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Application of biosolids to agricultural land provides valuable nutrients and organic matter and represents an essential pathway for rural-urban nutrient cycling. Biosolids have been found to contain pharmaceuticals and personal care products (PPCPs) as a result of their production at wastewater treatment facilities. A number of studies have shown that plants can take up PPCPs when grown in biosolids-amended soil. However, data on PPCPs residues in the tissue of plants grown in biosolids-amended soil is limited. The current study evaluates the ability of two models, specifically designed to estimate the uptake of chemicals from biosolids-amended soils into plants, to estimate human exposure to PPCPs. Utility of the Biosolids-amended Soil Level IV (BASL4) model and the Dynamic Plant Uptake (DPU) model was assessed by comparing concentrations in tissue predicted by the two models to experimentally determined concentrations reported in literature. A number of different environmentally relevant biosolids amendment scenarios were modeled to estimate the range of concentrations that could be present in the edible portion of plants. Concentrations of PCPPs predicted by the models were used to calculate estimated daily intake values. Hazard quotients for each PCPP were determined by comparing estimated daily intake values with acceptable daily intake values. Estimated concentrations of PPCPs residues generated by the BASL4 model were one to two orders of magnitude greater than concentrations predicted by the DPU model and concentrations reported in literature. Consequently, concentrations of PPCPs predicted by the BASL4 model resulted in an over-estimate of the potential hazard. For example, hazard quotients for triclocarban calculated based on concentrations estimated from the BASL4 model ranged from 0.77 to 6. The range of concentrations predicted by the DPU model contained the majority of experimentally determined concentrations reported in literature, which resulted in a more accurate hazard assessment. Hazard quotients calculated for triclocarban based on estimates from the DPU model ranged from 0.000000089 to 0.068, while hazard quotients based on experimental data ranged from 0.000013 to 0.065. The DPU model was shown to be an effective tool for predicting environmental relevant concentrations of PCPPs in plants grown in biosolids-amended soil and, therefore, in characterizing potential exposure to humans through the consumption of plants.