Title Suppression of avocado (*Persea americana* Mill.) fruit softening and changes in cell wall matrix polysaccharides and enzyme activities: differential responses to 1-MCP and delayed ethylene application.

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Abstract

Pre-ripe Booth 7 avocado (*Persea americana*) fruit, a cross of West Indian and Guatemalan strains, were treated with 0.9 micro L/litre 1-methylcyclopropene (1-MCP) for 12 hours at 20 deg C. After storage for 18 days in air at 13 deg C, at which time whole fruit firmness values averaged about 83 N, half of the 1-MCP-treated fruit were treated with 100 micro L/litre ethylene for 12 hours and then transferred to 20 deg C. 1-MCP delayed softening, and fruit treated with 1-MCP retained more green colour than air-treated fruit when full ripe (firmness 10 to 15 N). 1-MCP affected the activities of pectinmethylesterase (EC 3.2.1.11) [pectinesterase], alpha - (EC 3.2.1.22) and beta -galactosidases (EC 3.2.1.23), and endo- beta -1,4-glucanase (EC 3.2.1.4) [cellulase]. The appearance of polygalacturonase (EC 3.2.1.15) activity was completely suppressed in 1-MCP-treated fruit for up to 24 days, at which time the firmness of 1-MCP-treated fruit had declined nearly 80% compared with initial values. The effectof exogenous ethylene applied to partially ripened 1-MCP-treated fruit differed for different ripening parameters. Ethylene applied to mid-ripe avocado exerted no effect on the on-going rate or final extent of softening of 1-MCP-treated fruit, even though polygalacturonase and endo-1,4- beta -glucanase activities increased in response to ethylene. beta -galactosidase decreased in 1-MCP-treated fruit in response to ethylene treatment. 1-MCP delayed the increase in solubility and depolymerization of water- and CDTA (1, 2-cyclohexylenedinitrilotetraacetic acid)-soluble polyuronides, likely due to reduced polygalacturonase activity. At the full-ripe stage, the levels of arabinose, galactose, glucose, mannose, rhamnose, and xylose associated with the CDTA-soluble polyuronide fraction were similar among all treatments. In contrast, the galactose levels of water-soluble polyuronides declined 40% and 17% in control and 1-MCP treated fruit, respectively. Hemicellulose neutral sugar composition was unaffected by 1-MCPor ethylene treatment. The data indicate that the capacity of avocado fruit to recover from 1-MCP-mediated suppression of ripening can be only partially amended through short-term ethylene application and differs significantly for different ripening parameters.