Objectives & Rationale

Internal browning (IB) of ‘Cripps’ Pink’ apples is a worldwide tendency. It has been a very important internal defect in the past, costing the South African industry millions of Rands in revenue. The types of browning in this cultivar have been verified, and current storage regimes adapted according to the knowledge of the risk factors involved for shorter-term controlled atmosphere (CA) storage (up to 5 months). However, long-term controlled atmosphere (CA) storage (7-9 months) is still at risk of developing diffuse browning in particular. Certain step down cooling strategies in conjunction with 1-Methylcyclopropene (1-MCP) are currently being utilised in other Southern Hemisphere countries with good success for long-term storage. The objective of this study therefore was to investigate different step down cooling regimes, utilised in conjunction with 1-MCP, to reduce the risk of internal browning of ‘Cripps’ Pink’ apples and provide longer supply of good quality fruit.

Methods

‘Cripps’ Pink’ apples were sourced in the Grabouw and Ceres areas from internal browning risk orchards (5 populations/ orchards per area) and subjected to step down cooling regimes compared to no step down cooling, with or without 1-MCP, after 9 months in CA (0.5% CO2 and 1.5% O2) + 4 weeks regular atmosphere (RA) and a 7 day shelf life period. Misshapen fruit were excluded at harvest.

Key Results

- Fruit quality for step-cooled ‘Cripps’ Pink’ apples in conjunction with 1-MCP was better maintained compared to single temperature stored fruit.
- A risk of radial and diffuse browning development was identified if fruit were stored at single temperature without step cooling, either with or without 1-MCP.
- In Year 2, step down cooling starting from 3 °C proved to be more favourable than starting from 4 °C, delivering the best (least defects) and most consistent results. In Year 3 when ‘Cripps’ Pink’ apples from both areas were able to be harvested well within the 30 – 40% starch conversion range, step down cooling starting from 3 °C or 4 °C proved to yield similar results with regards to internal browning development.

Conclusion and Discussion / Recommendation

- A risk for diffuse and radial browning development was identified in not first step down cooling ‘Cripps’ Pink’ apples in conjunction with the use of 1-MCP.
- Diffuse browning is more affected by post-optimum harvest and radial browning more affected by pre-optimum harvest. This substantiates previous studies’ results that affect best practice handling protocols.
- Adhering to strict harvest maturity guidelines could enable successful marketing of good quality