

Remediation of Soils Contaminated with Naphthalene Using Bermuda grass and Tall Fescue Species

Mohsen Soleimani¹, M.A. Hajabbasi² and A.H. Charkhabi³

1- Department of Soil Science, College of Agriculture, Isfahan University of Technology, Isfahan, Iran. Phone: +98-311-3871878 Email: soleimani57@yahoo.com, 2- Department of Soil Science, College of Agriculture, Isfahan University of Technology, Isfahan, Iran. Phone: +98-311-3913477 Email: hajabbas@cc.iut.ac.ir; 3- Soil Conservation and Watershed Management Center, Tehran, Iran, Phone: +98-21-4901894-Email:charkhabi@yahoo.com

Abstract

Nowadays, environmental pollution is an important issue everywhere in the world. Increase of population, expansion of cities and human interface of nature, resulted in air, water and soil pollution. Soil pollution with petroleum hydrocarbons as a critical problem for environment has been under consideration since 1980. Shadegan wetland is an important ecosystem in South of Iran polluted with petroleum hydrocarbons and heavy metals due to burnt oil wells. Phytoremediation is one of the new methods for cleaning the polluted areas. In this method the pollution of water, soil and sediments decrease or eliminate by growing plants. This research carried out for recognizing of some species which can remediate soil contaminated with Naphthalene, a polycyclic aromatic hydrocarbon (PAH). The study was conducted in greenhouse at College of Agriculture, Isfahan University of Technology using a statistical randomized complete block design in form of factorial experiment with three replications. Soil samples were taken from 0-30 cm depths of two points from Shadegan wetland. The pollution in one point caused by oil leakage from transporting pipes (point source), and the pollution in the other point was from atmospheric deposition(nonpoint source). The species used in this research were Bermuda grass (*Cynodon dactylon*) and tall fescue (*Festuca arundinacea*). Soils were contaminated to study plant ability for remediation. The amounts of naphthalene added to soil were 75 and 150 mg/kg. The plants were grown in polluted soils for 8 weeks. The soil naphthalene extracted with soxhlet method and analyzed with HPLC. The amount of naphthalene in plant samples were analyzed with GC. Growing the plants in soil increased the degradation of naphthalene, over the control. Tall fescue showed a better ability than

Bermuda grass in some treatments. The high biomass of roots in this plant may caused the more degradation of naphthalene in the rhizosphere. Increase the concentration of naphthalene in soil decreased the degradation in all treatments and more time was needed for cleaning of these soils. The soil type also affected the degradation of naphthalene. The amounts of naphthalene uptake by Bermuda grass and tall fescue were lower than one milligram per kilogram dry weight. This could be due to the low concentration of these compounds in the rhizosphere. The growth of plants in longer periods recommended for better understanding phytoremediation of soil contaminated with naphthalene.