The relationship between ethylene- and oxidative-related markers at harvest with the susceptibility of pears to develop superficial scald

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Abstract

To better understand the specific biochemical pathways involved in superficial scald susceptibility, changes in ethylene biosynthesis, antioxidant, oxidative related processes and sugar metabolism were investigated for two scald sensitive pear cultivars ('Blanquilla' and 'Flor d'Hivern') with distinct postharvest ripening patterns at different harvest dates. Both cultivars developed symptoms of scald after 4 months of storage at -0.5 °C, but the biochemical basis underlying the fruit susceptibility were different. In the summer pear 'Blanquilla', capable of ripening even on the tree, scald susceptibility was higher in fruit of advanced maturity and was associated with the action of ethylene on triggering the expression of *PcAFS1* gene. In this cultivar, the levels of ACC, ACS enzyme activity and *PcAFS1* at harvest were strongly correlated to scald incidence. In contrast, in the winter pear, 'Flor d'Hivern', with little or no ethylene-production capacity even after cold storage, scald symptoms were already visible when fruit were removed from cold storage, regardless of the fruit maturity. In this pear cultivar, scald symptoms were not dependent on ethylene, but rather associated with higher lipoxygenase (LOX) activity at harvest, an enzyme often associated with responses to chilling injury, and lower content of sorbitol, a compound that may act as cryoprotectant preventing cell damage during cold storage.