Influence of coal fly ash application on trace element mobility and distribution in soil, plant and leachate

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ABSTRACT

The impact of soil application of four chemically different fly ashes was investigated using 1 m long “intact soil cores” collected from two major agricultural soils in Australia. Fly ashes were applied at rates equivalent to 0, 12, 36 and 108 Mg/ha, and mixed into top 10 cm of the soil. Canola (*Brassica napus*) was grown and its growth and yield were assessed, while any leachate from the cores were periodically collected and chemically analysed. At the end of the trial, the intact soil cores were sectioned at 0-10, 10-20, 20-40, 40-60, 60-90 cm soil depths and analyzed for pH, EC and trace elements.

Application of fly ash increased above-ground biomass by up to 25 % for some ashes, but reduced it in others possibly due to salinity. Canola grown at high rates of fly ash had elevated concentrations of Se, B and Mo in their shoots. Regardless of ash rates, seed concentrations of Se, B and Mo ranged from 0.10-0.53, 9.0-17.0, 0.54-1.81 mg/kg respectively. Concentrations of all trace elements in leachates were generally below the detection limits. This study suggests that fly ash has the potential to increase plant growth without any detrimental effects on soil or groundwater.

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