Photobioreactors: Biomas s production and CO_2 mitigation

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Carbon dioxide is the most important anthropogenic greenhouse gas (GHG) and the global atmospheric concentration of this compound has increased in the last centuries contributing to global climate change. In this sense, several research projects have suggested different ways to reduce atmospheric concentration of this compound, classified into three categories: i) to reduce power consumption, improving efficiency of use, ii) to reduce CO_2 emissions by using energy sources that do not release it, and iii) to develop clean technologies for captures and sequestration of CO_2, e.g., biological fixation of CO_2 by microalgae in photobioreactors. Culturing photosynthetic microalgae in photobioreactors is a sustainable strategy, since microalgae have a greater photosynthetic efficiency when compared to higher plants, can support high carbon dioxide concentrations and are able to produce essentials compounds using only inorganic materials (carbon dioxide and salts) and solar energy. The assimilation of carbon dioxide can promote the formation of volatile organic compounds (VOCs), extracellular biopolymers, precipitates carbonates and bicarbonates and converted, into molecular structure of cells (proteins, carbohydrates and lipids). High value products can be obtained, such as, proteins, pigments, feed for animals, fatty acids, biodiesel, biogas, organic fertilizers and others from microalgae. Also, microalgae may offer an alternative to conventional forms of secondary and tertiary wastewater treatment because their efficiency in the removal of pollutants. Studies in our laboratory were realized in bubble column photobioreactors and demonstrated biomass production of 5,1g/L and maximum CO_2 sequestration rate of 18.7 ± 0.5 mg/L/min in 96 h of cultivation.

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