



Research Paper

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Arsenic accumulation in pumpkin through contaminated groundwater and varietal evaluation thereof in Gangetic alluvium of West Bengal

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Abstract : Arsenic is the most hazardous toxic metalloid available in the natural ecological unit and widely distributed in various parts of the world. Near about 50 million people are suffering from its toxicity in Gangetic alluvium of India particularly in West Bengal. The emerging areas of arsenic problem in agricultural system through use of contaminated irrigation water and entry of toxin in vegetables have been largely ignored. Arsenic uptake by plants and its translocation to the edible parts were observed to vary with crops even across the cultivars. With this background, the experiment was laid out in RBD with five selected pumpkin cultivars each replicated four times to study the arsenic accumulation and varietal tolerance of pumpkin and arsenic intake and dietary risk assessment through fruits at different sites of framers' fields in Nadia district of West Bengal during summer of 2008-09 and 2009-10. The arsenic accumulation was estimated by using atomic absorption spectrophotometer (AAS) coupled with FIAS-400. The locally grown cultivar was observed to maximum arsenic accumulation with lower yield across the experimental sites, whereas, higher yielding capacity with least arsenic loading in fruit was recorded in cultivars Kali kumro and Ambili. Arsenic accumulation in different parts of pumpkin remained in an order of root > stem > leaf > fruit across the cultivars.

Key words : Arsenic, Uptake, Risk assessment, Pumpkin, Vegetable, Cultivar

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Pumpkin (*Cucurbita moscbata* Duch. ex Poir.) is one of the most popular summer vegetable, grown all over India, on a commercial scale for its immature and mature fruits. They are used as fresh vegetable, processed food and stock feed, sometimes young tender tops of shoots and leaves are also cooked as vegetable. Because of its high carotene content and good keeping quality, it is considered as a vegetable of immense value (Thamburaj and Singh, 2005). Under intensive cropping, pumpkin is successfully grown as a remunerative vegetable in Gangetic alluvium of West Bengal due to its low-cost of production and long keeping quality, but over the past decade, arsenic contamination in ground water has been reported from these areas (Mitra *et al.*, 2002; Pandey *et al.*, 2002). The word arsenic itself now-a-days sounds as a serious threat and cure to the human race because of its capability of causing terrible health hazards to human

being (Srivastava *et al.*, 2001; Rahman, 2002). The World Health Organization (WHO) ranked this calamity as "the largest poisoning of a population in history" (Smith *et al.*, 2000). Out of 20 countries in different parts of the world where groundwater arsenic contaminations and human suffering have been reported so far, the magnitude is considered to be the maximum in Bangladesh, followed by West Bengal, India (Sanyal, 2005). It causes serious problem in Gangetic alluvium of India and Bangladesh through contamination of groundwater and drinking water (WHO, 2001). The emerging areas of arsenic hazards in agricultural systems through use of contaminated irrigation water and entry of toxin in crops has been largely avoided. Increased arsenic levels in ground water-irrigated soil in West Bengal were well documented by Sanyal and Nasar (2002) and uptake of arsenic by crop plants grown in soils contaminated with high concentration of arsenic