



SIMULTANEOUS EFFECT OF NITRATE LIMITATION AND CO₂ SUPPLY ON FATTY ACIDS ACCUMULATION AND BIOMASS PRODUCTION IN *Nannochloropsis oculata*

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Introduction. Suitable microalgal lipids for biodiesel conversion can strongly vary as a result of changes in growth conditions such as temperature, pH, light intensity, but mainly by the nutrient media characteristics like carbon source, CO₂ supply, concentration of nitrogen, phosphates, and iron (1,2). The aim of this study was to determine the simultaneous effect of nitrate concentration (limitation) and culture supply with CO₂ in lipids production.

Methods. *Nannochloropsis oculata* strain was grown in f/2 media (3) in 1L glass photobiorreactors, with a light intensity of 100 μmol photons/m² s, 12:12 photoperiods, and temperature was controlled at 25 °C. Systems were aerated (2 vvm) and enriched with CO₂ and NaNO₃, both variables at three levels (0, 2, 4% (v/v) and 1.7, 2.45, 3.2 mM, respectively). Biomass, nitrates and lipids were carried out during 14 days. The simultaneous effect of nitrate concentration, CO₂ supply, nitrogen limitation mode and culture time were evaluated using a statistical design with the help of Design-Expert V8 software.

Results. A 52.3% increase of lipid production with respect to the lowest level was achieved by surface response analysis.

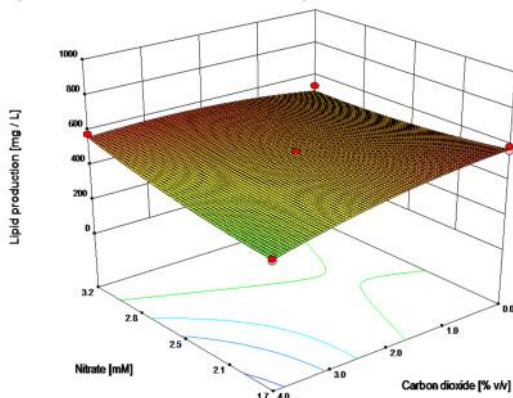


Fig.1 Design expert plot: surface response of lipid production after 14 days of culture.

The main parameters that defined the quadratic model of lipid production were CO₂ supply, culture time, and the interactions of CO₂ supply with nitrate concentration, and culture time with nitrogen limitation mode.

Concerning to biomass production the interaction of nitrate concentration with nitrogen limitation mode performed the major effects of the model.

All these parameters showed a p<0.05 value.

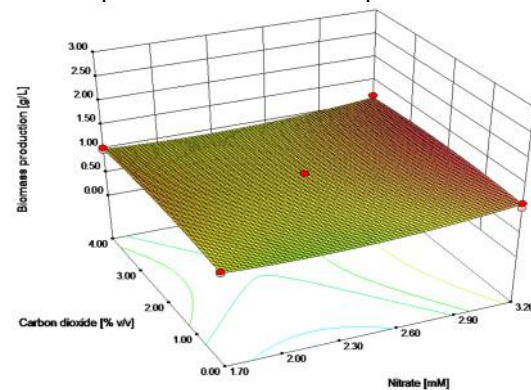


Fig.2 Design expert plot: surface response of biomass production after 14 days of culture.

Conclusions. The best conditions to obtain high lipid and biomass production were aeration enriched with CO₂ 2% (v/v) and 3.2 mM NaNO₃. Highest lipid and biomass productions achieved were 583 mg/L and 1.18 g/L, respectively.

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