Title Aroma volatile biosynthesis in 'Gala' apples stored in controlled atmosphere

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Abstract

The shelf life of apples (*Malus* × *domestica* Borkh.) can be greatly improved by controlled atmosphere (CA) storage in conjunction with low temperature. However, both conditions result in a marked reduction of total aroma volatile production during the long-term storage of apple fruits. The objective of the present study was to understand the mechanism of aroma volatile biosynthesis from 'Gala' apples stored in CA. Fruits were harvested at optimum maturity for long-term storage, precooled overnight at 0°C, treated with 1 $\mu l \cdot L^{-1}$ 1-methylcyclopropene (1-MCP) for 24 hours at 0°C, and then placed at 0 or 3°C either in standard CA (2.5 kPa O_2 + 2.5 kPa CO_2) for 120 and 240 days or in ambient air for 75 and 150 days. Post-storage fruit volatile biosynthesis was monitored for 14 days by headspace analysis at 20°C and quantified by solid-phase micro-extraction (SPME) FID-GC and GC-MS. The enzymatic activity of the most important enzyme in ester biosynthesis, alcohol acyl CoA transferase (AAT), which is responsible for the conversion of alcohols to esters, was studied. Fruit total aroma volatile production was significantly higher in fruits removed from air than from CA. 1-MCP treatment resulted in reduced rates of respiration, ethylene and volatile production as well as AAT activity in both air and CA stored fruits. CA storage reduced the activity AAT when compared to fruit stored in air. The activity of AAT was higher in fruits removed from 3°C than from 0°C. The higher enzyme activity and total volatile production from 'Gala' fruit held at 3°C suggests that aroma volatile biosynthesis in 'Gala' is chilling sensitive.