

**TOXIC TRACE ELEMENTS (CADMIUM AND ARSENIC) IN SRI LANKAN  
COMMERCIAL RICE (*Oryza sativa* L.)**

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Toxic trace element (TTE) contamination in dietary items, such as rice (*Oryza sativa* L.), poses a significant food safety concern, as even trace amounts of these elements can be harmful to human health. The bioavailability of TTEs is closely monitored in many countries to ensure compliance with statutory toxicological threshold values and permissible levels. This study investigated the presence of cadmium (Cd) and arsenic (As) in commonly consumed Sri Lankan rice varieties and assessed the potential for chronic dietary exposure to these toxic trace elements through rice consumption. A total of 54 ( $N = 54$ ) husked rice, representing the ten most commonly consumed varieties in Sri Lanka, were sampled at selected dedicated economic centres, from which 25 ( $n = 25$ ) analytical composites were homogenized, lyophilized and stored at  $-20\text{ }^{\circ}\text{C}$ . An analytical portion of  $\sim 0.2\text{ g}$  lyophilized grain powders underwent microwave-assisted high-pressure acid digestion and was profiled using inductively coupled plasma mass spectrometry. Results were expressed as mg/kg on a wet-weight basis (mg/kg ww). Toxicological assessment was conducted using WHO-JECFA Codex Alimentarius Maximum Permissible Values, Provisional Tolerable Monthly Intake ( $\text{Codex}_{\text{PTMI}}$ ) and European Food Safety Authority guidelines ( $\text{EFSA}_{\text{TWI}}$ ) considering national per-capita consumption rates. The mean  $\pm$  SD and median (IQR) Cd and As concentrations of rice grains were  $0.126 \pm 0.417$ ,  $0.033$  ( $0.063$ ) and  $0.055 \pm 0.030$ ,  $0.050$  ( $0.036$ ) mg/kg ww, respectively, which were below the Codex MPLs. Only one sample exceeded the  $\text{Codex}_{\text{PTMI}}$  for Cd. Twenty percent of samples exceeded the  $\text{Cd-TWI}_{\text{EFSA}}$ , indicating potential chronic dietary exposure to Cd. The red pericarp grains accumulated higher amounts of both Cd and As than the white pericarp varieties ( $p_{\text{Cd}}, p_{\text{As}} > 0.05$ ). Traditional varieties showed lower As ( $p_{\text{As}} > 0.05$ ) but higher Cd values ( $p_{\text{Cd}} > 0.05$ ) compared to improved varieties. The parboiled grains of “Nadu” and “Samba” had higher element concentrations than the non-parboiled “Kekulu” varieties, irrespective of the pericarp colour. Approximately 20% of rice samples in Sri Lanka, especially among the red pericarp and improved varieties, exceeded the EFSA threshold for Cd.

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