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Aluminium toxicity and phosphate deficiency activates antioxidant systems and up-regulates expression of phosphate transporters gene in ryegrass (*Lolium perenne* L.) plants

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Abstract

Soil acidity, associated with aluminium (Al) toxicity and low phosphorus (P) availability, is considered the most important problem for agricultural production. Even though the Al-P interaction has been widely investigated, the impact of P-nutrition on Al-toxicity still remains controversial and poorly understood. To elucidate further insights into the underlying mechanisms of this interaction in ryegrass (*Lolium perenne* L.), P uptake, antioxidant responses and the gene expression of phosphate transporters were determined. Two ryegrass cultivars with different Al resistances, the Al-tolerant Nui