

# The storage temperature affects flesh firmness and gene expression patterns of cell wall-modifying enzymes in stony hard peaches

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## Abstract

Stony hard (SH) peaches undergo minimal softening on the tree or after harvest in air at room temperature. Instead, the firmness of SH peach fruit is reduced by treatments with ethylene or auxin or storage at 10 °C. In this study, the SH peach cultivar 'Manami' was stored at 0 °C, 5 °C, 8 °C, 10 °C, 15 °C, 18 °C, and 20 °C to characterize fruit softening with storage temperature. Fruit firmness was effectively reduced with storage at 8 °C, 10 °C, and 15 °C, with softening occurring, even in fruit with lower ethylene production, at 15 °C. In these fruit tissues, expression of a cell wall-modifying enzyme gene coding for polygalacturonase (*PG*) was identified (*PpPGM*), which is related to fruit firmness. The duration and sequence of different softening treatments were also examined. Fruit stored at 10 °C for 6 d prior to cold storage (0 °C) continued to soften after storage, and *PpPGM* was expressed in these tissues during cold storage. However, fruit stored at 0 °C or 20 °C for longer than 2 w did not soften during subsequent treatment at 10 °C. These results indicate that temperature-induced fruit softening, for example, within 7 d of treatment and during storage at 15 °C, occurred under conditions of lower ethylene production and may be partly attributed to ethylene-independent *PG* induction. Thus, *PG* expression might be an important factor for SH peach fruit softening during or after storage.