Title Modulation of tomato pericarp firmness through pH and calcium: Implications for the texture of fresh-cut fruit

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Abstract

The effect of pH and calcium on pericarp firmness and pectin solubility was investigated in tomato fruit (*Lycopersicon esculentum* Mill. 'Tavira'). Pericarp disks were vacuum-infiltrated with 50 mM $CaCl_2$ or with distilled water and incubated for 4 h in buffer solutions at pH 4.5 and 7.0, and subsequently stored at 2 °C for 5 days. $CaCl_2$ treatment had a significant effect on firmness retention in disks from turning and ripe fruit. Pericarp disks from mature-green fruit infiltrated with $CaCl_2$ were firmer than untreated tissue after a 4 h incubation period, but the effect of calcium did not persist during storage at 2 °C. pH had a significant effect on the firmness of pericarp disks excised from turning and ripe fruit, but not on mature-green tissue. Treatments at pH 7.0 caused a reduction of the softening rate in disks from turning and ripe fruit, but had no significant effect at the mature-green stage. Water-soluble pectins decreased significantly in mature-green and ripe pericarp tissue following treatment with $CaCl_2$ at pH 7.0, suggesting that pH affects pectin dissolution. Firmness changes induced by pH and calcium after a 4 h incubation treatment were highly correlated with pectin dissolution. The results indicate that, besides calcium, pH contributes to textural changes in tomato fruit pericarp. Since wounding inflicted during processing and acidic solutions used to prevent enzymic browning and microbial growth are likely to acidify the apoplast of fresh-cut fruit, the ability to maintain an apoplastic pH near 7.0 can significantly contribute to enhanced firmness of fresh-cut fruit.