Productions of synthetically and biologically bacterial bio surfactants and emerging uses as biofuel in low income countries.

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Abstract

Biosurfactants are the most economically valuable biotechnological chemicals of the twenty-first century. Inefficient bioprocessing, on the other hand, has hampered the commercial manufacturing of these chemicals. Despite the fact that substantial research is being done on the use of low-cost substrates for their manufacture, there is a scarcity of literature on future bioprocess optimization methodologies, their accomplishments, and their promise for cost-effective biosurfactant production. This analysis looks at some of the most recent advancements and most promising tactics for improving and reducing the cost of biosurfactant production. Other emerging bioprocess intensification options include the use of nanoparticles and the coproduction of biosurfactant with other commercially significant chemicals such as enzymes. The latest discoveries presented here will not only provide an overview of relevant factors for economic biosurfactant production, but will also highlight a number of techniques that will open up new paths for biosurfactant research. This would go a long way toward establishing biosurfactants as a commercially viable molecule in the twenty-first century.

Keywords: Biofuels, Biosurfactants, Microbial fermentations, Enzymes, Energy.

Introduction

Surfactants are a class of compounds that play an important role in a variety of industries, including the petroleum business, soap and detergent manufacturing, pollution control, and even the food and beverage sector. They are chemically amphipathic compounds that reduce the surface tension at the oil–water interface, improving the solubility of water-insoluble substances [1-3]. There is rising worry about their environmental repercussions and difficulties in being degraded quickly in the environment, owing to their wide and extensive utilisation. This demanded the development of a synthetic surfactant replacement that was both effective and environmentally safe. Biosurfactants, a class of new age surfactants created from microorganisms, are equally diverse in terms of structure and function, and are gaining popularity due to their biodegradability and eco-friendliness. Surface-active compounds are produced by a variety of microorganisms for a variety of reasons, including the ability to adapt and develop on a range of substrates and other natural functions.

These biosurfactants are believed to be primarily involved in enhancing the solubility and availability of diverse water-immiscible substrates under varied growth and environmental circumstances. Pseudomonas, Bacillus, Rhodococcus, and Candida species are the most commonly implicated in the generation of biosurfactants. Biosurfactants have several advantages over their chemical counterparts in terms of lower toxicity, greater biodegradability and specificity, ability to function in a wide range of conditions, as well as biocompatibility and digestibility, making them ideal candidates for use in agriculture, food industry, and soil and water remediation.

Due to the rise in worldwide energy demand by rising nations and recent increases in global oil prices, biofuel research is currently a hot topic. Multiple techniques to using microbes in the manufacture of various biofuels (e.g. alcohols, hydrogen, biodiesel, and biogas) from a variety of starting materials are currently being investigated. This article gives a quick rundown of the current research in the field of biofuels, both on a laboratory and industrial scale, with a focus on the economic viability of various methodologies now being used. Biofuel research aims at producing energy products such as alcohols, diesel, hydrogen, and biogas from biological (mainly plant) sources. Research on the production of ethanol from plant materials started by German scientists as early as 1898. The oil shock of 1973–1974 resulted in the intensification of the research in this area. In the United States, biofuels research is seen as a way to minimize or eliminate dependence on foreign oil [4,5].

Biofuels are also viewed as more environmentally friendly sources of energy since they produce much lower (if any) carbon emission to the atmosphere compared to burning fossil fuels. Biofuel research aims at producing energy

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Since cell-based bioprocesses involve a number of interrelated parameters, monitoring each individually becomes tedious and time consuming [6-8].

Conclusion

Various new, promising prospects and tactics are discussed here, summing up all the developments in globalising and economising widespread and sustained manufacturing and applications of biosurfactants during the previous decades. These tactics would be in addition to the most important component of media optimization for cost-effective biosurfactant production, but they could be major factors in the future for the commercialization of biosurfactants. Despite an enormous amount of research work in the last two decades on economizing the production of biosurfactants, commercial success remains an economic challenge. Use of immobilized organism, use of NPs, solid-state fermentation, directed fermentation; foam fractionation, and fill and draw mode of operation could prove to be other promising processes for the enhanced industrial production. The global annual production of biofuels will continue to climb in the near future, but yearly changes will still be correlated to fluctuations in oil prices. The choice of the bioenergy approach to use in a specific country/community will eventually depend on the energy needs, flora, and political considerations. Oil and natural gas production costs continue to be exceptionally low compared to biofuel production, which continues to rely on government subsidies. Biofuels will be an important future supplement for fossil fuel energy rather than the sole source of energy within the near-term and intermediate future.

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