

## Bacteria-Endophyte Enhanced Phytotreatment of Petroleum Hydrocarbon-Contaminated Soil by *Nicotiana Tabacum*

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**Abstract** - The study entails an isolation of Bacterial endophyte from plant growing around a crude oil sludge dam. Based on morphological characterisation, gram reactions and 16S rDNA sequence analysis, the isolate was identified as *Bacillus sefensis* strain CS4. Following the tests on the abiotic effects as well as the initial concentration of perylene on growth and degradation efficiency of the strain, a total degradation percentage of 87 % was observed from the initial concentration of 30 mg/l for one week. Analysis of the degradation products of perylene using GC-MS/MS, indicated a shift from the previously degradation product of other bacterial endophytes showing that the strain provided a new pathway for PAH degradation. In order to evaluate the influence of a polycyclic hydrocarbon transforming ability of the bacterial strain on the phytoremediation of petroleum aromatic hydrocarbon (PAH), *B sefensis* CS4 was inoculated into *Chromolaena odorata* plants. The plants were grown for 16 weeks with or without PAH (500 mg/kg soil in each 1L pot) in non-sterile peat medium. Plants inoculated with the strain CS4 were much tolerant towards the phytotoxic effects of PAH, in terms of biomass index, leaves and stem dry weight. Although the presence of plants acted as the main effective treatment for PAH dissipation (52–69%), the inoculum with the strain leads to the highest PAH removal (up to 85%). Uninoculated plant control planted in the contaminated soil was susceptible to the phytotoxicity of the contaminants in the parameters tested. The study therefore presented the strain as a suitable plant endophyte for enhanced phytotreatment of PAH.

**Keyword:** Phytoremediation, Bacterial endophytes, Petroleum aromatic hydrocarbons, *Basillus sefensis*, *Chromalaena odorata*.