RESEARCH OF INTERACTION OF HUMIC ACIDS OF MANURE LARGE HORNED CATTLE AND NON-STANDARD PHOSPHORITES

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Abstract: *in this work, the interaction of humic acids isolated from cattle manure with a mineralized mass obtained by dry enrichment of phosphorite ores and sludge phosphorites formed by washing phosphorite flour from chlorine of the Phosphorite complex of the Central Kizilkum was studied. In the study, samples were prepared at a weight ratio of 1: (0.2-2.0) phosphorite with humic acids and the general, assimilable and water-soluble forms of phosphorus oxide (V) were studied. The results of the study showed that with an increase in the amount of humic acid, the general form of phosphorus oxide (V) decreases, the assimilable and water-soluble forms increase.*
Keywords: *humic acids, sludge phosphorites, mineralized mass, cattle, poultry manure, organic fertilizers.*

ИССЛЕДОВАНИЕ ВЗАИМОДЕЙСТВИЯ ГУМИНОВЫХ КИСЛОТ НАВОЗА КРУПНОГО РОГАТОГО СКОТА И НЕКОНДИЦИОННЫХ ФОСФОРИТОВ

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Аннотация: *в этой работе изучено взаимодействие гуминовых кислот, выделенных из навоза крупнорогатого скота, с минерализованной массой, полученной при сухом обогащении фосфоритовых руд и шламовыми фосфоритами, образовавшимися при промывке фосфоритовой муки от хлора Фосфоритового комплекса Центральных Кызылкумов. При исследовании подготовлены пробы при весовых соотношениях 1 : (0.2-2.0) фосфорита с гуминовами кислотами и изучены общая, усвояемая и водорастворимая формы оксида фосфора (V). Результаты исследований показали, что при увеличении количества гуминовой кислоты, общая форма оксида фосфора (V) уменьшается, усвояемая и водорастворимая формы увеличиваются.*
Ключевые слова: *гуминовые кислоты, шламовые фосфориты, минерализованная масса, навоз крупного рогатого скота, птичьего помёта, органоминеральные удобрения.*

In modern conditions, the conservation of soil fertility is one of the most urgent tasks of agriculture. An important role in maintaining soil fertility belongs to organic matter and its main component - humus. Humus content is one of the main indicators of soil fertility. Thanks to it, the basic functions are supported and soil fertility is ensured, while mineralizing humic substances, plants are provided with nitrogen and other necessary nutrients in an accessible form. Humic substances together with mineral particles of the soil form a soil absorbing complex, which determines its absorption capacity, boning and sticking together mineral particles of the soil, which contributes to the creation of a very valuable water-resistant lumpy-granular structure that improves the

water throughput and water-holding capacity of soils, contributes to the fixation of nutrients in it for more rational consumption by plants [1-2].

In addition, the joint processing of phosphate rock and animal waste reduces the loss of organic matter and nitrogen from animal waste, increases the availability of phosphorus for plants, which leads to an increase in the efficiency of both components since organic waste contains a significant amount of carboxylic acids that can bind calcium ions. That is, under the influence of humic substances formed during the decomposition of organic waste, phosphorus pentoxide, which is part of the phosphate raw material, passes from an unapproachable form into a form that is digestible for plants and will thereby show its fertilizing properties. In addition, calcium salts of phosphoric acid binds $(NH_4)_2CO_3$ and free NH_3 manure into non-volatile forms of nitrogen.

Based on the foregoing previous works, we studied the processes of obtaining organic fertilizers by composting organic waste from livestock farms with phosphate in the range of weight ratios Manure: phosphorite = 100: (2-25). The degree of decomposition of phosphate raw materials and the humification of organic substances of manure are determined. The optimal ratio of manure: phosphorite = (100: 10) and the preparation time of organomineral fertilizers (90 days) by composting the mineralized mass (MM), sludge phosphorites (SF), cattle manure and poultry manure were found. Organomineral fertilizers obtained using cattle manure and mineralized mass have the composition, (wt.%): P_2O_5 total. – 1,13; P_2O_5 by tr B – 0,64; organic matter – 22,7; humic acids (HA) – 3,17; fulvic acids – 3,29; water-soluble organic substances – 3,05 [3-4].

It is known that humic substances increase the solubility of phosphorites, prevent the retrograde of phosphorus in the soil, improve soil fertility and thereby increase crop yields. In this work, to determine the process of activation of phosphorites in the presence of humic substances separated from manure, we conducted special experiments. As mentioned above, one of the main substances formed during the humification of organic substances from cattle manure and poultry manure, which ensures the binding of part of calcium ions to sparingly soluble calcium humates, is HA.

HA was isolated from cattle manure without the addition of phosphorite. For this, a weighed portion of the compost was treated with a 1% NaOH solution, then the liquid phase was separated from the solid, and the filtrate was treated with a 5% HCl solution to precipitate free HA in the solid phase. The resulting precipitate was washed with distilled water from chlorine ions (qualitative reaction), and then dried to constant weight at 70 ° C. Humic acids isolated from compost contained 3,83% moisture; 6,63% ash; 51,11% carbon; 3,26% hydrogen; 3,76% nitrogen; 41,87% oxygen and sulfur (in% of organic substances); 5,02 mEq/g of functional (COOH, OH) and 4,64 mEq/g of phenolic groups.

In the experiments, MM and SF were used. The interaction of HA with MM and SF was studied as follows. The reacting components were taken in weight ratios of phosphorite: HA in the range of 1: (0,1-2,0). Samples of substances were placed in a porcelain mortar and crushed them for 15 min to a homogeneous mass. Then weighed portions were transferred to 250 ml volumetric flasks and 100 ml of distilled water was added to them. The flasks with the contents were shaken on a rotary apparatus for 6 hours, and then the volume of the solutions was brought to the mark with water, stirred and left at room temperature for 24 hours. After which the solutions were filtered off, and the amount of water-soluble P_2O_5 forms was determined in the filtrate.

Table 1. The results of the interaction of phosphate with humic acids

Ratios phosphorite: HA	**Number of components in %**			**P_2O_5 aq. 100 P_2O_5 total. %**	**P_2O_5 ass 100 P_2O_5 total. %**	**pH**
	P_2O_5 . total.	**P_2O_5 aq.**	**P_2O_5 ass. 0.2 M Tr. B**			
SF						
1 : 0	11,57	-	3,56	-	30,81	9,40
1 : 0,2	9,63	0,149	3,72	1,55	38,62	8,86
1 : 0,4	8,24	0,152	3,70	1,85	44,85	8,63
1 : 0,6	7,20	0,161	3,55	2,23	49,27	8,39
1 : 1,0	5,75	0,186	3,26	3,23	56,78	8,13
1 : 1,5	4,59	0,253	2,89	5,51	62,87	7,86
1 : 2,0	3,81	0,264	2,64	6,92	69,42	7,63
MM						
1 : 0	14,33	-	2,37	-	16,57	8,53
1 : 0,2	11,93	0,125	2,55	1,05	21,35	8,12
1 : 0,4	10,22	0,117	2,92	1,14	28,62	7,85
1 : 0,6	8,92	0,121	3,18	1,36	35,66	7,65
1 : 1,0	7,12	0,137	3,00	1,92	42,12	7,41
1 : 1,5	5,68	0,162	2,70	2,86	47,62	7,18
1 : 2,0	4,72	0,172	2,42	3,64	51,24	6,89

Filter precipitates were transferred to the same volumetric flasks, dissolved in a Trilon B 0,2 M solution and the amount of assimilable P_2O_5 forms determined in it. The experimental results are shown in table 1 from which it can be seen that the initial MM practically does not contain a water-soluble form of P_2O_5, and the relative content of the assimilable form of P_2O_5 in it is 12,34%. After the interaction of MM with HA at a ratio of MM : HA = 1: 0.2, it contains P_2O_5 water. : P_2O_5 total and P_2O_5 : P_2O_5 water amounted to 1,06 and 18,01%, respectively. And with MM : HA = 1: 2, these indicators rose to 3,4 and 60,46%. We observe a similar picture when using SF. So, after interacting with HA with the ratio of SF: HA = 1: 0.2, it contains P_2O_5 water. : P_2O_5 total and P_2O_5: P_2O_5

water It amounted to 1,06 and 18,01%, and for SF: HA = 1: 2 – 3,4 and 60,46%, respectively.

The interaction of humic acids isolated from composts prepared without additives of substandard phosphorites with MM and SF was studied in a wide range of weight ratios of substandard phosphorites to humic acids (from 1: 0,1 to 1: 2). The experimental results showed that the more humic acids taken for the interaction of MM and SF, the higher the content of the assimilable form of P_2O_5 in the product due to the formation of water-insoluble calcium humate. At the same time, the pH of the product also decreases. In the interaction of MM, HF phosphorites of Central Kyzylkum with humic acids, an increase in the content of the assimilable form of P_2O_5 in phosphate feedstock occurs. The best results were obtained with a weight ratio of phosphate raw materials: humic acids 1: 2. In MM, after a day of interaction of P_2O_5 svv. increased from 12.34% to 47,86%, in the Chess Federation from 9,87% to 53,72%.

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