



AGROPHYSICAL PROPERTIES OF MEADOW-SAZ SOILS OF CENTRAL FERGANA AND THE EFFECT OF NON-TRADITIONAL FERTILIZERS ON THEM

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Abstract

The article presents research data on the properties of meadow-saz soils formed in Central Fergana and the effects of non-traditional fertilizers prepared using urban waste under local conditions. According to the obtained results, the prepared non-traditional organic fertilizers have a positive effect on the agrophysical properties of the soil, leading to a decrease in soil bulk density and specific density, as well as an increase in soil porosity.

Keywords: Meadow-saz soils, experimental variants, fertility, agrophysical properties, water extract, nutrients, humus, fertilizer, non-traditional fertilizers, manure.

Introduction

To increase the fertility of irrigated soils, a number of systems of measures are used, such as fertilization, crop rotation, and improvement of the melioration state of soils, each of which has its own mechanism of action. For example, measures aimed at improving the melioration state of soils reduce the impact of factors limiting their fertility, the correct organization of crop rotation systems increases the biological activity of the soil, preserves and increases natural fertility, and improving the fertilization system directly increases effective fertility and increases the potential reserves of nutrients in the general background.

Nowadays, the development of new and diverse agrotechnologies aimed at maintaining and increasing soil fertility is of particular importance. One of these areas is new directions in the fertilization system aimed at directly improving the agrophysical properties of the soil, as well as eliminating the deficit of humus and nutrients, and non-traditional methods that directly serve to eliminate the deficit of fertilizers, especially organic fertilizers, and stabilize the ecology of the environment.

Research object and methods

The research object was selected irrigated meadow sedge soils formed in the peripheral areas of the Shohimardonsai extension. The effect of a new non-traditional fertilizer prepared using urban wastewater sludge on their properties and characteristics was also studied. The research used stationary-field and chemical-analytical methods. Laboratory analysis of soils was carried out according to generally accepted guidelines. Field experimental studies were carried out on the basis of the manuals "Methodology of field experiments with cotton under irrigation conditions", "Methodical guidelines for conducting field experiments". Also, the "Methodical recommendations" of the VVDokuchaev Institute of Soil Science were used.

Research results

The demand for non-traditional fertilizers in our country's agriculture is high, and they should replace the shortage of local organic fertilizers, thereby regulating the balance of humus and nutrients in the soil. Due to the annual demand for organic fertilizers in irrigated farming, an average of 10-15 t/ha is required, which means that there is practically no shortage of organic fertilizers. On the other hand, the scale of fertilizer production in our Republic is low, using various unnecessary waste residues that pollute the environment. According to statistical data, each year the demand for nitrogen fertilizers in agriculture is met by 70-80%, and the demand for phosphorus fertilizers by 30-40% [4]. Similar results have been reported by other researchers [1., 2., 3., 5., 6.]. There are enough raw materials in our Republic for the types of waste products mentioned above. They also differ in their types, containing nutrients in different quantities and proportions, and in practice, despite the fact that scientific foundations for the production of non-traditional fertilizers from them have been developed and prepared, they have not been widely used. Now, one of the important tasks is to introduce them on a republic-wide scale and determine their effect on different soils, their properties and characteristics. Because waste and residues contain high amounts of organic matter and other nutrients.

The average nutrient content of our unconventional fertilizer was as follows (relative to the air-dried sample):

No.	Organic matter (Humus), %	Gross forms., %			Active forms, mg/kg			
		N	P2O5	K2O	N-NH3	N-NO3	P2O5	K2O
Unity		Kilogram			Gram			
Quantity	191.2	19.5	20.6	11.7	74	19.8	340	2831

Another important aspect in the production of non-traditional fertilizers is the sources of waste and residues located in a particular area. For example, in our research, municipal sewage sludge, that is, the part that remains as a solid, is the main raw material, and it is appropriate to conduct experiments on this for the soils of that area, and related studies are being conducted on this. While transportation and application to other places, improving soil properties, are not without benefits, transportation and related processes lead to a decrease in economic indicators in the use of fertilizers.

The experiments we conducted for this purpose also had advantages in these indicators, and on the other hand, they were distinguished by their convenience, such as the fact that the cultivated areas



were widespread and a little away from the population. They also had positive significance in that they were prepared directly around the cultivated areas and trenches were opened during planting, so that gaseous nutrients were not depleted.

The experiments were conducted in 4 variants:

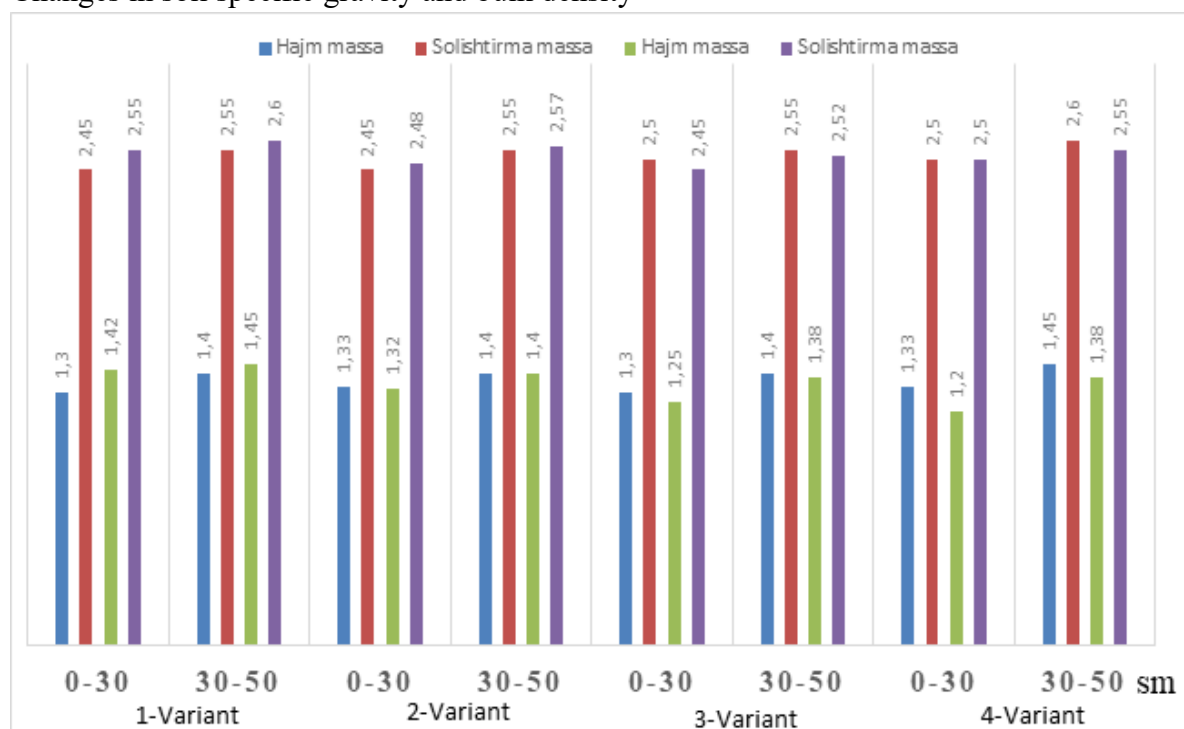
1. Control -unfertilized
- 2.N250P150K75
3. N250P150K75 + local fertilizer (15t/ha)
4. N250P150K75 + non-conventional fertilizer (15t/ha).

According to our results, the most positive changes in terms of total and mobile forms of humus and nutrients in the soil were observed in options 3 and 4, while a weakly positive change was observed in option 2, and a relatively negative change was observed in option 4 without fertilizers. Similar results were also reflected in the physical properties of the soil.

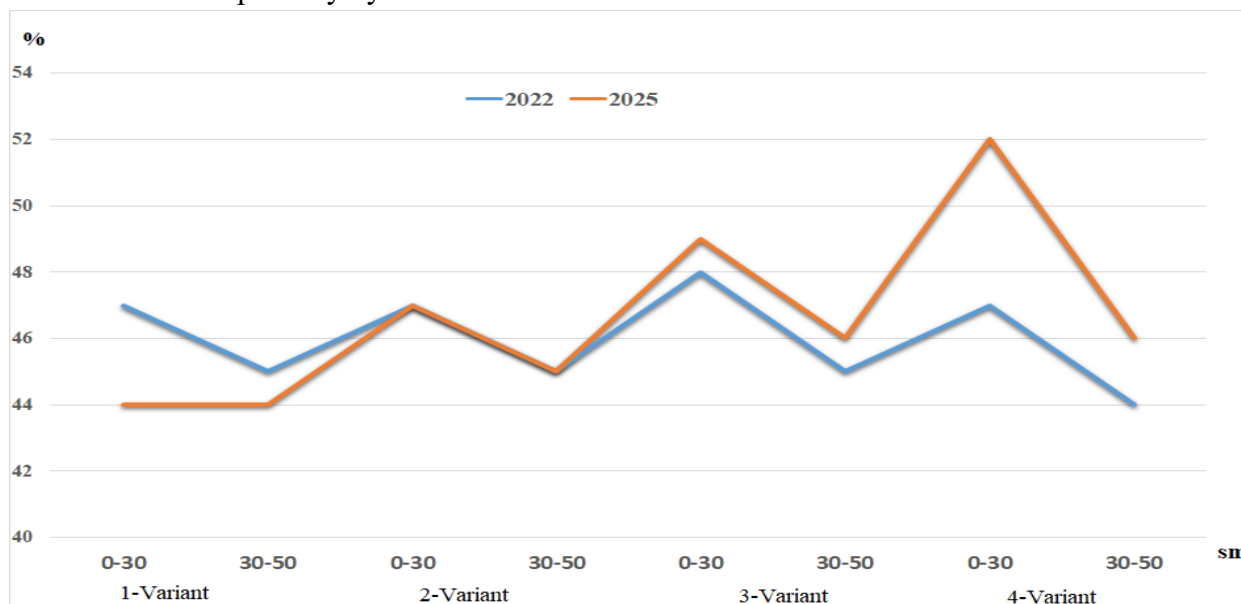
Our results of the impact of applied non-traditional fertilizers on the agrophysical properties of the soil have specific indicators. It is known from the scientific literature that the specific gravity of the soil is formed depending on its mineralogical composition, while the organic matter content in the soil shifts towards positive indicators in the order of increasing. The volumetric mass of the soil is directly dependent on the amount of organic matter. This situation was also reflected in our studies (graphs 1 and 2).

According to our results, the soils of our control variant, where no fertilizer was applied, changed negatively in terms of both specific gravity and bulk density, and as a result, the total porosity of the soil also decreased. Although the degree of change is not high, it is still there, and this situation is also reflected in field studies, where it is observed that the soils have slightly lost their aggregate state and have become denser.

Changes in soil specific gravity and bulk density



Variation of total porosity by variant



The scale of the changes is not clearly reflected in our second option, although it looks relatively progressive, it is very small when distributed over years, and may be significant over a long period of time, that is, when comparing results over many years.

Relatively clear differences are reflected in the variants where local organic fertilizers were used. In this case, changes occurred in both volume and specific gravity, and the total porosity changed positively by 2-3% according to calculations.

Our experimental option, which was set based on the goal, - the option with the use of non-traditional fertilizers, showed positive results in all indicators, leading to a significant decrease in specific and volume mass indicators. Due to this, the total porosity of the soil increased by up to 5% in the topsoil layer.

The scale of these changes in the soils, as noted above, is not the final equilibrium indicators under the conditions of continuous application of non-traditional fertilizers, but only the results of three years. More accurate information on this will require many years of experience. However, the experiments we conducted serve to reveal the essence of the positive properties and characteristics of the new fertilizer prepared.

Thus, according to our results, the new non-traditional fertilizer prepared has a positive effect on the properties and characteristics of the soil. The impact processes do not affect the levels of soil salinity. However, the fertility indicators increase rapidly as a result of the application of this fertilizer, due to the gross and mobile forms of humus, nutrients. Changes in the volume, specific gravity and total porosity of the soil increase in proportion to the number of options, and the option in which non-traditional fertilizers are used shows the most positive indicators and increases its value. This ultimately leads to changes in the aeration conditions, water properties, as well as free respiration of microorganisms in the soil, free branching of the plant root system, respiration, and a large accumulation of organic mass.

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