

Aromatic hydrocarbon degrading phyllosphere microorganisms

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Pyrogenic nature of the most recalcitrant aromatic hydrocarbons elevates their persistency in the environment and rapid bioaccumulation in living organisms. Therefore, air pollution by aromatic hydrocarbons is one of the current concerns. It has been shown that utilization of phyllosphere microorganisms as bioremediators is an efficient means of remediating these air pollutants.

This study was carried out to isolate aromatic hydrocarbon degrading phyllosphere fungi and bacteria from selected plants; *Ixora* sp., *Hibiscus* sp., *Ervatamia* sp., and *Amaranth* sp., which are highly abundant in roadsides around the oil refinery at Sapugaskanda and high traffic areas. Phenanthrene, naphthalene, xylene and toluene degradation ability of the isolated bacteria and fungi was then examined using plate assays and spectrophotometric analysis. The best degraders were selected for further identification and characterization.

Phenanthrene, naphthalene, toluene and xylene utilization rates of identified phyllosphere fungi; *Penicillium* sp. *Aspergillus* sp. and *Trichoderma* sp. were comparatively higher than that of isolated phyllosphere bacterial species; *Pseudomonas* sp., *Paracoccus* sp., *Klebsiella* sp. and *Alcaligenes* sp. *Penicillium janthinellum* utilized more than 90% of polyaromatic hydrocarbons in the medium during seven days' incubation, but *Pseudomonas* sp. required 14 days of incubation to achieve that level. Moreover, the best toluene degrader *Aspergillus niger* degraded toluene very efficiently compared to *Pseudomonas* sp. The best xylene degrader *Aspergillus flavus* utilized only 57.35% of xylene in the medium in seven days, but 90% degradation was observed in 14 days. Therefore, xylene degradation ability of fungi was comparatively less but significantly higher than that of bacteria.

Bioremediation is a very economically and environmentally friendly strategy used in cleaning of AH contaminated sites. According to the results, *Penicillium* spp. and *Aspergillus* spp. could be considered as the best fungal candidates for bioremediation. *Pseudomonas* sp. was able to degrade all tested AHs at relatively high efficiencies. Therefore, it can be considered as a general AH degrader. Therefore, ability of these microorganisms to degrade AH while surviving under environmental stress makes them very suitable candidates for bioremediation.

Keywords: Phyllosphere, Fungi, Bacteria, Bioremediation, Aromatic Hydrocarbon