Biodegradation of Chlorpyrifos and Soil Remediation Using Native Soil Bacteria and Triton X-A Novel Approach

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Chlorpyrifos(CPFS) is a pesticide extensively used by farmers. It is extremely dangerous to human and animal health, even at levels of 0.1 ppm. Pre-natal exposure to CPFS results in neurological problems. Exposure to the pesticide even at very low levels leads to death of honey-bee larvae and to memory and learning deficits in adult bees threatening their survival. CPFS contaminates air and ground water up to 13 KM from the site of application for up to 8 years. Urgent measures have to be developed to degrade the pesticide residues in farm soils. These procedures must be free from adverse effects on the environment and the ecology of farming. An ideal means of achieving this is to employ naturally-occurring bacteria in the soil to degrade the pesticides. When an effective strain of bacteria is isolated for the biodegradation, the strain may not be efficient. It was hypothesized that the surfactant Triton X would be effective in accelerating the biodegradation of CPFS by bacteria. Soil sample was collected from a farm under aseptic conditions. The various strains of bacteria present in the soil were isolated and cultured in a medium of CPFS, increasing the concentration of the pesticide solution gradually. Only the strain that was resistant to the pesticide survived this procedure. This strain was then collected and studied for its effectiveness on the biodegradation of the pesticide. The degree of degradation was assessed using MS-GS and the growth of the colony was measured using optical density measurements. Experiments were conducted on the degree of biodegradation in the presence of different concentrations of the surfactant Triton X. The degree of biodegradation increased from 30% in the absence of Triton X, to about 90% in the presence of Triton X.

Awards Won:

Intel ISEF Best of Category Award of $5,000

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