

Melatonin treatment delays senescence and improves antioxidant potential of sweet cherry fruits during cold storage

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Abstract

This study aimed to investigate the mechanisms activated by melatonin treatment at 0, 1, 10, 100, and 1000 μM for retarding senescence and improving the antioxidant potential of sweet cherry fruits during storage at 0 °C for 45 days. The results showed that sweet cherry fruits treated with 100 μM melatonin exhibited the lowest flesh browning and decay incidence after 45 days of storage at 0 °C. Moreover, endogenous melatonin accumulation occurring by higher *tryptophan decarboxylase*, *tryptamine 5-hydroxylase*, *serotonin N-acetyltransferase*, and *N-acetylserotonin methyltransferase* expression concomitant with endogenous hydrogen sulfide accumulation occurring by higher *l-cysteine desulphydrase* and *d-cysteine desulphydrase* expression and activity was promoted by melatonin in sweet cherry fruits. Besides, phenols, flavonoids, and anthocyanins accumulation and antioxidant potential were enhanced by melatonin in sweet cherry fruits via enhancing phenylalanine ammonia-lyase and chalcone synthase activities along with suppressing polyphenol oxidase activity. Interestingly, melatonin treatment maintained the membrane integrity in sweet cherry fruits, evaluated by malondialdehyde and hydrogen peroxide accumulation, which could be attributed to the enhanced activities of superoxide dismutase, catalase, ascorbate peroxidase, and glutathione reductase enzymes while suppressed the activities of phospholipase D and lipoxygenase. Taken together, this study highlights the beneficial effects of melatonin in retarding senescence and improving the antioxidant potential of sweet cherry fruits during cold storage.