Spectrum Journal of Innovation, Reforms and Development
Volume 19, September, 2023 | ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

ASSESSMENT OF PRODUCTIVITY OF IRRIGATED MEADOW-ALLUVIAL SOILS

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Abstract
Abstract. The article describes the state of fertility of irrigated meadow-alluvial soils. It contains information on the morphogenetic indicators of meadow-alluvial soils, the amount of humus and nutrients. The amount of humus and nutrients in these soils was observed to be low during the research.

Keywords. Irrigated meadow-alluvial soil, humus and nutrients, morphological characteristics, soil fertility.

Introduction

Worldwide, approximately 3 million hectares of land degraded due to erosion, and every minute approximately 44 hectares of agricultural land are being lost. In fact, agricultural area situated in arid zone is vulnerable to erosion, which leads to decline in agricultural productivity due to low quality soil (Kamilov et al., 2021). In the world, scientific research is being carried out in the priority areas of identifying negative processes occurring in soil layers, including salinization, glaciation, pollution with heavy metals, dehumification and other processes, their prevention and mitigating their consequences (Sanakulov et al., 2023). Soil morphology is the presence of the soil properties observed and studied in the field (Hardjowigeno, 1993). Study on the soil morphology is very important to get a picture of changes, or evolution, that occur in the soil body through the description and interpretation of soil profile properties in the form of diagnostic epipedon and endopedon, which will be the initial information in soil classification activities. Soil classification is important to have the information of soils properties of the soil and theirs productivities. Land use that based on soils characteristics and capability will be more productive and can minimize the threat of wasteful land use, leads to in decreasing the sustainability of land resources.

The higher the soil nutrient reserves, the higher the level of soil fertility. Nutrients in the soil are very dependent on the composition, amount, and type of minerals. The characteristics of acidic sedimentary rocks vary due to their formation process, which depends on the nature of the component material, the process or model of the deposition, and the environmental conditions of the deposition area.

Each soil has unique characteristics, consequently, the data on the morphology and diagnostics of meadow-alluvial soils are needed to determine the overall development of

the soil in balance with the environment. This study aimed to determine the morphological characteristics and classification of the irrigated soil Sirdaryo region.

2. Materials and Methods

Morphological characteristics generally accepted in soil science are: color, structure, density, granulometric composition, inclusions, new lesions, structure and thickness of the soil profile. Morphological characteristics reflect the origin of the soil, its relationship with the geographical environment, the history of development and evolution, and internal characteristics.

Soil samples were taken at each horizon from the two soil profiles to analyze the soil chemical and physical properties. Soil samples were dried and sieved with a 2 mm diameter sieve. Texture was measured by using pipette method (Black et al., 1965), bulk density was measured by using Wax method (Blake and Hartge, 1986), density was measured by using pycnometer method (Blake and Hartge, 1986), pH H_2O (1: 2.5) was measured by using a pH meter (McLean, 1982), humus - I.V. Tyurin, 1982) and total phosphorus and potassium - Gritsenko and Maltseva, mobile P_2O_5 and K_2O - according to the methods of B.P. Machigin.

3. Results and Discussion

In field conditions, the internal processes taking place in soils, their origin (genesis) and history of development are studied and identified and named according to external, so-called morphological signs.

N.M.Sibirtsev believed that it is possible to determine the soil according to its morphological (external) characteristics in the same way as determining a mineral, plant or animal. Therefore, it is especially important to correctly describe the soil in the field, to record all its properties [http://ecosystema.ru/08nature/soil/i03.htm].

Each type of soil in the process of its formation has a number of stable and characteristic morphological (external) features only for itself, which are found in the study of the structure of the soil profile revealed by the section.

In our research, we took soil sections from the research area in order to study the morphological features of soils.

Section 1. G.S. Sodikova, N.B. Meyliyeva.

Meadow-alluvial soil. The mechanical structure is medium sandy, formed on alluvial deposits, located on the 2nd pit, highly cultured, and the relief is wide undulating. The cutting was taken in a cotton field, the condition of the crop is medium. Gulistan District, Syrdarya Region, Syrdarya Tukhfasi Farm.

0-25 cm. It is brown in color, moisture is dry, medium sand, plant roots are dense, cut-like structure, soft, transition to the next layer is noticeable.

25-51 cm. The soil is light-colored, the moisture is fresh, medium sand, the roots of the plant are dense, the structure is cut-like, soft, there are concretions, the transition to the next layer is sharp.

51-73 cm. Yellowish, wet, heavy sand, plant roots are sparse, scaly, soft, white shoots are found, it is clear that it will pass to the next layer.
73-98 cm. The field is colored, wet, light sand, plant roots are not found, slaty structure, dense, gypsum crystals are found, transition to the next layer is noticeable.
98-124 cm. It is brown in color, the moisture content is very moist, light sand, plant roots are not found, slaty structure, dense, new wounds are not found, transition to the next layer is noticeable.
124-149 cm. Dark field color, moist, light sand, plant roots are not found, pasty, soft, new wounds are not found, the next layer is water.
As it can be seen from the given data, the profile of irrigated meadow-alluvial soils is complex, while the mechanical composition is average in the upper layers, sometimes it becomes heavier towards the middle and lower layers. and it can be seen that it is getting lighter. These soils differ in their new wounds. In general, these indicators are important in improving the productivity of these soils. This affects its quality assessment. Suharta (2010) stated that rough soil texture (sand dominance) leads to the low ability of the soil to retain water and nutrients, and the soil becomes prone to drought and sensitive to erosion.
Chemical and physical properties of the soil.
The amount of organic matter in the soil is the main factor that controls a number of properties of the soil, depending on the conditions of humus formation, the mechanical composition of the layer, the period of irrigation, the farming culture and the level of salinity. The amount of humus in the arable layers of the soil of the described area is 0.88-1.77%, in the sub-arable layers it is 0.66-1.09%, and in the lower horizons it is 0.31-0.42%. According to the amount of humus in the upper layer, the gray-meadow soils of the analyzed area belong to the group of medium (1.0-2.0%) and low (0.8%) supplied soils.
Based on the classification proposed by H. T. Riskieva on "Differentiated use of nitrogen fertilizers in cotton farming" (1989), the total nitrogen indicators in these soils are 0.047-0.110 in the upper layers, depending on the amount of humus. % and decreases to 0.014-0.033% depending on the lower layers. The ratio of carbon to nitrogen is 8.0-9.3 in the arable layers, and 6.4-7.4 in the lower layers (Table 1).

Table 1. Amount of humus and nutrients in newly irrigated meadow-alluvial soils of "Khamid Olimjon" massif, Syrdaryo district

Serial number	Layer depth, cm	Humus, %	Total nitrogen, %	C:N	Nutrients				
					Common , %		Active, mg/kg		
					Phosphorus	Potassium	$N\text{-}NO_3$	P_2O_5	K_2O
1	0-25	1,39	0,097	8,3	0,102	0,80	61,7	6,64	456
	25-51	0,99	0,082	7,0	0,057	0,75	72,4	5,58	360
	51-73	0,83	0,068	7,0	0,047	0,70	66,1	1,73	270
	73-98	0,34	0,049	4,3	0,043	0,60	83,2	1,70	358
	98-124	0,15	0,014	6,2	0,040	0,61	45,3	1,55	260
2	0-27	1,77	0,110	9,3	0,118	0,58	66,1	8,87	256
	27-47	1,09	0,066	9,6	0,126	0,53	87,1	8,67	200
	47-85	0,72	0,054	7,7	0,071	0,42	72,4	6,64	136
	85-108	0,42	0,033	7,4	0,118	0,60	79,4	4,12	206

4. Conclusion

Chemical characteristics and soil morphology showed that the pH and the level of natural fertility were very low, the soil color of the surface was dark and being lighter in the deeper soil depth, the texture of the soil was dominated by fine sand, and the C horizon was dominated by coarse sand. Soil structure on the A horizon to BW (BW1 and BW2) were crumbs, with loose soil consistency. Since the vegetation on the upper layer i was s dominated by shrubs, the fine roots were only reaching the depth of 40-50cm. The border of the upper horizon was clear, while the border of the lower horizon was unclear.

These soils are medium and low in humus content, very low in mobile phosphorus, and high in potassium. Therefore, amelioration technology and fertilization technology can be carried out as an effort to improve chemical properties and low soil fertility.

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