

Dynamic controlled atmosphere: Effects on the chemical composition of cuticular wax of 'Cripps Pink' apples after long-term storage

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Abstract

The effects of controlled atmosphere (CA) and dynamic controlled atmosphere based on chlorophyll fluorescence (DCA-CF) and respiratory quotient (DCA-RQ; RQ = 1.3 and 1.5) on the metabolism, decay incidence, concentration and chemical composition of 'Cripps Pink' apple peel wax after 8 months of storage plus shelf life at 20 °C were studied. DCA-RQ1.3 stored fruit had the lowest respiration rate, evidencing low metabolism, corroborating with the highest number of healthy fruit and consequently being the best storage condition. The mean wax concentration found 21.23 g m⁻², although it was lower for the DCA-RQ1.5 condition after 7 d. There was increase in wax concentration for DCA treatments from 7 to 14 d of shelf life. Chromatographic analysis allowed the identification of palmitic, stearic, oleic and linoleic fatty acids, with an increase in cis-11,14-eicosadienoic acid in all treatments and in palmitic acid in CA at 14 d. Triterpenoids, such as ursolic acid and oleanolic acids, were higher in CA, while alcohols such as 10-nonacosanol was higher in both DCA-RQ treatments. All treatments had high concentrations of nonacosane and tetracosanal. DCA-RQ decrease the incidence of greasiness. The supposed induction of anaerobic metabolism by extremely low oxygen levels and consequently higher concentration of ethanol, which were monitored by the two levels of RQ, induced the formation of compounds that may favor some mechanisms of adaptation against the low oxygen partial pressure (pO₂).