

TITLE: *Phytoremediation of petroleum contaminated soil using Typha latifolia.*

AUTHOR: Alex Gibellato Pavanelli

ABSTRACT

Petroleum and its derivatives take important place among soil organic contaminants. PAHs (polycyclic aromatic hydrocarbons), present in crude-oil, have been considered health dangerous compounds because of its high toxicity and chemical stability. Many physical, chemical and biological processes are being employed in order to remediate contaminate soil. Phytoremediation is based on using plants and the associated microorganisms to remove pollutants from water and soil and it may be considered a low cost technique set for large areas. The aims of this work were to evaluate the phytoremediation potential of common cattail (*Typha latifolia*) in crude-oil contaminated soil, regarding the degradation of both aromatic fraction (PAHs) and total petroleum hydrocarbons (TPH), and the oil interference on plant nutrient absorption. Besides, in this work was accomplished an investigation on soil ion exchange capacity as function of different oil contamination levels. It were carried out synchronous fluorescence spectroscopy analysis in soil extracts, gas chromatography (GC-FID) for PAH quantifying and TPH estimation, soil pH measurements and plant leaf chemical analysis (macro and micronutrients). For the contaminated soil ion exchange investigation it was carried out soil macro and micronutrient and aluminum quantitative analysis, and pH measurements. Fluorescence and gas chromatography results showed that cattail contributed for soil remediation. The aromatic fraction degradation by plant decreased 33% of oil fluorescence after 120 days, with no difference for the fertilizaed soil. Cattail cultivation decreased 49% the relative concentration of benzo(a)anthracene and 21% of benzo(b)fluoranthene. For fluoranthene, 64% was removed in vegetated soil against 19% in non vegetated soil. Fluorene wasn't detected anymore after 120 days in cultivated soil. TPH degradation was 74% in vegetated soil against 35% in non vegetated soil. Nutrient plant tissue data indicated that was no interference of soil contamination on plant nutrient absorption. The experiments concerning the oil interference on soil ion exchange showed that increasing contaminant diminishes the readiness for Ca, K and Cu, but it also causes decreasing on Al (toxic) readiness. Despite the constataion of petroleum contaminated soil phytoremediation by cattail, it was not possible to define if these compounds were degraded in rhizosphere or uptaken by plant.

Keywords: phytoremediation; petroleum; PAHs; TPH; *Typha* sp.; leaf tissue analysis; soil fertility.