

# PILOT SCALE ECOPIILING OF PETROLEUM HYDROCARBONS AND TRACE ELEMENTS CONTAMINATED SOIL USING *MEDICAGO SATIVA* AND *HELIANTHUS ANNUUS*

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## Abstract

Soil pollution is a major concern and many contaminated sites are tainted with a mixture of organic and inorganic contaminants. This pilot scale study evaluated the application of aided-phytoremediation as sustainable management strategy for the decontamination of petroleum hydrocarbons (PHC) and trace elements (TE) contaminated soil. The treatments were based on the use of alfalfa, (*Medicago sativa*), sunflower (*Helianthus annuus*) and organic matter (compost) in the constructed Ecopile (1.5 m<sup>2</sup> x 70 cm height). Total TE and PHC concentrations in soil, TE concentration in root and shoot plants were analyzed at the end of the first growth season (5 months).

The main soil contaminants were PHC (alkanes and polycyclic aromatic hydrocarbons (PAHs)), cobalt, copper, lead, mercury, zinc and barium. At the end of the 5-months experiment duration, PH C10-C40, PAH-L, PAH-M, PAH-H, Pb and Cu concentrations in Ecopile planted with *M. sativa* were significantly reduced as compared to the unplanted treatment. *M. sativa* co-planting with *H. annuus* did not affect TE contaminant removal from soil. Moreover, *M. sativa* co-planting with *H. annuus* did not affect PAH (M and H) degradation but had lower treatment performance for PH C10-C40 and PAH-L as compared to the treatment with *M. sativa* in monoculture. Residual risk assessment after the Ecopiling trial showed a positive effect of alfalfa and sunflower on earthworm's development. This study underlined the benefits of the Ecopiling option based on *M. sativa* and *H. annuus* cultivation for remediating PHC and TE contaminated soils.

## Keywords

Aided-phytoremediation; Phytotechnologies; metals; risk assessment, Ecopile.