Dynamic controlled atmosphere based on carbon dioxide production (DCA – CD): Lower oxygen limit establishment, metabolism and overall quality of apples after long-term storage

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Abstract

The present study aimed to estimate the lower oxygen limit (LOL) by DCA – CD (Dynamic controlled atmosphere based on CO_2 production) for several apple cultivars and seasons and compare this method with DCA – RQ. The metabolism and overall quality maintenance of fruit stored under DCA – CD was also compared with CA – ULO, DCA – CF and DCA – RQ for 'Imperial Gala', 'Fuji Suprema', 'Golden Delicious' and 'Cripps Pink' apples after 9 months of storage plus 7 d of shelf life at 20 °C. The experiments were carried out over three years. The DCA – CD method, which is based only by CO_2 production by the fruit, correctly estimated the LOL for cultivars and seasons, allowing the pO_2 variation according to fruit metabolism during storage period, with a difference between 0.01 to 0.10 kPa O_2, when compared to DCA – RQ. Storage under DCA – CD allowed the induction of anaerobic metabolism compounds in safe levels, below the odor threshold reported in the literature, and without damaging the cell membranes. Fruit under DCA – CD had lower flesh breakdown incidence and higher flesh firmness and reduced the decay incidence in 'Imperial Gala' and 'Golden Delicious'.