

Isolation of Profenofos Degrading Bacteria from Surface Water in Badulla District, Sri Lanka

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Environmental remediation has been used to solve environmental pollution problems effectively and efficiently. Microorganisms can be used in bioremediation processes to remove residual pesticides from the ecosystems. Pesticides have been widely used in agriculture to produce high-yielding, genetically improved crops, in order to achieve the zero hunger goal. However, pesticides indirectly pollute the natural water bodies due to the presence of pesticide residues, and such contaminated water has resulted in acute and chronic health effects. Therefore, this study aimed to find pesticide bioremediation bacteria that are regionally appropriate. In the study, 23 bacterial isolates (isolate 01 to isolate 23) were isolated from collected surface water samples, after being enriched for five days. The tolerance capacity of profenofos was then examined in all bacterial isolates resulting with optimal levels for four isolates (isolate 01, 03, 13, and 18), which were chosen for further investigation. Their pesticide degradation capability at 5-day intervals was determined using GC-MS, while the pesticide resistivity was determined using, a plate count. The results showed that the tolerance capacity of all isolates are not the same. According to the ANOVA followed by the Post Hoc Test, bacterial isolate 03 had a significantly high ability to break down profenofos (45.40% rate within the first 10 days of the study), while isolates 01, 03, 13, and 18 were able to withstand pesticides for 20 days in M9 minimal salt medium (MSM), isolates 01, 13, and 18 were unable to display a deterioration pattern. According to the results, isolate 03 is capable of decomposing profenofos at a high rate, while other isolates are only resistant to the pesticide.

Keywords: Bacteria in Water, Bioremediation, Gas Chromatography-Mass Spectrometry (GC-MS), Profenofos