Organ mineral fertilizer based on waste from livestock sector and low-grade Kyzyl kum phosphorite

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Органоминеральные удобрения на основе отходов животноводства и некондиционных Кызылкумских фосфоритов

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Abstract: *the article analyzes the results of researches of the composting phosphate slime with livestock sector wastes. It was found that phosphorus in the phosphate raw material transferred from unacceptable form into acceptable form for plants during the composting process. It was shown that the humic acid in organic matter reacts with phosphates substances in the raw.*

Аннотация: *анализируются результаты исследования компостирования фосфоритного шлама с отходом животноводства. Установлено, что фосфор в фосфатном сырье переходит из неусвояемой в усвояемую форму в процессе компостирования. Показано, что гуминовые кислоты в органическом веществе реагируют с фосфатными составляющими в сырье.*

Keywords: *phosphorite, stock farmer, humidity, acceptable phosphorus, humic acid.*
Ключевые слова: *фосфорит, животноводство, влажность, усвояемый фосфор, гуминовая кислота.*

The soil fertility mainly depends from organic matter playing role in soil formation processes and improvement of soil physicochemical properties, supply of plants by nutritional and biological active substances. The soil is exhausted rapidly without organic fertilizers especially when intensive methods of farming management. Nutrients of mineral fertilizers cannot replace humus as nitrogen source and others ones releasing when it mineralization although they will apply into soil a lot. The soil practice and results numerous agrochemical researches show that application the same mineral fertilizer affect negatively on soil properties, that is, humus content is decreased, microorganisms' numbers and composition are changed, direction of chemical and biological transformations is changed, as a result the fertility of the soil is reduced. When high content of the humus and due to more favourable agrophysical properties, the return from fertilizer increases in 1,5-2 times [1].

Therefore, when use of the fertilizers it is important to include reserves of humus in the soil. Maintenance of the humus reserves level in the arable soil can be exercised by regular of organic and organ mineral fertilizer application. Compost prepared based on waste from cattle farm amuses important place in the system of organic and organ mineral fertilizers. Many countries the composting organic wastes have already become sector on processing ones into fertilizers. Some enterprises, farm managements and scientific production associations work composting. In Uzbekistan there is no single science-based approach on preparation of the composts based on wastes from stock farms. The humus formation is made from organic substances in the composts is exclusive complex process which implements during the microorganisms' vital functions. The most valuable humus in the composts formed from stock farms in neutral oxidation and tempered moistening and during the optimal conditions for active vital functions of microorganisms.

To create optimal condition during the composting stock farmer wastes it is added mineral fertilizers, phosphorite flour, lime carbonate and other matter. These substances are necessary to support pH, as well as nutrient for microorganisms' vital functions [2].

Finished product the additives are acceptable for plants form. Manure composting with addition of phosphorite flour is effective approach. When composting manure with phosphorite flour humification rate of organic manure is increased, the nitrogen losses from it decreased, but phosphorus from phosphorite flour transfers into acceptable form due to interaction it with humic acid . The reaction among the humic acid and phosphates can be presented the following way:

$2R\,COOH + Ca_3(PO_4)_2 \longrightarrow (R\,COO)_2Ca + 2CaHPO_4$

$2R\,COOH + 2CaHPO_4 \longrightarrow (R\,COO)_2\,Ca + Ca\,(H_2PO_4)_2$

$2R\,COOH + Ca(H_2PO_4)_2 \longrightarrow (R\,COO)_2Ca + 2H_3PO_4$

At present at Kyzyl kum combine waste called mineral mass containing 12-14% P_2O_5 is removed out of the enrichment proces of phosphorite ore. Moreover, phosphorite slime containing 8-10% P_2O_5 is formed during the

washing phosphorite flour off chlorine. Losses of the phosphorus are reached to 35-40 % from initial mass of the phosphorite concentrate (26 % P_2O_5) in the reject material. However, the processing them to phosphorus fertilizers is imperative. One of the real and reasonable ways of their treatment to fertilizers are composting them with stock farmer wastes.

Implementation of the technology to production defined degree to solve the issue of phosphorus and organic fertilizers deficiency.

In connection with we have carried out some laboratorial experiments on composting manure with phosphorite slime from Kyzyl kum phosphorites containing (weight, %): 7.75 P_2O_5; 41.03CaO; 2.59Al_2O_3; 1.58 Fe_2O_3; 0.15 MgO; 21.63CO_2; CaO: P_2O_5 = 5.29. The composition of livestock (weight, %): moisture - 73,2; ashes - 15.2; organic matter - 11.6; humic acids - 2.58; fulvic acids - 2.35; water soluble organic substances - 2.57; P_2O_5 - 0.2; N_{total} - 0.48; K_2O - 0.58.

The composts were prepared when mass ratio o manure: phosphate raw, 1:0,026; 1:0,042; 1:0,079; 1:0,155; 1:0,222; 1:0,34; 1:0,5; 1:0,75 and 1:0,85. Further water was added into the prepared mixture to 70 % moisture then the mixture was mixed carefully and placed in the bottles with 0,5 l. The surface of the mixture was covered by thin layer of soil to create natural condition. Further battle was placed into thermostat and stood at 25°C.

Each 15 day we determined humidity compost, and added necessary amount of water to support humidity to 70 % and mixed. After two days, the composts were subjected to analysis. The results showed that at mass ratio of manure: phosphate raw 1:0,026 and 1:0,222 obtained products have the following composition (weight, %): humadity - 72.9-; ashes - 13.0; organic matter - 14.1; humic acids - 3.2; fulvic acids - 3.56; water soluble organic substances - 2.46; $P_2O_{5total.}$ - 0.42; $P_2O_{5acceptable.}$ by 2 % citric acid solution - 0.22; N_{total} - 0.43;K_2O - 0.61.

Thus, the high-performance organic mineral fertilizers can be obtained containing complex nutrient by composting low-grade with livestock sector wastes.

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