

Title Predicting the physiological maturity and role of heat, calcium chloride and potassium permanganate on storage life of golden delicious apple (*Malus domestica* Borkh) in cold storage

Author Mohammad Sayyari

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Abstract

Apple is a climacteric fruit and will ripen if the fruit is harvested at mature stage. In order to store apples successfully they must be harvested at physiological maturity, but before ripening is advanced. In the present study the Smith method was used to predict the time of maturity and this was compared with a starch/iodine test. Harvest time in 1999 and 2000 were predicted to be 136 and 142 days after bloom (DAFB) using the Smith method, and 137 and 141 DAFB using the starch/iodine test, respectively. (You should explain in a sentence what the Smith method is, since readers may not know) After determining time of maturity, fruits were harvested and vacuum infiltrated at 250 mmHg for 30 sec with 0, 4, or 6% CaCl₂ solution followed by heat treatment for 0, 48 and 72 hours at 38°C. Treated fruit were stored at 0°C with RH of 85-90% for 2.5 and 5 months, followed by 1 week storage at 20°C. Fruit infiltrated with 4 and 6% of CaCl₂ contained a significantly increased calcium content after 2.5 and 5 months at 0°C. The correlation between calcium concentration and calcium content of fruits was highly significant ($r=0.98$). There was a positive correlation between fruit firmness and calcium content of fruit and correlation coefficients after 2.5 and 5 months storage at 0°C were 0.77 and 0.83, respectively. Heat treatment for 48 and 72 hrs at 38°C also significantly increased fruit firmness. Calcium chloride at 4 and 6%, plus heat treatment significantly increased fruit firmness of these fruits held 1 week at 20°C after removal from cold storage. Calcium chloride plus heat treatment had no significant effect on total soluble solids, but significantly decreased fruit internal breakdown. There was no effect on firmness of fruit vacuum infiltrated with 4 and 6% CaCl₂ stored in bags containing potassium permanganate at 0, 10, 20 g/bag. Potassium permanganate alone significantly increased fruit firmness.