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# Mycoremediation Approach to Green Air: Phenanthrene and Anthracene Degrading Ability by *Fusarium solani* Isolate $P_{11}$M-46

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## Abstract

There are many health issues associated with air pollution that are rapidly increasing with time across the globe. Among many air pollutants, polycyclic aromatic hydrocarbons (PAHs) are of particular concern because of their carcinogenicity, genotoxicity, and long persistence in the environment. The majority of these PAHs release into the air through anthropogenic activities and natural sources. After releasing into the air, PAHs usually return to the ground due to their high molecular weight. These hydrocarbon depositions can be categorized as wet or dry depositions. One of the most prominent deposition surfaces of these pollutants is the phyllosphere. Microorganisms such as fungi perform a key role in PAHs elimination through bioremediation processes. Epiphytic fungi such as *Fusarium solani* isolate $P_{11}$M-46 utilizes the deposited phenanthrene and anthracene on the phyllosphere and convert those PAHs in to non-toxic levels. The aim of this study was to evaluate the ability of *F. solani* isolate $P_{11}$M-46 to degrade phenanthrene and anthracene, through a mycoremediation approach. Leaf samples were collected from Panchikawatta, Orugodawatta, Pettah, Maradana, Colombo Fort, and Sapugaskanda urban areas in Sri Lanka. Furthermore, PAH degradation ability of isolated *F. solani* isolate $P_{11}$M-46 was confirmed through High Performance Liquid Chromatography (HPLC). The effects of by-products produced from the biodegradation process on living beings were evaluated using *Artemia salina* and the by-products were identified using Gas Chromatography and Mass Spectrometry (GCMS). According to HPLC results, *F. solani* isolate $P_{11}$M-46 showed 68% of degradation percentage in phenanthrene while exhibiting 76% degradation in anthracene within 6 days. The GCMS analysis confirmed that the by-products were Phenol, 2-(phenylmethyl) from phenanthrene and 9, 10-anthracenedione from anthracene. Toxicity assay with *A. salina* confirmed that these byproducts were not toxic to the phyllosphere. The findings of the present study revealed the potential use of phyllosphere *F. solani* isolate $P_{11}$M-46 in the remediation of environmental pollutants phenanthrene and anthracene. And also the by-products produced during their degradation mechanism were also confirmed as nontoxic compounds. Therefore, *F. solani* isolate $P_{11}$M-46 could be effectively used in the bioremediation of phenanthrene and anthracene in polluted environments as a bioremediator.

***Keywords:*** Polycyclic aromatic hydrocarbons, Bioremediation, HPLC, GCMS, Toxicity