

Pesticides Residues P-Nitrophenol Degrading *Pseudomonas putida* from Cultivated Vegetables Soil Samples of Chikhli Tahsil of Buldana District



Biology

KEYWORDS : Para-nitrophenol, agri-land, *Pseudomonas putida*, vegetable and green technology.

Waghode S. M.

P.G. Department of Microbiology, Shri Shivaji Science College, Chikhli-443201 Dist- Buldana (M.S.) India.

A. M. Garode

ABSTRACT

Naturally occurring compounds undergo biodegradation easily and anthropogenic compounds resist biodegradation. Present study was to isolate para-nitrophenol a residues of pesticides degrading bacteria. Soil samples were collected from the vegetable agri-land where maximum times or abundantly pesticides are spreaded. Soil sample is collected from the various locations and villages of Chikhli Tahsil of Buldana district. From such vegetable fields soil samples are collected for the isolation of diversity of para-nitrophenol degrading bacteria. The isolated bacteria are characterized and identified according to Bergey's manual of determinative bacteriology. Total 80 numbers of samples are analyzed for the presence of *Pseudomonas putida*. Out of these samples 50 samples are shown the presence of *Pseudomonas putida* in various sources of soil samples such as cauliflower, spinach, bringle and cabbage. *Pseudomonas putida* is the key to developing effective and environment friendly 'green' technologies for degrading the pesticides and theirs residues.

INTRODUCTION

India is an agriculture based country. About 60-70% of its population is dependent on agriculture. A huge portion of arable land already under cultivation is being rapidly depleted by industries and urban encroachments. On the other hand, the demand for agricultural crops is increasing day by day due to the rapidly increasing population. Hence, the use of pesticides has become indispensable in agriculture. Some of the main agricultural products are Parathion, Methyl parathion, Chlorpyrifos, Malathion, Monochrotophos, and Dimethoate¹. Some investigators found that soil contaminated with pesticides could be possibly decontaminated by inoculation with specifically adapted microorganisms^{2,5}.

Naturally occurring compounds undergo biodegradation easily and anthropogenic compounds resist biodegradation. This is due to the absence of enzymes that can bring about an initial attack on the compound. About 30% of agricultural produce is lost due to pests. The effect of toxic chemicals in the environment can produce wide range of health effects. The presence of a large number of diverse bacterial species in nature expands the variety of chemical pollutants that can be degraded and the extent to which pollutant sites can be decontaminated⁸. The objective of present study is isolation of para-nitrophenol a residues of pesticides degrading bacteria.

MATERIALS AND METHOD

Soil sample is collected from the various locations and villages of Chikhli Tahsil of Buldana district. Collected of soil samples from the vegetable agri-land where maximum times or abundantly pesticides are spreaded. From such vegetable fields soil samples are collected for the isolation of diversity of para-nitrophenol degrading bacteria. The isolated bacteria are characterized and identified according to Bergey's manual of determinative bacteriology^{3,7}.

RESULTS AND DISCUSSION

Chikhli Tahsils is one of the large tahsils Buldana District in which lot of farmers are cultivated various vegetable such as cauliflowers, Cabbage, Bringle etc. in their agri lad which is heavily spreaded with various kinds pesticides. These pesticides are toxic chemicals which easily come in our drinking water reservoir in the rainy seasons along with the surface water from agri-land and biomagnified in the food chain.

Total 80 numbers of samples are analyzed for the presence of *Pseudomonas putida*. Out of these samples 50 samples are shown the presence of *Pseudomonas putida* in various sources of soil samples such as cauliflower, bringle and cabbage. Sourcewise presence of *Ps. putida* was as follows in table 1. *Pseudomonas putida* was isolated from different soil sample which degrades residues of pesticide i.e. para nitrophenol in soil.

Table 1 shows the sourcewise presence of para nitrophenol degrading *Ps. putida*.

Bacteria	Cauliflower sample			Spinach sample			Bringle sample			Cabbage sample		
	Total	Presence	%	Total	Presence	%	Total	Presence	%	Total	Presence	%
<i>P. putida</i>	20	15	75	20	13	65	20	10	50	20	12	60

From the soil samples from cauliflower and spinach fields were shown the presence of *Pseudomonas putida* in 15 samples out of 20 (i.e. 75%) and in 13 samples out of 20 (i.e. 65%). While in fig. 2 shown that the presence of *Pseudomonas putida* in the bringle and cabbage soil samples were present 10 samples out of 20 (i.e. 50%) and in 12 samples out of 20 (i.e. 60%).

Fig. 1 Shows percentage of sourcewise presence of para nitrophenol degrading *Ps. putida*.



The viability of bacterial inoculation in enhancing the biodegradation of organic pollutants, 4-nitrophenol was observed to be mineralized extensively in lake water inoculated with 4-nitrophenol degraders, whereas no degradation was measured in uninoculated lake water over one week incubation⁴. Degradation of PNP is mostly studied at lower concentrations⁹. However, *Pseudomonas putida* has been documented to be PNP-tolerant, and in about 72 h can completely degrade 500 ppm PNP, a concentration proven to be toxic to most of the microorganisms⁶.

CONCLUSION

The demand for agricultural crops is increasing day by day due to the rapidly increasing population. Hence, there is a need for a huge increase in the quantity of agricultural produce as well as improvement in its quality. The effect of toxic chemicals in the environment can produce wide range of health effects. There is an urgent need for safe, economical and reliable methods for detoxification/ remediation of such p-nitrophenol containing compounds. From the vegetable fields soil samples are collected

for the isolation of para-nitrophenol degrading bacteria. *Pseudomonas putida* was tested for the maximum limit for their degradation by increasing the concentration of para nitrophenol in the nutrient agar. *Pseudomonas putida* is the key to developing effective and environment friendly 'green' technologies for degrading the pesticides and their residues.

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