Title The ethylene biosynthetic and signal transduction pathways are differently affected by 1-MCP in apple and peach fruit

Author Valeriano Dal Cin, Fabio Massimo Rizzini, Alessandro Botton and Pietro Tonutti

Citation Postharvest Biology and Technology, Volume 42, Issue 2 , November 2006, Pages 125-133

Keywords Carbon dioxide; ERS; ETR; Ethylene receptors; Postharvest; Ripening

Abstract

1-Methylcyclopropene (1-MCP) is an antagonist of ethylene for receptor binding sites and the effects of its application differ in relation to a number of factors including genotype and ripening physiology. Peach (*Prunus persica* L. Batsch cv. 'Summer Rich') and apple (*Malus* × *domestica* L. Borkh cv. 'Golden Delicious') fruits were incubated with 1-MCP (1 μL L^{-1}) for 24 h at 20 °C and respiration rate, ethylene production and fruit firmness, together with ACC synthase, ACC oxidase, *ETR1*, *ERS1*, and *CTR1* gene expression patterns were assessed throughout the post-treatment phase. 1-MCP was confirmed to be effective in delaying ripening in apples while in peaches only a limited effect of the chemical was observed. A dramatic inhibition of ethylene biosynthesis and *ACS* gene expression was induced by 1-MCP in apples whereas no marked difference was observed in peaches between the two controls (in air and in sealed jars without 1-MCP) and the treated fruit. In apples, *Md-ETR1* and *Md-ERS1* gene expression was down-regulated by 1-MCP starting from the end of the treatment, while *Md-CTR1* appeared negatively affected by the chemical at a later stage. Transcription of *Pp-ETR1*, *Pp-ERS1* and *Pp-CTR1* genes appeared unaffected in 1-MCP treated peaches. Differences in receptor transcript levels between control fruit maintained in air and those enclosed in sealed jars without 1-MCP may be due to an effect of CO_2 that rapidly accumulates following incubation of ripening peaches. Results support the hypothesis that the different behaviour of peaches and apples in response to 1-MCP application might be related to differences in terms of ratio, expression patterns and/or turn-over of the ethylene receptors.