

Effects of Tabriz petrochemicals' biological sludge on heavy metals concentration in soil and spring barley in greenhouse conditions

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Abstract

Utilizing sewage sludge as a source of cheap fertilizer and rich in nutrients is common in some parts of Iran. But, too much application causes accumulation of heavy metals in soil, which results in soil pollution and transfer of this pollution to food chain and endangers human and animal health. The aim of this research was to investigate the effect of biological sludge of Tabriz petrochemicals complex on some heavy metals concentration in spring barley grown in a calcareous soil after 6 months of incubation. The experiment was conducted in greenhouse conditions with 5 levels of 0 (control), 25, 50, 75 and 100 ton/ha sewage sludge, in three replications, based on complete randomized blocks design. Soil analysis showed that application of biological sludge significantly increased DTPA extractable Fe, Zn, Mn, Cu and Cd (except 25 ton/ha treatment) compared to the control. The results of plant analysis showed an increase of Fe, Zn and Mn in shoots and Zn and Mn in roots, compared to the control. But elevation of root Fe content was not significant. The amount of Cu and Cd in shoots and roots was below the detection limit of the instrument. Overall, it was concluded that although the application of biological sludge increased the content of heavy metals in soil, but its effect on concentration of toxic elements, such as Cd, in plants was not significant.

Keywords: Petrochemical sludge, Heavy metals, Calcareous soil, Spring barley.

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