

Melatonin ameliorates chilling injury in green bell peppers during storage by regulating membrane lipid metabolism and antioxidant capacity

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Abstract

Melatonin is a kind of indoleamine that plays an important role against abiotic stress. In the current study, we investigated the effect of exogenous melatonin (100 μ M) on bell pepper during storage at 4 °C for 20 d and afterward shelf at 20 °C for 3 d. Melatonin treatment reduced cell structure damage and lightened the increase in chilling injury incidence, membrane permeability, and malonaldehyde (MDA) content under cold stress. The membrane lipid content and the ratio of unsaturated to saturated fatty acids increased by reducing the enzymatic activity and transcripts of phospholipase D (PLD) and lipoxygenase (LOX). Besides, melatonin application also inhibited the transcription of *CaNAC1*, which is the direct targeted regulator of the *CaPLD* gene. In addition, peppers treated with melatonin had a higher proline content than untreated peppers. Moreover, melatonin triggered the antioxidation protection system in peppers to resist oxidative damage by up-regulating the transcription level of the *CaSOD*, *CaPOD*, *CaCAT*, and *CaAPX* genes. Our results show that melatonin treatment may be a reliable method to relieve chilling injury in bell pepper fruit via the alleviation of cold-induced membrane lipid peroxidation and activating an antioxidant defense system.