

Optimization of ultrasound - assisted extraction (UAE) of biocomponents from microalgal biomass

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The presence of high-value compounds such as carotenoids, chlorophylls, lipids, proteins and carbohydrates are one of the main reasons behind the allure of developing microalgae-based biorefineries. The wide variety of microalgae species gives them various applications in the food, nutraceutical and biofuel industries [1].

Two species of microalgae, *Nannochloris sp.* and *Arthrospira platensis* have been proposed for carrying out extraction with ethanol. The software Design Expert 11 was used to build the experimental matrix and to predict and optimize the responses for both carotenoid concentration and carotenoid to chlorophyll ratio, for both types of microalgae. Carotenoid concentration and chlorophyll to carotenoid ratio were measured through UV-VIS spectroscopy [2]. The independent variables which were chosen are: temperature, ultrasonic amplitude and solvent – solid ratio (mL/g).

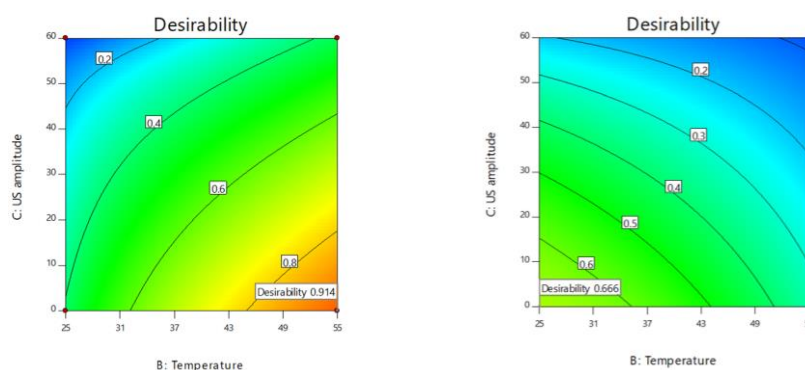


Figure 1. Optimization of extraction process variables for *Nannochloris sp.*(left) and *Arthrospira platensis* (right) based on model prediction in order to maximize both carotenoids concentration and carotenoids to chlorophyll ratio

The model allowed the optimization of extraction parameters (temperature, ultrasonic amplitude and solvent to solid ratio) for multiple scenarios, the one presented being to maximize both responses. It was observed that US exposure had different interactions with which species of microalgae, most likely as a result of the variety in terms of morphology and cell membrane structure/permeability between the various microalgal species.

Acknowledgment

The authors acknowledge the financial support received from the Competitiveness Operational Programme 2014 - 2020, Action 1.1.4: Attracting high-level personnel from abroad in order to enhance the RD capacity, ID project: P_37_471, MY SMIS 105145, Ultrasonic/Microwave nonconventional techniques as new tools for nonchemical and chemical processes, financed by contract: 47/05.09.2016.

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