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INFLUENCE OF BIOLOGICAL INDUCERS ON ANTIMICROBIAL, ANTIADHESIVE ACTIVITY BY *NOCARDIA VACCINII* IMV B-7405 SURFACTANTS

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Introduction. From year to year, the number of publications on the keywords “co-cultivation” and “co-culture” is increasing, which deal with the cultivation of producers of antimicrobial metabolites with other microorganisms, which in different works are called competitive, or biological inducers. The result of such "combined" ("mixed") cultivation is an increase in the synthesis and / or activity of antimicrobial compounds, an expansion of the spectrum or even the formation of new metabolites, which have not been synthesized by monoculture.

The largest number of such publications is devoted to the formation of bacteriocins by lactic acid bacteria, which is understandable, since the influence of competitive microorganisms on the production of these antimicrobial peptides has been studied since the 90s., and it was these studies that became the impetus for studying the induction of the synthesis of other metabolites - antibiotics, alkaloids, terpenoids with antimicrobial, antitumor, and cytotoxic activity. At the same time, information on the possibility of regulating the synthesis or antimicrobial activity of surface active substances (SAS) of microbial origin is still limited.

In previous studies, we have shown that the introduction of *Escherichia coli* IEM-1 and *Bacillus subtilis* BT-2 cells into the culture medium of the surface active substances producer *Nocardia vaccinii* IMV B-7405 was accompanied by the synthesis of surfactants with increased antimicrobial activity not only against bacteria. inductors, but also other bacterial and yeast test cultures. Note that microbial SAS is characterized not only by antimicrobial, but also by antiadhesive activity, including the ability to biofilms destruction. At the same time, the literature contains information on the effect of competitive microorganisms only on the antimicrobial activity of microbial surface active substances .

The aim of this work is To study the antimicrobial, anti-adhesive activity, effect on the destruction of biofilms) of *Nocardia vaccinii* IMV B-7405 surfactants synthesized in the presence of *Escherichia coli* IEM-1 and *Bacillus subtilis* BT-2 cells in a medium with industrial waste.

Materials and methods. Cultivation of *N. vaccinii* IMV B-7405 was carried out in a medium with refined and fried sunflower oil, as well as waste of biodiesel production. Live and inactivated by autoclaving *E. coli* IEM-1 and *B. subtilis* BT-2 cells were introduced into the medium at the beginning of the process and in the exponential growth phase. Surfactants were extracted from the supernatant of the culture liquid with a mixture of chloroform and methanol (2:1). The antimicrobial activity of surfactants was determined by the minimum inhibitory concentration, the effect of surfactant solutions on the adhesion of bacterial test cultures to polystyrene and the destruction of biofilms − by spectrophotometric method.

Results. It was found that regardless of the moment of introducing competitive bacteria into the medium of producer cultivation and their physiological state, synthesis of surfactants was observed which antimicrobial activity against wide range of bacterial test cultures (*E. coli* IEM-1, *B. subtilis* БТ-2, *Proteus vulgaris* ПА-12, *Pseudomonas* sp. MI-2, *Staphylococcus aureus* БМС-1, *Enterobacter cloacae* С-8) was 2–16 times higher (minimum inhibitory concentration was 5-96 μg / ml) , adhesion degree on polystyrene − 16–23% lower (concentration 40 μg/ml, degree of adhesion 25-54%), and the degree of biofilms destruction by 10–35% higher (concentration 100 μg/ml, degree of of biofilms destruction 73-93%) compared with the parameters established for surfactants obtained on medium without competitive microorganisms.

Conclusions. The introduction of live and inactivated bacterial inducer cells, in particular *E. coli* IEM-1 and *B. subtilis* BT-2, into the medium with waste of biodiesel production and fried oil, allows to regulate not only the antimicrobial, but also the anti-adhesive activity of *N. vaccinii* IMV B-7405 surfactants and their ability to destroy biofilms.