

### Abstract:

There is a high level of variability in development of shrivel and levels of weight loss between apples (*Malus domestica* Borkh.) from different growers in storage. This variability derives from large variation in skin water vapour permeance ( $\text{mol}\cdot\text{s}^{-1}\cdot\text{m}^{-2}\cdot\text{Pa}^{-1}$ ) within populations of fruit. Relationships found between shrivel, weight loss, and water vapour permeance for grower batches were used to develop a prediction system for the New Zealand Pipfruit industry that enables the identification of batches of fruit at risk of developing shrivel in storage. The mass loss segregation system measures water vapour permeance on random samples of fruit from batches of fruit from growers. Predictions of the risk of shrivel developing in batches of fruit during storage were made on 289 and 116 batches of 'Braeburn' and 'Pacific Rose' apples grown in the Hastings region. The mass loss segregation system was validated in 2002 using 500 fruit samples from 49 and 35 batches of 'Braeburn' and 'Pacific Rose' apples taken at harvest, respectively, and stored under commercial conditions for 6 months. Fruit were removed in September 2002 and incidence of shrivel was assessed. The models predicted the groupings of shrivel risk at 55 and 69% accuracy, for 'Braeburn' and 'Pacific Rose' apples. These prediction accuracies are about 40% better than the accuracy expected by random selection at 39 and 49%, respectively. The models predicted 70% and 88% of the batches with high levels of shrivel for 'Braeburn' and 'Pacific Rose' apples, respectively. The successful identification of at-risk batches of fruit will allow the industry to employ appropriate management strategies to minimise weight loss and the development of shrivel in storage.