



Heavy metal contamination of food baskets in an area having long term uses of treated and untreated sewage water for irrigation

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Agricultural fields of peri-urban area are often irrigated by treated and untreated industrial effluents due to scarcity of clean irrigation water. Large scale production of perishable vegetables is done in periurban area for local marketing. A year long study was conducted in the Dinapur area of Varanasi, India where treated and untreated sewage water from the Dinapur Sewage Treatment Plant is used for irrigation, to study food basket contamination. Samples were collected at monthly interval from 3/2005-2/2006. Samples of soil, irrigation water, vegetables (palak, amaranthus, cabbage, cauliflower, brinjal, tomato, lady's finger, bottle gourd, sponge gourd, bitter gourd, pointed gourd, pumpkin, radish and wheat) were collected from both contaminated (DC) and uncontaminated (DU) sites having use of wastewater and clean water for irrigation respectively. Samples were analyzed for Cd, Cu, Pb, Zn, Cr and Ni concentrations. Levels of all the heavy metals in soil, irrigation water and vegetable samples were significantly higher at contaminated (DC) compared to uncontaminated (DU) sites having clean water irrigation. Concentrations of all the heavy metals were below the permissible limit in both soil and irrigation water samples; however, Cd, Pb and Ni concentrations were above the safe limits of Indian standard in all vegetables. Heavy metal concentrations also varied among the vegetables: Cd was highest in cabbage (9.20 mg/kg), Pb highest in cauliflower (25.98 mg/kg) and Ni highest in brinjal (20.94 mg/kg). The difference in heavy metal accumulation in vegetables may also be due to the difference in their morpho-physiological characteristics. The study concludes that the long term irrigation by wastewater increased the heavy metal contamination in food basket, which may have serious consequences for human health.