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Microalgae cultivation

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Microalgae are unicellular microscopic photosynthetic structures. One of the most interesting factors of microalgae is that they do not compete with other food crops during food production. Additionally, they do not require terrestrial land for their growth as they have the ability to grow on freshwater as well as seawater. Microalgae have an appealing biomass composition. Under special conditions, they can be used to produce oils, proteins, carbohydrates and other compounds of interest. Microalgal cultivation is done using photobioreactors. Photobioreactors are of three types, namely raceway pond, tubular and vertical panel photobioreactors. Raceway pond photobioreactor is an open water system that is directly exposed to sunlight and is around 5-10 cm in depth. A paddle is provided to ensure proper mixing and the temperature is controlled through direct liquid evaporation. Raceway pond photobioreactors contain large volumes of water that act as a buffer when the temperature rises due to the absorption of heat from sunlight. Further, a tubular photobioreactor is a closed bioreactor system in which microalgae are cultivated in transparent tubes. Algal suspension is continuously circulated to avoid the settlement of algae. In order to avoid oxygen accumulation, a degassing valve is used. Vertical panel photobioreactor contains rectangular panels that are arranged in stacks in which the microalgae are cultivated. While the depth of this type of bioreactor is around 10-20 cm, the height varies from 0.5-1 m. Although microalgal production is easy, it is not produced widely because of several reasons, such as the backwardness in technology in many countries and the economic viability of producing compounds of interest.

Keywords: Photobioreactor, Microalgae, Raceway pond reactor, Vertical panel reactor, Tubular reactor

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