

Trace elements distribution in heirloom paddy pandasan cultivated under field conditions of dry and wet soil

ABSTRACT

Trace elements phytoavailability depends on the physical and chemical properties of soil. At the Crocker range of West Coast Sabah, Malaysia, the Pandasan paddy variety can be cultivated as flooded rice paddies or upland rice on acidic soil. Pandasan paddy samples were collected in Kiulu subdistrict from traditional farmer at two different locations. Available sources of trace elements were from weathering, fertilizers and pesticides. Soil and plant samples were collected after two months of seed sowing and during harvest season which was five months old for heavy metal analysis by inductively coupled plasma optical emission spectrometry (ICP-OES). Translocation factor of arsenic from root to grain indicated this trace element was very mobile in Pandasan paddy cultivated at dry soil compared to wet soil followed by zinc. Although, cadmium was not detected in paddy cultivated at flooded field for both, soil and plant, cadmium was detected in soil and plant roots cultivated in dry condition. Enrichment factor results suggested that Pandasan plant cultivated on dry soil was only a good bioindicator for lead and zinc. Pandasan grain was rich with iron followed by zinc. Selected heavy metals accumulation in Pandasan grain cultivated in flooded field did not exceeded the permissible limit of Malaysia Food Regulation 1985. However arsenic and plumbum concentration in Pandasan grain harvested from dry soil exceeded the permissible limit of Malaysia Food Regulation 1985. Health risk of heavy metals toxicity can be reduced if Pandasan paddy is cultivated in flooded field compared to dry soil.