus carbon in this soil layer by 0.571% or 22.84 t / ha, total nitrogen by 0.024% or 0.960 t / ha was noted. ha.

The given data show that due to the introduction of mineral fertilizers during the rotation of crop change, root and crop residues of cultivated crops, in the 0-50 cm soil layer, the content of organic matter increased by 0.123% or 4.92 t / ha. When applying the proposed agricultural technology for 2.5 years with the introduction of various norms and types of organic fertilizers, the carbon content of humic substances increased in the 0-50 cm soil layer by 0.551-0.571% and exceeds its content in the soils of the control variant by 0.428-0.448%, which corresponds to 17-18 t / ha of humus.

In these experiments, positive results were also obtained on the dynamics of changes in the content of assimilated by plants forms of mineral nitrogen, mobile phosphorus and exchangeable potassium, exceeding the content in the soils of the control variant, where the full norm of mineral fertilizers was applied, by a factor of 1.2-1.3 or more, the indicators of growth, development and productivity of cultivated crops have improved. So, in the control variant, an average of 31.8 t/ha of raw cotton was obtained, and in the variant where manure was applied at the rate of 20 t / ha with an underestimated rate of mineral fertilizers by 1.5 times, in comparison with the control variant, the increase was 5.9 t/ha, and on the variant where manure was introduced in the amount of 40 t / ha of manure with a 2 times reduced rate of mineral fertilizers, the increase was 9.0 t/ha. On the variant of the experiment, with the introduction of vermicompost at the rate of 5 t / ha against the background with a reduced rate of mineral fertilizers, in comparison with the control variant, the increase in the yield of raw cotton was 1.2 t/ha.

In the control variant, 42.3 t/ha of winter wheat grain yield was obtained, in the variants where agricultural technology was used and organic fertilizers were applied, the wheat grain yield was 48.4-54.7 t/ha, which is 6.1- higher than the control variant. 12.4 t/ha. The highest increase, of the order of 8.4 and 12.4 t/ha, was obtained in the variants where 20 and 40 t / ha of manure were used with a 1.5-2.0 times lower rate of mineral fertilizers. With the cultivation of a second crop - corn combined with legumes, the control variant yielded a grain yield of 49.4 t/ha, green mass - 250 t/ha. With the use of organic fertilizers and vermicompost, an increase in grain yield of 9.2-24.8 t/ha and 6.0-33.8 t/ha of green mass was obtained.

From the data obtained from the experiment carried out on irrigated serozem-meadow soil, it should be noted that the use of the proposed agrotechnology contributed to the enrichment of the soil with organic matter, the improvement of its nutritional regime, which affected the growth, development of cultivated crops and their productivity. On this one can conclude:

1. The results obtained revealed that for 3 years of the experiment in the control variant of the experiment with mineral fertilizers in the 0-50 cm soil layer, the content of humus (humus carbon) and total nitrogen increases, respectively, by 0.123 and 0.011% or by 4.92 t / ha and 0.44 t / ha. And on the variants of the experiment, where agricultural technology was used and manure was applied in the amount of 20 and 40 t / ha against the background of a reduced rate of mineral fertilizers by 1.5-2 times, the amount of humus carbon and total nitrogen increased in the 0-50 cm soil layer by 0.390- 0.551% and 0.034-0.039%, which is equal in humus to 15.6-22.0 t / ha and nitrogen by 1.56-1.36 t / ha, respectively. In the variant where vermicomposting was applied in an amount of 5 t / ha with a 2-fold reduced rate of mineral fertilizers, an increase in humus carbon in this soil layer by 0.571% or 22.84 t / ha, total nitrogen by 0.024% or 0.960 t / ha was noted. ha respectively.
2. The obtained positive results from the use of agricultural technology in relation to the content of humus, nitrogen, as well as forms of nutrients available to plants contributed to the growth,

development and productivity of cultivated crops. So, on cotton, in the control variant, an average of 31.8 t/ha of raw cotton yield was obtained, and in the variant where manure was applied at the rate of 20 t / ha with an underestimated rate of mineral fertilizers by 1.5 times, in comparison with the control variant, the increase was 5.9 t/ha, and in the variant where 40 t / ha of manure was used with a 2-fold decrease in the rate of mineral fertilizers, the increase was 9.0 t/ha. In the variant of the experiment, where biohumus was used at the rate of 5 t / ha against the background of a reduced rate of mineral fertilizers, in comparison with the control variant, the increase was 1.2 t/ha.

In a field experiment carried out on a slightly saline irrigated takyr-meadow soil of a desert zone, similar results were obtained with regard to the accumulation of organic matter in the soil, an improvement in the nutrient regime of the soil, the growth and development of cultivated crops and their productivity.

In this experiment, there was a control option without fertilizers –N200 P140 K100 and options with the introduction of a reduced rate of mineral fertilizers by 1.5-2 times due to the introduction of 20 and 40 t / ha of semi-rotted manure and the use of the microbiological preparation MERS in the amount of 100 ml / ha.

The results show that the use of organic fertilizers and a microbiological preparation in 3-5 variants of the experiment, in comparison with the initial state, the content of gross phosphorus in soils increased by 0.03-0.09% or 1.2-3.6 tons / ha, potassium by 0.06-0.15% or 2.4-6.0 t / ha.

It was revealed that the use of agricultural technology for 3 years on the takyr-meadow soils of the desert zone by applying organic fertilizers at the rate of 20 and 40 t / ha and a microbiological preparation while reducing the rate of mineral fertilizers by 1.5-2 times, contributed to the accumulation of organic matter in the soil (humus). So, in the non-fertilized control variant, in the upper 0-30 and 30-50 cm soil layers, the content of organic matter decreased by 0.191% or 7.64 t / ha. On the control variant with mineral fertilizers, due to the root and crop residues of cultivated crops in the 0-50 cm soil layer, the humus content increased by 0.147% or 5.9 t / ha (Table 2).

Table 2. Change in the content of organic matter when using agricultural technology for rotation of alternation on irrigated takyr-meadow soil, %

Variant	Depth cm	Humus,%					Change in organic matter
		10.04.09	25.05.10	05.11.10	03.04.11	25.09.11	
$N_0P_0K_{0-}$	0-30	1,290	1,300	1,130	1,145	1,195	-0,095
control variant	30-50	1,070	1,100	0,979	0,940	0,974	-0,096
$N_{200}P_{140}K_{100}$	0-30	1,401	1,403	1,405	1,485	1,498	0,097
Control with mineral fertilizers	30-50	1,200	1,230	1,230	1,230	1,250	0,050
N_{135} P_{95} K_{65}	0-30	1,407	1,429	1,435	1,475	1,532	0,125
+20 t/ha manure	30-50	1,226	1,200	1,214	1,219	1,265	0,039
N_{100} P_{70} K_{50}	0-30	1,458	1,499	1,550	1,575	1,593	0,135
+40 t/ha manure	30-50	1,268	1,316	1,300	1,330	1,325	0,057
N_{135} P_{95} K_{65}	0-30	1,390	1,418	1,422	1,430	1,465	0,075
+ MERC	30-50	1,181	1,197	1,205	1,225	1,238	0,057

The use of agricultural technology, where the rate of mineral fertilizers was reduced by 1.5 and 2 times and organic fertilizers were introduced at the rate of 20 and 40 t / ha, the content of humus (organic matter carbon) in the 0-50 cm soil layer increased by 0.164% or 6.67 t / ha and by 0.192% or 7.78 t / ha. And on the variant with a microbiological preparation, with a reduced rate of mineral fertilizers by 1.5 times, an increase in the carbon content of humus by 0.132% or 5.3 t / ha was noted in this soil layer. The results were also obtained, along with an increase in the humus content in the soil, an increase in the content of phosphorus and potassium forms assimilated by plants by 1.1-1.2 times is noted in the 0-50 cm soil layer.

These positive results in relation to the enrichment of the soil with organic matter, the improvement of its nutritional regime, had an effect on the improvement of the growth, development of plants and their yield. So, on the variant of the experiment, where 40 t / ha of manure was applied with a decrease in the rate of mineral fertilizers, the yield of cotton was 3.7 t/ha, which is 0.47 t/ha more than in the control variant with mineral fertilizers.

It was found that as a result of soil enrichment with organic matter, improvement of its nutritional regime, an increase in yield was obtained from cotton 0.38-0.52 t/ha, winter wheat -0.94-1.1 t/ha, mung bean -0.21- 0.34 t/ha.

Conclusions

1. The use of agricultural technology for soil enrichment with organic matter in the system of main crops "cotton - winter wheat" with repeated and intermediate crops contributed to an increase in the content of humus, nitrogen, mobile nutrients in the soil, which affected the growth, development of cultivated crops and their yield.
2. In the experiment on serozem-meadow soil, due to the introduction of high rates of manure and vermicompost, improvement of the nutrient regime of the soil, the increase in the cotton yield was 1.2-9.0 t/ha, for wheat grain 0.61-1.24 t/ha, corn for grain -0.92-24.8 t/ha and 0.60 – 3.38 t/ha of green mass. On takyr-meadow soil, due to the use of high rates of organic fertilizers and a microbiological preparation, an increase was also obtained from

cotton by 0.38-0.52 t/ha, winter wheat 0.94-1.10 t / ha and maw, 0.1-0.34 t / ha.

References

Soils of Uzbekistan, Publishing House "Fan", Tashkent, 1975, 27-35.

Tashkuziev, M.M. (2006). *Guidelines for the used content of total humus and mobile humic substances in the soil as indicators of its fertility*. Tashkent, 47.

Valiev, V. (1979). *Organic matter of hydromorphic soils of the serozem belt*. Pochvovedenie, 12, 41-49.

Tashkuziev, M.M., and Ziyamukhamedov, M.A. (2004). *The concept of scientific foundations for optimizing the chemical composition of the soil, increasing its fertility and supplying production*. Tashkent, 40.

Tashkuziev, M.M., and Sherbekov, A.A. (2008). *Organic matter of some soils of the sierozem belt and agricultural technologies aimed at increasing their fertility "Agricultural science for agriculture" III-International scientific and practical conference*. Collection of articles, Barnaul, 218-223.

Tashkuziev M.M. (2005). Influence of agricultural technology for managing organic matter on the fertility of irrigated typical gray soil. *In the materials of the international scientific conference "State and prospects for the development of soil science", Almaty,* 147-148.

Tashkuziev, M.M., Eshbekova F. Kh., and Sherbekov, A.A. (2010). A system of agricultural technologies aimed at increasing soil fertility and plant productivity. Materials of the international scientific and practical conference. *Problems of modern ecology and biosocial issues of regional development*. Shymkent, 199-203.

Tashkuziev, M.M., Sherbekov, A.A., Berdiev, G.T., and Ochilov, S.K. (2012). Agrotechnology for increasing soil fertility and productivity of agricultural crops in the conditions of the gray earth and desert zones of Uzbekistan. *Materials of the International Scientific and Practical Conference. Rational use of soil resources and ecology*, 282-286.

Tashkuziev, M.M., and Berdiev, T.T. (2012). Application of a system of agricultural technologies aimed at increasing soil fertility in the desert zone of Uzbekistan. *Agricultural science for agriculture. VII-International Scientific and Practical Conference. Collection of articles*, 218-220.

Berdiev, G. (2016). Agro technologies increasing the productioity of irrigated soils in the desert zone of Uzbekistan. *Europlan Science Review*, 3-4, 6-8.

Tashkuziev, M.M., Ochilov, S.K., Berdiev, T.T., and Sherbekov, A.A. (2013). Agro-technologies aimed at increasing soil fertility and the yield of cultivated crops. *Agricultural science-agriculture. VIII-International scientific-practical conference dedicated to the 70th anniversary of the Altai State Agrarian University, Collection of articles*, 235-237.

Tashkuziev, M.M., Sherbekov, A.A., Reimbaev, Zh. M., and Berdiev, G. (2013). Gu Methods of improving the ameliorative state and fertility of prone green soils of the belt of light gray soils. *International scientific-practical conference, Agricultural science-agriculture*, 386-389.

Tashkuziev, M.M., Berdiev, T.T., Sherbekov, A.A., and Ochilov, K. (2018). Agrotechnologies aimed at improving the ameliorative state and increasing fertility, prone to soil salinity. *Problems and scientific solutions in increasing, maintaining, protecting and restoring soil fertility. Materials of the scientific-practical conference of the Republic of Bukhara*.

Khalikov, B.M., and Namazov, F.B. (2016). *Scientific basis of crop rotation*. Tashkent, 222.

Ismanov A. Zh., Abdurakhmonov, N.Y., Kalandarov, N.N., Tursunov Sh. T., Mamazhanova O. Kh., and Sobitov, U.T. (2020). Soil-reclamation state of irrigated soils of intermountain basins of Central Asia (for example, Fergana region of Fergana Valley). *International Journal of Botany Studies*, 54(6): 781-788.

V.V. (2019). Paw Resource-saving technologies for the use of fertilizers for agricultural crops in the Republic of Belarus. *Improving soil fertility and the use of fertilizers materials of the international scientific-practical conference,* Minsk ITC of the Ministry of Finance, 3-5.

L.A. Bulavin, A.P. Gvozdov, D.N. Kutsev, S.A. (2019). Pyntikov Influence of predecessors, methods of tillage and fertilizers on the yield and quality of winter wheat grain. *Improving soil fertility and the use of fertilizers scientific and practical conference,* Minsk ITC of the Ministry of Finance, 26-27.

Shlapunov, V.N., Lukashevich, T.N., Dolgova, E.L. (2019). Mowing and stubble crops - a reserve for strengthening the fodder base and increasing soil fertility. *Improving soil fertility and using fertilizers materials of the international scientific and practical conference*. Minsk ITC of the Ministry of Finance, 139-140.

Al Shchetko, Rutkovskaya, L.S., and Rybak, A.R. (2019). Efficiency of fertilizer application systems in an ultra-long stationary experiment. *Increase of soil fertility and application of fertilizers, materials of the international scientific and practical conference*. Minsk "ITC of the Ministry of Finance, 147-148.

Hussain, S.K., Michlken, W., and Koop S. (1987). Detachment of soil directed by fertility management and crop rotating. *Soil Science Society of America Journal*, 52(5), 1463-1468.

Volger, B. Nitratverfugfarkeit des Bodens in Abhangig keit von zwishenfruehtfau. Lard. W.Z. Rheinland / 1979 S 2617-2618, 143-146.

Binder, K. (1989). Zueishen-Fruchtbou verfessert der Boden-Land-wirt schaft.

Technique of field experiments with cotton under irrigation conditions. Soyuz NIHI, Tashkent, 1981, 246.

Methods of analysis of soil and plants in Central Asia, Soyuz NIHI, Tashkent, 1977.

Arinushkina, E.V. (1970). *Guide to the chemical analysis of soils.* Moscow State University Publishing House, 487.