



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.  
Thesis Title : Studies on Cultivation Strategies and Biodiesel Production from Selected Microalgae Species of North-East India  
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Thesis Submitted to the Department/ Center : Centre for Energy  
Date of completion of Thesis Viva-Voce Exam : 03/03/2016  
Key words for description of Thesis Work : Microalgae, biodiesel, *Chloromonas* species (ADIITEC-III), *Scenedesmus* species (GUBIOTJT116)

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The thesis aims to select a potential microalgae species from existing 'microalgae resources' of the region and their potential aspects towards biodiesel production. *Chloromonas* species ADIITEC-III was isolated and identified as a new microalgae strain from the region. *Scenedesmus* sp (GUBIOTJT116) was taken as a reference species from the Department of Biotechnology, Gauhati University. Under the optimum physiological condition, total lipid yield of ADIITEC-III and GUBIOTJT116 was recorded to be  $31.8 \pm 0.9\%$  and  $35.2 \pm 0.72\%$  respectively. Nitrogen supplementation was studied to address the importance of nitrogen which plays an imperative role in microalgal lipids and fatty acid metabolism. Among the studied nitrogen sources, ammonium nitrate supports the lipid yield 35.86% in ADIITEC-III and GUBIOTJT116 showed high lipid yield (37.2%) with urea. Therefore, based on high lipid yield, the oil recovered from the isolates was transesterified into methyl esters (FAME) and was characterized by <sup>1</sup>H NMR spectrophotometer, thermogravimetric analysis (TGA), FTIR spectroscopy, acid value, iodine value, bomb calorimeter and differential scanning calorimetric (DSC) analysis. Thereafter, the FTIR spectrum of the oil sample of both the strains obtained under different nitrogen sources were investigated in detailed using the chemometric techniques of discriminate analysis and multivariate calibrations. Both the strains were further subjected to salt (NaCl) stress to enhance the lipid yield. Based on the data obtained, ADIITEC-III was selected for two stage cultivation and showed high biomass productivity ( $1.5 \pm 0.3 \text{ gL}^{-1}$ ) and increased lipid content of up to  $40.8 \pm 0.2\%$ . Moreover, ADIITEC-III under high salt stress condition (NaCl) showed better biodiesel properties than control condition. Further, the thesis includes the utilization of cow dung and piggery waste as an effective alternative media for microalgae biomass production. The cow dung and piggery waste were characterized for their elemental composition and based on the compositions a range of concentrations i.e. 5%, 10% and 15% were considered for the experimentation. Increased lipid yield was noticed at 5% cow dung and piggery waste concentrations for ADIITEC-III and GUBIOTJT116 compared to the culture grown in BG11 medium. The physico-chemical characteristics of synthesized methyl esters (FAME) of ADIITEC-III and GUBIOTJT116 were evaluated and were found to be within the limits of ASTM D6751 biodiesel standards. Thus, ADIITEC-III and GUBIOTJT116 could be a potential feedstock for biodiesel production.