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DEGRADATION STUDIES OF METHYL PARATHION BY AN INDIGENOUS SOIL BACTERIAL ISOLATE

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ABSTRACT

The farming community profoundly uses different types of pesticides, to protect their crops from variety of insects. Methyl parathion (MP) is an Organophosphorous pesticide, which is used worldwide and as a consequence its excessive consumption causes pollution of groundwater, surface water and soil. The concerned pesticide is highly toxic and its residues persist in the environment. The present study was thus aimed to isolate an indigenous soil bacterium by enrichment technique capable of degrading the concerned pesticide. A total 10 strains were isolated from the soil, of these, only one strain was found to be potential and was used for further studies. The potential strain was able to degrade methyl parathion to para- nitro phenol which is the first hydrolysis product of methyl parathion. The degradation of MP was studied through spectrophotometer and Gas Chromatography.

Key words : Methyl parathion, Bioremediation, Spectrophotometer, Gas Chromatography.

Introduction

The term pesticides cover a wide range of compounds including insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators and others. There has been a steady growth in pesticide production in India since 1952, the time when first pesticide industry was established. Chemical fertilizers and pesticides have been making a remarkable contribution in the agricultural sector towards improving the crop yield per hectare since better harvest requires rigorous cultivation, irrigation, and use of chemicals and fertilizers to protect the plants from pests and plant diseases. (Doxtader and Croissant, 1992). They do provide a protective covering to the crops from insects and pests but, are also responsible for the contamination of soils and water bodies, due to leaching and runoff to the nearby water reservoir (David *et al.*, 1993; Liu *et al.*, 2001; Shroff, 2000 and Mahiuddin *et al.*, 2014). Their extensive use exerts intense and fatal effects on wildlife populations and on humans as well. Nearly 500,000 illness and 20,000 deaths can be ascribed annually to the use of chemical pesticides. Cases of acute pesticide poisoning account for significant morbidity and mortality rate worldwide (Mahiuddin *et al.*, 2014). Due to the environmental concern associated with the gathering of pesticides in food chain, it is prerequisite to develop safe, convenient and economically feasible methods for pesticide detoxification (Pimental, 1983). Several conventional remediation techniques used in the past, have met with serious opposition due to their costly expenses and most importantly, most of the time they do not destroy the contaminating compound but rather transfer it from one environment to another place (Hurst *et al.*, 1997). Bioremediation has virtually emerged during recent past as most ideal, alternative, environment friendly and ecologically sound technology for removing pollutants from the environment, restoring the polluted sites, and preventing further contamination (Roe *et al.*, 1998).

Organophosphorous pesticides such as methyl parathion (MP) and methamidophos are extremely hazardous compounds. These compounds are biodegradable in nature but, some of their traces or residues do exists in nature which are highly toxic that ultimately affects human and animal's life cycle. Since