



Effect of sewage sludge on mercury accumulation in soil and corn

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Sewage sludge application on farmland as fertilizer is commonly practiced in many countries. Sewage sludge is rich in plant nutrients. However, high concentration of heavy metals like mercury (Hg) in sludge can cause pollution of soil, groundwater and human food chain. The objective of this study was to determine the effect of sewage sludge on concentration of mercury in soil and corn. In order to examine the risk of Hg transfer into plants arising from this practice under the farming conditions of central Iran, a five year field experiment was conducted in which we investigated uptake of Hg from a sludge-amended soil (fine loamy, mixed thermic Typic Haplarigid) by corn (*Zea mays*). Sludge application rates were 0, 25, 50 and 100 Mg ha⁻¹. To study cumulative and residual effects of the sewage sludge, applications were repeated on 4/5 of each plot in second year, on 3/5 of plots in third year, on 2/5 of plots in fourth year and in 1/5 of plots in fifth year. Thus, total sludge amounts applied were 0, 25, 50, and 100, in plots with one applications, 0, 50, 100, and 200 Mg ha⁻¹, in plots with two applications 0, 75, 150, and 300 Mg ha⁻¹, in plots with three applications, 0, 100, 200, and 400 Mg ha⁻¹ in plots with four applications and 0, 100, 250, and 500 Mg ha⁻¹ with five years applications. After the fifth year, soil samples from the 0-20 and 20-40 cm depths of the different parts of the plots were taken and analyzed for total Hg. Corn plants were harvested and roots, stems and grains were separately analyzed for Hg concentrations. Sludge application significantly increased total Hg concentration in the soil at both depths. Total Hg concentration in soil ranged from 20 µg kg⁻¹ (in control plots) to 1100 µg kg⁻¹ (in plots with 500 Mg ha⁻¹ sludge application). Sludge application significantly increased uptake of Hg in different plant parts. The order of Hg in different plant tissues were 91, 9 and 8 µg kg⁻¹ in root, stem and grain, respectively.

Keywords: Mercury, Sewage sludge, Soil, Corn.