Title Quality and cell wall degradation of tomato fruit as affected by exposure to ozone

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Abstract

We evaluated the effect of ozone treatments on tomato fruit quality and cell wall degradation. Tomato fruit was harvested at the light red stage, treated with ozone (10 mL L^{-1}) for 10 min and stored at 20°C. During storage we evaluated the changes in quality attributes, the solubilization and depolymerization of cell wall components and the activity of the polysaccharide degradingenzymes polygalacturonase (PO), b-galactosidase (b-gal) and pectin methylesterase (PME). Fruit decay and softening were reduced in ozone-treated fruits. Ozone exposure rapidly induced the accumulation of phenolic compounds, which are well known due to their antimicrobial properties, without causing negative alterations in other attributes such as fruit color, lightness, sugars, acidity or antioxidants. No differences in hemicellulose content or solubilization were observed between control and ozone treated fruit. However, control fruit showed during storage a higher increase in water soluble pectins than fruit subjected to ozone treatments. Ozone exposure also resulted in lower depolymerization of Na_2CO_3 soluble pectins during storage. The reduction in solubilization and depolymerization in ozone-treated fruit was not associated with changes in the either PO or b-gal activities. Instead a marked reduction in PME activity was found in ozone-exposed fruit. Results suggest that ozone treatments in appropriate doses are useful to delay tomato fruit softening. The treatments prevent pectin solubilization and depolymerization. These modifications occur with a concomitant decrease in the activity of the enzyme PME, involved in polyuronides methylester removal. This may then affect the acailability of preferred substrated for the action of other cell wall degrading enzymes such as polygalacturonase and/or pectatelyase. It is conceivable then, that besides the activation of defense active responses (such as the accumulation of phytoalexins), the delay in fruit cell wall degradation contributes to the reduced susceptibility to decay of ozone treated-fruits.