

The effect of 1-MCP and storage duration on the storage potential and flesh browning development on 'Cripps Pink' apples stored under controlled atmosphere conditions

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Abstract

Flesh browning (FB) is a major storage disorder of 'Cripps' Pink' apples. The aim of this study was to establish when and how during cold storage FB develops in 'Cripps' Pink' apples. Furthermore 1-methylcyclopropene (1-MCP) was tested as a way to curb senescence and ultimately FB, since radial FB has been attributed to late harvest or senescing fruit. Fruit maturity during storage as well as levels and activity of antioxidants plus membrane composition was measured in 'Cripps' Pink' apples. The fruit were harvested at post-optimum maturity (64% starch breakdown) and a flesh firmness of $7.9 \text{ kg}\cdot\text{cm}^{-2}$ from the Vyeboom area (Western Cape, South Africa). One half of the fruit was treated with 1-MCP whilst the control was left untreated. The fruit was then stored under controlled atmosphere (CA) at -0.5°C for either 1, 3 or 5 months followed by 7 weeks in regular atmosphere (RA) and then kept for 7 days under shelf-life at 20°C . Diffuse flesh browning was observed after 3 and 5 months of storage, although the incidence was very low. The rate of respiration was higher in the untreated fruit as indicated by the significantly higher level of internal CO_2 . Firmness and titratable malic acid were significantly higher in the treated fruit than in the untreated fruit. Discriminant analysis showed that longer storage was related to scald incidence and higher internal CO_2 levels. The sterol:phospholipid ratio of the untreated fruit was lower than the ratio of the treated fruit. The positive effect of the 1-MCP treatment on browning and scald incidence could be seen on treated fruit after three months of storage plus RA plus SL compared to untreated fruit. However, after 5 months of storage the treated fruit also had a high incidence of scald, albeit lower than in the untreated fruit.