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REGULATION OF BIOLOGICAL PROPERTIES OF *NOCARDIA VACCINII* IMV B-7405 SURFACTANTS

Microbial surface active substances (SAS, surfactants) due to a complex of physicochemical (ability to emulsify, decrease surface and interfacial tension) and biological (antimicrobial and antiadhesive activity, ability to biofilms destruction) properties are multifunctional preparations, promising for use in various industries and environmental technologies [1]. However, a significant disadvantage of these microbial synthesis products is the dependence of their properties of producers growing conditions, since surfactants are secondary metabolites and synthesized as a complex of similar compounds, the composition and ratio of which can change under different cultivation conditions. According to the literature, the main approaches to the regulation of biological activity of microbial surfactants are their post-fermentation chemical modification, as well as the improvement of producer strains by methods of metabolic and genetic engineering [2].

The detection of potential activators and/or inhibitors of key enzymes of the components microbial surfactant complex biosynthesis, responsible for certain properties, followed by appropriate modification of the nutrient medium composition allows to regulate the composition of the complex and, consequently, the properties of target product. Thus, it was found that the key enzyme of biosynthesis of *Nocardia vaccinii* IMV B-7405 surface-active aminolipids - responsible for antimicrobial activity of surfactants is $NADP^+$ -dependent glutamate dehydrogenase, the activators of which are cations of calcium, sodium and potassium. The increase of IMV B-7405 strain culture medium concentration of calcium chloride from 0.1 to 0.4 g/l or application additional of 0.5-1.0 g/l of sodium chloride, potassium chloride or there mixture was accompanied by an increase in $NADP^+$-dependent glutamate dehydrogenase activity by 1.5-3 times, as well as enhancing the antimicrobial and antiadhesive activity of the synthesized surfactants, the minimum inhibitory concentrations (MIC) of which against to bacterial (*Bacillus subtilis* BT-2, *Escherichia coli* IEM-1, *Staphylococcus aureus* BMS-1) and yeast (*Candida tropicalis* PE-2, *Candida albicans* D-6 *Candida utilis* BVS-65) test cultures were 1.8−125 times lower, and the adhesion of test cultures on abiotic surfaces treated with such surfactants, 1.1−1,6 times lower compared to the established for surfactants obtained on the basis medium without additional introduction of cations.

The possibility of surfactants regulating the biological activity as a result of co-cultivation of *N. vaccinii* IMV B-7405 with competing bacteria and yeast has been established. Thus, the introduction into *N. vaccinii* IMV B-7405 culture medium of both live and inactivated *E. coli* IEM-1 or *B. subtilis* BT-2 cells or yeast of the genus *Candida* was accompanied by the synthesis of surfactants with increased antimicrobial activity: MIC against bacterial and yeast test cultures were 2-128 times lower than MIC surfactants synthesized on medium without inducers. The adhesion of test cultures to abiotic surfaces treated with surfactants synthesized in the presence of yeast was 2-2.1 times lower, and the degree of destruction of biofilms was 2 times higher than in the case of surfactants obtained on medium without inducers.

The obtained results testify to the possibility of regulating the biological activity of *N. vaccinii* IMV B-7405 surfactants and can become the basis for the development of technology for obtaining surfactants depending on the field of their practical use.

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