

ABSTRACT

Cadmium accumulation in potato tuber cultivated in soils with naturally elevated Cadmium levels

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Cadmium (Cd) an environmentally and biologically toxic heavy metal has been found in Jamaican soils at naturally elevated levels. Plants uptake bioavailable Cd from these soils and accumulates it in their organs. The bioavailability of Cd in the soil is dependent on several soil factors. In this study, Cd concentration in potato tubers and soil along with the soil factors, pH, electric conductivity (EC), cation exchange capacity (CEC) organic matter, texture and zinc concentration were measured. Samples were collected from potato farms located in the parishes of St Elizabeth, Manchester and Trelawney. The highest levels of Cd in the soils were 62.28 and 40.85 ± 18.24 mg/kg for the parishes of Manchester and St Elizabeth, respectively. The Cd concentration in potato tubers in the parishes of Manchester, St Elizabeth and Trelawney were 0.22, 0.16 and 0.02 ± 0.09 mg/kg, respectively. In 50 % of the samples, the levels of Cd exceeded the World Health Organization (WHO) recommended limit of 0.1 mg/kg for peeled potato. Using Path Analysis (PA), the dominant factor influencing the bioaccumulation of Cd in potato tuber was found to be the zinc concentration in the soil. Soils with higher zinc concentration had a lower Cd bioaccumulation by tuber. Health risk calculations using a Risk Characterization Ratio (RCR) and a Critical Threshold (CT) suggested that Cd concentration in 45 % of the potato tuber samples poses health risk to humans.

Keywords: Da-Vaugh Jovian Sanderson; bioaccumulation; cadmium; soil; potato