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Usage Biogas Plants With Regarding Climate Conditions of Uzbekistan

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ABSTRACT: The article presents the results of the authors' many experiments on organic waste processing in agriculture. The analysis of the existing biogas plants of advanced countries and comparison of the products obtained during the anaerobic treatment of organic agricultural wastes is presented. Conclusions are drawn on the use of biogas plants taking into account the climatic conditions of Uzbekistan on an individual basis.

I. INTRODUCTION

Scientists of the Tashkent Institute of Irrigation and Mechanization of Agriculture of Uzbekistan pay special attention to optimizing the design of power plants based on renewable energy sources, in particular, developing methods for automatic control of processing processes, creating a new generation of biofertilizer and renewable energy devices, accelerating the process of biochemical transformations at the expense of intensive withdrawal of gaseous products under reduced pressure and reciprocating mixing of biomass. [1,2,3,4].

Another problem is closely connected with the problem of waste recycling - increasingly worsening: environmental protection, which also requires intensive and rational processing of organic agricultural wastes, solid domestic waste and sewage. Concentration of poultry and livestock, as well as wastes of waste water purifiers (desalination of saline water - upper grass) is known to be associated with the problem of harmless disposal.

Modern biotechnology provides for any transformation of the substrate into a food product and vice versa [5,6]. The expediency of implementing such processes is determined primarily by sanitary-epidemiological and, to a lesser extent, by economic and technical factors.

II. OBJECT, PROBLEM AND METHODS OF INVESTIGATION

Anaerobic biochemical transformations are achieved in bioreactors due to the intensive withdrawal of gaseous products under reduced pressure (vacuum) and stepwise treatment with reciprocally-stirring biomass mixing. But their tests showed that the intensity of processing (productivity) of organic waste in biogas plants is functionally dependent on the temperature and composition of the loaded biomass in the bioreactor. Biogas plant with a "classical" scheme of energy supply and preliminary preparation of biomass for loading into a bioreactor in climatic conditions. Central Asia consumes the costs of commodity biogas for own needs, which reach 80-90%, and sometimes even up to 100%. In order to eliminate the aforementioned shortcomings of anaerobic processing, we developed and introduced a number of biogas plants. In these installations, organic wastes from industry, agriculture, water purifying upper grasses (pizza, azolla and eihornia) of waste water from open drainages in the Republic of Uzbekistan are analyzed. The plant sizes were chosen depending on the sources of organic waste.

In these installations, experiments were conducted to determine the regime parameters of biogas plants taking into account the climatic and structural compositions of organic waste from the Central Asian republics. In the study of the object, the study was, for example, the acceleration of microbiological processes-the morphology of microorganisms, their physiology, biochemical and geochemical properties, the endurance of bacteria under various conditions, the time of technological biomass retention in bioreactors, the reuse of the thermal energy of biofertilizers ejected after the anaerobic process, , the energy of gas generators in obtaining electrical energy from biogas, solar and geothermal energy to provide bioreact renewable energy sources.

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As a result of testing by us a number of installations (Fig.1.), A coefficient was determined that takes into account the optimal amount of "foreign substances" content in organic waste in the process of anaerobic processing and the ways of neutralizing them in pure (homogeneous) pig manure in 2009 [7].

Fig.1. Biogas plant. Seoul

In the world practice, biogas plants with a homogeneous organic waste composition are not used, except for simple ones (plants with a spontaneously flowing anaerobic process). The latest analyzes of more than 100 biogas plants in the world's leading countries, such as Germany, the USA, Holland and China, have shown that multifactorial organic waste or direct consumption products are used to stabilize the process in bioreactors. Here are some examples: a corn silage-93.7%, wheat (cereal silage from the whole plant-2.9%, slurry -3.4% (working volume of bioreactor -3000 m3), biogas composition, are loaded into the bioreactor for processing manure of cattle. methane content (CH4) -57.5%, pig manure processing, pig manure-42.2%, corn silage-52.6%, grass silage-4.2%, wheat meal-1.0% (the working volume of the bioreactor is 2350 m3), the biogas composition in terms of methane content (CH4) is 52.9%, in bioreactors for bird droppings, turkey dung -5,4%, corn silage-83,4%, rye (cereal silage with whole about 6,2%, corn meal-2,8%, wheat grain-1,8%, potato-0,3% (working volume of bioreactor -2100m3) composition of biogas in methane content (CH4) - 51,8 %) [8].Such anaerobic composition of organic waste is used throughout the world, however it is not suitable for the republics of Central Asia [9].

A small-sized biogas plant was launched in Khorezm region in 2010 in the Khorezm region (Figure 2.) This facility processes manure from 50 heads of dairy cattle per day (1t / day of manure with a moisture content of W = 94 ± 2%).

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Fig.2. Biogas plant in Khiva region of Khorezm region.

In 2015, the design institute "UzzamoAloyiha", based on our technology and technical drawings, developed a project of a biogas complex for the KRS farm in the Karaulbazar district of the Bukhara region.

In 2016, according to the optimally adjusted parameters of the State "Address Program", in the territory of the Buzachi village, the Capital Construction Department of the Bukhara Oil Refinery commissioned and commissioned a step-by-step processing biogas complex with processing of 25 tons of manure per day (Fig. 3) .

At present, this building processes cow dung 25 tons per day. with the output of methane (CH4) 68% (up to 31% CO2 and a minor part of the accompanying gases) and about 25 tons per day of high-quality organic fertilizers.

Fig.3. Biogas complex Karaulbazar district of Bukhara region.

III. CONCLUSION

After analyzing the composition of the processed organic fertilizer, Sanitary and Epidemiological Stations of the Ministry of Health of the Republic of Uzbekistan determined: organic nitrogen 89.7 mg / l, potassium 586.561 mg / l, calcium 303.0385 mg / l and phosphorus 60.436 mg / l [7]. With this content, the processed manure after the biogas plant is suitable for feeding fishes. Part of the biogas produced is used to produce 32 kW / h of electricity in the gas generator, while the other part goes for the needs of the farm and the own energy inputs of the biogas complex. In all installations, the waste heat recovery is proposed for implementation. Due to this, the costs of commodity biogas for own needs of a biogas plant have been reduced to 70%.In addition to the above, fertilizers obtained after the complex are separated into a liquid and a dense fraction. The liquid fraction of biofertilizer (methanogens) returns to the pit with manure for loading the bioreactors of the complex, since the initial manure after the farm has insufficient moisture for anaerobic processing.

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A dense fraction is placed on fields for growing vegetables and crops. One ton of processed manure for fertilizer replaces 8 to 9 tons of original manure from the farm.

Thus, the proposed technology and the installation of manure processing in Central Asia meet all the requirements for the processing of organic waste in agriculture. To date, such installations can be installed on the territory of Central Asia of any size and quantity by individual order.

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