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Effect of Petroleum Pollution on Soil Water Repellency and Structural Stability in Bakhtiardasht Plain, Isfahan

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Abstract

Petroleum pollution is an important environmental issue in most countries especially those with an oil industry. To study the effect of petroleum pollution on soil water repellency and its relation to soil structural stability, this study was conducted in Bakhtiardasht area, Isfahan. Polluted and adjacent non-polluted locations were selected to be representative in the green space around the Isfahan Oil Refinery. Soil water repellency was assessed using water drop penetration time (WDPT) in the polluted locations. Soil samples with the least aggregate disturbance were collected and their physical and chemical properties were measured. Soil structural stability was evaluated using the wet-sieving method and mechanically dispersible clay (MDC); structural stability indices of mean weight diameter (MWD) and geometric weight diameter (GMD) of aggregates and MDC were then calculated. Results showed that the positive effect of petroleum pollution on the MWD and GMD was significant. Negative impact of petroleum pollution on MDC was also significant. Increment of total petroleum hydrocarbons (TPHs) increased soil water repellency. A positive correlation was observed between water repellency and GMD in the soil. Although greater soil water repellency increased MWD and GMD and decreased MDC in the polluted locations compared with control locations, the diminished water retention of polluted soil created an unfavorable condition for the green space in the area.

Keywords: Petroleum pollution, Water drop penetration time, Soil structural stability, Wet sieving, Water repellency.

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