

LIFE CYCLE ASSESSMENT OF CAROTENOIDS PRODUCTION WITH MICROALGAE

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Microalgae have a great potential to produce sustainable fuel, food and high-value compounds such as cosmetic supplements and pigments. Since they are cultivated in technical systems, they do not contribute to land use competition and loss of biodiversity through pesticides and fertilizers like other energy crops. Despite these advantages, the commercialization of algae technology is still in an infant stage. Since algae fuel production failed due to economic constraints, the production of high-value compounds is a promising approach because these products can achieve higher returns on investment as biofuels. Among the high-value products, carotenoids are regarded as promising mainly for humans, because of their provitamin-A activity, i.e. in the body, beta-carotene is converted to vitamin A.

The presented work will focus on the environmental impacts of carotenoids production with microalgae. With the Life Cycle Assessment (LCA) methodology, different scenarios were analyzed, considering different types of cultivation systems (e.g. flat panel and tubular photobioreactors) and extraction processes (e.g. pressure liquid extraction and supercritical fluid extraction). The assessment is based on primary and secondary data, taking into account laboratory and pilot studies for developing an upscaling methodology. The results of the sensitivity analysis show to which extent the different stages of the process influence the results and if the impacts could be reduced by changing energy sources or system configuration.

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