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Evaluation of biodiesel quality and lipid production by *Synechocystis sp.* grown under different culture conditions

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In this study, the effects of different types of carbohydrates, vitamins and amino acids, temperature, photoperiod (light/dark cycle), initial pH, NaCl, NaNO₃, sodium thiosulphate pentahydrate on biomass and lipid productivity of *Synechocystis sp.* were investigated. Maximum lipid productivity was achieved under the following conditions: light/dark period (24-0) (Biomass productivity: 75 Mg/L day, lipid productivity: 24 Mg/L day), sodium thiosulphate 1mM (BP: 125, LP: 32.42), initial pH 7 (BP: 109, LP: 22.89), NaNO₃ (LP: 0.5 g/l), sucrose % 1 (BP: 194 LP: 71.93), glycine % 0.1 (BP: 130, LP: 40), biotin (BP: 155, LP: 26.85) and temperature 30°C (BP: 111, LP: 33.42). The fatty acid profiles of the selected cyanobacterial strain grown in this condition were determined using GC analysis and compared with control subjects to further validate biodiesel quality. Fatty acid profiles of the cyanobacterial cell were used to estimate biodiesel quality parameters including saturated fatty acid (%), mono unsaturated fatty acid (%), poly unsaturated fatty acid (%), degree of unsaturation, saponification value (mg/g), cetane number, long chain saturated factor, cold filter plugging point (°C), cloud point (°C), pour point (°C), allylic position equivalent, bis-allylic position equivalent, oxidation stability (h), higher heating value, kinematic viscosity (mm²/s), density (g/cm³).

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