

Reducing the impact of late season rainfall is not an easy task. The frequency and intensity of late season rainfall is unpredictable, but ongoing research aims to generate important results that will be directly applicable to orchard practice.

### Calcium and Cracking

Calcium has long been associated with increased resilience to cracking, increased firmness, increased storage duration and increased yield. This all depends on calcium actually getting to the fruit. Early accumulation is vital through the vascular system but calcium accumulation across the fruit skin has not been extensively explored. Applications of calcium via overhead irrigation after rainfall events during the more cracking susceptible Stage III of cherry growth has had some success in international studies, but results are inconsistent.

Studies of apple report that foliar calcium uptake is possible, but some disagreement on timing exists with some in support of early and others for late, uptake in fruit development. Foliar applications have also been associated with changed distribution of calcium throughout fruit tissues which may explain the inconsistent results regarding total calcium levels and impact on quality. Early and repeated spray patterns for calcium uptake are supported.

This ongoing HIA funded study undertaken in Tasmania was designed with two objectives; to assess the effectiveness of foliar applications of calcium compared to fertigated applications, and to assess uptake of foliar applications during different developmental stages.



In the first year of this study 2 trials were undertaken. Trial 1 applied calcium through fertigation (two-line dripper system) and through foliar applications (low-volume sprayer to run-off). Trial 2 applied fertigation as per commercial operation, with additional foliar applications of calcium at early (Stage I) or late (Stage III) fruit development stages, or completely throughout the season (from Stage I and through Stage III).

Calcium levels (expressed as mg/kg dry weight) at stage II (pit-hardening) and at maturity were determined from aggregated samples after wet digestion followed by analysis using an ELEMENT 2 High Resolution Inductively Coupled Plasma Mass Spectrometer (ICP-MS).

In the second year, the trials were repeated to confirm the difference in calcium levels resulting from foliar and fertigated applications, and to assess the impact of application type on fruit cracking. 'Sweet Georgia' cherry trees on Mazzard were used in all trials.



# Reducing the impact of late season rainfall

## Rain and cracking



### Calcium application

Calcium levels were not significantly different between application types in Trial 1, at either Stage II, or at harvest maturity. There was a significant increase in calcium levels in the fruit skin from the foliar applications; the mean skin calcium concentration from the foliar treatment was  $436 \pm 17$  mg/kg compared to  $359 \pm 18$  g/kg for the fertigation treatment (Figure 1) confirming that distribution of calcium is different with application type.

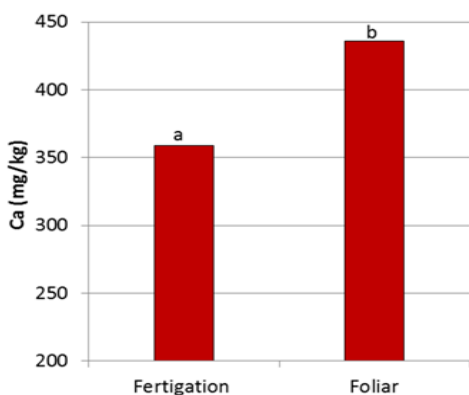


Figure 1. Calcium levels in fruit from trees with calcium supplied via fertigation or foliar application

### Calcium and foliar application timing

In the first year stem retention increased with early or full foliar applications (Figure 2A) while fruit firmness only increased with full foliar program (Figure 2B). In the second year no significant effect of application timing was seen, but there was a trend towards larger fruit with a complete foliar program.

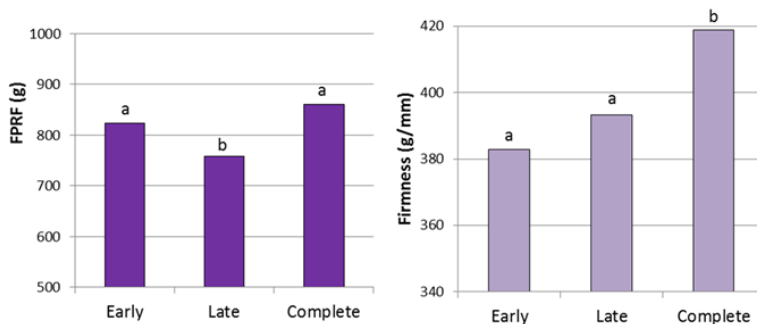


Figure 2. Stem retention (or fruit pedicel retention force (FPRF)) (A) and fruit firmness (B) at harvest maturity from fruit subjected to early, late and complete foliar calcium programs.

### Calcium and fruit quality

In the first year there were no significant effects of fruit calcium levels at harvest on fruit size, sugars, acidity or firmness. In the second year, but there was an effect on stem retention (Figure 3). The foliar treatment resulted in higher stem retention; this was related to the calcium levels in the skin. The second year also saw significantly higher stem retention with foliar applications.

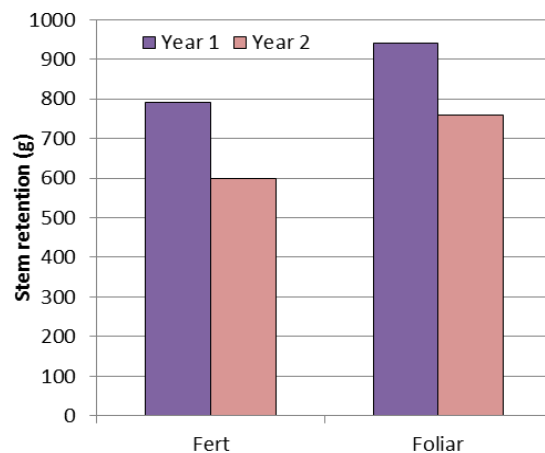


Figure 3. Increased stem retention from foliar applications over 2 years

### Calcium and cracking

In the first year no rainfall was recorded for the 3 weeks prior to harvest; assessment of cracking in these trials revealed less than 1 % cracking in trees from all treatments. In the second year, cracking was noticed, but with no difference between treatments in total cracking. However, the foliar treatments had a higher proportion of side cracks

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