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Aromatic Hydrocarbon Degrading Phyllosphere Fungi

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Abstract

Ambient air contains high amounts of potentially genotoxic and carcinogenic aromatic hydrocarbons (AH) that originate from the petroleum related activities and coal refining processes. The potential of phyllosphere organisms to oxidize these compounds into nontoxic forms has been investigated in some recent studies. This study was carried out to investigate the presence of aromatic hydrocarbon degrading fungi in the phyllosphere of *Ixora* sp., *Amaranth* sp., *Hibiscus* sp. and Ervatamia sp. which are common on roadsides close to the oil refinery at Sapugaskanda and in several urban areas having high level of vehicular emission. Their ability to degrade the AHs phenanthrene, naphthalene, xylene and toluene was investigated.

Leaf samples of the four plant species were collected from five areas namely Kollonnawa, Sapugaskanda, Orugodawattha, Panchikawattha and Maradana. Then Phyllosphere fungi were isolated into pure cultures on Czapek-Dox medium using pour plate method and identified up to the genus level. Plate assays and spectrophotometric analysis were used to evaluate phenanthrene, naphthalene, xylene and toluene degradation ability of them as the sole source of carbon. The best fungal AH degraders were selected for further characterization and identification.

Isolated phyllosphere fungi, *Penicillium* spp, *Aspergillus* spp and *Trichoderma* spp were able to degrade phenanthrene, naphthalene, toluene and xylene. *Penicillium janthinellum* was found to be the most effective in degrading naphthalene and phenanthrene with 98.85% and 84.83% efficiency respectively. Moreover, *Aspergillus niger* has the highest toluene degradation ability. The best xylene degrader: *Aspergillus flavus*, utilised 57.35% of xylene in the medium. Initial experiments indicated that the highest degradation of aromatic hydrocarbons occurs after seven days. Therefore, in all these experiments, isolated fungal spp. were incubated for seven days in media supplemented with aromatic hydrocarbons.

While traditional chemical and physical remediation techniques are currently becoming less effective from environmental and economical point of view, there is an increasing interest in bioremediation. According to the finding of the present investigation *Penicillium* spp. and *Aspergillus* spp. are having the potential to be used in effective bioremediation strategies in the removal of AH. Their ability to degrade these compounds while surviving under environmental stresses makes them suitable candidates for bioremediation.

Keywords: Bioremediation, Fungi, Phyllosphere, Polyaromatic hydrocarbon