Effects of nitrogen source on enhancing growth conditions of green algae to produce higher lipid

Hesam Kamyaba, Chew Tin Leeb*, Mohd Fadhil Md Din*a, Mohanadoss Ponrajaa, Shaza Eva Mohamadc, Mohsen Sohrabic

*aFaculty of Civil Engineering, Department of Environmental Engineering, Institute of Environmental Water Resources and Management (IPASA), Water Research Alliance, Universiti Teknologi Malaysia, Johor 81310, Malaysia
bFaculty of Chemical Engineering, Department of Bioprocess Engineering, UniversitiTeknologi Malaysia, Johor 81310, Malaysia
Tel. +607 5538005; email: ctlee@utm.my
cFaculty of Bioscience and Bioengineering, UniversitiTeknologi Malaysia, Johor 81310, Malaysia

Received 23 March 2013; Accepted 20 September 2013

ABSTRACT

Microalgae represent a potential source of biological material to produce biodiesel. This study focused on the effects of nitrogen concentration to enhance lipid content from Chlorella sorokiniana and their potential use to serve as a raw material for biofuel production. Light intensity and different nitrogen concentrations were used to determine the optimum cultivation environment for the fresh water microalgae, C. sorokiniana. The effects of various nitrogen sources were examined in order to determine the optimum lipid content produced by the microalgae. It was found that the optimum cultivation of microalgae growth has caused the biomass growth and has led to higher lipid production. The growth rate and lipid content were determined by measuring the optical density at 620 nm and fluorescence intensity using Nile red method. Microalgae of 10% (v/v) concentration was found to be the optimum inoculum concentration with higher growth rate obtained when compared to 50% (v/v). The NH4NO3 nitrogen concentration showed greater lipid production compared to NaNO3 cells cultivated with final lipid content. The 0.2 M of NH4NO3 nitrogen concentration produced highest lipid (3.138 a.u), when compared to two different nitrogen sources: NH4NO3 and NaNO3 with different concentrations.

Keywords: Microalgae; Chlorella sorokiniana; Nitrogen source; Lipid productivity

*Corresponding author.

1944-3994/1944-3986 © 2013 Balaban Desalination Publications. All rights reserved.