

Abstract

The present study characterized the effects of growing-season applied soybean oil emulsions on at-harvest and postharvest behaviour of 'Golden Delicious' and 'Gala' apples. Three single treatments (midseason = soy1, 21 days before harvest = soy2, three days before harvest = soy3) of soybean oil emulsion (1% food grade oil, emulsified with 0.1% Latron[®]; v/v) were administered to apple trees grown in two different locations within Washington State, USA, to test the following variables: time of application, duration of storage, and influence of storage atmospheres. Fruit measurements included maturity indices (firmness, acidity, soluble solids, starch conversion), respiration rate, ethylene evolution, internal ethylene concentration, volatile aroma emission, flavour regeneration capacity, peel fatty acid distribution, fruit colour development, weight loss in storage, development of cuticular cracks and epicuticular wax crystallization patterns. The fruit was harvested at commercial maturity and stored for up to 6 months at 0.5°C in refrigerated air (RA) or under 2% O₂ and 0.2% CO₂ controlled atmosphere (CA) conditions.

Fruit firmness, titratable acidity, soluble solids content, and fatty acid distribution in the peel tissue were unaffected by the soybean oil treatment. At harvest and after storage 'Golden Delicious' apples treated with soy2 emitted more aldehydes (mainly hexanal), and oil applications closer to harvest (soy2, soy3) consistently yielded fruit with improved ester regeneration capacity after CA storage. 'Gala' apples treated with soy1 had significantly higher alcohol and ester levels when compared to control fruit. Delayed degreening was observed on 'Golden Delicious' apples after soy1 and soy2 treatment in 2003, but no treatment effect was noted in 2004. As observed by scanning electron microscopy (SEM), oil application decreased the occurrence and severity of cuticular cracks in susceptible varieties such as 'Golden Delicious'. The rate of weight loss during storage was slowed down for all soybean oil treated apples and was directly related to the development of cracks. All apples showed altered wax crystallization patterns after soybean oil application.

In conclusion, field-applied soybean oil emulsions have demonstrated potential to improve postharvest quality of apples by stimulating volatile aroma emission of fruit, delaying weight loss in storage and the improvement of cuticular structures.