INTENSIFICATION OF SURFACTANTS SYNTHESIS UNDER NOCARDIA VACCINII IMV B-7405 CULTIVATION ON A MIXTURE OF GLUCOSE AND GLYCEROL

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It was shown the possibility to use mixed growth substrates to intensify the synthesis of biosurfactant (BS) by Nocardia vaccinii IMV B-7405. The highest values were observed for a mixture of glucose and glycerol. However, to attain the maximum efficiency of carbon conversion to the final product, optimal molar ratio of monosubstrate concentrations determining for its synthesis is necessary. Which in turn, requires the theoretical calculations of the energy requirements for the biomass production and BS synthesis on the energy-deficient substrate followed by determining the concentration of energy-excessive substrate which compensate for the energy expenditure [1, 2]. Aim of the research was to implement theoretical calculations, understanding of the metabolic pathways of relevant monosubstrate synthesis is important.

Materials and Methods. Literature review was used at the primary stage. It was revealed that glucose assimilated in the pentose phosphate cycle, and the catabolism of glycerol to dihydroxyacetone phosphate could proceed via both the glycerol-3-phosphate and the dihydroxyacetone pathway.

Results. It was found that the synthesis of extracellular biosurfactant on a mixture of glucose and glycerol at molar ratio of 1.0:2.5 increased 2.0–2.3-fold compared to that on corresponding monosubstrates. The increased level of BS on the mixed substrate is determined by intensification of surface-active trehalose monomycolate synthesis, confirmed by 1.2–5.7-fold increase in activity of the enzymes involved in
their biosynthesis (trehalose phosphate synthase, phosphoenolpyruvatecarboxykinase, phosphoenolpyruvate-synthase) compared to cultivation on monosubstrates glucose and glycerol. Use of the mixture of energetically unequal growth substrates is rational for the increase of the synthesis of secondary metabolites. Which indicated that the high efficiency of these mixed substrates can be achieved by both the correct choice of substrates and the correct determination of the molar ratio of their concentrations.

References.


Key words: biosurfactant, energetically nonequivalent substrates.

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