LABORATORY AND PILOT-SCALE CULTIVATION OF *TETRASELMIS STRIATA* UNDER OPTIMIZED GROWTH CONDITIONS FOR FISH FEED PRODUCTION

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**Abstract**

In this work Tetraselmis striata was cultivated in drilling waters (salinity 29 ‰) obtained from the commercial fishery of Plagton S.A.. Previous studies had shown that the microalga displayed optimum growth using 0.2 g L-1 of the commercial fertilizer Nutri-Leef (30%-TN, 10%-P, 10%-K) together with 0.18 g L-1 of NaHCO3 at a pH value of 8. The effects of temperature, photoperiod and CO2 flow rate on growth and biomass composition of T. striata were also examined in laboratory conditions. The temperatures of 19±1oC, 25±1oC and 28±1oC were studied under continuous illumination (24:0, L (Light): D (Dark)). The highest biomass productivity of 93.7 mg L-1 d-1 was achieved at 25oC and high protein (49.9%), lipid (23.5%), carbohydrate (19.6%) and pigment contents (5.1%) were also recorded at this temperature. Further experiments were conducted at 25oC studying the photoperiods of 20:4, 18:6, 12:12 L:D. Results revealed that biomass was significantly affected by light absence and biomass productivity gradually reduced as the dark periods lengthened. The metabolic products exhibited higher accumulation rates under continuous illumination which was selected as optimum. The effect of carbon source was also estimated employing pure CO2 at different flow rates (10 mL min-1, 20 mL min-1, 90 mL min-1). T. striata could not tolerate the high flow rate of 90 mL min-1 while high biomass productivities (87.5 mg L-1 d-1) were recorded at 10 and 20 mL min-1. Pilot-scale experiments at the optimum growth conditions were conducted in a raceway pond of 40 L capacity. Biomass productivity reached 93.5 mg L-1 d-1, while protein, carbohydrate, lipid and pigment contents were 48.8%, 21.6%, 28.1%, 4.8% respectively. In both laboratory- and pilot-scale experiments, analysis of amino acids and fatty acids showed that the produced biomass is suitable for incorporation into conventional fish feeds.

**Keywords**

*Tetraselmis striata*; photoperiod effect; temperature effect; optimization of CO2 flow rate