BIOSYNTHESIS OF SURFACTANTS BY BACTERIA AND THEIR APPLICATIONS

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Currently, there is an increased interest in surface-active substances of biogenic origin (biosurfactants) as environmentally safe and cost-effective surface-active agents for multi-purpose purposes. Biosurfactants have undeniable advantages over synthetic surfactants, such as: low toxicity, activity under extreme conditions, improved functional characteristics, the possibility of obtaining from renewable raw materials. Among biosurfactants, microbial synthesis products are the most promising, since the ability to control the fermentation process by selection or genetic modification of the producer strain, as well as the selection of optimal conditions for its cultivation, allows increasing the yield of the product without significant costs. Along with the traditional use of biosurfactants as emulsifiers and detergents, they attract attention as agents of biomedicine and veterinary medicine. According to Biosurfactant Market Global Forecast, the global microbial biosurfactants market is expected to grow by 11.2% from 2022 to 2027 due to the need for environmentally friendly surfactants for industrial, agricultural and medical applications. The pandemic of coronavirus infection has negatively affected all sectors of the economy, but at the same time there has been an exorbitantly high demand for the products of biosurfactants for use as detergents, cleaning and hygiene products, due to the growing trend towards sanitation in residential and industrial premises.

Based on bioresources of the Regional Profiled Collection of alkanotrophic microorganisms (acronym of the IEGM collection, http://www.iegmcol), we selected non-pathogenic strains of *Rhodococcus* spp. capable of synthesizing trehalolipid biosurfactants with emulsifying, solubilizing immunotropic and anti-adhesive activity. Preparations of various degrees of purification suitable for differentiated ecobiotechnological and medical applications have been obtained. As a result of genome sequencing of the strains *R. erythropolis* IEGM 267 and *R. ruber* IEGM 231 we identified key enzymes and ways to expand the functionality of synthesized biosurfactants. An urgent task is to optimize the biosynthesis of *Rhodococcus*-biosurfactants based on the use of renewable (non-hydrocarbon) raw materials, which will open up new areas of their application in ecobiotechnology and agriculture.

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