

# AGROCHEMICAL PROPERTIES OF TYPICAL GRAY SOILS OF THE FERGANA REGION, OLDLY IRRIGATED

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## Abstract

The article examines and studies the agrochemical properties of typical irrigated gray soils of the Fergana Valley, namely humus, amino acids, total nitrogen, phosphorus, potassium, and the granulometric composition of the soils.

**Keywords:** Agrochemical properties of typical gray soils, humus, amino acids, total nitrogen, phosphorus, potassium, granulometric composition of soils.

## Introduction

According to Lomonosov, the main reason for the transformation of parent rocks into soil is the decomposition of animals and plants over time. All processes of soil formation are associated with organic matter, especially humus. This organic matter contains a large part of plant nutrients.

Organic matter also plays the role of a major source of energy. A number of chemical elements migrate in the form of humus and organo-mineral, or rather humus-mineral compounds. This process continues in the soil, lithosphere, and hydrosphere.

Humus is a substance that provides nutrients, but the plant does not directly feed on humus, but it, that is, humus, participates in a number of physical and chemical processes in the soil and has a direct effect on it. It directly affects the water-air and temperature regime of the soil. In short, humus determines and controls soil fertility.

The quality and quantity of humus, along with other factors, is strongly influenced by organic fertilizers, in our conditions an average of 10 t/ha of fertilizer is applied to raspberry fields per year. This is of great importance in soils consisting mainly of mineral mass, such as gray soils.

The humus-forming properties of organic fertilizers have also not been sufficiently studied. In this regard, the special role of chemical elements contained in soil and organic matter is noteworthy.

One of the characteristics of the value of humus is its reserve, that is, the total nitrogen content and its ratio, that is, nitrogen to carbon or carbon to nitrogen, the amount of humus. According to the table, in typical irrigated gray soils, the humus content in the average arable layer is 1.3-1.4%, in the arable sub-layer it is 1.1%, in the carbonate illuvial layer it is 0.8%, and in the subsequent layers it fluctuates around 0.3-0.6%.

**Table 1 Agrochemical properties of typical irrigated gray soils**

Cut-off mark	The depth, cm	Humus, %	Gross, %				Mobile, mg/kg			Carbonates
			N	C:N	P	K	NO <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CO <sub>2</sub> , %
1	0-28	1,301	0.125	6.8	0.33	2.04	44.5	22.10	350.1	6.10
	28-44	1,100	0.105	7.3	0.28	2.12	40.4	18.10	250.3	7.30
	44-85	0.785	0.065	7.9	0.24	2.10	25.4	10.10	280.1	10.11
	85-150	0.645	0.053	7.9	0.27	1.78	7.10	4.81	320.1	7.4
2	0-34	1.40	0.132	7.1	0.36	2.10	51.2	24.19	375.2	7.1
	35-45	1,323	0.108	7.9	0.30	2.18	43.2	20.3	290.1	7.4
	45-85	1,002	0.079	8.3	0.27	1.94	27.4	11.7	300.1	11.2
	85-110	0.824	0.057	8.7	0.29	1.69	10.3	6.9	324.1	7.8
3	0-27	1,374	0.118	6.9	0.29	2.00	49.2	22.3	357.1	6.3
	27-38	1,037	0.091	7.4	0.34	2.20	41.7	18.7	284.7	6.9
	38-84	0.849	0.076	8.5	0.30	1.83	25.2	10.6	263.6	10.4
	84-150	0.615	0.053	9.0	0.26	1.56	13.4	6.2	300.1	8.2

It is now widely known that the correlation coefficient between the amount of humus and the amount of total nitrogen is positive, especially in gray soils, so the total nitrogen content varies along the profile depending on the amount of humus, and this value, i.e. C:N, fluctuates in the range of 6.8-9.6 in the studied soils and increases along the profile. In the subsoil, this value is in the range of 7.3-7.9, in the maternal sex limit and in the sex range of 9.2-9.6, that is, humus is poor in nitrogen. One of the reasons for this is the application of about 10 t/ha of organic fertilizer per year, and this fertilizer forms humus in the amount of 3%, i.e. 0.3 t/ha, and this humus is relatively rich in nitrogen. So, organic fertilizer is a source of carbon and at the same time humus. One of the founders of the theory of humus formation, PAKostichev, solved the problem of the participation of microorganisms in the process of humus formation and the nitrogen content of humus.

According to D.N. Pryanishnikov, nitrogen is a component of all amino acids, on the basis of which the protein molecule is built. Nitrogen makes up 16-18% of the protein mass. This fact alone explains the role of nitrogen in plant and soil life. Without nitrogen, proteins cannot be formed, which means that without protein there can be no protoplasm and life. In addition, nitrogen, in addition to proteins, is a component of nucleic acids. Nitrogen is a component of chlorophylls. As a source of nitrogen, nitrates, nitrites, and ammonium are present in the soil. Their amount varies in different soils. The role of legumes and legumes in nitrogen fixation is well known. Under normal natural conditions, nitrogen salts are scarce in the soil, since they do not remain stable in the soil for a long time in the form of nitrate and ammonia.

Libich, focusing on the role of nitrogen as a nutrient, made the mistake of assuming that atmospheric nitrogen was sufficient for plants.

As mentioned above, the total nitrogen content is closely related to the humus content in the soil, and in typical irrigated gray soils, when the humus content varies around 0.33-1.30% according to the soil profile, the total nitrogen content is around 0.023-0.125%, and the nitrogen in the mobile



form N-NO<sub>3</sub> is 6.10-44.51 mg/kg. However, the main mass of nitrogen in the soil is formed as a result of the mineralization of plants that have fallen into it. According to Tyurin, the organic nitrogen content in the soil is up to 0.40-0.45% in black soils, and 0.1-0.2% in gray soils, or 3-5 tons per hectare. Since nitrates in the soil are unstable, little attention is paid to their supply levels. Nevertheless, Kochergin recommends the following classification. N-NO<sub>3</sub>mg/kg

0-5 is very low

5-10 low

10-15 average

> Above 15

According to this indicator, the studied soils, i.e. typical irrigated gray soils, are highly supplied with arable and sub-arable layers. Taking this indicator into account, if it is necessary to apply nitrogen fertilizers during the growing season, it is advisable to apply nitrogen fertilizers during this period, since the plant's need for nitrogen is high, NO<sub>3</sub>, NH<sub>4</sub> are quickly washed out, and it is necessary for plant development.

It should not be forgotten that the N:P:K ratio in the soil is of great importance in plant nutrition. The effect of phosphorus on plant life is multifaceted. If the soil is well supplied with phosphorus, plant productivity and crop quality increase significantly.

The sugar content in vegetables and fruits increases, which means that in soil sufficiently supplied with phosphorus, the sugar content in raspberries increases, and the yield is good. Phosphorus increases the winter hardiness of plants, increases the rate of ripening. According to VGMineev, it accelerates the ripening of grain crops by 5-6 days. With a normal supply of phosphorus, the roots of plants become strong and penetrate deep. The penetration of roots into the soil improves its supply of water and nutrients.

It should be noted here that direct contact between the roots and the soil is of particular importance in supplying plants with phosphorus. Chirikov attached particular importance to this. In this regard, it is worth paying attention to the fact that the root system has a great influence on the soil.

Phosphorus is an irreplaceable element in the composition of complex proteins. At the same time, according to Pryanishnikov, unlike nitrogen and sulfur, it is not included in the composition of simple proteins. Phosphorus is present in the soil in the composition of minerals. However, plants are mainly fed by the remains of orthophosphoric acids. According to Mineev, total phosphorus in gray soils is 4.2 t / ha, organic phosphorus is 0.6 t / ha, and mineral phosphorus is 3.6 t / ha. According to these indicators, organic phosphorus is 14.2% of total phosphorus, and mineral phosphorus is 85.8%. In the studied soils, that is, in typical irrigated gray soils, total phosphorus is 0.24-0.33% by profile, and mobile phosphorus is 5.11-22.10 mg / kg. Soil phosphorus levels are classified as follows: 0-10 mg/kg is very low, 10-15 mg/kg is low, 15-20 mg/kg is average, and >20 is high.

In kg per hectare, 0-50 is considered very low, 50-75 is low, 75-100 is average, and >100 is high. According to these indicators, typical gray soils are moderately supplied with arable and sub-arable layers, and it is recommended to provide plants with up to 45 kg of phosphorus.

As mentioned above, plants need potassium, microelements, and some macroelements in addition to N and P for normal life. Potassium is of great importance among alkali metals in plant life. Algae love potassium very much and absorb it in significant quantities. The role of potassium in plant life is also diverse. According to Pryanishnikov, potassium plays a major role in the



accumulation of carbohydrates by plants.

Potassium deficiency causes reduced yields in most crops, and potassium deficiency also reduces plant resistance to disease.

Plants usually use all forms of potassium in the soil during their nutrition. This, of course, depends on the type of plant and soil-climatic conditions. Clay minerals are of great importance in this regard.

The granulometric composition of soils and clay minerals play a significant role in the supply of soil with potassium. Micas, hydromicas, illites, vermiculites are rich in potassium. The least amount of potassium is found in kaolinite. The supply of soils with potassium has the following form: mg/100 g of soil 10-20 low, 20-50 medium, 50-100 high, 100-150 very high. Or in mg/kg 100-200 low, 200-500 medium, 500-1000 high, and above 1000 very high according to VGMineev. According to this indicator, the plow layers and sub-plots of typical irrigated gray soils are moderately supplied. According to the data presented, typical irrigated gray soils are considered suitable soils for plant cultivation in terms of nutrient elements.

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