Electric fields to support microalgae growth with a differentiated biochemical composition

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The search for raw materials with interesting nutritional content not competing for the arable land is a vital challenge for more sustainable and resilient food and feed production. Microalgae biomass is a potential source of functional macronutrients that can be produced under controlled environmental factors such as as light, temperature, nutrient availability, salinity and other physical stresses to leverage growth performance. Moderate electric fields (MEF) technology provides a new paradigm for the cultivation, harvesting and downstream processing of microalgae biomass. Depending on how the electric field is designed, a myriad of physical-chemical events can be controlled *in-situ* to change the biological activity of microorganisms and enzymes. In the present work, the influence of MEF application on the growth of microalgae *Pavlova gyrans*, known in the feedstock market due to its valuable biochemical composition and nutritional value, was assessed. MEF treatment was applied under optimal growth temperature conditions (between 24 and 28 ºC) at different at different growth stages and during the dark phase of its photoperiod. Results have shown that MEF when properly controlled do not change P. gyrans growth rate and influences its biochemical composition. At the end of the growth period increases up to 86 % and 66 % were observed for chlorophyll *a* and carotenoid content, respectively, as a result of the stress caused by electric field application. Increases in lipid, carbohydrate and protein fractions were also observed. This work demonstrated the potential of MEF application to microalgae as an innovative strategy to promote differentiated metabolic pathways during growth and thus influence biochemical composition of the produced biomass.

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