

TpIRT1 is a transition metal transporter in Polish Wheat (*Triticum polonicum* L.) with a broad substrate specificity

Yulin Jiang¹, Xing Chen¹, Songyue Chai¹, Huajin Sheng², Lina Sha¹, Xing Fan¹, Jian Zeng¹, Houyang Kang¹, Haiqin Zhang¹, Xue Xiao¹, Yonghong Zhou¹, Olena Vatamaniuk³, and Yi Wang¹

¹Sichuan Agricultural University

²University of Saskatchewan

³Cornell University School of Integrative Plant Science

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Abstract

Uptake and internal transport of micronutrients are essential for plant growth, development, and yield. In this regard, Iron Regulated Transporters (IRTs) from the ZIP (Zinc-regulated, iron-regulated transporter-like proteins) family play an important role in transition metal uptake. The majority of studies have been focused on IRT1-like proteins in diploid species, but few in polyploids. Here, we studied the function of TpIRT1A and TpIRT1B homoeologs in a tetraploid crop, Polish wheat (*Triticum polonicum*). Our results highlighted the importance of TpIRT1 in the uptake and translocation of Fe, Mn, Co, and Cd with direct implications for wheat yield potential. Both TpIRT1A and TpIRT1B were located at the plasma membrane and internal vesicles in *Arabidopsis* protoplasts, and responsible for Cd and Co sensitivity in yeast. The over-expression of TpIRT1B in *A. thaliana* increased Fe, Mn, Co, and Cd concentration in its tissues and improved plant growth under Fe, Mn, and Co deficiencies, while caused more sensitive to Cd than wild-type plant. Functional analysis of IRT1 homoeologs from tetraploid and diploid ancestral wheat species in yeast disclosed four distinct amino acid residues in TdiIRT1B (*T. dicoccum*) and TtuIRT1B (*T. turgidum*). Together, these results increase the knowledge of IRT1 function in a global crop, wheat.

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