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EFFECT OF LOGON BENTONITE CLAY ON SOIL MECHANICAL COMPOSITION

Tungushova Dilbar Abdukayumovna

Research Institute of Breeding, Seed Production and Agricultural Technology of Cotton Growing

Turakulov Dilmurod Abdulvosidovich

Senior teacher, Namangan Institute of Engineering and Technology

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Abstract

The study examined the effect of bentonite sludge applied as a supplement to the soil on changes in the mechanical composition of the soil in the drive and subsoil layers. the amount of agronomically useful macrostructural aggregates increased by 1.92-3.57%.

Introduction: Worldwide, large reserves of bentonite are located in the United States, Greece, Japan, Italy, Brazil, Romania, Mexico, Argentina, Spain, India, Hungary, Poland, Canada, Turkey and Cyprus. According to the data, in 2019, China-5.6; U.S. 4.7; India-3.4; Turkey and Greece -1.3; a total of 20.9 million. tons of bentonite mud were mined, which was widely used in various sectors of the economy. [6]The largest reserves in Uzbekistan are the South Aqrabot, Aktash, Maidon, Guzar, Yakkabag, Pachkamar, Dehkanabad and Hovdak fields. Z.M.Zakirov, M.M.Mirsaidov [8]. The total reserves of bentonite mud in the deposits are more than 2 billion tons, which are used in various industries (chemical industry, construction, medicine) and agriculture. G.E. Kamagurov [9].Maintaining and improving soil fertility, as well as optimizing the nutritional regime of agricultural crops, bentonite clay is widely used as a supplementary feed. The use of bentonite sludge as an additional food source in combination with mineral fertilizers improves the agrophysical, agrochemical properties of the soil, increases the yield and quality of agricultural crops.

Studies have shown that [4, 10, 12] natural sorbents such as bentonite and bentonite-like clay, glauconite sandstones, etc. are called multifunctional raw materials due to the specific properties and diversity of the composition of the material, physicochemical properties.Macro and microelements as an independent source of plants, as sorbents that increase cation and anion exchange capacity, the ability of soil to retain water, clean the soil and water from pesticides, heavy metals, radiation and others. Reduces the toxicity of soil salts, reduces the filtering ability of sandy soils and increases it for muddy and swampy soils.

According to S.M.Boltaev, the use of organo-mineral compost on the basis of non-traditional agro-ores used in saline soils affected the change in the amount of macro-aggregates in the soil. As a result of compost application of 21.0 t / ha, agronomically useful macro-aggregates in the 0-30 cm layer of soil were 60.03%, which is 8.9% higher than the control and 11.0% higher than the initial state in the soil.

The average yield of cotton was 33.3 t / ha, which is 2.8 t / ha more than 4000 m3 / ha washed salty soil variant and 5.6 t / ha more than in the case of 40.0 tons of river mud. yield was observed. [7, 13].According to MV Khovansky, EV Agafonov, bentonite clay significantly improved the agrophysical properties of the soil, increased the number of agro-technical particles with a size of 0.25 to 10.0 mm, improved their water resistance, micro aggregation and mechanical composition of soil were improved the proportion of physical sludge increased mainly due to an increase in the amount of sludge particles. The coefficient of soil structure increased from 3.04 to 3.54 units. These changes occurred in variants where bentonite mud was applied to the soil at a rate of 10.0–15.0 t / ha. [11].In northeastern Thailand, paulownia seedlings were observed to grow rapidly using a combination of bentonite mud and mineral fertilizers, and paulownia seedlings planted in sandy soils using bentonite mud were more drought tolerant. [3]. Bentonite has high cation exchange [2] and the ability to store nutrients. Although the use of bentonite in forestry is not widespread, its use in agriculture should become commonplace. [1]. Because it increases the water holding capacity of the soil. [5].

Experimental system and method. The field experiment was conducted in 2018-2020 in the conditions of moderately saline meadow soils of the farm "Ubaydulloota" Mingbulak district of Namangan region, which is part of the Central Fergana region. The experimental options were located in four plot, two tiers. The total area of each unit is 216 m2 (7.2 x 30), the calculation area is 108 m2. Experimental mineral fertilizers on two homogeneous backgrounds, in the first background NPK-150 was applied: 105: 75 kg / ha (1 background control); the second background was based on the application of NPK-200: 140: 100 kg / ha (2 background control) norms.

Research results. It is known from scientific sources that the nutrients applied to the soil cause changes in the mechanical composition and structure of the soil, regardless of their type and quantity. The study examined the effect of bentonite mud applied to the soil as a supplementary nutrient on changes in the mechanical composition of the soil in the topsoil and subsoil.Before starting the field experiments, the aggregate parts of the experimental field soil in the initial state were analyzed. In the next stages, i.e. three years after the application of bentonite mud to the soil, in 2020 changes in the components of the aggregates in the soil layers were detected.

In the study of the state of the aggregates, samples of 0-10, 10-20, 20-30, 30-40 and 40-50 cm layers of soil were taken in the section of variants, and the state of the aggregate was determined by the method of NI Savinov. (Table 1).According to the data in the table, in the 0-10 cm layer of soil, particles of soil aggregates larger than 10 mm are 8.32%, those of 10-7 mm are 4.57%, particles of

Table 1. Initial granularity of experimental field soil,%

Soil layers, cm	Aggregate size, mm									
	>10	10-7	7-5	5-3	3-2	2-1	1-0,5	0,5-0,25	0,25<	0,25-10
0-10	8,32	4,57	8,71	5,31	12,87	8,86	11,81	7,82	31,73	59,95
10-20	6,26	4,64	9,14	5,87	11,16	8,81	10,83	9,63	33,66	60,08
20-30	8,38	3,81	10,04	5,25	10,81	7,78	12,57	8,94	32,42	59,2
30-40	7,62	2,93	8,57	4,42	11,05	9,18	11,35	9,17	35,71	56,67
40-50	6,43	3,11	8,62	4,54	9,43	7,65	9,79	8,11	42,32	51,25

7-5 mm are 8.71%, those of 5-3 mm are 5 , 31%, 3-2 mm 12.87%, 2-1 mm 8.86%, 1-0.5 mm 11.81%, 0.5-0.25 mm 7.82% and 0.25 mm soil particles smaller than 31.73%.Coarse macrostructures (less than 0.25) are 31.73% in the 0-10 cm layer, 33.66% in the 10-20 cm layer, 32.42% in the 20-30 cm layer, 35.71% in the 30-40 cm layer, and In the 40-50 cm layer, it was 42.32%.

In the experimental field, the amount of agronomically useful macroaggregates (10-0.25 mm) in the 0-10 cm layer of soil was 59.95%, 60.08% in the 10-20 cm layer of soil and 59.20% in the 20-30 cm

layer, In the 30 -40 cm layer it was 56.67%, in the 40-50 cm layer it was 51.25%, and it decreased from the upper layers to the lower layers.

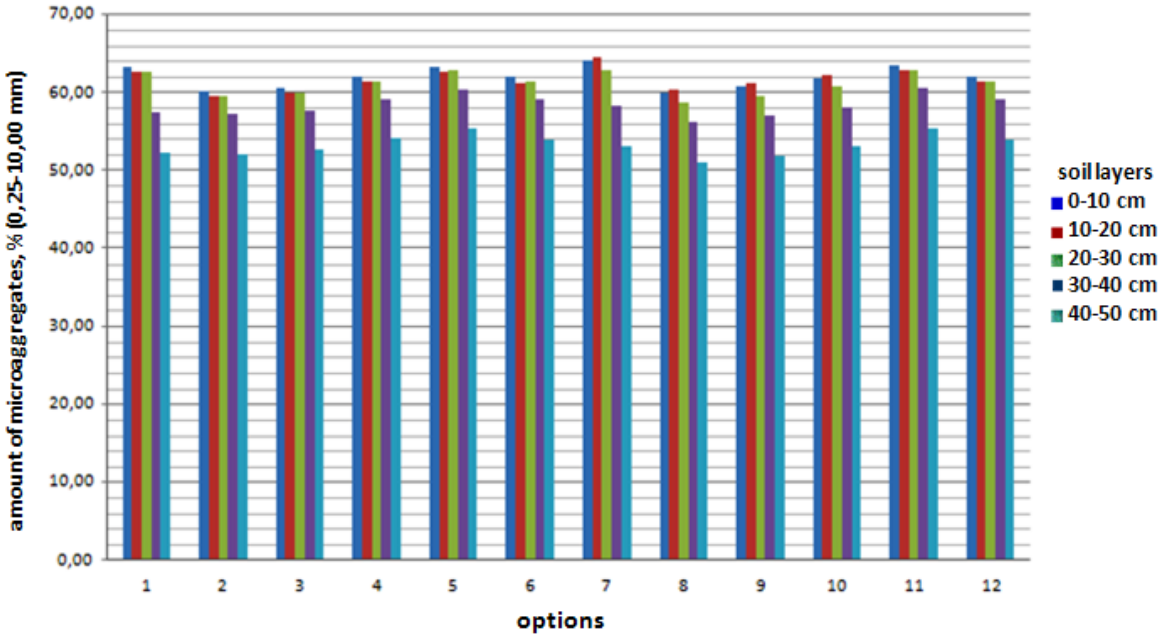

Figure 1. Influence of applied bentonite mud on the amount of macroaggregates in the soil.

In the third year of the experiment, when analyzing samples taken from soil layers by variants, the amount of agronomically useful macrostructural (0.25-10 mm) aggregates was 63.16%, 62.49%, 62 , 61%, 57.27% and 52.18%, in variant 1, where only 3 tons of bentonite mud per hectare was applied annually. The amount of similar aggregates in variant 7 where bentonite was applied to 4.5 t / ha was 63.91% 64.37% 62.79% 57.25% 52.09%.In the experiment, the best results in the formation of agronomically useful macrostructures in the soil were observed in the variants using 1.5-3.0 t / ha of bentonite mud per year under autumn plowing.

Similar data were obtained in the application of mineral fertilizers N-200, R2O5-140, K2O-100 kg / ha, ie, changes in the norms of mineral fertilizers had almost no effect on the formation of soil structures.

Conclusion. It should be noted that the increase in the number of macrostructural aggregates was due to a decrease in the number of coarse macrostructural aggregates (less than 0.25).

Thus, in the conditions of moderately saline soils of the meadow, the amount of macrostructural aggregates that are agronomically useful in the soil was increased 1,92-1,97 and 3,21-3,57 % respectively,when applying the Logan deposit bentonite mud in the fall, 1.5-3.0 t / ha per year, against the background of mineral fertilizers.

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