

## BIOTECHNOLOGY OF MULTICOMPONENT ORGANIC WASTE DEGRADATION WITH THE USE OF GMP-BIOREACTOR

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One of the global problems of mankind is the accumulation of solid organic waste in landfills, the degradation of which occurs for a long time. Some farms use bioseptics to process such waste, but they have a number of disadvantages. Therefore, the aim of our work was to develop and test a new bioreactor for the degradation of multicomponent household organic waste.

GMP-Bioreactor is a plastic container with a capacity of 300 L. It contains a mixing pump, a heat exchanger for heating the culture fluid and a thermocouple to control and maintain a stable temperature. Control and regulation of temperature and mass transfer is carried out by the electronic control unit outside the bioreactor. The previously developed universal granular microbial preparation (GMP) was used for efficient degradation of organic waste.

The main distinguishing feature of bioreactor is the pulse mode of the technological cycle, which is cyclic change of anaerobic and aerobic conditions. The advantages of the pulse mode are as follows. The first stage of degradation of solid food waste (polymers) occurs due to anaerobic microorganisms with the accumulation of hydrolysis products: fatty acids and alcohols. When switching the bioreactor to aerobic mode is the complete oxidation of fatty acids and alcohols to CO<sub>2</sub> and H<sub>2</sub>O. The end result is the complete degradation of solid food waste and the reduction of dissolved organic compounds on total carbon from 466 ppm to up to 24 ppm.

To determine the optimal mode, several variants of the ratio of pause and mixing time were investigated. The main studied parameters were pH, Eh, the concentration of dissolved organic compounds on total carbon and the concentration of ammonium nitrogen in the culture fluid. It is determined that the most effective mode of the technological cycle is 5 minutes of mixing and 30 minutes of pause. Under such conditions, the duration of fermentation **T** was 39 hours, and the degradation coefficient for total carbon **Kd** = 20. The **pH** values were in the range 7 – 7.4, and **Eh** – +274 - +300 mV.

Thus, the bioreactor developed by us provides fast and effective degradation of solid and liquid mixed organic waste to obtain water suitable for watering vegetables. This installation is offered for use in cottage townships. In the future, we plan to scale the bioreactor, increasing its working volume from 300 to 1000 liters and improving biotechnology, which is a prospect for its large-scale implementation in industry.