

Title Changes in firmness, cell wall composition and cell wall hydrolases of grapes stored in high oxygen atmospheres

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Abstract

To investigate the effects of high oxygen (O₂) atmospheres on the firmness of 'Kyoho' grapes (*Vitis vinifera* L. X *V. labrusca* L.), changes in cell wall constituents and hydrolase activities were examined during 60 days of controlled atmosphere storage in air (control), 40% O₂ + 30% CO₂ or 80% O₂ (high O₂) at 0 °C and 95% relative humidity. Grapes stored in high O₂ retained greater firmness than grapes stored in air. The cell wall contents of high O₂-stored fruits contained less water-soluble pectin (WSP), more Na₂CO₃ soluble pectin (SSP) and higher hemicelluloses than air-stored fruits. The levels of cellulose and CDTA-soluble pectin (CSP) did not significantly change. The effects of high O₂ on enzyme activity were dramatic for polygalacturonase and β-galactosidase, moderate for cellulase, and very low for pectinesterase. No pectate lyase was detected. Taken together, WSP, SSP and hemicelluloses appeared to have major structural roles in retaining the firmness and preventing the deterioration of fruits kept in high O₂.