

Relationships among ethylene, cell wall degrading enzyme activities and on-tree softening in persimmon (*Diospyros kaki* Thunb.) fruit

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Abstract

Persimmon (*Diospyros kaki*) fruit soften naturally on the tree during late autumn. We investigated the relationships among ethylene production, the cell wall degrading enzymes polygalacturonase (PG), pectinesterase (PE), β -D-galactosidase (β -D-Gal) and α -L-arabinofuranosidase (α -L-Arf), and on-tree softening of persimmon 'Saijo' fruit. Fruit were harvested from mid-September to late November from a commercial orchard in Matsue, Japan. Flesh firmness decreased gradually until early November and then decreased rapidly. Activity of PG decreased slightly in early October and thereafter was maintained at the same level until late November. Activity of PE increased during September and October and peaked in mid-November. Activity of β -D-Gal increased rapidly from mid to late November, whereas α -L-Arf activity increased rapidly from early to late November. Fruit that showed abnormal on-tree softening and fruit that represented a softening degree ranging from 1 (firm) to 4 (very soft or part of the peel ruptured) were harvested on the same date in late October and the activity of four cell wall degrading enzymes and internal ethylene concentration were determined. The internal ethylene concentration increased rapidly from softening degree 2 to 3. The activity of PE, β -D-Gal and α -L-Arf increased with advancing degree of softening. Consequently, on-tree fruit softening in late autumn might be caused by cell wall decomposition by the cooperative activities of PE, β -D-Gal, and α -L-Arf induced by ethylene synthesis.