

Title Different postharvest conditions modulate ripening and ethylene biosynthetic and signal transduction pathways in Stony Hard peaches

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Abstract

Stony hard (SH) peaches are characterized, at ripening, by the maintenance of flesh firmness and the lack of ethylene production due to a reduced expression of *Pp-ACS1*. In a trial comparing melting flesh (MF, cv. 'Summer Rich') and SH ('IFF331' selection) fruit at two different postharvest temperatures (10 and 20 °C), unexpected behaviour was observed in SH peaches that displayed an increase in ethylene production and a decrease in flesh firmness when stored at 10 °C, a temperature regime basically ineffective in delaying ripening in MF fruit. This appeared to be the result of an induction of *Pp-ACS1* transcription, making this genotype of particular interest for studying temperature stress physiology and ethylene-related ripening processes in peaches. Comparative expression analyses of genes involved in cell wall metabolism pointed out the presence of a negative (*Pp-EG4*), positive (*Pp-endoPG*) or no (one member of the *PL* family) relationship with ethylene at ripening. Results clearly showed that the last stage of firmness decrease (melting) only occurs in fruit producing ethylene and is associated with *Pp-endoPG* transcript accumulation. The expression of genes involved in ethylene biosynthesis and signalling pathways was evaluated using QRT-PCR. *Pp-ACO1* appeared to be induced in SH kept at 10 °C but not at 20 °C. Transient increases in *Pp-CTR1* and *Pp-EIN2like* gene expression have only been detected at the early stages of ripening in samples producing ethylene, indicating that a causal relationship might exist between ethylene and elements of its transduction pathway during peach fruit ripening.