

Biodegradation of Used Engine Oil by Bacterial Cultures

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Abstract: In the present study biodegradation of used engine oil by four bacterial cultures was targeted. Versatile catabolic capability of four bacterial cultures *Bacillus subtilis* PD6, *Bacillus* sp. PD9, *Enterobacter* sp. PD11 and *Bacillus* sp. PD14 was assessed by subjecting them for the utilization of used engine oil in 250ml 0.1XMD9 media containing flasks. Biodegradation of used engine oil was analysed by COD analysis and observation were statistically processed by ANOVA. Out of four bacterial cultures, *Bacillus* sp. PD9 and *Bacillus* sp. PD14 were found to be efficient cultures which were able to degrade 67.8% and 65.5% used engine oil within six days. Other two cultures *Bacillus subtilis* PD6 and *Enterobacter* sp. PD11 also exhibited successful biodegradation of used engine oil but less efficiently compared to *Bacillus* sp. PD9 and *Bacillus* sp. PD14. This study accentuate the role of isolated four bacterial cultures in removal of used engine oil and its possible application in bioremediation studies.

Keywords: Biodegradation, Bioremediation, Bacterial cultures, COD, Used engine oil, ANOVA

I INTRODUCTION

Man developed new technologies to facilitate the work as well as to obtain the comfort at every step of life. In doing so various aspects related to environmental health knowingly or unknowingly were ignored. The outcome of most of these developmental processes is environmental deterioration. To facilitate the comfortable transportation automobile vehicles were developed across the world. These vehicles have certainly expedited the transport but at the same time played and still playing major role in environmental deterioration.

The demand for petroleum as a source of energy and as a primary raw material for chemical industries in recent years has resulted in sudden increase in its consumption worldwide. This dramatic increase in production, refining and distribution of crude oil has brought with it, an ever increasing problem of environmental pollution (Atlas and Bartha, 1992).

Petroleum products used in the automobile vehicles include gasoline, diesel, engine oils of variable densities, grease etc. All these products are derived from the crude oil, extracted from the oil wells dig dip into the earth. Environmental deterioration by automobile vehicles, running on petroleum products such as gasoline, diesel occurs at every level. Various gases released during combustion of petroleum products have contaminated air significantly. Engine oil which is used to provide lubrication to engine parts, has also contributed heavily in the pollution of water and soil.

The fate of petroleum hydrocarbons in the environment is largely controlled by abiotic factors which influence rates of microbial growth and enzymatic activities that determine the rates of petroleum hydrocarbon utilization (Leahy and Colwell, 1990). The persistence of petroleum pollution depends on the quantity and quality of hydrocarbon mixture and on the properties of the affected ecosystem. In one environment, petroleum hydrocarbon persists indefinitely whereas under another set of conditions the same hydrocarbons may be completely biodegraded within a few hours or days (Atlas and Bartha, 1972). Hydrocarbon-degrading bacteria and fungi are widely distributed in marine, freshwater and soil habitats (Atlas and Bartha, 1973). The ability to isolate high numbers of certain oil-degrading microorganisms from oil-polluted environment is commonly taken as evidence that these microorganisms are the active degraders of that environment (Okereantugba and Ezeronye, 2003). Although, hydrocarbon degraders may be expected to be readily isolated from an oil-associated environment, the same degree of expectation may be anticipated for microorganisms isolated from a total unrelated environment such as domestic wastewater.

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