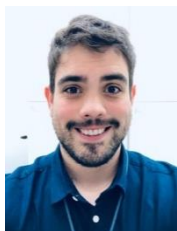


Factorial Optimisation Of The Production Of *Cyanobium* Sp. As Source Of Pigments And Antioxidant Compounds

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Abstract:

The interest for cyanobacteria have increased in the last few years due to the capacity of those microorganisms to produce high-valued bioactive compounds, in special pigments, such as phycobiliproteins and carotenoids. However, two of the great constrains about cyanobacteria-based bioprocesses are the lack of knowledge on cyanobacteria basic biology and the limited number of species used by industry [1].

The cyanobacterium *Cyanobium* sp. LEGE 06113 appears as a potential source of high-valued compounds and its unicellular morphology can be an advantage for industrial application [2].

In terms of cyanobacteria production, abiotic factors have a great impact in the growth and biochemical composition. Temperature, pH and salinity are the main responsible for the maintenance of the photosynthetic apparatus and consequentially the accumulation of pigments [3].

The factorial optimization was done in a three-factor Box-Behnken design: temperature (20–30 °C), NaCl concentration (10–30 g.L⁻¹) and pH (6.0–9.0) targeting pigments production maximization. For each design point (13, in triplicate), biomass, carotenoids, phycobiliproteins and antioxidant capacity were ascertained during 18 days. The maximum productivity value for each parameter was plotted in the factorial model and the optimal combination of the three factors was then determined.

The quadratic model was statistically significant ($p < 0.01$; $R^2 > 0.8$) for all evaluated parameters. The optimal combination of factors was a temperature of 20 °C, [NaCl] of 10 g.L⁻¹, and pH of 9.0, with the following predicted values: 2.04 mg.L⁻¹.d⁻¹ for carotenoids and 4.14 mg.L⁻¹.d⁻¹ for phycobiliproteins and total antioxidant capacity of 2.40 mg_{TE}.L⁻¹.d⁻¹.

Keywords: Cyanobacteria, Phycobiliproteins, Carotenoids, Bioactive compounds, Box-Behnken

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