Poster

Isolation of a novel bacterial degrader strain from a contaminated soil by the insecticide chlorpyrifos, using the enrichment culture technique.

Jaime Villaverde Capellán, Alba Lara Moreno y Eduardo Hernández Amador *

Departamento de agroquímica, microbiología ambiental y conservación de suelos. IRNAS-CSIC. Apartado 1052, 41080 Sevilla, España.

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ABSTRACT

Motivation: The use of pesticides in the modern agriculture has meant an improvement in the conditions and production of crops. However, the continuous use has led to contamination problems in soils, water and sediments affected by its application. One of the pesticides widely used to fight against insect pests is the chlorpyrifos. This organophosphate pesticide produces a metabolite known as triclhoro-2-pyridinol (TCP) which presents a high toxicity increasing the risk of environmental toxicity. The current study was carried out to assess the effect of native microorganisms from an agricultural soil contaminated by chlorpyrifos in the bioremediation of soils contaminated with this pesticide.

Methods: The soil sample was collected from a private property where chlorpyrifos was commonly used that was located in Roche, in the southern Cadiz. In order to isolate degrading bacterial strains from the soil treated with chlorpyrifos, enrichment technique with mineral salt medium (MSM), a nutrients solution and using the insecticide as the only carbon source was employed. Subsequently, potential CLP bacteria strains degraders were isolated from the microbial consortium, initially isolated. Biological oxygen demand (BOD) assays were performed with the aim of determining which bacterial strains were capable to biodegrade chlorpyrifos. Once the BOD results were obtained, the samples were analysed by the gas chromatography-mass spectrometry to measure the insecticide concentration present in the solution, after the assay.

Results: A total of 21 bacterial strains were isolated from the enrichment mediums. From these strains, nine of them reached values of 50 mg O2 L-1 in BOD assays. These values were relevant to continue with the analysis of the solution from the samples in the gas chromatography-mass spectrometry. The degradation studies with gas chromatography-mass spectrometry where the concentration of supernatants from the BOD assays were analysed with the 197-ion extraction, indicated that R13A strain was able to degrade 70% of chlorpyrifos within 384 hours.

Conclusions: In the present work, the effect of microbial population in the treatment of a soil that had received continuous applications of chlorpyrifos was determined. The R13A strain isolated from soil has shown promising results in the preliminary assays of biodegradation. However, future studies of biodegradation and mineralisation are necessary to further the knowledge about R13A and its ability to

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