

Efficiency algal oil production

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Abstract

Developing alternatives to fossil fuels is one of the most urgent demands of today. Oleaginous algae are most popular in the microbial biofuel field, because of their ability to produce substantial amounts of Triacyl Glycerols (TAG). Algae produced more oil in stressed condition as compared to their optimal growth conditions. We developed industrial biotechnology cultivation *A. platensis* in laboratory, in field experiments and in greenhouse complexes of different regions of Russia, Ukraine, Moldova and Estonia. We investigated the effects of high and low light intensity, sub-optimal temperatures and nitrogen starvation on lipid content in the cells *A. platensis*. It is shown that cyanobacteria are excellent candidates with high significance in producing third generation biofuels. The analysis of energy balances of solar energy conversion to biomass of oleaginous microalgae confirms the principled possibility of achieving the record productivities of biomass and oil. At the optimal organization of the process, the energy content of the final product can exceed the cost of additional energy for the cultivation of microalgae, even without the use of energy equivalent anthropogenic CO₂ as a nutrient. In this case, the energy of biomass waste after lipid extraction constitutes a significant portion in the total energy content of the obtained products. Production of the valuable associated products with high added value (astaxanthin, β -carotene, phycocyanin, and chlorophyll) can also significantly increase the profitability of production. There are significant opportunities to improve the technology. For example, improvement of efficiency of light energy conversion into biomass, the increase in lipid content in the microalgae biomass, optimization of constructions of the cultivators and bioreactors for reduced capital cost. The extended studies in this interdisciplinary area involving experts from different fields of science and technology are needed to implement these opportunities.

Biography

Nadezhda I Chernova is pursuing PhD at Lomonosov Moscow State University (Biology). The scientific interests have associated with bioenergetics, screening of microalgae and cyanobacteria for biofuel production, the ways to increase effectiveness of cultivation microalgae as a sources of biofuels. She has published more 100 scientific works in reputed journals and the four patents.

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