Hot water treatment to alleviate chilling injury and enhance ascorbate-glutathione cycle in sweet pepper fruit during postharvest cold storage

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Abstract

Sweet pepper (*Capsicum annuum* L.) fruit are highly perishable vegetable and have a short storage life at ambient temperature. The current handling and storage temperatures, below 7 °C, extend the storage life, but chilling injury (CI) occurs after a longer storage. A pre-storage hot water treatment, dipping sweet pepper 'Miogi' fruit in 45 °C hot water for 15 min, substantially induced tolerance of fruit to CI at 6 °C storage, and extended storage life for long duration. This research was conducted to reveal the antioxidantive responses of fruit to pre-heat treatment and chilling storage. The purpose of the present study was to understand the effect of hot water treatment on the alleviation of chilling injury and ascorbate-glutathione cycle involved in sweet pepper fruit. Hot water treatment inhibited the increases in malondialdehyde and hydrogen peroxide levels, and enhanced the increases in ascorbate and glutathione contents compared with the control fruit during storage. The activities of ascorbate-glutathione cycle related enzymes including ascorbate peroxidase, monodehydroascorbate reductase, dehydroascorbate reductase and glutathione reductase were higher in hot water treated fruit than in the control fruit during cold storage. These results indicate that the alleviation of CI in sweet pepper fruit by hot water treatment in 45 °C hot water for 15 min might be due to the enhancement of the ascorbate-glutathione cycle by increased activity of related enzymes.