Title Thaumatin-like proteins and their possible role in protection against chilling injury in peach fruit

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Abstract

Peaches are highly perishable; they ripen and deteriorate quickly at ambient temperature, and cold storage is used to slow these processes. The cell wall protein composition of two peach cultivars, and total protein composition were examined at harvest and after cold storage (3 weeks, 5 °C) by two-dimensional polyacrylamide gel electrophoresis. The two peach cultivars used were 'Oded', a white-, melting-flesh, cling-stone, early season cultivar resistant to chilling injury, and 'Hermoza', a white-, melting-flesh, free-stone, mid-season cultivar susceptible to chilling injury. Following storage, peptides in the cell wall with molecular masses ranging from 18 kDa to 60 kDa were identified by amino acid sequence to be thaumatin-like protein 1 precursor and thaumatin-like protein 2 precursor. qRT-PCR analysis revealed that the thaumatin-like protein 1 precursor transcript accumulated significantly in both cultivars during storage. However, after 1 and 2 weeks of cold storage at 5 °C the thaumatin-like protein 1 precursor transcript levels were significantly higher in the chilling injury-resistant peach 'Oded' than the susceptible peach 'Hermoza'. This early accumulation of the thaumatin-like protein 1 precursor transcript in the resistant peach suggests that thaumatin-like protein 1 precursor (and perhaps thaumatin-like protein 2 precursor) might be involved in protecting against chilling injury. Although thaumatin-like proteins accumulated to high levels in cell walls of chilling injury-sensitive 'Hermoza', the kinetics of transcript accumulation suggest that the early appearance of the transcript for this protein family might be involved in shielding the fruit from the dramatic cell wall-structure changes that accompany the onset of chilling injury in stone fruit, and that result in woolliness development.