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### The Effectiveness Of The Application Of Non-Traditional Organo-Mineral Composts To Soil Fertility

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**Brief annotation.** This article gives information about 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.

**Keywords.** Loose and loamy soils, organic fertilizers, mineral fertilizers, organo-minerals, compost, bentonite, nitrogen, phosphorus, potassium, humus, water permeability, moisture capacity, volume mass, permeability, fertility, agrophysics, agrochemistry.

Today, the use of organic fertilizers and non-traditional agro-ores in addition to mineral fertilizers for crop nutrition and supplemental nutrition, along with the rational use of available resources, maintaining and increasing soil fertility, is gaining importance in the world. There are natural reserves of non-traditional agro-ores in 44 countries worldwide, which are widely used in various sectors of the national economy. Organic fertilizers and non-traditional agro-ores and various organo-mineral composts prepared from them are highly effective in growing abundant and high-quality crops from agricultural crops. The most important issue is the development of component ratios of local fertilizers and composts made from non-traditional agro-ores, which are used as additional nutrients in cotton farming.

In the cotton-growing countries of the world, composts made from organic fertilizers are used on a large scale, along with mineral fertilizers, to feed cotton and maintain soil fertility. Preparation of composts with non-traditional agro-ores and various manures in different proportions, determination of the effect of organo-mineral composts on soil fertility, improvement of plant absorption of nutrients from the soil, and studies of the latest effects of composts are relevant.

**Research methods.** "Methods of conducting field experiments", "Methods of agrophysical research of soils in Central Asia", "Methods of agrochemical research of soils in Central Asia" and in the mathematical-statistical analysis of experimental data, the B.A. Dospekhov method was used. Including, the chemical composition of composts prepared on the basis of Hovdak bentonite slurry and various organic fertilizers by passing the aqueous solution through the spectrometer, SoyuzNIXI (1963), (1977) methodology based on Physical properties of the soil: volumetric mass using a cylinder (by the Kachinsky method, cylinder volume - 500 cm<sup>3</sup>), porosity by the method of A.R. Doyarenko, moisture capacity from the physical properties of water (by the Rozov method) (water holding abilities), water permeability of the soil by the square Rom method was determined.

Soil agrochemical analyzes based on the methods of Allied National Cotton Research Institute (1963 and 1977), the amount of humus in the soil I.V. Tyurin, total nitrogen, phosphorus I.M. Maltseva and P.N. Gritsenko, nitrate nitrogen in an ionometric instrument, mobile phosphorus

B.P. Machigin the amount of exchangeable potassium was determined by the methods of V.P. Protasov.

### **The effect of non-traditional organo-mineral composts on the agrophysical properties of the soil, changes in soil volume mass and porosity**

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

In order to the root system of the plant to develop well, for the microbiological processes of substance exchange and gas exchange in the soil to take place, the soil must have a good moisture capacity and water retention capacity.

As proven by many scientists, microbiological processes are also active if the subsoil layer is well supplied with moisture, air, and nutrients. In addition, due to various effects, the volume mass of the soil varies in its own way.

N.A. Kachinsky [1; 236-318-p]. in the process of studying soils with heavy mechanical composition, it was concluded that the productivity of the soil depends on its mechanical composition, and the development of agricultural crops is always better in soils with a low mechanical composition.

M. Belousov [2; 186-b], S.N. Ryzhov, Saakyants [3; 25-26-p] and others came to the conclusion that irrigation increases the volume mass of the soil, affects its chemical composition, causes a certain amount of nutrients in the soil - nitrogen, phosphorus, potassium, carbon and microelements to wash away and decrease. F.M. Hasanova, M. Tojiev, A. Sodikov. [4; 237-241-p] to the soil in irrigated lands studied the influence of tillage equipment on soil compaction and cotton yield, and analyzed the different effects of heavy tractors and chain tractors on the soil during operation.

B.M. Kholikov, R. Tillaev, S. Choldonboevlar [5; p. 67-70, 94; 67-70-b] according to the data obtained from many scientific studies, they determined that agrotechnical activities increase the volume mass of the soil, the optimal volume mass leads to the good development of the plant, as well as the improvement of the hydrometric, aeration, microbiological and nutritional regime of the soil.

L.A. Spijevskaya [6; 24 p.], according to the results of scientific observation, all types of crops increase the volume mass of the soil during its growth period and cause its densification.

For example, in alfalfa, the volume mass of the plowed layer was 1.38 g/cm<sup>3</sup>, and after plowing it was 1.27 g/cm<sup>3</sup>.

When the density of the soil is around 1.1-1.3 g/cm<sup>3</sup>, conditions are created for optimal growth and development of cotton. At this density, there is sufficient air exchange in the soil, biological activity and a high level of nutrient absorption is ensured, the capillary absorption of nutrients that are difficult for the plant to absorb is facilitated.

According to the analysis of the above-mentioned literature, the importance of using modern resource-efficient technologies in maintaining and increasing soil fertility is understood.

In order to increase the effectiveness of bentonite from non-traditional agro-ores, mixing it with local fertilizers and preparing compost and applying it as an additional nutrient to the soil, no scientific researches have been conducted.

Taking this into account, scientific research works were conducted to increase the efficiency of using non-traditional organo-mineral composts in cotton and cotton-complex crops in the conditions of barren and moderately saline barren grassland soils of Surkhandarya region.

In our research, the effect of composting standards prepared on the basis of different manures with Hovdak bentonite on changes in soil volume mass was studied in cotton and cotton-complex crops at different standards and periods during 2006-2016.

It should be noted that compost standards were applied to the soil before autumn plowing, and their final effects were studied over the years.

In the conducted field experiment, the annual rates of mineral fertilizers are N-150, R-105, K-75 kg/h in the option of 0-10 of the soil in spring; Volumetric mass in 10-20 and 20-30 cm layers is proportionally 1.30; 1.32 and 1.34 g/cm<sup>3</sup>, while at 0-30 and 30-50 cm these indicators were equal to 1.32 and 1.39 g/cm<sup>3</sup>.

These indicators are preliminary indicators as a control.

By the end of the cotton growing season, due to the effect of treatments and seasonal irrigation, the volume mass in the 0-10, 10-20 and 20-30 cm layers of the soil decreased from the initial values to 0.03 and 0.04 g/cm<sup>3</sup>, 0-30 and 30-50 cm it was observed that it increased by 0.03 and 0.04 g/cm<sup>3</sup> in the layer.

In the experiment, the annual rates of mineral fertilizers are N-200, R-140 and K-100 kg/h, 0-10 of the soil at the beginning of the operational period; In layers of 10-20 and 20-30 cm, the volume mass was close to the indicators of option 1 (because in this period the annual rates of fertilizers were not yet applied). At the end of the operation period, the volume mass of the above soil layers is proportionally 1.33; It was 1.35 and 1.37 g/cm<sup>3</sup> and 1.35 and 1.42 g/cm<sup>3</sup> or 0.1 compared to option 1; 0.01; 0.01 and 0.01; It was found to be less than 0.01 g/cm<sup>3</sup> Fig. 1.

It is known from the scientific literature that an increase in mineral fertilizer rates leads to a slight decrease in the volume mass of the soil. In the background of mineral fertilizers N-150, R-105, K-75 kg/h, when an additional 15 t/h of manure is applied before plowing, the volume mass of the soil before sowing is 0-10; 10-20; 20-30 and 0-30; 1.29 proportionally in layers of 30-50 cm; 1.30; 1.31 and 1.30; if it was 1.37 g/cm<sup>3</sup>, 0.01 compared to the option where mineral fertilizers were at these standards (no manure was used); 0.02; 0.03 and 0.02; It was less than 0.02 g/cm<sup>3</sup>.

It was found that this reduction was at the same level as compared to the option where mineral fertilizers N-200, R<sub>2</sub>O<sub>5</sub>-140, K<sub>2</sub>O-100 kg/h were applied. It should be said that regardless of the applied rates of bentonite and manure-based composts, compared to the control option, it was observed that the volume mass of the soil decreased before planting the seed and at the end of the period of operation.

However, the effect of 16.5 t/h and 18.0 t/h rates of composts on the change in bulk density of the soil resulted in a decrease of 0.02 and 0.01 compared to the control and 15 t/h manure.

A relatively high effect of composts is observed when they are applied at the rate of 21.0 t/ha, 0-10 of the soil before sowing; 10-20; 20-30 and 0-30; In layers of 30-50 cm, the volume mass is proportionally 1.25; 1.26; 1.28 and 1.26; It was 1.37 g/cm<sup>3</sup>.

These indicators are 0.05 compared to options used in mineral fertilizers N-150, R<sub>2</sub>O<sub>5</sub>-105, K<sub>2</sub>O-75 and N-200, R<sub>2</sub>O<sub>5</sub>-140, K<sub>2</sub>O-100 kg/h; 0.06; 0.06 and 0.06; 0.02 g/cm<sup>3</sup> is less.

Also, in the research, a highly inverse correlation between soil porosity and its volume mass under the influence of compost, manure and bentonite was found, and it was proved to be equal to  $r = -1.0$ .

By the end of the cotton period, the volume mass in all layers of the soil is 0.05, while the differences between the options are preserved; 0.04; 0.03 and 0.04; It was found that it increased by 0.02 g/cm<sup>3</sup>.

Against the background of the standards of mineral fertilizers N-150, R-105, K-75 kg/h, in the variant where only 9.0 t/h of bentonite was used, although the volume mass of the soil was close to the control values during the seeding period, it was 0-30 and 30-50 cm at the end of the application period. In layers with 1.34 and 1.42 g/cm<sup>3</sup>, it was 0.01 and 0.02 g/cm<sup>3</sup> less compared to the control, but 0.02-0.03 g/cm<sup>3</sup> more than the effect of the optimal rate of compost was found to be.

In the following second and third years of the research, it was observed that the volume mass of the soil increased slightly from year to year under the influence of the composts used, as well as in the options where only mineral fertilizers and bentonite (9.0 t/h) were used.

However, it was found that the final effects of the increase in soil volume mass were lower in the variants with manure and compost compared to the control. Even in the third year of the impact of composts, during the seeding period, mineral fertilizers N-150, R205-105, K20-75 kg/h in the norm of fertilizers (15 t/ha) were applied, these indicators were 0.03 g/cm<sup>3</sup>, acceptable norms of composts (21.0 t/ha) was also observed to increase by 0.02 g/cm<sup>3</sup>, which indicates that the effects of applied manure and compost are decreasing in the 3rd year.

So, the norms of mineral fertilizers N-150, R-105, K-75 kg/h to N-200, R-140, K-100 kg/h, compost norms from 16.5 t/h- 21.0 t /ha and in the first year when 15 t/h of manure was applied, it was observed that the volume mass of the soil decreased by 0.01-0.03 g/cm<sup>3</sup> due to their influence. It was observed that the final effects of the composts decreased, even the final effects of 9.0 t/h bentonite in the third year were almost equal to the values of the control option.

In barren soils that are being grazed, different rates of irrigation can rapidly change the aggregate state of the soil and lead to deterioration of its physical condition.

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

In our study, the effect of applied compost rates on changes in porosity of barren soils under grazing was determined.

15 t/h of manure and bentonites 1.5 against the background of mineral fertilizers N-150, R-105, K-75 kg/h; 3.0; It was observed that when using composts prepared on the basis of the standards of 6.0 and 9.0 t/ha, the soil porosity increased not only in comparison with the options where mineral fertilizers were used, but also manure.

### **Effect of applied organo-mineral composts on soil water permeability and moisture capacity.**

Another of the water-physical characteristics of the soil is its water permeability, which is one of the main parameters determining the elements of irrigation technology. In particular, when the water permeability is optimal, the layer of the soil that needs to be moistened is quickly moistened, and it gives an opportunity to increase the water level in the egates.

Due to this, the leakage of water is reduced, it is possible to determine the distance between the furrows correctly, to irrigate the field evenly and to increase the coefficient of water use.

It should be noted that, depending on the cultural condition, water permeability may differ even in soils of the same type under the influence of various reasons M.M. Sarimsakov [7; 57-59 p].

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

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

In the second year of research, that is, after the first year of exposure to composts, in the control option (N-150, R-105, K-75 kg/h), at the beginning of the period of operation, the water permeability of the soil was equal to 330 m<sup>3</sup>/h in 1 hour at the beginning of the observation hours. This indicator was 723 m<sup>3</sup>/h in 6 hours.

These indicators differ only by 8.0 m<sup>3</sup> in the first year, because in this variant only mineral fertilizers were used as a control. At the end of the application period, it was found that the water permeability of the soil did not change under the influence of mineral fertilizers not only in option (1) where N-150, R-105, K-75 kg/h was applied, but also under the influence of N-200, R-140, K-100 kg/h and in options (1 and 2) it was 516-521 m<sup>3</sup>/h in 6 hours at the end of the period of operation.

On the basis of the standards of mineral fertilizers N-150, R-105, K-75 kg/h, in the option where 15 t/h of manure was applied, in the second year, 337 m<sup>3</sup>/h in the 1st hour of observation, 730 m<sup>3</sup>/h in the 6th hour, absorbing water (before planting) it was determined that these indicators decreased by 13.0 and 33.0 m<sup>3</sup>/h compared to the first year of the effect.

In this option, at the end of the operation period, 231 m<sup>3</sup>/h was absorbed in the 1st hour of observation, and 526 m<sup>3</sup>/h in the 6th hour. In the first year, these indicators were equal to 240 and 567 m<sup>3</sup>/h, and in the last year of impact, the water permeability was 9.0 and 41.0. It was observed that it decreased by m<sup>3</sup>/h. However, it should be noted that in the second year after the application of manure (15 t/ha) and in the third year after its application, the water permeability of the soil increased by 16 and 10 m<sup>3</sup>/ha at the end of the application period compared to the control option (1).

So, in the conditions of barren soils that are being grazed, when 15 tons of manure is applied per hectare, not only the agrophysical properties, but also the water-physical properties of the soil are improved.

16.5 to 18.0 t/h of the applied compost standards; It was found that with the increase to 21.0 t/ha, the water permeability of the water-physical properties of the soil was further improved in comparison to the control and the manure-applied option.

As observed in all options, it was found that the water absorption capacity of the soil decreases from the 1st to the 6th hour of observation. The indicators in the last hour of monitoring were 23 and 27 m<sup>3</sup>/h compared to the control option, 22 m<sup>3</sup>/h compared to the option with mineral fertilizers N-200, R205-140, K20-100 kg/h, and 16 and 17 m<sup>3</sup>/h more compared to option 3. was found to be. The final impact of compost (21.0 t/ha) applied in option 6, which was considered acceptable, was 36 and 45 m<sup>3</sup>/h less compared to its impact. This indicates that the effect of applied compost standards on soil water permeability in the 1st year was relatively high.

As a result of further increase of compost rates to 24.0 t/ha, the soil water permeability indicators did not differ in the last hours of monitoring compared to its acceptable rate (21.0 t/ha).

On the background of mineral fertilizers (N-150, R205-105, K20-75 kg/h) in the option with 9.0 t/h of bentonite, the indicators were higher than the control (8-11 m<sup>3</sup>/h) and were less compared to the options with manure and compost rates.

In the 3 years of the research, indicators were obtained among the options based on the above rules, but it was found that the effect of composts decreased in comparison to the first year and the last effect in 1 year.

**Table 1** Effect of compost rates on soil water permeability.

Order of options	Annual rates of mineral fertilizers, kg/h			Three- year rates of compost, manure, bentonite, t/h	Before planting						At the end of the validity period					
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O		Amount of water absorbed during observations(hours) (m <sup>3</sup> /h)											
					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(bentonit)	357	534	677	727	748	765	240	376	496	531	550	566

About the effect of applied organo-mineral composts on the change of humus, total nitrogen and mobile nutrients in the soil

To increase the productivity and quality of agricultural crops in agriculture, restoring and improving soil fertility is the most urgent task.

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

D.V. Kharkov, F.E. Kolyaseva [8; According to the data of 4-11-p], increasing the rate of annual fertilizers given to the soil has a positive effect on the increase in productivity, it has been proven that increasing the rate of nitrogen fertilizers from 90 kg/h to 240 kg/h in the season gave positive results.

Application of additional organic fertilizers to mineral fertilizers in the care of agricultural crops increases the effectiveness of mineral nutrients.

The use of excess mineral fertilizers to improve soil fertility causes an increase in the cost of agricultural products and a sharp decrease in the effectiveness of mineral fertilizers A.T.Azizov [9; 35-39 p].

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

Bentonite slurry used in the experiment is an acceptable raw material for composting with semi-rotted manure. In general, the abundance of humus determines the fertility of the soil, because in addition to general nitrogen, phosphorus, potassium, carbon dioxide, it contains humic, ulminic and fulvic and crenic acids, which improve the water-resistant macro and microstructure of the soil. R. Musaev [10; 16-17 p].

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

The effects of composts applied in the first year of the study on changes in soil fertility and the final effects (Table 2) were studied.

In 2006, at the end of the cotton season, mineral fertilizers N-150. It was found that the amount of humus in the upper soil layers was equal to 0.890 and 0.700% in the control variant used in the norms of 105, K-75 kg/h.

Also, in this option, the initial amounts of gross nitrogen and phosphorus were 0.086-0.070 and 0.141-0.115% in proportion to the soil layers, and in the fall of 2006, these indicators were equal to 0.089-0.073 and 0.142 and 0.117%.



Therefore, it was observed that the amounts of total humus, nitrogen and phosphorus in the control option did not change after the first year.

In the second option, where mineral fertilizers are applied in the rates of N-200, R-140, K-100 kg/h, the total humus, nitrogen and phosphorus amounts are proportionally 0.898-0.711 in the upper layers of the soil. It was 0.094-0.074 and 0.149-0.119%. Even in this option, after the first year of the experiment, it was found that the amount of total nitrogen and phosphorus increased by 0.005-0.007%, while the amount of humus in the soil did not change much. This situation can be expressed by the fact that the applied nitrogen fertilizers are also used for plant development.

In the first year of research, it was observed that the effect of compost made on the basis of bentonite and manure slightly increased the amount of humus and total nitrogen in the soil (15 t/h) compared to the option where only manure was used.

This condition can be expressed by the improvement of the quality of the manure mixed with bentonite under sufficient humidity and temperature during the preparation of composts, the increase of the nutritional elements in its content and the effect.

In these options, in proportion to compost standards (16.5; 18.0; 21.0 and 24.0 t/ha), the amount of humus in the 0-30 and 30-50 cm layers of the soil is 0.990-0.710; 0.990-0.710; 1.010-0.715; 1,000-0,710%, total nitrogen - 0,090-0,070; 0.090-0.069; It was 0.096-0.076 and 0.095-0.071%.

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

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

In the second year of the research (the year of the effect of the applied composts after the 1st year), in all options (including the control) it was observed that the amount of total humus, nitrogen and phosphorus decreased compared to the first year, which is due to the microbiological and agrochemical changes in the soil, as well as the absorption of nutrients by plants.

It was found that the positive effect on the improvement of soil fertility is relatively high if non-traditional agro-ores are mixed with manure and used as compost, rather than using them alone.

Compost standards applied by the third year of experiments

Application of non-traditional organo-mineral composts every three years as additional nutrients before autumn plowing in the above-mentioned rate has been proven to have a positive effect on the increase of nutrients in the soil.

Fig. 2 Correlation relationship between the changes of nutrients under the influence of composts  
A highly positive correlation was found between changes in total and mobile nutrients in the soil under the influence of applied manure, bentonite and compost, and the correlation coefficient was proved to be equal to  $r=0.731$ .

Soil fertility depends not only on the amount of total humus, nitrogen, phosphorus and potassium, but also on the extent to which they are provided with nitrate, ammonium nitrogen, mobile phosphorus and exchangeable potassium in their mobile forms that are easily absorbed by plants.

N.M. Ibragimov has studied the changes in the dynamics of nitrate nitrogen depending on soil types [11; 46-48 p]. Even now, despite the application of nitrogen fertilizer standards of more

than 200 kg/h, it does not lead to an increase in the yield of cotton and cotton crops. Because, when nitrogen fertilizers are applied to cotton, their absorption coefficient is low (targeted nitrogen) and it was also determined by applying N15.

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

According to the obtained data, 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 2nd year of research at the end of the period of cotton in the control option (N-150, R2O5 -105, K2O-75 kg/h) nitrate nitrogen content in the upper layers of the soil was equal to 19.4-12.4 mg/kg, or increased by 0.7-0.3 mg/kg from the initial state.

In 2 years of research, it was found that the amount of nitrate nitrogen in the soil increases depending on the applied mineral fertilizers and compost standards. It is worth noting that, especially in options where compost is used in different rates, the optimal effect of composts in the second year is 21.0 t/to 1:04 ratio (15 t of cattle manure + 6.0 t of bentonite slurry) when the amount of nitrate nitrogen in the soil is 0-30 and 30 At -50 cm it was 24.2-13.5 mg/kg, and it was observed that the model was 2.0-0.7 mg/kg superior to the variant, which can be considered as the rapid mineralization of the organic part of the used composts.

In the experiment, by the third year of research, the amount of nitrate nitrogen in the soil in the variants is slightly reduced, which is expressed by the assimilation by the plants and the decrease of the final effect of the composts.

It was observed that the amount of mobile phosphorus in the soil increased year by year with the increase in the rates of applied mineral fertilizers and compost. In the control option, the amount of mobile phosphorus in the 0-30 and 30-50 cm layers of the soil is 28.0-14.0 proportionally at the end of the cotton period during the research years; It was 28.9-14.0 and 29.1-14.4 mg/kg. These indicators are 0.3-0.1 mg/kg more than the initial state.

In the case of using N-200, R2O5-140, K2O-100 kg/h standards of mineral fertilizers, these indicators are 29.1-14.2 29.8-14.2 and 30.0-14.5 mg/kg, 0.9-0.1 mg/kg higher than control in 0-30 and 30-50 cm layers (last year).

The optimal effect of the applied composts is 21.0 t/h (15+6.0). The amount of mobile phosphorus in the soil was 32.9-15.8 mg/kg in the upper layers in the last 3 years of research, 3.8 more than the control option. -1.4 mg/kg, 1.9 mg/kg compared to only 15.0 tons of manure and 3.3 mg/kg compared to only bentonite (9.0 t/ha).

The balance of potassium in the soil is almost satisfactory in the options where additional nutrients, manure and compost of different standards are used, and it is considered optimal, that is, when 21.0 t of compost is used, in the 2nd year of research, at the end of the operational period, the amount of K2O is 235-170 mg/kg, 35 from the initial state of the soil. 0 mg/kg was more. In the last 3 years of the study, this indicator was found to be 30.0 mg/kg more than the control option.

In conclusion, it can be said that the effect and recent effects of the used non-traditional organic-mineral compost standards on the increase of general and mobile nutrients in the soil are positive, and their effects have been relatively decreasing in the last third year.

It was found that the use of composts as an additional nutrient once in three years before plowing has a positive effect on maintaining and increasing soil fertility in the conditions of barren soils that are being grazed. Table 3.



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

Order of options	Annual rates of mineral fertilizers, kg/h			Three-year rates of compost, manure and bentonite	N-NO <sub>3</sub>		P <sub>2</sub> O <sub>5</sub>		K <sub>2</sub> O	
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O		Soil layers, cm					
					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(bentonit)	20,3	12,2	29,0	11,8	210	160

As a result of many years of research, it became known that in recent years, the use of non-traditional organo-mineral composts as an addition to mineral fertilizers in improving soil fertility and increasing the amount of nutrients that are decreasing in the soil composition causes an increase in humus, total and mobile nutrients and an increase in efficiency.

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