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Biomass productivity of *Nannochloropsis* sp. grown in desalination brine culture medium

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ABSTRACT

Desalination technologies play a vital role in water production. Along with the production of clean drinking water, desalination plants produce waste in the form of hypersaline water or brine which may harm the surrounding environment. This paper proposes a method of brine management using microalgae. The alga species *Nannochloropsis* sp. was tested for its ability to grow in high salt stress conditions, up to 80 g L^{-1}, and in desalination brine with concentration of 70 g L^{-1}. Interestingly, four- and five-fold increases in biomass were observed in salt stress conditions of 60, 70, and 80 g L^{-1}. In the case of the desalination brine conditions, *Nannochloropsis* sp. growth resulted in comparable biomass values to the salt stress experiments, proving that algal growth was not inhibited due to the presence of brine. For cost efficiency, further research was conducted to optimize the concentration and components of the brine-nutrient medium. The best growth was obtained in the optimized brine-based F/2 medium (B_{UV}), which was scaled up and tested for its bio-desalination and biofuel capacities. Biomass productivity and lipid productivity were found to be 0.05 ± 0.016 g L^{-1} d^{-1} and 9.5% ± 2.1% w/w, respectively. This study presents a cost-effective sustainable method for brine management through which value is created.

Keywords: Desalination brine; *Nannochloropsis* sp.; Salt stress; Chlorophyll-a content; productivity; Lipid

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