

NEW ADDITIVES OF BIOACTIVE SUBSTANCES IN THE BIOCHEMICAL DIGESTION PROCESSES

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The liquid wastes from the agro-industrial sector can serve as renewable source of value-added products, following the specific treatment. Such treatment is also important from the ecological point of view, as it may prevent the discharge in natural environment of wastes with varying composition, often containing toxic or environmentally-unfriendly components. Usually, the liquid wastes from agricultural and food sector are being processed through the following methods: sedimentation, decanting in stabilizing ponds, anaerobic digestion, etc. Our research was focused to intensification of anaerobic fermentation processes using the additives of bioactive substances introduced into the digested biomass. As an initial biomass, the vinasse from grain distillation taken from "Garma Grup" Company, Hâncești region, R.Moldova was taken, as well as the other liquid wastes, including from corn fermentation and beer production.

The technological experiments have been performed using the experimental laboratory set-up, using several additive types. The biomass mixed with the nutritive solution and additives (2 ml/400 ml biomass) was subjected to anaerobic digestion under the mesophilic conditions (20-32°C). Alcoholic fermentation was traced by the volume of emitted carbon dioxide (CO₂), titrated, following the standard procedure, NaOH. Thus, it was found that in case of tomatin application, higher amounts of emitted gas were observed, whereas in case of menthol, dihydrofumaric acid, sclareol, vanillin the rate of the gas emission was lower. At the same

time it became obvious that introduction of higher amounts of additives (in 2-4 times) in many cases makes no sense as it does not provoke further acceleration of digestion process.

The results obtained testify that the substances of natural origin used as additives, render the pronounced effects on alcoholic anaerobic fermentation of vinasse under the mesophilic conditions. The comparative assessment of different additives action in the studied processes have demonstrated that the dihydrofumaric acid caused the emission of 266 cm³ CO₂ during 76 hours, aescinum – 251 cm³ during 55 hours, tomatin – 233 cm³ during 78 hours, sclareol – 232 cm³ during 55 hours, vanillin – 229 cm³ during 69 hours, whereas catechin – 180 cm³ during 61 hours of fermentation, until the process was completed.

The study of the effects of additives of bioactive substances with possible antioxidant properties on biomass from agro-food sector fermentation with identification of these processes mechanisms can be a perspective direction, suggesting the new ways of wastes valorization. The anaerobic digestion products obtained in the proposed technological conditions can have the added value and find further applications. Thus, carbon dioxide can be introduced into the microalgae cultivation basins, promoting their biomass growth and development. In their turn, microalgae can be used for feeding the animals in zootechnical sector (mainly, the poultry), to be used as fertilizers or as a source of second-generation biofuel (or a source of biomethane, biohydrogen, bioethanol). Water separated from the digested biomass, can be used in technical scopes at the industrial entities, to help constructing the semi-closed or even closed water using cycles. The solid digested fraction, separated from water, can be applied on agricultural fields an efficient fertilizer, specifically, for decorative plants or technical cultures, based on of its composition determination and approval for such uses.

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