Bioconcentration and translocation efficiency of metals in paddy (Oryza sativa): a case study from Alor Setar, Kedah, Malaysia

ABSTRACT

This study aimed to measure and compares the concentration of metals accumulated in various parts (grains, stems and roots) of paddy (Oryza sativa). Thirty samples were collected from selected paddy field in Alor Setar, Kedah, Malaysia. Metals (75As, 9Be, 114Cd, 59Co, 52Cr and 208Pb) concentration in various parts of the paddy and soil were analysed by using the sensitive Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Bioconcentration factor (BCF) and translocation ratio were calculated based on the concentration of metals obtained. The mean concentration (mg/kg) of metals in grain samples were 0.06±0.12 for 75As, 0.0038±0.0037 for 9Be, 0.01±0.01 for 114Cd, 0.14±0.19 for 59Co and 0.21±0.15 for 208Pb while 52Cr concentration in all samples were below the ICP-MS detection limit. From the calculated translocation ratio, absorption of paddy plant had relation: root > stem >> grain. This study showed that measured concentration of metals in grain samples were all below the maximum permitted proportion (mg/kg) of Fourteenth Schedule (Regulation 38) of the Malaysian Food Regulation 1985.

Keyword: Bioconcentration factor (BCF); Metals; Paddy (Oryza sativa); Translocation ratio