



## Influence of Method, Duration and Norms of Application of Logon Minefield Bentonite Mud on the Amount of Nutrients in the Soil

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ARTICLE INFO	ABSTRACT
Published Online: 01 December 2021	The article discusses the impact of the application of bentonite sludge from the Logan deposit in different methods, terms and standards on the nutrients in the soil in the conditions of meadow saline, moderately saline soils of Central Fergana. As a result of application of Logan bentonite mud under autumn plowing at the rate of 1.5-3.0 t / ha per year, in three years in the driving layer of the soil humus 0.003-0.007%, total nitrogen 0.002-0.006%, phosphorus 0.005-0.015%, potassium 0.012-0.030 % increase and reports of improved agrochemical properties.
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<b>KEYWORDS:</b> Logan minefield bentonite mud, meadow loam soils, autumn plowing, humus, total nitrogen, total phosphorus, total potassium, nutrients.	

### INTRODUCTION

Restoration and improvement of soil fertility is of course the most important task to increase the productivity and crop quality of agricultural crops.

Researchers point out that an increase in humus in soils plays an important role in increasing not only soil properties but also crop yields. The organic matter removed by the crop causes a decrease in the amount of humus, nitrogen and other nutrients in the soil. Depletion of humus, cultivation also affects the physical condition of the soil. Their density increases, air and water order deteriorates. The use of large amounts of mineral fertilizers, herbicides, toxic chemicals causes their accumulation in the soil. The nature of the soil humus also changes and its protective function decreases. [1].

Studies in the black soils of southern Russia in 2008-2010 have shown that the use of bentonite sludge contributes to an increase in the amount of humus in the soil. By the end of the application period, the amount of humus increased from 3.09 (control) to 3.2 - 3.25% under the influence of bentonite mud applied at the rate of 10-15 t / ha under the autumn plowing in the care of sunflowers. In the second year, the difference from control increased by 0.19-0.24%, and in the third year - by 0.13-0.20%. [2].

E.V. Agafonov, P.S. Gerasimenko, M.V. Khovanskiy, V.P. Goryachev, A.B. In the research of Tsygankov [3], the application of bentonite mud under autumn plowing increased the total phosphorus content in the soil by 0.02-0.04% and the total potassium content by 0.09%.

As a result of the impact and end effects of non-traditional agro-ores, the highest agrochemical properties of the soil were achieved at 0.75 t / ha and 3.0 t / ha under cotton under typical gray soils, with an average humus content of 0.012-0.017% compared to the control option. and total nitrogen content increased by 0.007%. In the light sandy soils of Surkhandarya region, the amount of humus under the influence of agro-ores increased by 0.092%. [4].

In forestry in northeastern Thailand, pavlonia seedlings were observed to grow rapidly using a combination of bentonite mud and mineral fertilizers, and pavlonia seedlings planted in sandy soils using bentonite mud were more drought tolerant [5]. Bentonite has high cation exchange [6] and nutrient storage capacity. Although the use of bentonite in forestry is not widespread, its use in agriculture should become commonplace. [7]. Because it increases the water holding capacity of the soil. [8].

Application of bentonite mud in different norms led to an increase in the amount of humus in the 0-40 cm layer of soil by 0.05 - 0.1%, the highest result was achieved when applied at 10 t / ha. The application of bentonite mud to the soil contributed to an increase in TSK from an average of 29.3 to 33.7 mg.eq / 100 g in the 0-20 cm soil layer. [9]

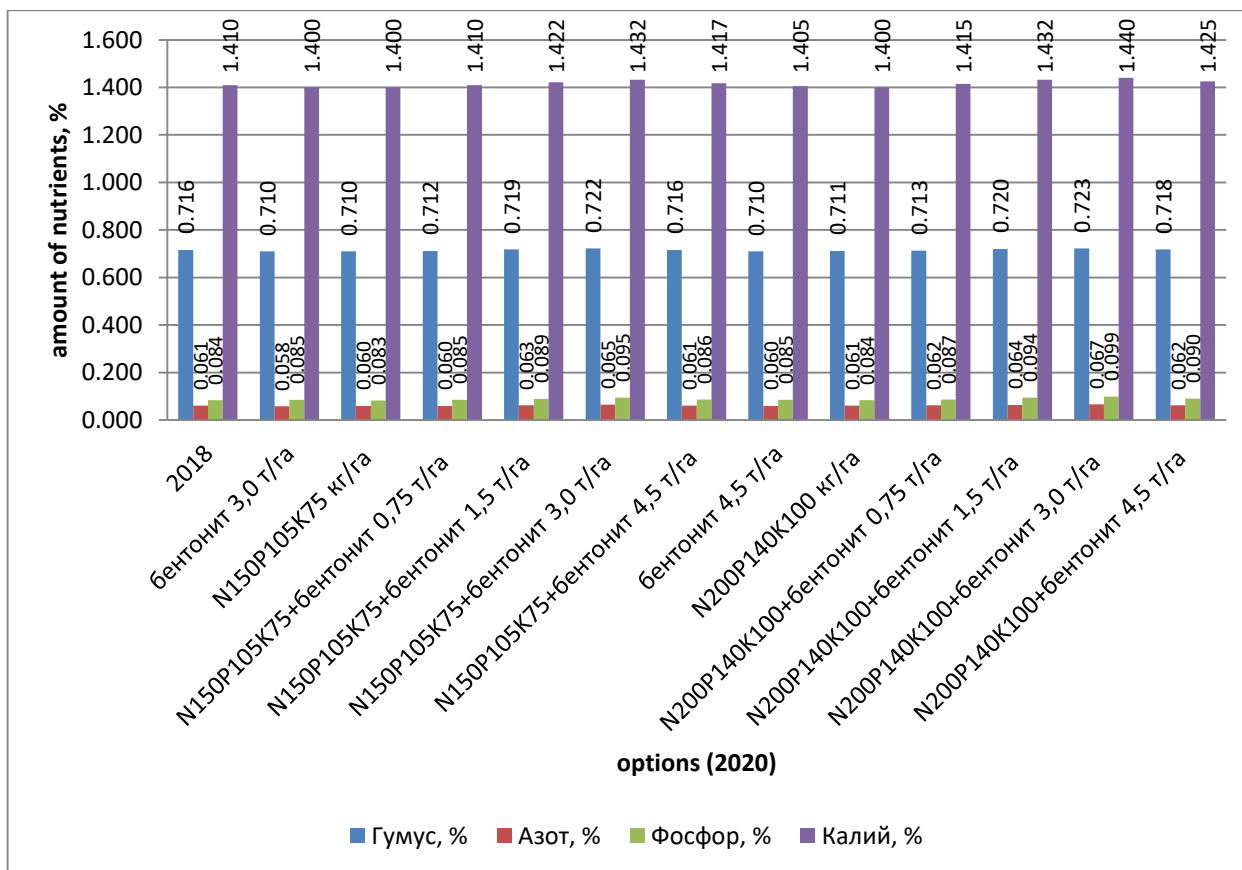
When used as a supplement in semi-decomposed cattle manure and bentonite sludge in grazing soils in the ratio of 1: 0.4 to 21.0 t / ha in the cultivation of cotton, the amount of humus in the 0-30 and 30-50 cm layers of soil is 0.012-0.017% higher and total nitrogen was found to increase than the control by 0.007-0.003%. [10]

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In a study conducted in the southern black soils of Russia in 2008-2010, under the influence of bentonite mud applied at the rate of 10-15 t / ha under the autumn plowing, the humus content of sunflower increased from 3.09 (control) to 3.2 - 3.25%. found to have increased to. In the second year, the difference was 0.19-0.24%, and in the third year - 0.13-0.20%. [11]

### RESULTS AND DISCUSSION

The study was conducted during 2018-2020 and determined the effect of the method, duration and norms of application of bentonite sludge from the Logan deposit on the change in the amount of total forms of nutrients in the soil. These data are shown in Figures 1 and 2.



**Figure 1.** Effect of logan minefield bentonite turbidity on changes in soil humus, total nitrogen, phosphorus and potassium content. (in the 0-30 cm layer of soil)

Prior to the start of the field experiment, humus was 0.716–0.605%, total nitrogen was 0.061–0.051%, phosphorus was 0.084–0.068%, and potassium was 1,400–1,400% in the topsoil (0–30 cm) and in the subsoil (30–50). This situation can be expressed by the ongoing physicochemical, biological processes in the soil and the assimilation of plants.

By the third year of the study (2020), at the end of the application period, only mineral fertilizers (N-150, R2O5-105, K2O-75 and N-200, R2O5-140, K2O-100 kg / ha) were applied to the soil without the use of concrete fertilizers. The quantities of the elements were found to decrease from the beginning of the experiment to the last year. Control options (2 and 8)

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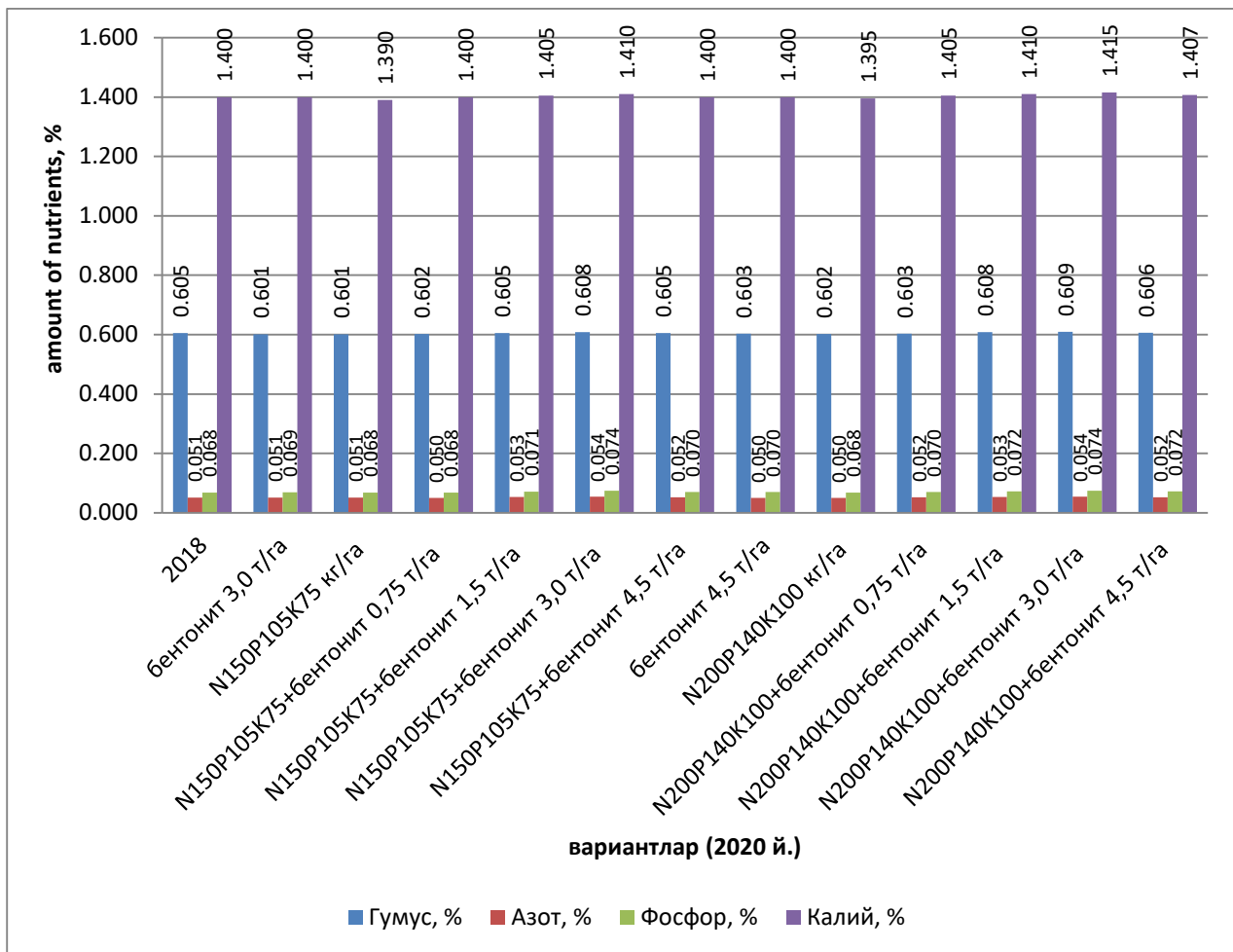


Figure 2. Effect of logan minefield bentonite turbidity on changes in soil humus, total nitrogen, phosphorus and potassium content. (in a layer of 30-50 cm of soil)

In the control options, humus-0.710-0.601% and 0.711-0.602%, total nitrogen-0.060-0.051% and 0.061-0.050%, total phosphorus-0.083-0.068% and 0.084- respectively in the soil layers of 0-30 and 30-50 cm, respectively. 0.068%, total potassium was 1,400-1,390% and 1,400-1,395%. These indicators were found to be reduced by 0.006-0.003% humus, 0.001% total nitrogen, 0.001% total phosphorus and 0.010% potassium in the 0-30 cm layer in proportion to the initial state. Hence, the balance of nutrients in the soil was negative.

Against the background of mineral fertilizers, a slight change in the control option was observed when 0.75 t / ha of bentonite mud was applied (3 and 9 var.) During the growing season of cotton, with humus, total nitrogen, phosphorus and potassium in the 0-30 cm layer of soil 0.712-0.713, respectively; 0.060-0.062; 0.085-0.087; 1,410-1,415%, while in the 30-50 cm layer, 0.602-0.603; 0.050-0.052; 0.068-0.070; Was 1,400-1,405%.

Against the background of mineral fertilizers, bentonite sludge was applied to the autumn plow once every three years at 4.5 t / ha in variants (6 and 12) in the 0-30 cm layer of soil in accordance with the above values of 0.716-0.718; 0.061-0.062; 0.86-0.90; 1,417-1,425%, and 0.605-0.609 in the 30-50 cm layer; 0.052; 0.070-0.071; 0.006-0.007 in a 0-30 cm

layer of soil relative to the control options (2 and 8), at 1,400-1,405%; 0.001-0.002; 0.003-0.006; 0.017-0.025%, and 0.003-0.004 in the 30-50 cm layer; 0.001-0.002; 0.002-0.004; Was higher by 0.010-0.012%.

High rates were observed in the variants of Logan bentonite mud against the background of mineral fertilizers applied in the autumn plowing 1.5-3.0 t / ha per year. Against the background of mineral fertilizers N-150, R2O5-105, K2O-75 kg / ha bentonite mud 0.719% humus in 0-30 layers of soil in the variant applied annually under autumn plowing at 1.5 t / ha; total nitrogen, phosphorus, and potassium were 0.063%, 0.089%, and 1.422%, respectively, relative to the control variant, 0.009%, 0.003% 0.006%, and 0.022%, respectively, in the 30-50 cm layer, 0.605; 0.053; 0.004 and 1.405%, respectively, compared to the control option 0.004; 0.002; 0.003 and 0.015% higher, respectively. When applied to 3.0 t / ha under autumn plowing, 0.722 in the driving layer of soil (0-30 cm); 0.065; 0.095 and 1.432%, respectively, compared to the control option of 0.012; 0.005; 0.012 and 0.032% higher, 0.608 in the underlying (30-50 cm) layer; 0.054; 0.073 and 1.410%, respectively, 0.007 compared to the control; 0.003; 0.006 and 0.020% higher, respectively. Nitrogen bentonite sludge, which can be washed

out of the soil or released in the form of gas, is retained in the soil in certain amounts, depending on the adsorbent properties. Some of the nitrogen trapped in the soil is converted to humus as a result of the immobilization process. Immobilization is purely biological in nature, based on the synthesis of protein in the body by microorganisms in the presence of carbohydrates and nitrogen. Various bacteria, actinomycetes and mold fungi break down cellulose, pentoses into plant and animal remains. They need mineral compounds (or nitrogen fertilizers) of nitrogen in the soil primarily as nitrogenous nutrients. These two substances are converted into proteins of microbial cell plasma. When microorganisms are killed, part of it goes into the mineral (NH<sub>3</sub>) state and part into the humic substances in the soil as a result of the humification of the protein.

Against the background of mineral fertilizers N-200, R2O<sub>5</sub>-140, K<sub>2</sub>O-100 kg / ha, when applied under autumn plowing at the rate of 1.5-3.0 t / ha per year, the above pattern is maintained, and humus in the 0-30 cm layer of soil is 0.009-0.012 %, total nitrogen 0.003-0.005%, phosphorus 0.006-0.015%, potassium 0.032-0.040%, 0.004-0.007 respectively in the 30-50 cm layer; 0.003-0.004; 0.004-0.006; It was observed that it was higher by 0.015-0.020%.

## CONCLUSION

Based on soil analysis, it can be concluded that as a result of application of Logan bentonite sludge under autumn plowing at the rate of 1.5-3.0 t / ha per year, in three years in the driving layer of the soil humus 0.003-0.007%, total nitrogen 0.002-0.006%, phosphorus 0.005- An increase of 0.015%, potassium 0.012-0.030% was observed and improved agrochemical properties.

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