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Moss endophytes and polyaromatic hydrocarbon degradation

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Polyaromatic hydrocarbons (PAHs), coming from many urbanization and industrialization processes are known to be toxic, carcinogenic and mutagenic. Bioremediation using endophytic fungi has been a novel attempt to remove PAH in an environmental friendly manner. In this study, an attempt was made to isolate and identify endophytic fungi from the *Macromitrium* sp. and to investigate their ability to degrade phenanthrene and naphthalene. Samples of healthy *Macromitrium* sp. were collected from the Sapugaskanda area (highly polluted) and Hettimulla area (minimally polluted). Moss samples were surface sterilized and endophytic fungi growing from these were isolated onto malt extract agar. Percentage frequency of occurrence was obtained from isolated colonies after identification up to the genus level. Using plate assay and spectrophotometric assay, ability to utilize PAHs and percentage degradation of PAHs on Bacto Bushnell-Haas media and broth, were measured respectively. The results were then analyzed using ANOVA (one way) and Tukey's pair-wise comparisons. Then genomic profiles of each fungus were obtained. Out of 36 and 21 endophytic fungi, from Sapugaskanda and Hettimulla samples, *Eupenicillium* sp1 (highest frequency of occurrence) and sp2, Aspergillus sp1, *Penicillium* sp4, *Rhizopus* and a white sterile sp. were common to both sites. From the Sapugaskanda sample, *Mortierella, Nigrospora, Aspergillus* sp1 and *Penicillium* sp5 showed high growth in PAHs incorporated media. In the spectrophotometric assay, 12 and 7 endophytic fungal isolates (several *Penicillium* sp, *Aspergillus* sp. and *Nigrospora* sp.) of the Sapugaskanda sample showed naphthalene and phenanthrene degradation of over 90%. In contrast to that, almost all from the Hettimulla sample showed significantly lower colony diameter and PAH degradation percentages indicating that some fungal strains from the Sapugaskanda sample have a significantly higher potential to utilize PAHs due to some differences in genomes. Checking of genomic profiles was unsuccessful due to unfavorable genomic digestion. Considering all, it can be concluded that endophytic fungi in *Macromitrium* moss in the more polluted Sapugaskanda area have significantly higher PAH degradation capability than that of the less polluted Hettimulla area, indicating their potential to be used in further studies for the improvement of novel bioremediation processes.

Keywords: Polyaromatic Hydrocarbons (PAHs), bioremediation, *Macromitrium* sp. endophytic fungi

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