“Bioaccumulation of Toxic contaminants in the foods crops grown from the polluted urban runoff : A Qualitative and Quantitative Assessment”

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Agriculture accounts for approximately 70 % of the worldwide water consumption, and the concept of food-water nexus has dominated the top seat at the global agenda. Today, the bioaccumulation of new emerging contaminants in the available irrigation water, and the awareness of their possible health implications, has received aesthetic concern from the World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), and the United Nations Development Program (UNDP). The objectives of this fundamental research are to establish a new greenhouse hydroponic system for food crops cultivation, to examine the toxic pollutants uptake of plants grown from polluted water, to evaluate the effects of wastewater reuse in irrigation on growth and yield of food crops in relation to macroscopic symptoms, photosynthetic pigments, proline content, lipid peroxidation, and oxidative response. The unique activities of guaiacol peroxidase (POD), catalase (CAT) and ascorbate peroxidase (APX) were examined. The elongation of roots and shoots of the selected food crops models were significantly inhibited as a function of metal-concentration and duration of exposure. Heavy metals-contaminated irrigation water resulted in the profound reduction of the total chlorophyll, chlorophyll-*a*, chlorophyll-*b*, and carotenoid contents. The excessive accumulation of proline content were detected in the treated food crops. Malondialdehyde content, konwn as the biomarker of the degree of lipid peroxidation was markedly increased after the exposure to heavy metals. The activities of APX, POD, and CAT have been drastically altered, with a profound stimulation effect in these antioxidant enzymes activities, predicting the heavy metal-induced oxidative stress in the food crops. The concurrent augmentation in the antioxidant enzymes and proline level after heavy metal treatment further justified the oxidatie stress curtailing pathway in the food crops against the macromolecular damage. The current findings provide a meaningful insight into the interruption of heavy metal-contaminated wastewater irrigation practice, and its possible future health risk estimates. The health threats associated with the cross-contamination of anthropogenic pollutants in the food crops are expected to be exacerbated on a larger scale by the bio-accumulation of emerging chemical products from the unregulated dumping of domestic and industrial effluents.

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