

**Title** Internal browning disorders in 'Braeburn' and 'Pink Lady': the role of harvest temperature and apoplast composition

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### **Abstract**

'Braeburn' and 'Pink Lady' are commercially important cultivars in New Zealand, with both cultivars susceptible to internal browning disorders. Symptoms of Braeburn browning disorder (BBD) include brown water-soaked patches in the cortex, with cavities occurring in severe cases. In 'Pink Lady', radial browning manifests as horizontal patches that extend from the inner to the outer cortex. Browning tends to be more prevalent in late harvest fruit, with expression exacerbated by controlled atmospheres (CA). BBD can be reduced by pre-CA stand down treatments at 0.5°C for 14-28 days, but it is not known if the same stand down treatments can be applied to 'Pink Lady'. There is limited understanding of the physiological factors that predispose fruit to browning disorders, and the physiology associated with efficacy of stand down treatments. This study explores the concept that apoplastic mineral and sugar composition may be related to BBD incidence and is influenced by the diurnal temperature cycle immediately before harvest. Cold nights (< 7°C) may impede transport of recently imported sugars from the apoplast to the symplast, causing a sugar and mineral imbalance across the cell membrane that may be detrimental to cellular function and tolerance to storage stresses. Results will be reported from experiments in 2005-2007 that relate diurnal changes in apoplast composition to BBD incidence. Preliminary results will also be reported for 'Pink Lady' to determine if the predisposing factors identified for 'Braeburn' are applicable to internal browning disorders in 'Pink Lady'. These concepts could have implications for 'Braeburn' and 'Pink Lady' storage protocols, and for other apple cultivars susceptible to internal browning.