Abstract

"Stark Red Gold" nectarines were harvested at 30 N of flesh firmness (FF) and 1 nl g^{-1} h^{-1} of ethylene production, and treated in sealed plastic containers with 1 µl l^{-1} (1 ppm) 1-methylcyclopropene (1-MCP) for 12 h at 25 °C. Treated and control fruit were then transferred either to a growth chamber at 25 °C or to a cold room at 4 °C for 3 days. At the end of treatment with 1-MCP; ethylene production in control fruit had increased relative to production at harvest, and this rise was abolished by the presence of the chemical. Moreover, treated fruit showed lower soluble solids content (SSC) and higher FF and titratable acidity (TA) compared to control ones, and putrescine and spermine levels were moderately enhanced in the mesocarp at the end of treatment. In contrast with the inhibition of ethylene production, 1-aminocyclopropane-1-carboxylate synthase (ACS) and especially 1-aminocyclopropane-1-carboxylate oxidase (ACO1 and ACO2) transcript levels were enhanced relative to controls. During storage, 1-MCP affected ethylene production and biosynthetic gene expression, fruit softening and other quality parameters in a temperature-dependent manner: in fruit held at 25 °C a strong decrease in ethylene production, a delay in ripening and lower ACS and ACO1/ACO2 levels were recorded, while in fruit held at 4 °C an opposite trend was observed. Results suggest that 1-MCP application followed by storage at 25 °C appears effective in controlling postharvest ripening. The lack of efficacy of the chemical in cold-stored fruit is discussed in relation to changes in SAMDC gene expression and putrescine accumulation in treated fruit relative to controls, which may be part of a stress response.