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Fucoxanthin production from Tisochrysis lutea and Phaeodactylum tricornutum at industrial scale

Hugo Pereira[1], Marta Sá[2], Inês Maia[3], Alexandre Rodrigues[4], Iago Teles (Cabanelas, ITD)[2], Rene Wijffels[2], João Navalho[4], and Maria Barbosa[2]

[1]Universidade do Algarve
[2]Wageningen University & Research
[3]University of Algarve
[4]Necton S.A.

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Abstract

Fucoxanthin is a xanthophyll carotenoid with high market value. Currently, seaweeds are the primary feedstock for fucoxanthin industrial production. However, marine microalgae reach 5 to 10 times higher concentrations (2.24 to 26.6 mg g-1 DW), and are considered a promising source. In this work, two marine microalgae were produced at industrial scale to evaluate biomass and fucoxanthin production; Phaeodactylum tricornutum for autumn/winter and Tisochrysis lutea for spring/summer. Both strains were grown in 15 m3 tubular flow-through photobioreactors, for 170 consecutive days, in semi-continuous cultivation regime. The average volumetric biomass productivities of P. tricornutum and T. lutea were 0.11 and 0.09 g DW L-1 day-1. P. tricornutum reached higher maximum biomass concentration (2.87 g DW L-1) than T. lutea (1.47 g DW L-1). This is the first work in literature reporting a long-term industrial production of T. lutea. P. tricornutum fucoxanthin content ranged between 0.2 and 0.7 % DW, while T. lutea between 0.2 and 0.6 % DW. The fucoxanthin content was correlated with the irradiation (MJ m-2) and the biomass concentration in the photobioreactor (g L-1). Overall, this work shows possible scenarios for fucoxanthin production from microalgae, increasing the window to supply the industry with steady production throughout the year.

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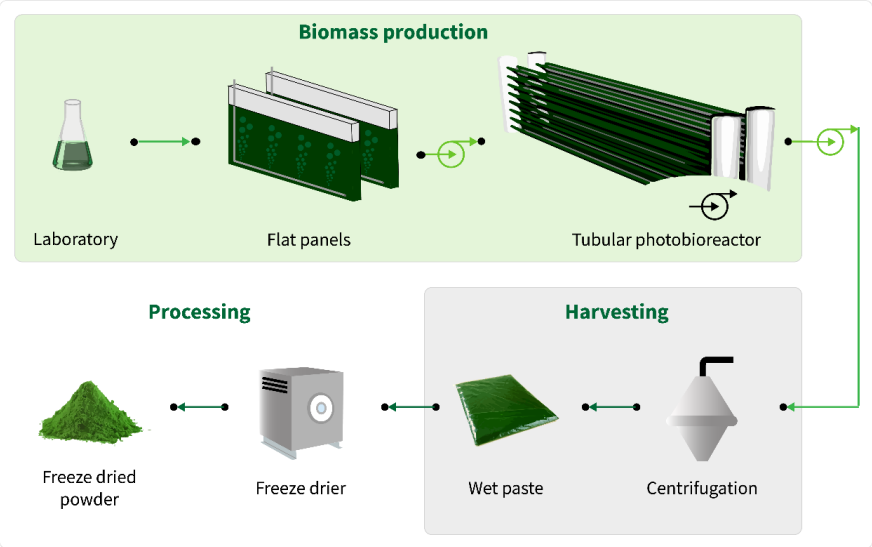

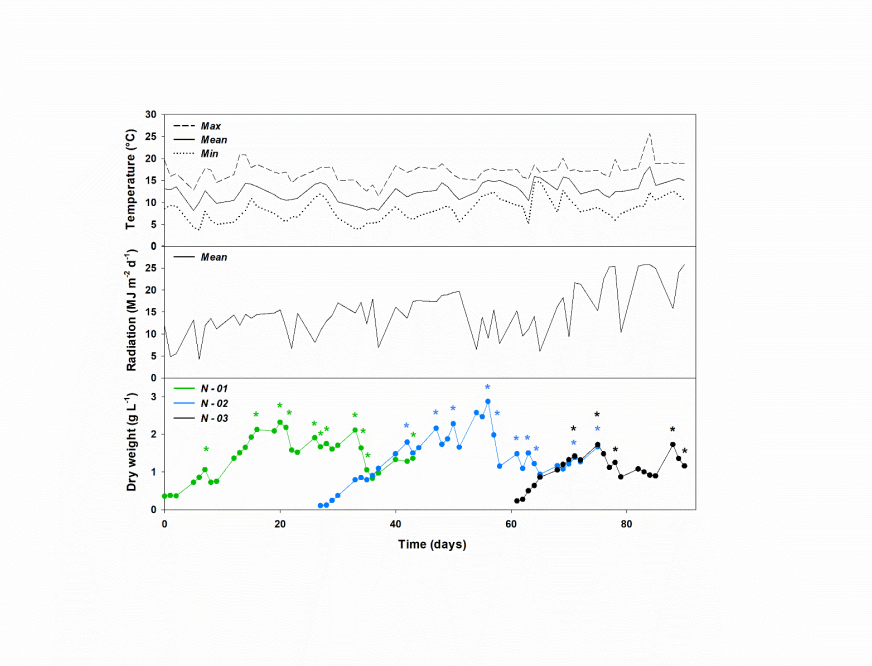

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