

Title Salicylic acid pretreatment alleviates chilling injury and affects the antioxidant system and heat shock proteins of peaches during cold storage

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Abstract

Peach [*Prunus persica* (L.) Batch. cv. Beijing 24] fruit at commercial maturity were immersed in 0, 0.35, 0.7 and 1 mM salicylic acid (SA) solution for 5 min, stored at 0 °C for 28 days, then moved to 20 °C for 3 days to simulate shelf life. Chilling injury (CI) index, decay index (DI), firmness and thiobarbituric acid-reactive-substance (TBARS) content of fruit were measured at the end of shelf life. The results showed that only 1 mM SA significantly maintained higher firmness and lower CI, DI, and TBARS content of fruit compared with the control. Studies were then conducted to determine if 1 mM SA alleviated chilling injury by influencing antioxidant systems and/or heat shock proteins of the fruit. Reduced-to-oxidized ascorbate ratio (AsA/DHAsA) in 1 mM SA-treated-fruit was 39%, 61%, and 55% higher than that in controls at the midpoint of storage, the end of storage and after 3 days of shelf life, respectively. The reduced-to-oxidized glutathione ratio (GSH/GSSG) in SA-treated-fruit was 68% higher than that in controls at the midpoint of storage. Ascorbate peroxidase and glutathione reductase activities in SA-treated-fruit were significantly greater than those in controls during cold storage. Before SA treatment, heat shock protein 101 (HSP101) was not found in peach fruit, nor was it found in control fruit during or after cold storage. In contrast, at the midpoint of cold storage, HSP101 was expressed strongly in SA-treated-fruit. At the end of storage and after 3 days of shelf life, expression of HSP101 was weak. In both SA-treated and control fruit, expression of HSP73 was found before, during, and after cold storage, but expression in SA-treated-fruit was stronger than that in control fruit. The effect of SA on alleviating chilling injury of peaches during cold storage may be attributed to its ability to induce antioxidant systems and HSPs.