



Waste water irrigation and heavy metal contamination in peri-urban India

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This paper describes preliminary results of an ongoing study to assess the impacts of wastewater irrigation on heavy metal contamination of crops grown in the peri-urban areas of Varanasi in the northern gangetic plains of India.

The practice of wastewater irrigation is widely adopted by resource poor farmers, but the potential health risks are often overlooked. Wastewater is often contaminated with industrial effluent that contains high levels of heavy metals. Dietary intake of heavy metals is a substantial risk to the health of families who depend upon the use of contaminated irrigation water to grow crops to meet their food requirements.

The concentration of heavy metals (Cadmium, Chromium, manganese, Zinc, Copper, Nickel, and Lead) in water, soil and crop samples was monitored on a monthly basis from August 2003 to July 2004 at three peri-urban villages (Dinapur, Lohta and Shivpur) where waste water had been regularly used for irrigation for many years. Nine vegetables were monitored for heavy metal concentration (palak (*Beta vulgaris*), radish (*Raphanus satius*), wheat (*Triticum aestivum*), amaranthus, tomato (*Lycopersicon esculentum*), Bhindi (*Abelmoschus esculentus*), brinjal (*Solanum melongena*), and cauliflower (*Brassica oleracea var Botrytis*)). Regular exceedences of EU standards were observed for Cadmium, Zinc and Lead in the majority of crops sampled. In irrigation water the heavy metals cadmium, chromium, manganese and nickel were found to regularly exceed the FAO standards.

These ongoing scientific studies are part of a wider interdisciplinary effort involving affected communities, policy makers and planners. The project seeks to identify technical and institutional means of monitoring and ameliorating the contamination, and its health implications.