

## **Elucidating the expression of zinc transporters involved in zinc uptake by upland rice landraces in Malaysia**

### **ABSTRACT**

Zinc (Zn) is an essential nutrient that plays important roles in numerous physiological processes in plants, serving as a cofactor for many enzymes and as the key structural motifs in transcriptional regulatory proteins. A deficiency of Zn, therefore, decreases growth, but excess Zn has significant toxicity to biological systems through metal-based cytotoxic reactions. Zinc uptake in relation to gene expression was studied by conducting a solution culture experiment. Two upland rice landraces were selected from Malaysia. Germinated seedlings were grown in Yoshida standard solution culture for 2 weeks. Plants were transferred into a modified nutrient culture for a further 2 weeks. (The ZnSO<sub>4</sub> was omitted from the solution to induce Zn deficiency). Total RNA were extracted from shoots and roots. Quantitative analysis of 7 genes (OsZIP1, OsZIP3, OsZIP4, OsZIP5, OsZIP8, -tubulin, and 18srRNA) using commercial primers were carried out by Q-PCR. Results of this study in roots showed over expression of OsZIP4, OsZIP1, OsZIP8 and OsZIP5 under Zn deficiency condition, but the expression of OsZIP3 was not shown. OsZIP4, OsZIP8 and OsZIP5 were expressed in the shoots, while OsZIP1 and OsZIP3 were not up regulated by Zn deficiency (OsZIP3 was not expressed in roots and shoots). OsZIPs were expressed more in the Zn-deficient Bertih than in the Zn-deficient Nabawan variety.

**Keyword:** Rice; Zinc; Zinc deficiency; Zn transporter OsZIP