

Arsenic Speciation in *Cicer arietinum*: A Terrestrial Legume That Contains Organoarsenic Species

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Abstract : Arsenic poisoned ground water is a major concern in South Asia. The arsenic enters the food chain not only through drinking but also by using arsenic polluted water for irrigation. Arsenic is highly toxic in its inorganic forms; however, organic forms of arsenic are comparatively less toxic. In terrestrial plants, inorganic form of arsenic is predominantly found; however, we found that significant proportion of organic arsenic was present in root and shoot of a staple legume, chickpea (*Cicer arietinum* L) plants. Chickpea plants were raised in pot culture on soils spiked with arsenic ranging from 0-70 mg arsenate per Kg soil. Total arsenic concentrations of chickpea shoots and roots were determined by inductively coupled plasma-mass spectrometry (ICP-MS) ranging from 0.76 to 20.26, and 2.09 to 16.43 $\mu\text{g g}^{-1}$ dry weight, respectively. Information on arsenic species was acquired by methanol/water extraction method, with arsenic species being analyzed by high-performance liquid chromatography (HPLC) coupled with ICP-MS. Dimethylarsinic acid (DMA) was the only organic arsenic species found in amount from 0.02 to 3.16 % of total arsenic shoot concentration and 0 to 6.93 % of total arsenic root concentration, respectively. To investigate the source of the organic arsenic in chickpea plants, arsenic species in the rhizosphere of soils of plants were also examined. The absence of organic arsenic in soils would suggest the possibility of formation of DMA in plants. The present investigation provides useful information for better understanding of distribution of arsenic species in terrestrial legume plants.

Keywords : arsenic, arsenic speciation, dimethylarsinic acid, organoarsenic

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