Reduction of Toxic Levels of Cadmium Uptake in Tomato Roots and Shoots

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In this study, a graphite atomizer, flame ionization atomic adsorption analysis, Inductively couple plasma spectrometry and cation inhibition were used for determination of the uptake of cadmium by tomato plants roots and shoots and tomato seeds. It was also confirmed that this translates to high cadmium readings in ketchup. Analytically significant data was obtained yielding part per million concentrations of cadmium in roots and shoots in cadmium rich environments, cadmium starved situations and zinc saturated soils as well as cadmium presence in ketchup. The variation of Cd uptake under each condition was determined and evaluated to determine true inhibition methods. The results obtained validated that tomato seeds uptake significant amounts of cadmium in cadmium rich soils. It was validated that in the presence of Zinc, cadmium uptake was reduced over 75%. Possible scenarios for cadmium contamination utilizing JECFA, OSHA, EPA and Consumer Report literature research and Sustainability footprint analysis are proposed to be a result of fertilizer products used in tomato vines or contaminated soil. Cadmium research confirms that microgram/liter ingestion levels of cadmium cause significant health effects including: lung and prostate cancer, irreversible kidney disease, bone and immune system impacts and poor cardiovascular system functionality. This study confirms that cadmium uptake can be blocked with Zinc additions but future studies could include further isolation of the metallothionein protein. This protein is thought to be the main conductor of cadmium within the tomato roots and shoots.

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