

# Soaking with an essential mineral (Fe, Zn, Cu, Mn and Se) mixture delays senescence and improves nutrient accumulation in postharvest fruit of *Ziziphus jujuba*

Benliang Deng, Haojie Shi, Hongxia Liu, Shipeng Li, Shan Tian and Xusheng Zhao

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## Abstract

Fresh jujube is a healthy climacteric fruit with a high medicinal value. However, it is highly perishable during harvest and storage. In addition, essential minerals (EMs) and antioxidants are indispensable nutrients for human health. In the present study, the effects of an EM mixture (containing 1 mM Fe, Zn, Cu, Mn, and Se) on postharvest jujube fruit senescence, and antioxidant and mineral nutrient accumulation, were investigated. The results showed that soaking with the EM mixture delayed fruit senescence by decreasing the reddening index, coupled with reduced weight loss and decay incidence, and maintained firmness. In addition, greater total antioxidant capacity, as well as higher accumulation of iron, zinc, copper, manganese, selenium and total phenolics, was detected in the EM mixture-treated fruit compared with those in the control. However, the EM-delayed senescence and improved antioxidant capacity could be partly abolished by dimethylthiourea (a specific ROS scavenger) or diphenyleneiodonium chloride (a specific inhibitor of NADPH oxidase (NOX)). Further experiments showed that higher H<sub>2</sub>O<sub>2</sub> levels and NOX activities could be detected in EM-treated fruit compared with those in the control. However, the EM-enhanced H<sub>2</sub>O<sub>2</sub> content and NOX activity were partly attenuated by diphenyleneiodonium chloride. These results showed that the NOX-mediated H<sub>2</sub>O<sub>2</sub> is required for EM-delayed postharvest jujube fruit senescence. Thus, EM soaking provides us a new method to delay postharvest fruit senescence and improve nutrient quality.