

Fruit Softening in Apples

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Predictors of post-harvest fruit softening

Fruit softening is a loss in flesh firmness during post-harvest storage.

Apple fruit softening (FS) occurs when cells lose their structural integrity leading to rounded cells with greater cell separation and large intercellular spaces. FS was calculated as a percentage using the difference in flesh firmness between fresh and stored fruit. In a three-season study, conducted across five commercial orchards with trials in 11 orchard blocks in Southern Tasmania, post-harvest FS ranged between 0 and 31.5% (Figure 1).

Predicting fruit softening

This study found that FS had a negative correlation with crop load and a positive correlation with flesh firmness at harvest (Figure 2). This indicates that lighter crop loads and fruit with greater firmness at harvest undergo more FS during storage.

High fruit potassium (K) and potassium:calcium (K:Ca) ratio were associated with an increased FS during storage. Ca plays a critical role in cellular functioning and imparting structural strength, and high levels of K can inhibit Ca uptake, thus increasing FS.

A negative relationship was observed between FS and manganese (Mn). As Mn has a role in slowing down fruit senescence, high levels of Mn will reduce the risk of FS.

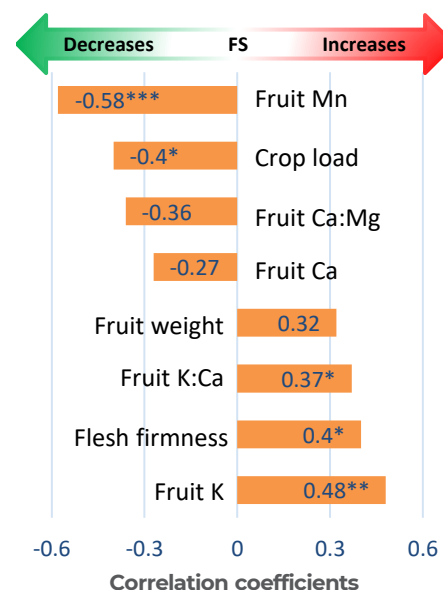


Figure 2: Predictors of apple fruit softening (FS). Spearman's correlation coefficients (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$)

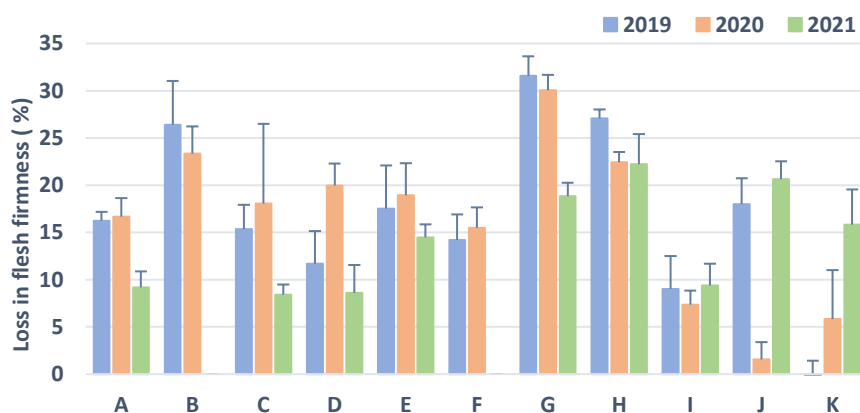


Figure 1: Percentage of post-harvest fruit softening in apples harvested from the five commercial orchards (11 orchard blocks) in Southern Tasmania across three seasons.

Highlight box

- Low crop load and large fruit size increases FS.
- High potassium and low calcium content in the fruit increases while high manganese reduces the risk of FS.
- Optimising crop load in order to regulate fruit size is critical.
- Focus on balancing of mineral nutrients, especially potassium and calcium.

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