

# Effect of pre-treatment and modified atmosphere packaging on quality attributes and volatile composition of pomegranate arils ('Bhagwa')

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Acta Horticulturae 1079: 165-171. 2015.

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## Abstract

A major problem associated with minimally processed pomegranate arils (*Punica granatum* L.) is the development of off-odours and microbial growth when stored under modified atmosphere packaging (MAP) at high CO<sub>2</sub> and low O<sub>2</sub>. This study investigated the effects of passive-MAP combined with anti-browning pre-treatment (4-hexylresorcinol (0.001 M) + potassium sorbate (0.05 M) + ascorbic acid (0.5 M)) on the microbial quality and change in volatile composition of pomegranate ('Bhagwa') arils stored at 5°C for 15 days. Changes in headspace gas composition, physicochemical attributes, volatile composition and microbial quality were evaluated at 3-day intervals for 15 days. Volatile compounds were extracted via headspace solid phase micro-extraction (HS-SPME) and analyzed by gas chromatography-mass spectrometry (GC-MS). Headspace gas composition was significantly influenced by pre-treatment, packaging and storage duration ( $p < 0.05$ ), across all treatment. A decrease in total soluble solids (TSS), titratable acidity (TA) (0.3-0.4 g citric acid (CA) 100 ml<sup>-1</sup>) and pH (2.6-3.4) was observed across all treatments. Anthocyanin concentration varied with storage duration and treatment, however, an increase was observed with reference to initial concentration (12.8±0.5 mg cyanidin-3-glucoside (C3gE) 100 ml<sup>-1</sup>). Yeast and mould counts ranged from 1.5-4.9 log CFU g<sup>-1</sup> after 12 days of storage. Pre-treatment and passive-MAP helped maintain produce quality attributes and delayed microbial growth compared to clamshell trays. Furthermore, compositional changes in volatile compounds were identified from GC-MS analysis. A total of 13 primary and 28 secondary volatiles were detected and identified in the headspace of pomegranate juices of 'Bhagwa'.