

**Title** Effects of minimal processing and packaging on volatile compounds and other sensory aspects in carrots

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**Citation** Abstracts, 10<sup>th</sup> International Controlled & Modified Atmosphere Research Conference, 4-7 April 2009, Antalya, Turkey. 80 pages.

**Keyword** Minimal fruit; package; storage

### **Abstract**

The market for minimally processed fruits and vegetables grows. Consumers expect fresh products that are processed and packaged to increase convenience and functionality without changing flavour and taste. Many factors influence the quality of minimally processed vegetables; e.g. raw material, processing conditions, packaging material and storage conditions. The process of washing, trimming, peeling, cutting and packaging of carrots initiates physiological and biochemical changes, which then influence post-harvest quality. Several studies demonstrate that volatile terpenoids play a major role for the aroma and flavour perception of carrots. However, changes in volatile constituents have largely been ignored in studies with minimal processed carrots. Carrots were minimally processed and analysed for volatile constituents by dynamic headspace sampling. Trimming and storage at 2–8°C for 2 days before processing resulted in a significant loss in mono- and sesquiterpenes. The total terpenoid content decreased by 59%. Washing in water after cutting also reduced the content of volatiles, especially the sesquiterpenes. These differences in chemical constituents had a significant effect on the sensory quality of minimally processed carrots. Flavour intensity, carrot flavour, sweetness and juiciness were significantly higher in cut and centrifuged carrots than in the cut, washed and centrifuged product. Packaged carrots lost 55 to 65% of the initial terpenoid content during the first 24 hours of storage at 5°C increasing to > 88% at day 8 when carrots were packed in polypropylene film with perforation providing an internal atmosphere of 10-20% O<sub>2</sub> and 5-10% CO<sub>2</sub>. In contrast, losses were around 70% in carrots packed in film without perforation. However, these conditions giving an atmospheric composition down to ~ 0% O<sub>2</sub> and up to > 45% CO<sub>2</sub> were harmful to the product. The findings indicate that gentle processing and optimal packaging technology is essential to provide consumers with better minimal processed carrot products with high terpenoid flavour quality.