

Title Ripening, volatiles and sensory attributes of West Indian and Guatemalan-West Indian hybrid avocados as affected by 1-methylcyclopropene and ethylene

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Citation Thesis, Doctor of Philosophy, University of Florida. 213 pages. 2010.

Keywords Methylcyclopropene; Avocados; Ethylene inhibitors; Volatile compounds

Abstract

This study aimed to evaluate the effects of the ethylene inhibitor 1-methylcyclopropene (1-MCP) on ripening, volatile compounds and sensory attributes of avocado.

Fruit ripening was strongly affected by postharvest application of aqueous 1-MCP. Concentrations above $225 \mu\text{g L}^{-1}$ (4.16 mmol m^{-3}) and 2-min immersion treatments delayed ripening sufficiently to limit shelf life due to significant fruit shriveling and high decay severity. Ripening asynchrony (blossom end softens faster than stem end) occurs naturally and it was consistently exaggerated in all 1-MCP treatments at $200 \mu\text{g L}^{-1}$ or above; incidence was much lower for $150 \mu\text{g L}^{-1}$ treatment. However, a 4-day treatment of mid-ripe fruit with ethylene at $100 \mu\text{L L}^{-1}$ effectively promoted complete recovery from the strong ripening asynchrony caused by aqueous 1-MCP treatment at $900 \mu\text{g L}^{-1}$. Polygalacturonase activity was not directly related to ripening asynchrony.

Total volatile emissions from untreated avocado pulp cubes decreased during ripening. Sesquiterpenes, mainly β -caryophyllene, were predominant in mature-green and mid-ripe fruit and minimally detected in ripe fruit. Alkanes were a major group in 'Booth 7' and 'Monroe' at all ripeness stages. The results suggest that ethylene is involved in ester metabolism in 'Simmonds' and of α -copaene metabolism in all cultivars studied. Aqueous 1-MCP at 75 or $150 \mu\text{g L}^{-1}$ for 1 min significantly increased alkane emission in mid-ripe 'Booth 7' and 'Monroe'. Total volatile emissions were not affected by ethylene or 1-MCP in ripe 'Simmonds' fruit.

Electronic nose analysis successfully classified avocado pulp by ripeness stage using fruit either untreated or treated with aqueous 1-MCP. Lower classification power was obtained when all treatments and ripeness stages were involved.

Overall, a single postharvest immersion in aqueous 1-MCP (75 or $150 \mu\text{g L}^{-1}$ for 1 min) effectively extended shelf-life of West Indian and Guatemalan-West Indian hybrid avocados by 20% to 100%. At ripe stage, fruit quality remained marketable, and acceptable sensory attributes of texture, flavor and overall liking were maintained. Best results were observed for Guatemalan-West Indian hybrids and for early-harvested fruit (picking date A).