Bioremediation of Diesel Oil Contamination Using Bacillus Found in Palm Oil Sludge

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Bioremediation is an emerging technology for treatment of soil and water contaminations. This study aims to demonstrate bioremediation of diesel oil contaminated mangrove soil using bacteria isolated from palm oil sludge. Reduction of Polycyclic Aromatic Hydrocarbon (PAH) and Total Petroleum Hydrocarbon (TPH) components of diesel oil was tested on contaminated soil planted with mangroves and mangrove associates (Tomato seedlings, Anuang, Yellow-nut Sedge). Two hundred forty (240) Bacilli were isolated from palm oil sludge and were screened for lipolytic activity. Only 82 isolates were positive in lipase and screened for biosurfactant activity. Based on screening results, five Bacillus isolates were selected for PAH and TPH degradation tests. To simulate oil pollution, mangrove soil was mixed with diesel oil at 25g/kg concentration. Experimental set-ups were inoculated with selected isolates while negative control set-up was untreated. After two weeks, the samples were analyzed using Gas Chromatography-Mass Spectrometry (GC-MS) for PAH and TPH reduction. For toxicity reduction assay, test plants were planted in diesel oil-amended soil. Diesel oil toxicity was indicated by mortality of the plants. Results show that the selected isolates reduce toxicity of polluted soil. In mangrove seedlings, Xylocarpus granatum lost their leaves after one week treatment but those inoculated with Bacilli sp. (specimen Bacillus172) survived with new buds four weeks later. GC-MS analysis showed that Bacillus172 reduced PAH and TPH components of diesel in the soil, compared with control. Hence, this specimen is a potential bioremediator for diesel oil pollution.

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