

Biodegrading Potentials of Plant Growth - Promoting Bacteria on Insecticides Used in Agricultural Soil

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Abstract : Pesticide residues left in agricultural soils after cropping are always accumulative, difficult to degrade and harmful to animals, plants, soil and human health in general. The biodegrading potential of pesticides- resistant PGPB on soil pollution was investigated using in situ remediation technique following recommended standards. In addition, screening for insecticide utilization, maximum insecticide concentration tolerance, insecticide biodegradation and insecticide residues analyses via gas chromatographic/electron column detector were determined. The location of bacterial degradation genes was also determined. Three plant growth-promoting rhizosphere (PGPR) were isolated and identified according to 16S rRNA as Paraburkholderia tropica, Burkholderia glumae and Achromobacter insolitus. From the results, all the three isolates showed phosphate solubilizing traits and were able to grow on nitrogen free medium. The isolates were able to utilize the insecticide as sole carbon source and increase in biomass. They were statistically significantly tolerant to all the insecticide concentrations screened. The gas chromatographic profiles of the insecticide residues showed a reduction in the peak areas of the insecticides, indicating degradation. The bacterial consortium had the lowest peak areas, showing the highest degradation efficiency. The genes responsible for degradation were found to be in the plasmids of the isolates. Therefore, the use of PGPR is recommended for bioremediation of agricultural soil insecticide polluted areas and can also enhance soil fertility.

Keywords : biodegradation, rhizosphere, insecticides utilization, agricultural soil

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