

# THE EFFECTS OF PAPILIONACEOUS PLANTS AND BIOPREPARATION ON PETROLEUM HYDROCARBONS DEGRADATION IN AGED-POLLUTED SOIL

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Keywords: hydrocarbons biodegradation, papilionaceous plant, bioaugmentation, *Pseudomonas*.

## Summary

Petroleum pollution is still one of crucial environmental problems. Bioaugmentation is a popular technique used in soil remediation. The aim of soil inoculation is acceleration of decomposition processes or improving the degradation efficiency. Effectiveness of bioaugmentation processes depends on the number and activity of microorganisms adapted to pollutant degradation. Enhancement of microorganisms' activity can be reached by the use of plants. Roots of plants excrete organic substances that stimulate microorganisms' growth. Among different species of plants interesting are papilionaceous plants because of their nitrogen fixation ability in symbiosis with bacteria. The effects of using papilionaceous plants (*Trifolium pratense*), multiplied autochthonous microorganisms and commercial biopreparation in aged-petroleum-polluted soil were studied. The samples of soil were taken from the refinery in Czechowice-Dziedzice (Poland) and classified as heavily degraded with a C/N-ratio of 100:0.7. Investigations were conducted for 14 weeks. Microbiological analysis included: total bacteria, fungi, *Actinomycetes* and *Pseudomonas* counts. Concentration of heavy fractions, TPH (total petroleum hydrocarbons) and PAHs (polycyclic aromatic hydrocarbons) were measured at the start and at the end of the experiment. Presence of papilionaceous plant (*Trifolium pratense*) enhanced the growth of microorganisms, nitrogen concentration and biodegradation processes (removal of 63% of TPH, 44% of heavy fractions, 9% of 4-6 aromatic PAH and 80% of 2-3 aromatic PAH) in polluted soil. An increasing number of *Pseudomonas* species was observed in samples in which pollution removal was more effective.