ICET 2025
ISSN 3084-8628

INTERNATIONAL CONFERENCE ON EMERGING TECHNOLOGIES

"TECHNOLOGY FOR SUSTAINABLE FUTURE"

BOOK OF ABSTRACTS

2ND APRIL 2025

FACULTY OF TECHNOLOGY
SABARAGAMUWA UNIVERSITY
OF SRI LANKA, BELIHULOYA

Bioremediation of Textile Industry Wastewater by *Nostoc* sp. and Analysis of its Fatty Acid Profile for Biodiesel Production

S.M.D.C. Bandara[1], R.R. Ratnayake[1]*

[1] National Institute of Fundamental Studies, Kandy, Sri Lanka

renuka.ra@nifs.ac.lk

Abstract

This study explores an integrated approach to bioremediate textile industry wastewater (TWW) using *Nostoc* sp., followed by biodiesel production from TWW-grown cyanobacterial biomass. Initially, TWW was collected from a leading textile company in the Colombo district, Sri Lanka, and initial physicochemical parameters were measured. A 10% (v/v) homogenous inoculum of *Nostoc* sp. was inoculated into transparent glass tanks with a total volume of 20 L of TWW under greenhouse conditions providing continuous aeration and a 12:12 light: dark photoperiod. The growth of *Nostoc* sp. and TWW decolorization were evaluated spectrophotometrically over a period of 4 weeks. After 4 weeks, significant growth performance and TWW decolorization were observed, indicating its potential for sustainable TWW treatment. Pollutant removal was assessed via the reduction of chemical oxygen demand (COD), giving a significant reduction of 96.48 ± 0.37%. In terms of nutrient removal, ammoniacal nitrogen, nitrate, and phosphate removal were assessed and they were recorded as 76.28 ± 0.79%, 69 ± 1.07%, and 81.14 ± 0.73%, respectively. The wastewater-grown biomass was harvested via filtration and oven-dried at 55˚C to obtain its dry powder. The lipids of *Nostoc* sp. were extracted in a soxhlet apparatus using *n*-hexane as the extraction solvent and a total lipid content of 21.5% (w/w) was obtained. Lipids were converted to their fatty acid methyl esters (FAMEs)/biodiesel via a transesterification reaction. The transesterified lipids were analyzed via Agilent 7890B GC-FID system. The major FAMEs identified were palmitic acid (C16:0), oleic acid [C18:1 cis (n9)], stearic acid (C18:0), cis-10-pentadecanoic acid (C15:1), lauric acid (C12:0), and myristic acid (C14:0), with percentages of 45.92%, 24.77%, 8.82%, 8.65%, 6.66% and 5.19%, respectively, indicating a well-balanced saturated and unsaturated FAME composition for biodiesel production. Thus, this integrated approach not only offers a sustainable solution for TWW remediation but also simultaneously provides a potential feedstock for biodiesel production.

Keywords: *Biodiesel, Bioremediation, Lipid content, Nostoc sp., Textile wastewater*