CHANGE MECHANICAL YOUR STVIE IRRIGATED SWAMP - MEADWAY SOILS FERGHANA VALLEY, UZBEKISTAN

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Annotation

This article presents the results of a study on changes in the particle size distribution of irrigated bog-meadow soils formed in the Umid Nigohi massif in Fergana. It has been demonstrated that, based on the physical clay content (<0.01 mm) in the genetic horizons of these bog-meadow soils, they are classified as heavy loamy and light clays (46.6-62.5%). In terms of mechanical composition, these bog-meadow soils are characterized by a predominance of silt particles.

Keywords: marsh-meadow soils, granulometric compound, physical sand, physical clay, heavy loam, light clay.

Introduction

In soil physics, soil is considered as a heterogeneous multiphase dispersed system that, under certain conditions, has the ability to accumulate and release, conduct and transform (convert) substances and energy at its lower and upper boundaries [1].

Marsh-meadow soils are soils that form under conditions of excessive moisture, where moisture-loving plants thrive. Marsh soils are characterized by the presence of a peat horizon, a significant amount of undecomposed and partially decomposed organic matter, a rich supply of nutrients for plant growth, and a low content of ash elements [2]. Marsh soils are widespread in the Northern Hemisphere, particularly in Russia, Canada, the USA, as well as in Brazil, Argentina, and Indonesia. In Central Asia, as a result of drainage land reclamation and rational use of water resources, a sharp reduction in the area of marsh soils has been observed [3]. In Uzbekistan, marsh and marsh-meadow soils are mainly widespread in the desert zone, found in river floodplains and in the lower reaches of the Amu Darya.

According to the "Atlas of Soil Cover of the Republic of Uzbekistan", marsh-meadow soils together with meadow soils occupy an area of 3,547.8 thousand hectares. Of these, the Fergana region accounts for 272.4 thousand hectares. In the valley regions, the share of marsh-meadow and meadow-marsh soils accounts for: 0.3% of the total irrigated land area in the Fergana region, 20.0% in the Namangan region (in the desert zone), and 3.4% in the Andijan region [4, 5]. However, marsh-meadow soils are not sufficiently distinguished among the main genetic groups of soils, and their particle size distribution (mechanical composition) has not yet been fully studied.

LITERATURE ANALYSIS AND METHODOLOGY

The object of the study was irrigated marsh-meadow soils formed on the territory of the Zhuydam farm, located in the city of Fergana in the Fergana region.

The research methods are based on generally accepted standard techniques in soil science, conducted in field, laboratory, and office conditions. The morphogenetic (sectional) method of V.V. Dokuchaev was adopted as the primary research method. The granulometric (mechanical) composition of the soil was determined using the Kachinsky method in accordance with the state standard of the Republic of Uzbekistan O'zDSt 817-97 [6].

RESULTS AND DISCUSSION

The solid part of the soil consists of rocks, minerals, and organic matter; these particles are called mechanical elements. The ratio of mineral particles of different sizes, expressed as a percentage, characterizes the mechanical composition of the soil. If the diameter of the mechanical elements exceeds 1 mm, they are considered the soil skeleton, and if smaller, they are considered fine earth. Fine earth, in turn, is divided into two parts: particles with a diameter greater than 0.01 mm are called physical sand, while those less than 0.01 mm are called physical clay.

The mechanical composition of the soil influences many of its properties, in particular its water properties (water retention capacity, water permeability, capillary rise of moisture), thermal properties, temperature regime, nutrient supply, microbiological activity, specific resistance during soil cultivation and many other important characteristics [7].

The particle size distribution (mechanical composition) of soil is studied based on the relative percentage of particles of different sizes. This is usually expressed as a percentage of the air-dry soil mass. Particle size distribution reflects the process of soil formation and allows for the observation and assessment of changes in the parent material under the influence of various soil processes. Mechanical composition influences the water regime of soils and the degree of their leaching, and is also reflected in their temperature regime.

The properties of mechanical elements directly depend on their size. Particles of the same size are grouped into fractions. Grouping particles by size is called the classification of mechanical elements [8] (according to Williams-Kaczynski)

(Table 1). **Classification of mechanical elements of soils (according to Williams-Kaczynski)**

Particle size, mm	Name of the mechanical element	Group of factions	
>3	Stones (gravel, pellets)	Physical sand	Soil skeleton
January 3	Small stone (gravel, crushed stone)		
1-0.5	Coarse sand		
0.5-0.25	Medium sand		
0.25-0.10	Fine sand		
0.10-0.05	Fine sand		
0.05-0.01	Coarse dust		
0.01-0.005	Medium dust	Physical clay	
0.005-0.001	Fine dust		
0.001-0.0001	Silt		
<0.0001	Colloids		

Soil pits belonging to the Joydam farm were established on plots No. 208, 209, 210 and 354. To collect soil samples, 4 main deep pits, 4 semi-deep pits and 4 shallow pits were dug.

The first section (3-2023-1) was divided into 4 genetic horizons based on morphological features.

In the first horizon Ah (0–32 cm), the arable layer, the content of particles smaller than 0.01 mm (physical clay) is 59.5%, which corresponds to heavy loam in terms of mechanical composition. In the subsoil layer Ah-o (32–50 cm), physical clay constitutes 61.2%, and in terms of particle size distribution, it is

classified as light clay. In horizon B1 (50–60 cm), the amount of physical clay is 57.0%, therefore, this horizon is also classified as heavy loam. In horizon B2C (60–68 cm), physical clay constitutes 50.7%, confirming that the parent rocks forming the bog-meadow soils are also classified as heavy loam.

The second section (3-2023-2) was divided into 7 horizons based on morphological features.

In the Ah horizon (0–31 cm), the content of particles smaller than 0.01 mm is 54.0%, which corresponds to heavy loam. In the Ah-o subsoil (31–43 cm), the total content of particles smaller than 0.001 mm is 56.8%, that is, according to the mechanical composition, it is heavy loam. In the B1 horizon (43–66 cm), the content of physical clay is 61.3%, which corresponds to light clay. In the B2 horizon (66–87 cm), the physical clay is 48.8%, and according to the particle size distribution, it is heavy loam. In the B3 horizon (87–96 cm), the physical clay is 47.5%, which also corresponds to heavy loam. In the B4C horizon (96–120 cm), the content of physical clay is 58.0%, which confirms its heavy clay composition. In the last horizon C (120–134 cm), physical clay makes up 55.2%, and in terms of mechanical composition, this horizon also belongs to heavy loams.

The obtained data show that in the genetic horizons of the studied soil sections the content of physical clay varies from heavy loam to light clay.

CONCLUSION

When characterizing the fertility of irrigated marsh-meadow soils, their mechanical composition is one of the key and essential indicators. Soils with a heavy mechanical composition are characterized by relatively high moisture content and, most importantly, the ability to retain it for long periods. However, such soils are characterized by low water and air permeability. Light soils, on the other hand, are characterized by low nutrient and moisture content, but high infiltration capacity and intensive aeration processes.

From the data provided, it is evident that in irrigated bog-meadow soils the content of physical clay (<0.01 mm) fluctuates between 46.6 and 62.5%, which allows them to be classified as heavy loams according to their mechanical composition.

It is recommended that agrotechnical measures such as soil cultivation, irrigation, application of organic and mineral fertilizers, and placement of

agricultural crops be carried out taking into account the mechanical composition of the soil.

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