424/D

Isolation of aromatic hydrocarbon degrading phyllosphere bacteria

L J S Undugoda, S Kannangara* and D M Sirisena
Department of Botany, Faculty of Science, University of Kelaniya, Kelaniya

Polyaromatic hydrocarbons (PAH) and aromatic hydrocarbons (AH) are major types of environmental pollutants, which are released into ambient air due to vehicular emission and industrial processes. Phyllosphere microorganisms can degrade those chemicals after wet and dry deposition onto the leaves, through a mechanism, which can be used in bioremediation of these pollutants. The present study was carried out to investigate the presence of AH and PAH degrading bacteria on the phyllosphere of *Ixora* sp., *Amaranthus* sp., *Hibiscus* sp. and *Ervatamia* sp. which are common on road sides close to oil refineries and in urban areas having a high level of vehicular emission.

Leaf samples of the four selected plant species were collected from five areas, namely Kolonnawa, Sapugaskanda, Orugodawatta, Panchikawatta and Maradana. Initial bacterial isolation was carried out according to pour plate method using modified mineral salt (MS) medium. The PAH and AH degradation ability was evaluated by plate assays and spectrophotometric analysis using phenanthrene, naphthalene, xylene and toluene as the sole source of carbon in the medium. The best bacterial degraders were selected for further identification and characterization.

Leaf washings had PAH and AH degrading bacterial strains, ranging from 2×10^6 to 8×10^9 cfu/ml. The highest number of phyllosphere bacteria capable of degrading AH and PAH was isolated from *Ixora* sp. and the least number from *Amaranthus* sp. Plate assays and spectrometric analysis revealed that many phyllosphere bacteria could degrade naphthalene more efficiently compared to the other tested hydrocarbons. Xylene degradation ability of the tested bacteria was significantly higher ($p < 0.05$), compared to their toluene degrading ability. The significantly higher values for degradation of naphthalene phenanthrene, xylene and toluene were obtained with two *Pseudomonas* spp. They were able to degrade more than 90% of naphthalene and phenanthrene. Values obtained for xylene and toluene degradation with these two spp. were more than 64% and 40% respectively. In addition, *Paracoccus* sp., *Klebsiella* sp., and *Alcaligenes* sp. showed a relatively high AH degradation ability.

While traditional chemical and physical remediation techniques are currently becoming less effective from an environmental and economical point of view, there is an increasing interest in bioremediation. Hence, bacterial degraders such as *Pseudomonas* spp. isolated in this study can be used for effective bioremediation strategies. Their ability to degrade PAH and AH while surviving under environmental stress make them suitable candidates for bioremediation.

Keywords: Bioremediation, phyllosphere, poly aromatic hydrocarbon.

sagarikadpk@kln.ac.lk Tel: 071 4458395