

Exploring the Innovative Biotechnological Potentials of Microalgae: A Comprehensive Review

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Abstract

Many of the unique bioactive chemicals found in marine species have exceptional promise for biotechnological innovation. Among them, microalgae have generated a great deal of attention as viable options for creating novel industrial uses. Numerous bioactive substances, including as antioxidants, immunostimulatory agents, antiviral and antibiotic compounds, hemagglutinins, peptides, polyunsaturated fatty acids, biofuels, proteins and natural colors, are produced in large quantities by these photosynthetic microbes. The search for ecologically friendly, high-value, and sustainable bioproducts has led to a noticeable increase in interest in microalgal biotechnology in recent years. Microalgal biomass is in high demand because of its numerous uses, many of which are still being thoroughly studied by scientists. As effective light-energy and carbon dioxide converters, microalgae produce more biomass than terrestrial plants and are becoming more widely acknowledged for their adaptability in a variety of biotechnological fields. These include the production of renewable bioenergy, pharmaceutical research, nutraceuticals, animal feed additives, environmental cleanup, and even new treatment strategies for viral diseases like COVID-19. This analysis highlights the growing significance of microalgal biotechnology in influencing sustainable industrial practices and next-generation bio-based solutions by synthesizing current advancements in its use across several industries.

Key words: Biomass, microalgae biotechnology, unicellular photosynthetic