

Nutrient Enrichment in Alginate Bead for Enhancement of Cell Growth and Ammonium Removal by Alginate Immobilized *Nannochloropsis* sp

ABSTRACT

Microalgae have been immobilized in alginate matrixes for the ease of harvesting of the microalgae. However, not all microalgae thrive when immobilized. Immobilized cells are sensitive to the micro-environment in alginate matrixes. Hence, this study aims to improve the growth of immobilized cells and also ammoniacal-nitrogen (NH_4 +-N) removal by adding growth medium in alginate beads during the immobilization process. Different strength of the Guillard's f/2 medium (0%, 30%, 50%, and 100%) was enriched in alginate beads inoculated with *Nannochloropsis* sp. The immobilized cells were then cultivated in seawater with 1000 μM NH_4 +-N as the sole nitrogen source. The growth and NH_4 +-N uptake by immobilized cells enriched with different strength of f/2 medium were compared. There were no significant differences on specific growth rate and specific uptake rate of immobilized cells after nutrient enrichment in alginate beads. However, maximum cells attained and maximum NH_4 +-N removed increased when strength of f/2 medium enriched in alginate beads was increased. Significantly higher maximum cells attained and maximum NH_4 +-N removal were found in immobilized cells enriched with half strength of f/2 medium than those without nutrient enrichment. The present study demonstrated that nutrient enriched in alginate beads can be used by immobilized cells, and subsequently improves the performance of immobilized cells in marine water treatment and production of microalgal biomass simultaneously