METHOD OF APPLYING BIOGUMUS AND OBTAINING LIQUID BIOORGANOMINERAL FERTILIZERS FROM EARTHWORM BIOMU

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Abstract: "Gomus" is a Latin word translated as "earth", referring not to the planet itself, but to its upper, fertile layer. It becomes fertile due to the decomposition of organic matter - leaves, grass, animal remains and their metabolic products. Only 5% of the total mass of biohumus is enough for soil fertility. Forming these percentages is not easy. It takes 100 years to create a 10 cm layer. Man-made pollution, unintended use of land slows down the process even more, makes the soil dead.

Keywords: biohumus, mineral fertilizers, potassium, magnesium, magnesium, nitrogen, phosphorus.

Biogomus contains 0.7-1.2% potassium, 0.3-0.5% magnesium, 2-3% magnesium, 0.8-2% nitrogen and a lot of phosphorus. Biogomus for seedlings also contains fulvic and humic acids. Only they are able to process the photon energy of the sun. Acids convert it into chemicals. They block pathogenic bacteria in the soil. It is important for the development and life of plants. Fulvic acid provides cells with the necessary nutrients, prevents swelling, eliminates toxins and viruses.

Many doctors believe that fulvic acid deficiency is one of the causes of any disease in general. It can only be obtained from plants. So, liquid biohumus is not just a fertilizer, but a kind of medicine. For them, the substance is a growth stimulator of the root system. Receiving food, it enters the deep layers of the soil. Moisture can be extracted from them. It is useful during drought. In normal soil, humic acid occurs in water-insoluble form. Plants only absorb solutions. It is possible to dissolve the substance from biohumus.

One of the main problems facing the agriculture of our country is the low coefficient of beneficial effect of mineral fertilizers. It is 60-70% for potassium fertilizers, 20-25% for phosphorus fertilizers in the first year, and 40% in the last 2-3 years.

The next problem is related to soil humus, which is considered the basis of productivity in all soils. Humus plays an important role in the processes of improving the physical properties of the soil and creating a moderate water-weather regime. It acts as an accumulator of soil energy, prevents the leaching of mineral fertilizers from it and thus the widespread pollution of the environment, and also transforms hard-to-dissolve phosphorus compounds into a well-absorbed state. All this ensures the mobility of bound phosphates in the soil, which is from 3 to 6 g of P2O5 per 1 m2 of cultivated area. This is a large reserve of phosphorus, which is currently not used for crops.

Cultivation of agricultural products is the main source of food production, which is one of the economic sectors. In this place, providing the agro-industrial complex with biological, organic and mineral fertilizer compositions that allow to increase soil fertility, rational use of land and water resources is the main factor of obtaining high-quality and high yield from agricultural crops. Therefore, one of the priority tasks is to develop a technology for obtaining effective organomineral fertilizers containing humus substances for plant nutrition in agriculture.

Due to the fact that the content of humus in fertile soils is decreasing, special attention is being paid to the production of fertilizers and plant growth stimulants containing humus using organic resources and their use in agriculture. In this regard, the development of technologies for obtaining humic fertilizers and stimulants, which are necessary for increasing soil productivity, is considered one of the urgent tasks.

A certain level of scientific results have been achieved in our republic on the processing of the oxidized form of Angren coal into organomineral fertilizers [1]. In this regard, it is important to establish the production of liquid bioorganomineral fertilizer using earthworm humus as a raw material source. In order to fill the gap in the field of bioorganomineral fertilizers in drip irrigation and hydroponics, a liquid bioorganomineral fertilizer production technology based on earthworm biohumus was created.

The principle technological scheme for the production of liquid bioorganomineral fertilizers is presented in Fig. 1.

5000 kg of water and 500 kg of sieved and ground biohumus are placed in a reactor with an external heater (30-35OC) (Figure 1) and a suspension is formed by mixing. 50 kg of nutrient medium (sugar, molasses, etc.) is also added here. The ratio of biohumus to water is 1:10. In order to ensure regular mixing of biohumus with water, a rotating motor is attached to the reactor and a stirrer is attached to its axis of rotation. The rotation speed of the mixer is 180 rpm, the temperature in the reactor water mask is maintained at 30-35OC.

The mixture of biohumus with water is periodically stirred in the reactor for 40 minutes. At the same time, air is supplied to the reactor for 120 minutes using a compressor for aeration of aqueous separation from biohumus. After the aeration is completed, the mixed suspension of biohumus is kept in the reactor, where it rests for 2 hours. The suspended bacterial extract on the sediment is pumped from the reactor to the collector (Figure 2).

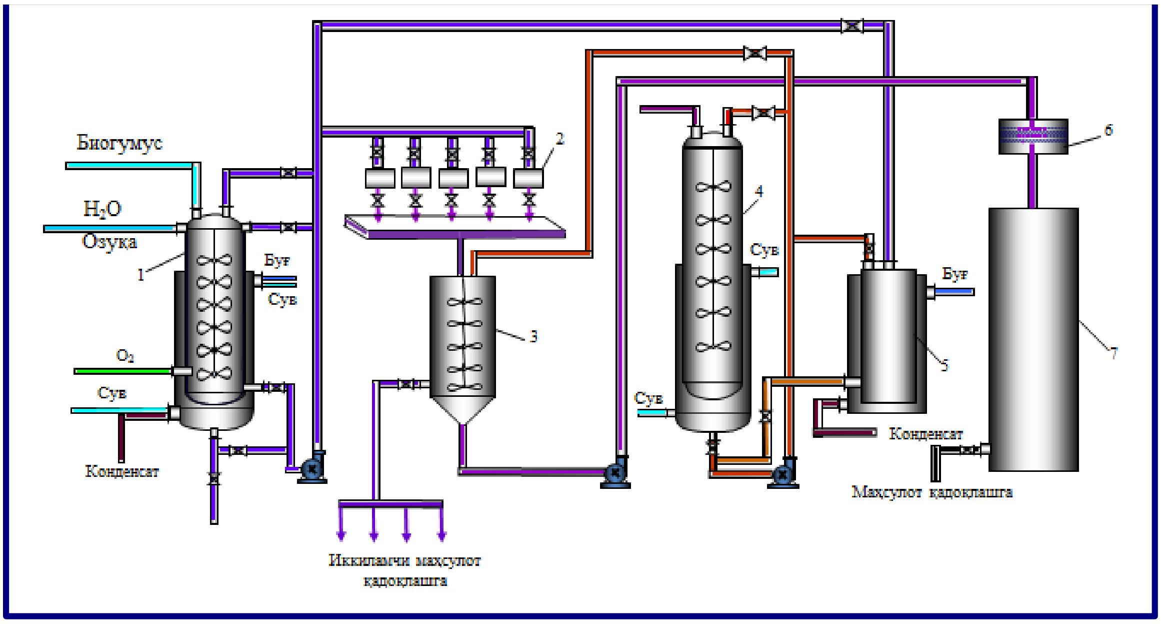

Figure 1. Principle technological scheme of production of liquid bioorganomineral fertilizers from earthworm biohumus:
1st reactor; 2- bacterial secretion collector; 3-liquid bioorganomineral fertilizer preparation mixer; 4-alkaline extract neutralizer; 5-collector-disinfector; 6th filter; 7-finished product warehouse.

5000 kg (1:10 ratio) of boiling water (70-80OC) is added to the residual sediment in the reactor (Figure 1). The water temperature in the reactor jacket is also brought up to 70-80OC. Then 35 kg of nitric acid (1:0.07 ratio of biohumus) is added to the suspension in the reactor and the process continues for 2 hours with constant stirring. Then the decantation process is carried out - settling and separating the nitric acid solution from the biohumus, then the acidic separation on the sediment is transferred from the reactor to the collector-clarifier (picture 4) using a pump.

5000 kg (1:10 ratio) of boiling water (70-80OC) is added to the residual sediment in the reactor (Figure 1). Then, 25 kg of sodium alkali (in a ratio of 1:0.05 to biohumus) is added to the suspension in the reactor, and the extraction process is carried out for 2 hours with constant stirring. In this, the extraction of humic acids from biohumus into an aqueous solution takes place.

Then the decantation process is carried out - settling and separation of the first alkaline solution from the biohumus, then the alkaline separation on the sediment is transferred from the reactor to the collector-clarifier (Figure 5) using a pump.

Boiling water (70-80OC) is added to the precipitate in the reactor in a ratio of 1:10 from the heater. During the 2-hour extraction process, stirring is carried out periodically, and 30 kg of potassium alkali (in a ratio of 1:0.06 to biohumus) and 160-200 kg (in a ratio of 1:0.3-0.4) of cotton as a reagent for complete extraction of humic acids are added. ash is added. The extraction process takes 2 hours with constant stirring. In this, complete extraction of humic acids from biohumus into an aqueous solution occurs.

Then, after a 2-hour settling process, a decantation process is carried out - settling and separation of the second alkaline solution from the biohumus.

The mixture of alkaline separations in the collector-cooler (Figure 5) is naturally cooled to a temperature of 20-30OC. The cooled alkaline solution is transferred to the accumulator (Figure 4), as a result of which a part of the alkali is neutralized by nitric acid in the accumulator.

The acid-alkaline mixture in the collector (Figure 4) is neutralized by adding small portions of mineral acids until the pH-environment reaches 8-9 with constant stirring, and as a result, a neutralized alkaline solution is formed. Thermal phosphoric acid or extracted phosphoric acid purified from foreign additives (fluorine, sulfate, etc.) is used as mineral acid.

To obtain liquid bioorganomineral fertilizers, the mixture of the bacterial extract from the collector (picture 2) and the neutralized alkaline extract from the collector (picture 4) are mixed in the collector (picture 3) in a ratio of 1:6.

The finished product is passed through a 20-μm filter (Figure 6) and sent to the finished product warehouse (Figure 7) or to the consumer.

After the cycle is completed, the semi-liquid precipitate remaining in the reactor, collectors (images 1, 4 and 5) is transferred to a separate container. It can also be used as a solid organomineral fertilizer [2-30].

Rheological properties of alkaline extract isolated from biohumus and liquid bioorganomineral fertilizer are presented in Table 1.

Table 1

Biogrheological properties of alkaline extract isolated from humus and liquid bioorganomineral fertilizer

Temperature (t), 0S	**Alkaline extract**		**Liquid bioorganomineral fertilizer**	
	Density (r), g/cm3	**Viscosity (ŋ), sPz**	**Density (r), g/cm3**	**Viscosity (ŋ), sPz**
25	1.0246	1.06	1.0150	1.05
30	1.0223	0.96	1.0135	0.95
40	1.0175	0.83	1.0102	0.81
50	1.0131	0.73	1.0070	0.72
60	1.0090	0.66	1.0037	0.64
70	1.0047	0.61	1.0000	0.58
80	1.0007	0.58	0.9963	0.54

Thus, by adopting this technology in the conditions of industrial production, it is ensured to meet the demand of agro-industrial enterprises for effective liquid bio-organomineral fertilizers with unique consumption properties. These fertilizers are of high quality, can be stored for a long time, can be used for drip irrigation and hydroponics, and show high export potential. The product is high yielding, high value added and agrochemically efficient..

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