ABSTRACT

Light and nitrogen affects the biomass and lipid production of microalgae. High intensity of light (400 µmol m\(^{-2}\) s\(^{-1}\)) leads to high biomass and lipid accumulation. Low intensity of light (200 µmol m\(^{-2}\) s\(^{-1}\)) leads to high carbohydrate accumulation. Highest biomass, lipid and carbohydrate production were obtained under 16:08 h light: dark cycle. Highest biomass and carbohydrate production of Desmodesmus sp. VIT were obtained at fluctuating light intensity simulating intermediate overcast sky condition. Desmodesmus sp. VIT cultured under sunny sky condition attained highest lipid production. The ILIS increased the lipid production of Desmodesmus sp. VIT compared to constant light intensity. Fluctuating light intensity decreased the lipid production of Desmodesmus sp. VIT compared to constant light intensity. Medium pH fluctuation affects the growth of Desmodesmus sp. VIT on different nitrogen source. Medium acidification during ammonium uptake inhibited the growth of Desmodesmus sp. VIT on ammonium chloride. Medium acidification during growth on ammonium was minimized using bicarbonate. Highest lipid content (28.3%) of Desmodesmus sp. VIT was obtained with urea. Highest carbohydrate content of Desmodesmus sp. VIT was obtained with potassium nitrate. Phosphorus sufficient medium showed highest lipid productivity and carbohydrate productivity compared to phosphorus limited medium. Desmodesmus sp. VIT lipid production and carbohydrate production was increased with increase in iron concentration.

Iron supplementation during LEGP led to increase in lipid productivity of Desmodesmus sp. VIT. Carbon supplementation during LEGP led to increase in biomass productivity, lipid productivity and carbohydrate productivity of Desmodesmus sp. VIT. Increase in inoculum concentration led to increase in DCW of Desmodesmus sp. VIT. Salt addition increased the lipid production of Desmodesmus sp. VIT. Sodium bicarbonate minimized the medium acidification on ammonium with various inoculum sizes.