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Kinetic modeling of growth and lipid body induction in *Chlorella pyrenoidosa* under heterotrophic conditions

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15 **Abstract**

16 The aim of the present work was to develop a mathematical model to describe the biomass and
17 (total) lipid productivity of *Chlorella pyrenoidosa* NCIM 2738 under heterotrophic conditions.
18 Biomass growth rate was predicted by Droop's cell quota model, while changes observed in cell
19 quota (utilization) under carbon excess conditions were used for the modeling and predicting the
20 lipid accumulation rate. The model was simulated under non-limiting (excess) carbon
21 and limiting nitrate concentration and validated with experimental data for the culture grown in
22 batch (flask) mode under different nitrate concentrations. The present model incorporated two
23 modes (growth and stressed) for the prediction of endogenous lipid synthesis/induction and
24 aimed to predict the effect and response of the microalgae under nutrient starvation
25 (stressed) conditions. MATLAB and Genetic algorithm were employed for the prediction and
26 validation of the model parameters.

27 **KEYWORDS:** Heterotrophic Microalgae, *Chlorella pyrenoidosa*, MATLAB, Kinetic Modeling,
28 Lipid accumulation, Nutrient Stress.

29 **1. Introduction**

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