



## Potassium contributes to zinc stress tolerance in peach (*Prunus persica*) seedlings by enhancing photosynthesis and the antioxidant defense system

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**ABSTRACT.** Zinc (Zn) is considered to be a major industrial pollutant because excessive amounts can impair plant growth. In this paper, we found that peach ‘Yoshihime’ seedlings are promising Zn tolerant plants. However, heavy Zn toxicity (2 mM) damaged plant performance by disrupting biochemical processes, including photosynthesis, proline production, and K<sup>+</sup> nutrition. Notably, elevated external K<sup>+</sup> supply (10 mM) alleviated peach seedlings from Zn toxicity, evidenced by enhanced photosynthesis, antioxidant defense systems, and plant K<sup>+</sup> nutritional status. Moreover, the transcript levels of *KUP* (K<sup>+</sup> uptake) genes involved in K<sup>+</sup> acquisition, transport, and homeostasis were

significantly upregulated following supply of sufficient  $K^+$  upon Zn toxicity. In general,  $K^+$  favorably contributes to improvements in internal  $K^+$  homeostasis, via the help of  $K^+$  transporters, further protecting plant photosynthesis and the antioxidative defense system. Our findings further benefit the study of the mechanisms underpinning heavy metal tolerance in woody plants.

**Key words:** Potassium; Photosynthesis; Antioxidant defense system; Peach; Zinc stress