PROJECT REPORT
ON

A STUDY ON SOLID WASTE MICROFLORA AND ITS APPLICATION IN BIODEGRADATION

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Submitted to the Visveshwaraiah Technological University, Belgaum in partial fulfillment of requirement of VIII semester, Bachelor of Engineering in Biotechnology.

2008 - 2009

DEPARTMENT OF BIOTECHNOLOGY ENGINEERING

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SYNOPSIS

Solid Waste (SW) is a waste type that includes predominantly household waste (domestic waste) with sometimes the addition of commercial waste collected by a municipality within a given area. They are in either solid or semisolid form and generally exclude industrial hazardous wastes. The solid waste disposal industry divides solid waste into four major categories depending on the state in which they are disposed like General Solid Waste or Municipal Solid Waste, Industrial Solid Waste, Residual Solid Waste and Infectious Solid Waste. Micro organisms that dwell in these wastes are grouped under Solid Waste Microflora (SWM). The most common organisms that are found in solid waste are bacteria and fungi.

The solid waste samples were collected; isolation and identification of microflora were done. The different methods adopted for the isolation of microorganisms were Blotter method for fungi and Spread plate method for bacteria.

Identification of bacteria was done based on their colony and biochemical characteristics by referring Bergey's Manual of Determinative Bacteriology [4]. Bacteria identified were *Neisseria subflava, Staphylococcus aureus, Aeromonas* species, *Bacillus pasteurii, and Corynebacterium kutscheri.* Identification of fungi was carried out based on their colony and morphological characteristics and spore formation by referring Barnett's Manual [3]. Fungi identified were *Asperigillus niger, Talaromyces* species, *Rhizopus* species and *Mucor* species.

SWM have the astonishing, natural catabolic diversity to degrade and transform or accumulate a huge range of compounds. These properties were exploited in the degradation of Propoxur, a Carbamate insecticide that is available as an emulsifiable concentrate, wettable powder, and is used against household pests such as cockroaches, mosquitoes, and flies. It is toxic to humans, fish, wild birds, wild animals, live stock and bees.

Out of 9 isolates identified, *Neisseria subflava, Staphylococcus aureus, Talaromyces* species and *Rhizopus* species were subjected for biodegradation of propoxur for a period of 12 days. The analysis of biodegradation was done by estimation of residual

phenol obtained by degradation of propoxur, using colorimetric 4- aminoantipyrine method [13, 24, 25].

It was found that *Neisseria subflava* degrades propoxur rapidly after an acclimatization time of 3 days. *Staphylococcus aureus* also degrades propoxur but shows inhibition by the metabolite accumulated, which is overcome after a short time. *Talaromyces* species and *Rhizopus* species degrade propoxur rapidly within a period of one day, but an intense inhibition is seen by metabolite accumulated, which is probably due to the inhibition of enzymes involved in metabolism.

This study has a lot of scope because of the following reasons: (1) an efficient degradation of the pesticides used for insect control could eliminate the problems of environmental pollution, (2) a balance between degradation and efficacy of pesticides could result in safer application and effective insect control, and (3) knowledge about the mechanisms of biodegradation could help to deal with situations leading to the generation of toxic metabolites and bioremediation of polluted environment. In addition to this, advances in genetic engineering and biotechnology offer great potential to exploit the degradative properties of microorganisms. These methods could be used to improve the degradative capacity of these above mentioned microorganisms, so that degradation period can be shortened and to eliminate the inhibition caused by the metabolite.