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Agrochemical Condition Of Irrigated Soils In Mirzachol Oasis

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Abstract: The article provides detailed information on the humus and nutrient content of saline and irrigated meadow-gray soils of the research area with varying degrees of gypsum. In addition, important information is provided on ways to increase the humus content and improve the fertility of soils with varying degrees of gypsum, as well as ways to effectively use such soils.

Keywords: Irrigated meadow-gray soil, gypsum levels, humus, nutrients, nitrogen, phosphorus, potassium.

Introduction: Scientific research is being conducted around the world to manage gypsum soils and establish effective use of gypsum lands by assessing their potential for agricultural use. In this regard, special attention is paid to scientific research aimed at determining the occurrence and formation of gypsum in soils, the effect of precipitation and irrigation on their properties, and the placement of crops in agriculture by mapping gypsum soils, taking into account the degree of gypsum content of the soil, the depth of the gypsum layer, and the thickness of the gypsum layer.

In particular, extensive scientific research is being conducted in our republic to determine the current state of gypsum soils, improve their ecological and reclamation status, assess their qualitative productivity, and achieve specific results. In the development strategy of New Uzbekistan for the period of 2022-2026, the goal is to "increase the income of peasants and farmers by at least 2 times through the intensive development of agriculture on a scientific basis, to reach the annual growth of agriculture by at least 5%", and to achieve this goal, "Increasing soil fertility and protection" is defined as one of the main priorities. Therefore, it is important to determine the origin and formation of difficult-to-reclamate soils, their properties, assess the reclamation status, assess the qualitative fertility of gypsum soils, and determine the level of fertility in order to effectively use such lands.

Many scientific studies have been conducted by M.M. Toshko'ziev [13,14] to determine the components of soil humus. Among them, he studied the soils of the region of gray loamy soils in depth and found that the humus content in their soils is about 1.0-1.5 percent, and in saline soils it is even up to 1.0 percent. This amount of humus is considered to be a characteristic and suitable fertile soil for the soils of the region. It is emphasized that it is important to study the dynamics of humus and nutrients in the soils of this irrigated region and to manage soil processes.

During the entire growing season, plants absorb the nutrients they need from the soil, and along with their crops, many mineral and organic substances are removed from the soil. Repeated planting of the same type of plant in a field over many years leads to a deficiency of this type of organomineral substance. This significantly affects the decline in soil fertility [1,2,9,10].

A.J. Bairov and others [5,6] have studied the fractional composition of phosphorus and found that in most cases phosphorus is stored in the soil in the form of organomineral compounds, which are insoluble in water and difficult for plants to absorb, and the demand of plants for phosphorus is high from its initial stages. Phosphorus deficiency in the soil sharply reduces the growth and development of the root system and the plant's resistance to adverse abiotic and biotic factors. According to the authors, mineral phosphorus is much more abundant in the soil than organic phosphorus, and organic phosphorus is of great importance in plant nutrition.

The soils of the Mirzachol region are considered to be soils with varying degrees of salinity, and according to the hydrothermal regime, they are mainly considered to be semi-hydromorphic and hydromorphic soils. The soils of the Mirzachol valley are mainly formed under the influence of seepage waters. [3,5,6,7,8].

Although the irrigated soils of our republic are characterized by a relatively high level of humus and nutrient supply, the soils of the gray soil region are characterized by a relatively high level, but this indicator is the opposite in oasis soils. According to the results of many years of scientific research, it is scientifically proven that among the irrigated meadow-alluvial, meadow, and swamp-meadow soils widespread in the oasis, the swamp-meadow soils have a relatively high humus content [11].

Research object; our research was conducted on irrigated soils of Mirzaabad district, Syrdarya region.

METHODOLOGY

Consists of methods of analyzing soil map data of the studied area, generalizing the results of field, laboratory, and chamber-analytical research. Preparation, field, camera and cartographic works were carried out based on the guidelines [9], general chemical analysis of the soil was carried out based on E. V. Arinushkin [4] and UzPITI manuals [12].

RESULT AND DISCUSSION

From the results of chemical analysis of soil samples taken from irrigated meadow-gray soils of the researched area, it was found that the amount of humus fluctuates in the range of 0.343-0.713% along the profile in soil section 62 and it decreases towards the lower layers. The amount of total nitrogen is 0.032-0.045%, depending on the amount of humus, and the amount of mobile (N-NO3) is 3.11-16.75 mg/kg, and it is poorly supplied with mobile nitrogen. The carbon to nitrogen ratio (C:N) was 6.2-9.2, total phosphorus was 0.29-0.43%, and the amount of mobile phosphorus (P2O5) was 9.86-23.76 mg/kg, making it a group of soils with low levels of mobile phosphorus. The amount of total potassium is 1.70-2.16%, and the amount of mobile potassium (K2O) is 108-202 mg/kg, and it is moderately and sufficiently supplied with mobile potassium. The amount of carbonates (CO2) in the soil profile is 4.56-5.45%, and is noticeable slightly above the middle layer of the profile (Table 1).

In the topsoil and subsoil layers of soil section 108, the humus content is 0.311-0.985%, the total nitrogen content is 0.029-0.058%, the mobile nitrogen content is 7.75-15.0 mg/kg, and the carbon to nitrogen ratio (C:N) is 6.2-9.9. Total phosphorus is 0.13-0.38%, mobile content is 9.84-20.80 mg/kg, total potassium is 0.58-1.66%, mobile potassium content is 116-218 mg/kg, and carbonates (CO2) content is 4.56-5.45% (Table 1).

Table 1

Watered meadow - humus and nutrients of gray soils quantity of elements

Section №	Depth cm	Humus %	Common %			C:N	Activity, mg/kg		
			N	P	K		$N\text{-}NO_3$ mg/kg	P_2O_5 mg/kg	K_2O mg/kg
62	0-26	0,713	0,045	0,43	1,79	9,2	16,75	21,76	202
	26-51	0,597	0,038	0,42	1,94	9,1	10,68	17,98	178
	51-86	0,431	0,034	0,38	1,83	7,4	7,16	15,71	153
	86-105	0,392	0,032	0,33	1,70	7,1	5,24	12,43	127
	105-155	0,343	0,032	0,29	2,16	6,2	-	9,86	108
108	0-27	0,985	0,058	0,38	1,63	9,9	15,0	20,80	218
	27-49	0,896	0,056	0,24	1,66	9,3	8,25	19,41	192
	49-87	0,756	0,048	0,21	1,51	9,1	8,25	14,05	167
	87-110	0,682	0,045	0,14	0,98	8,8	7,75	11,22	132
	110-158	0,311	0,029	0,13	0,58	6,2	-	9,84	116
135	0-27	0,709	0,044	0,34	1,13	9,3	13,0	19,52	237
	27-49	0,494	0,034	0,33	1,06	8,4	10,0	13,44	163
	49-91	0,384	0,03	0,25	1,37	7,4	13,0	9,60	144
	91-128	0,312	0,026	0,13	1,08	7,0	7,75	9,28	115
	128-170	0,297	0,025	0,11	0,50	6,9	-	8,97	112
167	0-24	0,753	0,053	0,34	1,75	8,2	13,8	18,88	175
	24-48	0,636	0,049	0,33	1,28	7,5	12,25	14,4	156
	48-88	0,512	0,042	0,23	0,77	7,1	6,0	10,56	123
	88-128	0,376	0,039	0,16	0,53	5,6	3,3	9,60	117
	128-160	0,283	0,036	0,12	0,39	4,6	-	7,84	112

In soil section 135, the humus content was 0.297-0.709%, the total nitrogen content was 0.025-0.044%, the mobile nitrogen content was 7.75-13.0 mg/kg, the carbon to nitrogen ratio (C:N) was 6.9-9.3, the total phosphorus was 0.11-0.34%, the mobile content was 8.97-19.52 mg/kg, the total potassium content was 0.50-1.13%, the mobile potassium content was 112-237 mg/kg, and the carbonates (CO2) content was 3.79-5.63%.

In soil section 167, the humus content was 0.283-0.753%, the total nitrogen content was 0.036-0.053%, the mobile content was 3.3-13.8 mg/kg, the carbon to nitrogen ratio (C:N) was 4.6-8.2. Total phosphorus 0.12-0.34%, mobile content 7.84-18.88 mg/kg, gross potassium 0.39-1.75%, mobile content 112-175 mg/kg, carbonates (CO2) content 3.98-5.86% (Table 1).

According to the results of generalized laboratory analysis, when analyzing the level of humus and nutrient supply of a total of 4692.0 hectares of irrigated land of the studied area, it was determined that soils with low humus supply (0.4-0.8%) accounted for 94.5% and soils with medium humus supply (0.8-1.2%) accounted for 5.5% (Figure 1).

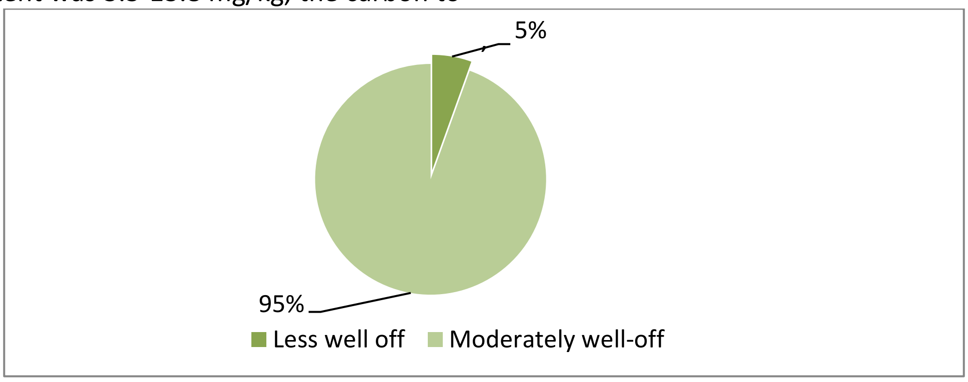

Figure 1. Level of humus supply

The process of metabolism between microorganisms present in varying amounts in the soil leads to a relatively high accumulation of nitrogen and ash elements (phosphorus, sulfur, etc.) in the upper layers of the soil. As a result, soil fertility is formed, which is a product of the long-term process of soil formation and development [11].

In terms of the level of availability of mobile phosphorus in agricultural lands relative to the total irrigated land area of the studied area, very poorly supplied (<15 mg/kg) areas accounted for 35.9%, and poorly supplied (15-30 mg/kg) areas accounted for 64.1%. it was found that the group of soils with low availability of mobile phosphorus constitutes the main part of the area (Fig. 2).

According to the level of exchangeable potassium supply, very poorly supplied (<100 mg/kg) areas account for 3.8%, poorly supplied (100-200 mg/kg) areas account for 66.0%, moderately supplied (200-300 mg/kg) areas account for 26.7%, and highly supplied (300-400 mg/kg) areas account for 3.4%, with the majority of the massif being comprised of soils poorly supplied with exchangeable potassium (Figure 3).

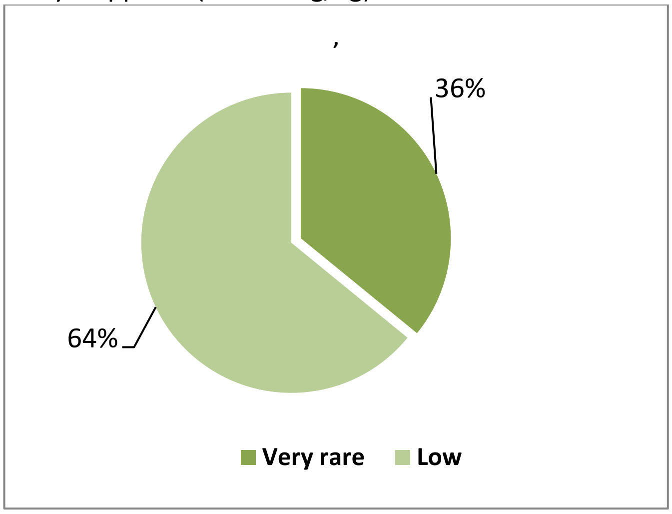

Figure 2. Phosphorus supply level.

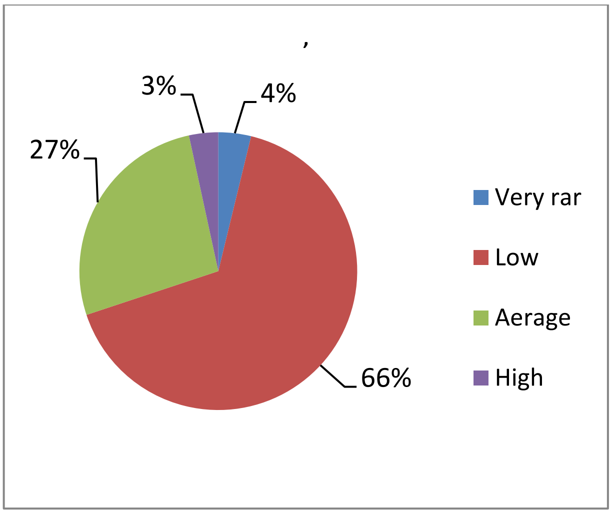

Figure 3. Level of potassium supply.

CONCLUSION

In conclusion, it can be said that in all genetic layers of irrigated meadow-gray soil sections of the researched area, the amount of humus and nutrients decreases from the surface arable layer to the lower layers, depending on the mechanical composition of the soil. It was found that the main areas of the massif are predominantly poorly drained soils, based on the degree of humus supply. They are mainly soils that are poorly supplied with mobile phosphorus, one of the nutrients, and poorly and moderately supplied with exchangeable potassium. The soils are weakly carbonated, and due to years of frequent irrigation, irrigation with water, and precipitation, it has been observed that the soil has been washed from the surface layer to the lower layers, accumulating relatively more in the middle layer.

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