

Heavy metals contamination of municipal effluent on soils urban area

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Abstract:

Treated wastewater is an available water resource, especially in arid areas. Use of sewage sludge as a fertilizer has become prevalent in agricultural lands. However, trace or heavy metals present in sludge and municipal effluent pose the risk of human or phytotoxicity from land application. This study designed and implemented to investigate heavy metals accumulation in urban soils of south of Tehran under municipal effluent irrigation and sludge application. The large city of Tehran in Iran produces about 2 millions m³/day of wastewater, which is planned the effluent and sludge from treatment plants is going to be used for the irrigation of crops in more than one hundred thousands hectares of agricultural lands in the south of Tehran. For this purpose soil samples were taken from two parts, the area under sewage sludge application for more than 10 years and also soil samples from an area under water pipe irrigation in different depth. Some soil characteristics such as texture, pH, CEC, Percent organic matter and percent CaCO₃ were determined. Total heavy metals concentration Pb, Cd, Ni, Cu, Zn in the soil samples were obtained by determining metal concentration in a 4 N HNO₃ extract (70 °C) by atomic absorption spectrometry. Result showed For polluted soil samples average concentrations of Pb, Zn, Cu, Ni, and Cd respectively, were: 25.5, 10.2, 5.5, 4.8, 0.91 mg/kg 0-30 depth and for soil samples pipe water irrigation average concentrations in order 8.5, 2.8, 1.9, 0.50, 0.4 mg/kg. Concentrations of heavy metals for 0-30 cm depth in sewage-irrigated soils as compared to pipe water irrigated ones showed there was significant variation in concentrations in two sources of irrigation water and metal content in soil. Average concentrations of heavy metals in 30-50 depth for sewage-irrigated soils, Pb, Zn, Cu, Ni and Cd, were 11.5, 8.5, 4.5, 3.5, 0.08 and for pipe water irrigated ones, 3.2, 2.8, 1.7, 0.2, 0.05. It can be concluded urban soils would be polluted because of sewage sludge application. Sewage- irrigated soils needs to be monitored periodically in view of their significant accumulation of heavy metals. Accumulation of dreaded metals in soils like Pb, Cd and Ni affect on human health and plants can be unsafe to consume by human.

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