

Title Differential effects of 1-methylcyclopropene on citrus leaf and mature fruit abscission.
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Citation Journal of the American Society for Horticultural Science Vol: 129 (2004); 473-478

Abstract

1-Methylcyclopropene (1-MCP) is a gaseous ethylene-binding inhibitor that controls or delays ethylene-related postharvest problems in a range of horticultural commodities. Our previous work demonstrated that exposure of calamondin to 1-MCP 16 h before canopy sprays of ethephon greatly reduced unwanted leaf drop while only partially inhibiting the ability of ethephon to cause fruit loosening. The objective of this experiment, conducted in Lake Alfred, Florida, USA, was to determine whether formulated 1-MCP (SmartFresh) could be used in the field to stop defoliation caused by abscission agent applications without significantly altering abscission agent-induced fruit loosening. Spray solutions containing 400 mg ethephon litre⁻¹ with 0, 1, 2.5, and 5 mM 1-MCP were applied to canopies of *Citrus sinensis* cultivars Hamlin and Valencia. The timing of 1-MCP applications was (a) 24 h before, (b) in combination with, or (c) 24 h after ethephon. Ethephon at 400 mg litre⁻¹ significantly reduced fruit detachment force (FDF) but caused >70% leaf drop within 15 days after application in both cultivars. Applications of 1-MCP reduced ethephon-associated leaf abscission but had little effect on the ability of ethephon to reduce FDF. The timing of 1-MCP application did not affect the ability of ethephon to cause fruit loosening; however, the best consistent treatment for the control of leaf drop was achieved with the combined application of 5 mM 1-MCP and 400 mg ethephon litre⁻¹. 1-MCP was used in combination with the abscission agents coronatine, methyl jasmonate (MeJa) and 5-chloro-3-methyl-4-nitro-1H-pyrazole (CMNP) to determine its effect on leaf drop and fruit loosening. Leaf drop in trees treated with ethephon, coronatine, and MeJa was reduced by the addition of 1-MCP. However, fruit loosening was largely prevented when 1-MCP was used in combination with coronatine or MeJa. Like ethephon, CMNP-induced fruit loosening was not affected by 1-MCP. The results demonstrate the ability to control ethephon-induced leaf abscission without affecting mature fruit loosening by targeting ethylene binding in citrus.