

Melatonin reduces pesticide residue, delays senescence, and improves antioxidant nutrient accumulation in postharvest jujube fruit

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Abstract

Melatonin reportedly delays postharvest fruit senescence, but information on its *in vivo* effects on pesticide degradation in postharvest fruit is limited. In this study, we investigated the effect of melatonin on the regulation of pesticide degradation and antioxidant nutrient accumulation in jujube fruit after storage. The results showed that melatonin treatment markedly promoted the degradation of three different types of pesticide (chlorothalonil, malathion, and glyphosate) in postharvest jujube fruit. However, this melatonin-enhanced pesticide degradation was greatly reduced by *p*-chlorophenylalanine (a specific inhibitor of melatonin synthesis) and L-buthionine-sulfoximine (a specific inhibitor of glutathione). Furthermore, pesticide-induced glutathione and melatonin accumulation, coupled with increased glutathione reductase and glutathione S-transferase activities, was further enhanced by melatonin in jujube fruit after storage. Pesticide-delayed fruit senescence (evaluated by weight loss, decay incidence, and firmness) was also further enhanced by melatonin. Interestingly, pesticide-impaired ascorbic acid contents, total phenolics accumulation, and total antioxidant capacities (as evaluated by Fe³⁺ reducing power) recovered with melatonin treatment in postharvest jujube fruit. This study provides a new biodegradable method for pesticide removal and improves postharvest fruit quality in agronomic production.