

Title Concentration dependence of 'Redchief Delicious' apple fruit softening and chlorophyll fluorescence to repeated doses of 1-methylcyclopropene.

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#### Abstract

We studied the dose-response of 'Redchief Delicious' apple [*Malus sylvestris* (L) Mill. var. *domestica* (Borkh.) Mansf.] fruit to repeated (weekly) dosages of 0.0, 0.02, 0.1, and 1.0 micro L.L-1 1-methylcyclopropene (1-MCP) by measuring fruit firmness and chlorophyll fluorescence throughout an extended storage period at 0, 5, 10, 15, and 20 deg C. The rate of firmness loss for nontreated fruit increased with increasing temperature. 1-MCP applied at concentrations of 0.1 and 1.0 micro L.L-1 slowed firmness loss. The 1-MCP dose-response curve for the rate of firmness loss was essentially the same for all five temperatures. A concentration of 1.0 micro L.L-1 1-MCP prevented firmness loss at all temperatures for the duration of the study; however, after holding fruit for an additional 7 days at room temperature, the fruit stored at 10 deg C softened with increasing storage duration, whereas fruit at stored at higher and lower temperatures did not. The influence of 1-MCP on chlorophyll fluorescence (Fo and Fm) was markedly affected by temperature; Fo increased during storage at higher storage temperatures and this increase was enhanced by 1-MCP. Conversely, Fm decreased during storage and the rate of decline was much greater at the higher storage temperatures; the rate of decline was reduced by 1-MCP, but only at the higher storage temperatures. Photochemical efficiency (Fv/Fm) of nontreated fruit declined with time for all storage temperatures. Treatment with 0.1 and 1.0 micro L.L-1 1-MCP only marginally reduced the rate of decline of photochemical efficiency. Sample loss due to decay increased with temperature, but was reduced by 1-MCP at all temperatures.