

Aerated Static Pile (ASP)-Enhanced Bioaugmentation of Oil Sludge Contaminated Soil using LIBeM Consortium

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This paper focused on efficiency of selective locally isolated beneficial microorganisms (LIBeM) consortium in bioaugmentation of oil sludge contaminated soil in a laboratory scale. Five different selective microbial consortiums LIBeM were obtained from Environmental Microbiology Laboratory, Universiti Malaysia Sabah. The arrangement of aerated static pile (ASP)-bioreactor made up of acrylic materials dimension (60cmx40cmx20cm) was developed with three silicone tubing's connected to air pump (Model RESUN lp100 Low Noise Air Pump) act as continuous aeration to the soil. Six different sets treatment containing 10 kg of soil mixed with 20% (v/v) oil sludge were denoted as Consortium 1 (*P. aeruginosa* BAS-Cr1 + *S. paucimobilis* ReTOS-Cr1 + *S. maltophilia* RAS-Cr1), Consortium 2 (*C. tropicalis* RETL-Cr1 + *C. violaceum* MAB-Cr1 + *S. maltophilia* RAS-Cr1), Consortium 3 (*C. tropicalis* RETL-Cr1 + *S. maltophilia* RAS-Cr1 + *P. aeruginosa* BAS-Cr1), Consortium 4 (*C. tropicalis* RETL-Cr1 + *C. violaceum* MAB-Cr1 + *P. aeruginosa* BAS-Cr1) consisted with three bacterial strains whereas Consortium 5 (ReTOS-Cr1 + BAS-Cr + RAS-Cr1 + RETL-Cr1 + MAB-Cr1) with five bacterial strains and Control plot (Natural attenuation) consisted of indigenous microbial in the soil as a control plot. The rates of biodegradation of oil sludge were studied for a period of three months and periodic sampling of soil from each bioreactor was carried out at 7 days of interval. Analysis of Total Petroleum Hydrocarbon (TPH) was done along with physiochemical parameters such as pH, moisture content and microbial population (CFUs) in the soil. The results obtained revealed biodegradation of oil sludge contaminated soil in all set treatments were much higher than Control plot (NA) by 12.1 fold. The bioreactor augmented with Consortium 4 proved to be a better performance with 94% of TPH removal followed by Consortium 2 (91.6%), Consortium 5 (90.1%), Consortium 1 (90%), Consortium 3 (87.5%) and Control plot (27.4%) respectively. The variations of physiochemical parameters that influence the reduction of oil sludge in the soil were also discussed in this paper. It was noted that, the continuous supplied of oxygen from aerated static pile (ASP) into the soil showed a good prospects in bioremediation of oil sludge.

Keyword: Bioremediation, Oil sludge, Microbial Consortium, Aerated Static Pile (ASP), LIBeM

Biography:

Dr. Piakong Mohd. Tuah completed her PhD at UTM, Skudai Malaysia in Bioremediation. He completed his MSc. Environmental Biotechnology in Bristol, England in 1997. Now he is working as a Associate Professor at Faculty of Science & Natural Resources, Universiti Malaysia Sabah (UMS) Sabah, Malaysia. From 1981-Jan 1998 he worked as Environmental Health Officer, Ministry of Health Malaysia stationed at Health Office, Kota Belud, Kota Kinabalu, Semporna and Tawau, Sabah assigned to various units: Food Quality Control, Communicable Disease Control, Rural Environmental Sanitation Programme, General Health (includes International Health). Other responsibilities were to perform duties as a Prosecuting Officer under the Food Act 1983 and other respective public health laws in Malaysia. Recipient of the TCP (Technical Co-operation Programme) Scholarship 1993, British Government, U.K. Passed Malaysia Government Laws Examination in 1989.