

Bioremediation of Lubricant Oil Pollution in Water by *Bacillus megaterium*

S. M Gopinath¹, M. Ismail Shareef^{2*}, Ashalatha³, Aravind Ganessin⁴

Professor, Head of the Department, Department of Biotechnology, Acharya Institute of Technology, Bangalore, India¹

Assistant Professor, Department of Biotechnology, Acharya Institute of Technology, Bangalore, India^{2, 3}

P.G. Student, Department of Biotechnology, Acharya Institute of Technology, Bangalore, India⁴

ABSTRACT: Lubricant oil from Pump motors, automobile engines and engines of boats and ships constitute an important pollutant of water and soil ecosystems, leading to devastating damage to the aquatic ecosystem at times of accidents. There are wide varieties of microorganisms in water and soil known to utilize petroleum hydrocarbons as an energy source and degrade them. Hydrocarbon utilizers (HCUs) found to be useful in the remediation of oil pollution in soil and water, includes certain species of *Pseudomonas*, *Rhodococcus*, *Bacillus*. This work is primarily based on degradation study of engine oil and evaluation of the effectiveness of indigenous microorganisms in the process. Microbes isolated from polluted sites have been screened for their ability to grow under in vitro culture, where used engine oil was the sole carbon source. Evaluation of residual oil content and percentage degradation of oil in culture medium was measured at regular intervals of 7 days for a period of 28 days. Residual oil was estimated by the toluene cold extraction method, percentage degradation of hydrocarbons was evaluated using Gas Chromatography (GC). And heavy metals in the sample before and after remediation were also analyzed by Energy diffraction spectroscopy (EDS) and characterised using Scanning Electron microscope (SEM). Results of the study have indicated that microbes are potential agents studied under in vitro conditions for restoring oil contamination and thereby biodegrading the harmful hydrocarbon pollution

KEYWORDS: Hydrocarbon utilizing Bacteria, biodegradation, bioremediation, Hydrocarbons.

I. INTRODUCTION

Oil derived from crude oil or mixture containing synthetic oil including engine oil, gear oil, hydraulic oil, spent oil, tank bottom sludge and slop oil generated from petroleum refineries are said to be source of spent oil which is a major environmental problem in most developing countries like India. There are 36,165 Hazardous waste recycling industries, generating 62, 32,507 metric tons of HW every year. Mechanical methods such as electrolysis, re-refining are too expensive labour intensive and no technological upgradation P K Selvi et al [1]. When the used oil is accidentally or deliberately released into the environment can cause serious problems to both biotic and a biotic ecosystem such as carcinogenicity and mutagenicity was stated by Anthony [2]. In [3] authors said release of untreated or spent oil into estuaries, lakes and ponds causes immediate and obvious problems to animals and plants. There by causing long term effects on ecosystem which related to prolong period depending on the concentration of toxicants in their top of food chain.

In most oil contaminated sites some highly toxic derivatives like benzene, xylene, alkyl benzenes, 1, 3-butadiene are present. And these components are well known carcinogens for both animals and humans [4]. Illegal dumping of spent oil into environment is a global ramification, prolong exposure of high level polycyclic aromatic hydrocarbons can develop liver or kidney disease and high level risk of cancer [5].