

ORGANIC-MINERAL FERTILIZER BASED ON CHICKEN MANURE AND PHOSPHORITE

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Abstract: there have been prepared the composts based on manure and mineralized mass from Central Kyzylkum phosphorite when weight ratios of Chicken manure : Phosphorite (from 100 : 2 to 100 : 25). In prepared mixing some water was added based on calculation to reach humidity till 70%. There have been determined the kinetics and rate of transformation of manure organic parts in humic substances and unassimilable form of phosphorus into assimilable for plant form in mineralized mass. The level releasing organic matter and nitrogen into gas phase has been determined during the composting manure with mineralized mass from Central Kyzylkum phosphorite.

Keywords: chicken manure, mineralized mass, composting, phosphorus, organic-mineral fertilizer.

ОРГАНОМИНЕРАЛЬНЫЕ УДОБРЕНИЯ НА ОСНОВЕ ПТИЧЬЕГО ПОМЁТА И ФОСФОРИТОВ

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Аннотация: приготовлены компосты на основе навоза и минерализованной массы фосфоритов Центральных Кызылкумов при массовых соотношениях Птичий помёт : Фосфорит (от 100 : 2 до 100 : 25). В приготовленную смесь добавили воду исходя из расчета для достижения влажности до 70%. Определены кинетика и степень превращения органической части навоза в гуминовые вещества и неусвояемых форм фосфора в усвояемую для растений форму в минерализованной массе. Определен уровень выделения в газовую фазу органических веществ и азота при компостировании помёта с минерализованной массой фосфоритов Центральных Кызылкумов.

Ключевые слова: птичий помёт, минерализованная масса, компостирование, фосфор, кальций, органо-минеральное удобрение.

It is necessary to note that in 2016 JSC “Uzkimyo sanoat” produced 153.8 thousand tonnes of phosphoric fertilizers (based on 100% of P₂O₅). As regards, need of agriculture of Uzbekistan is 691.7 thousand tonnes of P₂O₅. These figures indicate that provision of agriculture for phosphoric fertilizer is insufficient. Today, at Kyzylkum phosphorite combine there are produced waste in form of off-balanced ore (13-15% P₂O₅) and phosphorite sludge (10-12% P₂O₅) during the beneficiation process of Central Kyzylkum phosphorite. Total number produced waste phosphorite has already reached 13 billion tonnes. One of the most rational approaches of low-grade phosphorite processing is usage of compost technology based on chicken manure [1].

Composting chicken manure with addition of phosphorite powder is the most effective way. In [2] presented that during the decomposition of chicken manure with phosphorite powder fair quantity of organic acids piled up forming ammonium, potassium salts and others in the compost. These salts interact with phosphorite powder generating insoluble organic compounds of calcium and more movable compounds of phosphorus with ammonium and potassium.

Early we [3] carried out research on obtaining organic-mineral fertilizers on the basis of manure of chicken, avian litter with the addition of slime phosphorite of the Central Kyzylkum. It was shown that with increasing composting time, the formation of humic substances and mobile forms of phosphorus increases in all ratios.

Composts were prepared under weight ratio of Dung : Phosphorite equal to 100 : 2; 100 : 4; 100 : 5; 100 : 8; 100 : 10; 100 : 12; 100 : 16; 100 : 21 и 100 : 25. In prepared mixing it was poured water based on calculation to reach till 70%. Obtained mix was placed in vessel with 0.5 l then from above thin layer earth was poured. Subsequently, vessels were placed and incubated in thermostat at 25 °C. Each 15 days some samples were selected to determine for composition then required quantity of water was poured subsequent stirring and setting in the thermostat more.

Content of P_2O_{5total} , $P_2O_{5acceptable}$ by EDTA and 2 % solution of citric acid were defined according to the procedure in. Ash content according to State standard 26714-85, nitrogen by State standard 26715-85, humidity by State standard 26712-85, organic matter by State standard 27980-80. Water-soluble fraction content of organic matter recovered from product by water was determined by filtration and evaporation in water bath, drying solid residue to constant weight subsequent burning to calculate ash content. Humic acids were leached processing product by 0.1 N solution of alkali and acidification of obtained solution by mineral acid. The solid phase after separating from it alkali soluble organic matter is residual organic matter. The latter was washed carefully by distiller water then dried to constant weight and determined outlet in towards to organic weight. Difference between amount of alkali soluble organic matter and humic acid gives us content of fulvic acids in the compost.

As a result, when ratio of Dung : Phosphorite. So, when weight ratios of Dung : Phosphorite equal to 100 : 2 for 90 days relative content of $P_2O_{5acceptable}$ by EDTA and 2 % solution of citric acid increase from initial 16.57 and 9.01 % to 71.43 and 63.03%, while at ratio of 100 : 25 $P_2O_{5acceptable}$ by EDTA and 2 % solution of citric acid grow to 45.02 and 43.54 % respectively.

As a result, when ratio of Dung : Phosphorite = 100 : 2 after 15 days the content of humic acids, fulvic acids, and water-soluble organic matter constitutes 0.88%, 4.16%, 0.98%, but after 90 days has already reached 2.67%, 6.27%, 2.07% respectively. With weight ratio of Dung : Phosphorite = 100 : 25 after 15 days content above is 0.61 %, 2.99%, 0.7 %, and after 90 days is 2.03%, 5.34%, 1.68% respectively.

As a result, when ratio of Dung : Phosphorite. Thus, when weight ratio of Dung : Phosphorite 100 : 2 for 90 days losses of organic matter and nitrogen into atmosphere is 26.57 and 21.75 %, and at 100 : 25 that of indicated substances make up 14.22 and 9.87 %, that is with increase content of mineralized mass in the compost losses of the substances are reduced in gas phase.

Thus, investigation of composts prepared in a range of weight ratios of Dung : Phosphorite = 100 : (2-25) have shown that when composting chicken manure with mineralized mass because of interaction of organic acids with phosphorite movable phosphorus content increases while losses of organic matter and nitrogen reduce considerably, which promote finally growth of product outlet. In addition, it was established that increasing the curing time of composts leads to raise acceptable form of phosphorus, humic and fulvic acids, as well as water-soluble organic matter while increase mass fraction of phosphorite in towards to chicken manure promotes to grow conversion rate of organic matter into humic acids, fulvic acids and water-soluble organic matter. There has been found the limit ratio and composting time. It has been shown the optimal ratio of Dung : Phosphorite is 100 : (8-12) in which organic-mineral fertilizers with maximal humus substances content and acceptable P_2O_5 can be generated. Fertilizer obtained after drying to air-dry condition is defined the following figures on quality (weight. %): P_2O_{5total} – 1.19-2.71; $P_2O_{5acceptable}$ by EDTA – 0.85-1.22; $P_2O_{5acceptable}$ 2% solution of citric acid – 0.72-1.13; humic substances – 11.01-9.05.

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