

Melatonin treatment delays postharvest senescence and maintains the organoleptic quality of ‘Newhall’ navel orange (*Citrus sinensis* (L.) Osbeck) by inhibiting respiration and enhancing antioxidant capacity

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Abstract

Melatonin can improve postharvest quality and strengthen resistance to oxidative stress-induced senescence of many horticultural products, however, the effects of melatonin on storage quality and physiological senescence of citrus fruit are still unclear. The objective of this study was to determine the effect of $200 \mu\text{mol}\cdot\text{L}^{-1}$ melatonin on the organoleptic quality and antioxidant system of ‘Newhall’ navel orange stored under ambient conditions for 84 days post-harvest. Melatonin caused a significant decrease in respiration rate and weight loss rate, and increased in fruit firmness, total soluble solids, soluble sugar content, titratable acidity and Citrus Color Index (CCI) indicating inhibition of fruit quality deterioration. Melatonin treatment impeded the accumulation of hydrogen peroxide and malondialdehyde, suggesting an inhibition of reactive oxygen species (ROS) burst and oxidative damage. In addition, the application of melatonin enhanced ROS scavenging capacity by increasing the activity and expressions of catalase, superoxide dismutase, ascorbate peroxidase, glutathione reductase and by promoting the accumulation of ascorbate, reduced glutathione and total phenol. Moreover, the PCA (principal component analysis) demonstrated melatonin delayed postharvest senescence of orange fruit is associated with inhibition of postharvest respiration and stimulation of oxidant-defense system.