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EFFICIENCY OF APPROXIMATE ORGANO-MINERAL COMPOSTS FOR SOIL PRODUCTIVITY

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Annotation
The article describes the effect of the use of non-traditional organo-mineral composts as a supplement to change the water-physical and agrochemical properties of soil as a supplement to increase the fertility of bare and loamy soils.
This article also provides information on the composition of various fertilizers in the preparation of organo-mineral composts, the chemical composition of manure and bentonite sludge, the form and norms of nutrients in them. The effects of the norms and timing of the application of organic-mineral composts in the soil in different proportions on changes in soil reclamation, as well as the effects of these nutrients as a natural ameliorant on changes in soil water permeability, moisture capacity, volume, porosity.
The article describes the research methods and soil climatic conditions of the experiment. The experimental field soil is a semi-hydromorphic and hydromorphic soil.
The authors also found a correlation between changes in soil nutrients under the influence of organo-mineral composts. A high positive correlation was found between the change of nutrients in the soil in general and mobile form under the influence of applied manure, bentonite and compost, and the correlation coefficient was proved to be r = 0.731.

Keywords: Bare and loose soils, organic fertilizer, mineral fertilizer, organo-mineral, compost, bentonite, nitrogen, phosphorus, potassium, humus, water permeability, moisture capacity, volume mass, permeability, fertility, agrophysics, agrochemistry.
There is evidence that soil fertility depends not only on the amount of total humus, nitrogen, phosphorus and potassium, but also on the degree to which their easily digestible mobile forms are supplied with nitrate, ammonia nitrogen, mobile phosphorus and exchangeable potassium. Today, in addition to mineral fertilizers, the use of organic fertilizers and non-traditional agro-ores is important in the rational use of available resources in the field of agriculture around the world, maintaining and

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increasing soil fertility, as well as crop nutrition and supplementary feeding. There are natural resources of non-traditional agro-ores in 44 countries around the world, which are widely used in various sectors of the economy.

The efficiency of organic fertilizers and non-traditional agro-ores and various organo-mineral composts made from them is high in the cultivation of abundant and high-quality crops. The most important issue is the development of component ratios of local fertilizers used as additional feed in cotton and composts made from non-traditional agro-ores.

In the cotton-growing countries of the world, composts made from organic fertilizers, along with mineral fertilizers, are widely used in feeding cotton and maintaining soil fertility. Research on the preparation of composts in different proportions with non-traditional agro-ores and different fertilizers, to determine the effect of organo-mineral composts on soil fertility, to improve plant nutrient uptake from the soil and to study the final effects of composts is relevant.

In the cotton industry of the country, along with mineral and local fertilizers, special attention is paid to the use of non-traditional agro-ores rich in micro and macro elements to increase soil fertility and cotton yield. By improving the technology of applying non-traditional agro-ores to the soil in different ways and norms, it will be possible to save the existing reserves of mineral fertilizers in the country.

One of the important tasks in the Action Strategy of the Republic of Uzbekistan for 2017-2021 is "... the application of intensive methods in agricultural production, first of all, modern agro-technologies that save water and resources." In this regard, it is important to conduct research to improve the methods of widespread use of non-traditional organo-mineral composts in combination with mineral fertilizers in maintaining and increasing soil fertility.

The land of the Republic occupies a very large area, its lands are located in different regions and are characterized by a variety of land and water conditions.

Therefore, the development of specific agro-technical, reclamation and economic regional scientific and practical measures to maintain and increase the fertility of soils in each natural climatic conditions is one of the most pressing issues in the development of agriculture in our country.

In order to increase soil fertility in the country, science-based reclamation and agro-technical measures are being implemented. It has been found that reducing the shortage of mineral and local fertilizers, improving the water-physical properties of the soil, increasing the productivity of non-traditional agro-ores as a supplement can give good results.

Research methods. "Methods of conducting field experiments" in the study, determination of nutrient content in the soil and agrophysical analysis

"Methods of agrochemical, agrophysical and microbiological research in irrigated areas", "Methods of agrophysical research of soils in Central Asia", "Methods of agrochemical research of soils in Central Asia" and B.A. Dospekhov's method was used in mathematical and statistical analysis of experimental data. In particular, the chemical composition of composts prepared on the basis of Hovdak bentonite sludge and various organic fertilizers was carried out on the basis of the methodology of SoyuzNIXI (1963), (1977) by spectral aqueous solution. Physical properties of soil: volume mass by means of a cylinder (Kachinsky method, cylinder volume - 500 cm3), porosity by AR Doyarenko method, moisture

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capacity by water physical properties (Rozov method) (water retention capacity), soil permeability by square rum method detected.

Soil agrochemical analysis based on the methods of SoyuzNIXI, (1963 and 1977), the amount of humus in the soil I.V.Tyurin, total nitrogen, phosphorus IMMaltseva and P.N.Gritsenko, nitrate nitrogen in ionometric instrument, mobile phosphorus B.P.Machigin , the amount of exchangeable potassium was determined by the methods of V.P.Protasov.

Soil and climatic conditions of the test site

The research was conducted in the fields of the Surkhandarya branch of the former UzPITI of Termez district of Surkhandarya region, now in the experimental fields of Surkhandarya ITS of PSUEAITI, in production conditions in Termez and Qizirik districts. Surkhandarya region is located in the southern part of the country, stretching 180-200 km from north to south and 70-140 km from west to east.

The territory of the region includes Surkhandarya, Sherabaddarya, Sangardak, Khojaipok, Kofirnikhan, Topalang and river valleys on the right bank of the Amu Darya. The total land area of Surkhandarya region is 2059.9 thousand / ha, of which the usable part is 450.2 thousand / ha, the irrigated area is 333.8 thousand / ha, the remaining 1358.7 thousand / ha is mountainous, river and lake and other lands. The area of gray-brown soils is 6793 ha, barren soils 82568 ha, barren meadow soils 10645 ha, desert sandy soils 9358 ha, desert meadow soils 46417 ha and saline soils 21506 ha. The districts of the Sahara region include Termez, Jarqurghon, Muzrabad, Sherabad, Qizirik and Angor, Bandikhan and part of Kumkurgan districts.

It is bordered by Gissar in the north, Boysun and Kohitang in the west, Babatag in the east, and the Amudarya valley in the south, and forms the whole Surkhan-Sherabad oasis. The desert zone of the region is spread over a wide area from the south-west, including the Hovdak, Uchqizil, Kattaqum and Qizirikdara deserts. The irrigated soils of the desert zone of Surkhandarya region have undergone autorphic development, but by the end of the last century, as a result of the development of irrigated agriculture, semi-hydromorphic processes began in many soil groups, resulting in rising groundwater levels and increasing mineralization. Propagation of semi-hydromorphic and hydromorphic soils was possible.

As a result, active salinization processes have begun and a negative water-salt balance has been formed, and soil reclamation has deteriorated. According to the general land fund in terms of salinity of soils of Surkhandarya region, as follows;

Non-saline lands - 100.8 thousand / ha, 36.1% of the total land area, weakly saline lands - 108.4 thousand / ha, 38.8%, moderately saline lands - 47.6 thousand / ha, 17.0%, strong saline soils account for 22.5 thousand / ha, or 8.1%.

Irrigated lands with unsatisfactory reclamation status in Surkhandarya region make up 19.6 thousand / ha (National Report on Land Resources, Tashkent-2011) there is a need to exit.

The experimental soils of our research are ancient irrigated, grazing loamy and moderately saline loamy soils with humus content of 0.888-0.700% in the topsoil (0-30 cm) and subsoil (30-50 cm) layers, total nitrogen 0.086-. 0.070%, total phosphorus 0.141-0.115%, nitrogen in the form of nitrate 18.7-12.1,

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mobile phosphorus 27.7-14.0 and exchangeable potassium 200-160 mg / kg, which are poorly supplied with nutrients.

Influence of non-traditional organo-mineral composts on agrophysical properties of soil, changes in soil volume mass and porosity

One of the main factors determining soil fertility is its agrophysical properties. In particular, the mechanical composition of the soil, granularity, volume mass, porosity, its water permeability, water holding capacity, and others.

For good development of the root system of the plant, the optimal conduct of microbiological processes of gas exchange in the soil, the soil moisture capacity, the ability to retain water must be good.

As proven by many scientists, microbiological processes are also active when the soil driving layer is well supplied with moisture, air, nutrients. In addition, due to various influences, the volumetric mass of the soil varies peculiarly.

N.A.Kachinskiy [1; 236-318-b]. mechanical composition In the process of studying heavy soils, the fertility property of the soil depends on its mechanical composition, it was concluded that the development of agricultural crops in soils with mechanical composition will always be good.

M.Belousov [2; 186-b], S.N.Ryjov, Saakyants [3; 25-26-b] and others have concluded that irrigation increases the volume mass of the soil and also affects its chemical composition, causing a certain amount of nutrients in the soil - nitrogen, phosphorus, potassium, carbon and micro-elements to be washed away. F.M.Hasanova, M.Tojiev, A.Sodiqov. [4; 237-241 b] to the soil in irrigated lands studied the effects of tillage equipment on soil compaction and cotton yield, and analyzed the effects of heavy tractors and chain tractors on the soil during operation.

In the field experiment conducted, the annual norms of mineral fertilizers were N-150, R-105, K-75 kg / ha in the variant of 0-10 of soil in spring; In layers 10–20 and 20–30 cm, the volume mass is 1.30, respectively; At 1.32 and 1.34 g / cm3, at 0-30 and 30-50 cm, these values were 1.32 and 1.39 g / cm3, respectively.

These indicators are the initial indicators as a control.

By the end of the cotton growing season, under the influence of tillage and seasonal irrigation, the volume mass of 0-10, 10-20 and 20-30 cm layers of soil increased from the initial values by 0.03 and 0.04 g / cm3, 0-30 and 30-50 cm. an increase of 0.03 and 0.04 g / cm3 was observed in the layer.

In the experiment, the annual norms of mineral fertilizers were N-200, R-140 and K-100 kg / ha in the variant 0-10 of the soil at the beginning of the application period; In layers of 10–20 and 20–30 cm, the volume mass was close to the parameters of option 1

It is known from the scientific literature that an increase in the norms of mineral fertilizers leads to a slight decrease in the volume mass of the soil. When applying an additional 15 t / ha of manure on the background of mineral fertilizers N-150, R-105, K-75 kg / ha, the volume mass of the soil before sowing is 0-10; 10-20; 20-30 and 0-30; 1.29 in proportions in layers of 30-50 cm; 1.30; 1.31 and 1.30; 1.37 g / cm3, while mineral fertilizers were 0.01 compared to the variant with the same norms (no manure was applied); 0.02; 0.03 and 0.02; Was less than 0.02 g / cm3.

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This decrease was found to be at a similar level compared to the variant applied in the norm of mineral fertilizers N-200, R2O5-140, K2O-100 kg / ha. It should be noted that regardless of the norms of bentonite and manure-based composts used, it was observed that the volume mass of the soil decreased both before sowing and at the end of the application period compared to the control option. However, the effect of compost norms of 16.5 t / ha and 18.0 t / ha on changes in soil volume mass resulted in a decrease of 0.02 and 0.01 g / cm3, respectively, compared to the option applied with a higher 15 t / ha fertilizer than the control.

The relatively high effect of composts was observed when they were applied at a rate of 21.0 t / ha, 0-10 of the soil before sowing the seeds; 10-20; 20-30 and 0-30; In layers of 30-50 cm, the volume mass is proportional to 1.25; 1.26; 1.28 and 1.26; 1.37 g / cm3.

These values are 0.05 compared to the options used in the norms of mineral fertilizers N-150, R2O5-105, K2O-75 and N-200, R2O5-140, K2O-100 kg / ha; 0.06; 0.06 and 0.06; Less than 0.02 g / cm3.

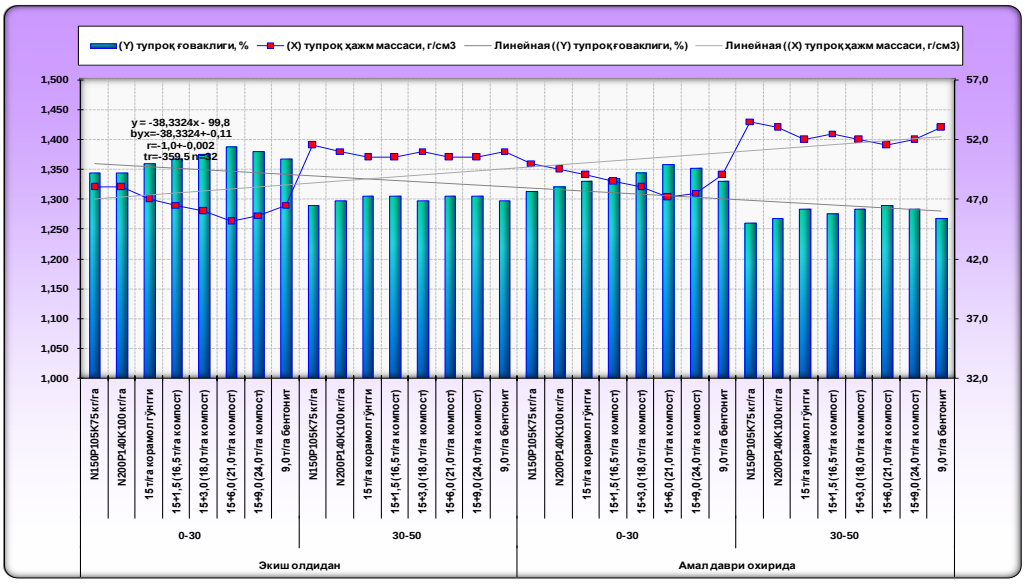

Figure 1. Correlation between soil volume mass and porosity under the influence of compost norms, 2006.

The studies also found a highly inverse correlation between soil porosity and its bulk mass under the influence of compost, manure and bentonite, proving that r = -1.0.

By the end of the cotton application period, the volume mass in all layers of the soil was 0.05, while the differences between the variants were maintained; 0.04; 0.03 and 0.04; Increased by 0.02 g / cm3. Against the background of the norms of mineral fertilizers N-150, R-105, K-75 kg / ha in the variant where 9.0 t / ha bentonite is used, the soil mass is close to the control values at the time of sowing, but at the end of the application period 0-30 and 30-50 cm 1.34 and 1.42 g / cm3, which is 0.01 and 0.02 g / cm3 less than in the control, but 0.02-0.03 g / cm3 more than the effect of the optimal rate of composting was found.

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In the second and third years of the research, it was observed that under the last effect of composts, as well as in the variants using only mineral fertilizers and bentonite (9.0 t / ha), the volume mass of the soil increased slightly from year to year.

However, even in the final effects of increasing the volume volume of the soil, it was found that the options used for manure and compost were less than the control. Even in the third year of exposure to composts, during the sowing of seeds in the background of fertilizers applied fertilizers N-150, R2O5-105, K2O-75 kg / ha against the background of fertilizers (15 t / ha), these values are 0.03 g / cm3, the optimal norms of compost (21.0 t / ha), an increase of 0.02 g / cm3 was also observed in the applied variant, indicating a decrease in the last 3 years of the last effects of the applied manure and compost.

Thus, the norms of mineral fertilizers from N-150, R-105, K-75 kg / ha to N-200, R-140, K-100 kg / ha, compost norms from 16.5 t / ha to 21.0 t / ha and 15 t / ha in the first year of manure application, it was observed that under their influence the volume mass of soil decreased by 0.01-0.03 g / cm3. It was observed that the final effects of composts decreased, and even the final effect of the third year of bentonite at 9.0 t / ha remained almost equal to that of the control variant.

In overgrazed fallow soils, as a result of irrigation at different rates, the aggregate condition of the soil changes rapidly and can lead to deterioration of the physical condition.

The volume depends on the mass and the resulting porosity, the amount of humus in the soil, and also affects the absorption capacity of the soil.

In our study, the effect of compost norms applied to changes in the porosity of overgrazed loamy soils was determined. Against the background of mineral fertilizers N-150, R-105, K-75 kg / ha 15 t / ha of manure and bentonite 1.5; 3.0; When using composts prepared on the basis of 6.0 and 9.0 t / ha, it was observed that the porosity of the soil increased not only in relation to the options used for mineral fertilizers, but also manure.

The relatively high effect of the compost norms used in the experiment was at their rate of 21 t / ha (15 + 6.0), in this variant 0-10 of the soil before sowing the seeds; 10-20; 20-30 and 0-30; The porosity in layers of 30-50 cm is proportional to 51.9; 51.5; 50.8 and 51.8; 1.9 and 2.3 of the control variant, accounting for 47.3%; 2.3 and 2.2; 0.8% and 15 t / ha compared to the standard option of 1.5; 1.5; Were higher at 1.2 and 1.4%, respectively.

In conclusion, in order to improve the porosity of the soil from the physical conditions in the conditions of overgrazing loamy soils, mineral fertilizers N-150, R-105, K-75 kg / ha prepared on the basis of 15 t / ha of manure and 6.0 t / ha of bentonite mud 21 It is advisable to use 0 t of organo-mineral compost.

Because the increase in soil porosity also has a positive effect on heat, water, air, microbiological processes, leading to an improvement in the nutritional regime of the plant.

The effect of applied organo-mineral composts on soil water permeability and moisture capacity

Another water-physical property of the soil is its water permeability, which is one of the main indicators that determine the elements of irrigation technology. In particular, when the water permeability is optimal, the layer of soil that needs to be moistened quickly moistens and allows the water level in the edges to increase. Therefore, the outflow of water is reduced, it is possible to accurately determine the distance between the furrows, evenly irrigate the field and increase the coefficient of water use.

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It should be noted that, depending on the cultural condition, the water permeability can vary in soils of the same type for various reasons MM Sarimsakov [7; 57-59-b].

In general, the permeability of the soil is determined by the absorption of water and then its transfer to the lower part of the layers. If the volumetric mass of the soil increases and the porosity decreases, the filtration (absorption) into the lower layers also decreases. In addition, all agro-technical measures applied affect the water permeability of the soil.

In our study, the effect of bentonite and compost-based compost standards on soil water permeability was studied (Table 1).

In the second year of the study, ie in the control variant under the influence of composts at the end of the 1st year (N-150, R-105, K-75 kg / ha), at the beginning of the application period the soil water permeability was 330 m3 / ha per 1 hour at the beginning of the observation hours. this figure was 723 m3 / ha in 6 hours. These figures differ only by 8.0 m3 / ha compared to the first year, as in this option only mineral fertilizers were used as controls.

This means that not only the agrophysical properties of the soil, but also the water-physical properties have been improved when 15 tons of manure per hectare is applied in the conditions of grazing lands. 16.5 t / ha to 18.0 of the applied compost standards; With an increase to 21.0 t / ha, it was found that the water permeability of the soil from the water-physical properties was even better than in the control and fertilizer application option.

Relatively high values were obtained at the rate of 21.0 t / ha of compost, and the water permeability of the soil was 352 in proportion to the observation hours before sowing; 534; 671; 715; 737 and 746 m3 / ha, and 248 at the end of the period; 374; 485; 513; 533 and 543 m3 / ha.

As observed in all variants, it was found that the water absorption capacity of the soil decreases from 1 to 6 hours of observation.

The application of an acceptable 21.0 t norm of organo-mineral composts as a supplementary nutrient before autumn plowing in grazing loamy soils was found to have a positive effect on soil water permeability and moisture capacity in the last third year as well. On the effect of applied organo-mineral composts on changes in soil humus, gross nitrogen and mobile nutrient elements In agriculture, the most urgent task is to restore and improve soil fertility to increase the productivity and quality of agricultural crops.

1-table Influence of compost norms on soil water permeability.

Option Procedure	Annual norms of mineral fertilizers kg / ha			Compost, manure and bentonite 3 - year norms, t / ha	before planting						At the end of the application period					
	N	P_2O_5	K_2O		Amount of water absorbed during observations (hours) (m3 / ha)											
					1	2	3	4	5	6	1	2	3	4	5	6
1	150	105	75	-	335	515	657	699	718	731	230	363	478	508	527	541
2	200	140	100	-	339	524	670	717	740	758	236	372	490	524	545	562
3	150	105	75	15 (manure)	350	530	676	722	746	763	240	377	494	529	550	567
4	150	105	75	15+1,5 (16,5)	360	536	680	725	752	770	245	382	500	534	556	574
5	150	105	75	15+3,0 (18,0)	367	541	686	731	760	773	251	386	506	541	562	581
6	150	105	75	15+6,0 (21,0)	381	551	693	738	767	782	258	393	514	549	571	588
7	150	105	75	15+9,0 (24,0)	388	550	690	736	765	780	256	392	512	547	570	586
8	150	105	75	9,0(bentonite)	357	534	677	727	748	765	240	376	496	531	550	566

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It is known that applied mineral fertilizers (NPK) do not increase the amount of humus in the soil, but have a positive effect on the decomposition and storage of its reserves.

D.V.Kharkov, F.E.Kolyaseva [8; According to pp. 4-11, increasing the rate of annual mineral fertilizers applied to the soil has a positive effect on productivity, while increasing the rate of nitrogen fertilizers from 90 kg / ha to 240 kg / ha during the season has been shown to have positive results.

The application of organic fertilizers in addition to mineral fertilizers to the soil in the care of agricultural crops increases the effectiveness of mineral nutrients.

The use of excess mineral fertilizers to increase soil fertility leads to an increase in the cost of agricultural products and a sharp decrease in the effectiveness of mineral fertilizers AT Azizov [9; 35-39-b].

The main factors that increase the amount of humus in the soil are the use of organic fertilizers and composts, crop rotation, rotation and replanting.

The bentonite sludge used in the experiment is an acceptable raw material for composting with semi-rotten manure. In general, the high content of humus determines soil fertility, because in addition to total nitrogen, phosphorus, potassium, carbon dioxide, it contains humic, ulminic and fulvoic and cranic acids, which improve the water-resistant macro and microstructure of the soil R. Musaev [10; 16-17-b].

In our research, the effect of bentonite and manure-based compost standards on soil fertility was determined by the amount of total humus, nitrogen and phosphorus and mobile nutrients in it.

In the first year of the study, the effects of composts applied to changes in soil fertility and recent effects were studied (Table 2).

In 2006, at the end of the cotton application period, mineral fertilizers N-150, R- In the control variant used at 105, K-75 kg / ha, the humus content in the above soil layers was found to be 0.890 and 0.700%, respectively.

Also, in this variant, the initial amounts of gross nitrogen and phosphorus in the soil layers were 0.086-0.070 and 0.141-0.115%, respectively, while in the fall of 2006 these figures were 0.089-0.073 and 0.142 and 0.117%, respectively.

The optimal effect of compost norms on changes in humus, total nitrogen and phosphorus content in the soil was observed when applied at 21.0 t / ha, the amount of humus increased by 0.12-0.015% compared to control, total nitrogen by 0.006%.

In the experiment, against the background of fertilizer standards N-150, R-105, K-75 kg / ha only (9.0 t / ha) bentonite was used, there was no increase in total nitrogen in the soil relative to control, but the total phosphorus content in the topsoil was 0.006% higher. was found to be

In the second year of research (in the year of the last effect of the applied composts 1 year) in all variants (including control) a decrease in total humus, nitrogen and phosphorus levels compared to the first year was observed, which is due to microbiological, agrochemical changes in the soil, as well as plant nutrient uptake.

It has been found that non-traditional agro-ores have a relatively high positive effect on improving soil fertility when used as compost by mixing them with manure rather than using them alone.

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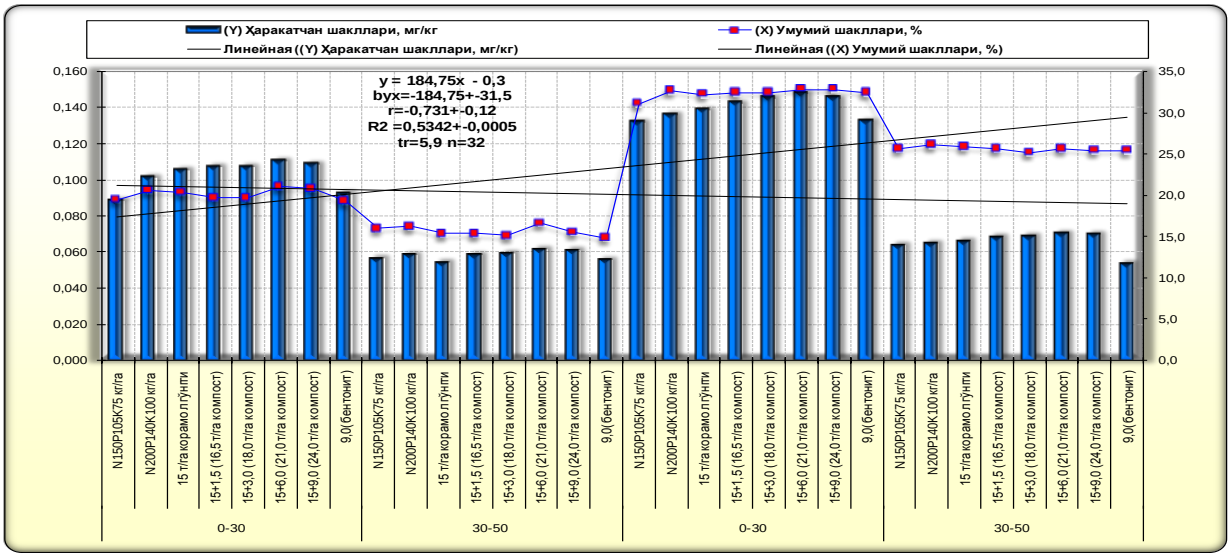
By the third year of the experiments, the effect of the compost standards applied was reduced, and the amount of humus, total nitrogen and phosphorus was close to control in some variants.

The use of non-traditional organo-mineral composts as a supplementary feed before the autumn plowing at the above-mentioned rate every three years has been shown to have a positive effect on their effect and the increase in nutrient elements in the soil in their final effects.

Figure 2 Correlation between nutrient changes under the influence of composts

A high positive correlation was found between the change of nutrients in the soil in general and mobile form under the influence of applied manure, bentonite and compost, and the correlation coefficient was proved to be r = 0.731.

Soil fertility depends not only on the amount of total humus, nitrogen, phosphorus and potassium, but also on the degree to which their mobile forms, which are easily assimilated by the plant, are supplied with nitrate, ammonia nitrogen, mobile phosphorus and exchangeable potassium.



Changes in the dynamics of nitrate nitrogen depending on soil type have been studied in many scientific studies NM Ibragimov [11; 46-48-b]. Even now, despite the application of nitrogen fertilizers in excess of 200 kg / ha, it does not lead to an increase in yields of cotton and cotton.

This is because when nitrogen fertilizers are applied to cotton, their low absorption coefficient (marked nitrogen) has also been determined by the application of N15.

Increasing the useful coefficients of nitrogen fertilizers is the application of organo-mineral composts to the soil. Therefore, the effect of compost standards applied on our research (prepared on the basis of bentonite and manure) on changes in the amount of nitrate nitrogen in the soil was studied.

The data obtained showed that the initial nitrate nitrogen content in the soil was 18.7–12.1 mg / kg at 0–30 and 30–50 cm, respectively, in the control variant (N-150, R2O5) at the end of the validity period of cotton in year 2 of the study. -105, K2O-75 kg / ha) in the upper layers of the soil, nitrate nitrogen content was found to be 19.4–12.4 mg / kg, or an increase of 0.7–0.3 mg / kg from the initial state.

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In 2 years of research, it was found that the amount of nitrate nitrogen in the soil increases depending on the norms of mineral fertilizers and composts applied. It should be noted that the optimal effect of composts in the second year is 21.0 t / ha at a ratio of 1:04 (15 t of cattle manure + 6.0 t of bentonite sludge). At -50 cm, it was observed that the proportion was 24.2–13.5 mg / kg, which was 2.0–0.7 mg / kg higher than the standard variant, which can be attributed to the rapid mineralization of the organic part of the composts used.

In the third year of experimental research, a slight decrease in the amount of nitrate nitrogen in the soil in the variants is characterized by the assimilation by plants and a decrease in the final effect of composts.

It was observed that the amount of mobile phosphorus in the soil increased from year to year with the increase of applied mineral fertilizers and compost norms. In the control variant, the amount of mobile phosphorus in the 0-30 and 30-50 cm layers of soil at the end of the cotton application period was 28.0-14.0, respectively; 28.9–14.0 and 29.1–14.4 mg / kg. These values are 0.3-0.1 mg / kg higher than the initial state.

In the case of application of mineral fertilizers N-200, R2O5-140, K2O-100 kg / ha, these values are 29.1-14.2; 29.8–14.2 and 30.0–14.5 mg / kg, which was 0.9–0.1 mg / kg higher in the 0–30 and 30–50 cm layers (last year) than the control.

The optimum effect of the applied composts is 21.0 t / ha (15 + 6.0) in the norm. -1.4 mg / kg, which was 1.9 mg / kg higher than the 15.0 ton fertilized variant, and 3.3 mg / kg higher than when bentonite (9.0 t / ha) was used alone.

Potassium balance in the soil was almost satisfactory in the variants with the use of additional nutrients, manure and compost of various sizes, ie at the end of the 2nd year of the study, when 21.0 t of compost was applied, the K2O content was 235-170 mg / kg. Was more than 0 mg / kg. In the last 3 years of the study, it was found that this figure was 30.0 mg / kg higher than the control variant.

In conclusion, it can be said that the effect and end effects of the applied non-traditional organo-mineral compost norms on the increase of total and mobile nutrient elements in the soil were positive, and their relative third year effects were observed to decrease. It was found that the use of compost as a supplementary feed once every three years before plowing has a positive effect on maintaining and increasing soil fertility in the conditions of overgrazed fallow soils. Table 3.

Table 3 Influence of compost norms on changes in mobile forms of nutrients in soil (mg / kg), 2007. at the end of the validity period.

Option procedure	Annual norms of mineral fertilizers, kg / ha			3-year norms of compost, manure and bentonite, t / ha	$N-NO_3$		P_2O_5		K_2O	
					Soil layers, cm					
	N	P_2O_5	K_2O		0-30	30-50	0-30	30-50	0-30	30-50
1	150	105	75	-	19,4	12,4	28,9	14,0	210	180
2	200	140	100	-	22,2	12,8	29,8	14,2	220	170
3	150	105	75	15 (manure)	23,1	11,9	30,4	14,5	225	170
4	150	105	75	15+1,5 (16,5)	23,5	12,8	31,2	15,0	235	160
5	150	105	75	15+3,0 (18,0)	23,5	13,0	31,8	15,1	230	170
6	150	105	75	15+6,0 (21,0)	24,2	13,5	32,4	15,4	240	180
7	150	105	75	15+9,0 (24,0)	23,8	13,4	31,8	15,3	240	180
8	150	105	75	9,0(bentonite)	20,3	12,2	29,0	11,8	210	160

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Many years of research have shown that the use of non-traditional organo-mineral composts in addition to mineral fertilizers in recent years to increase soil fertility and decrease the amount of nutrients in the soil leads to an increase in humus, nutrients in general and mobile form.

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