Future Orchards Demonstration Trial: Final Report

Project title:	Bitter Pit Treatment of Apples with Calcium Foliar Fertilisers
Region:	Southern Victoria
Contact:	Angus Crawford and Petar Bursac
Projective Objective:	**Objective**: To trial different formulations of calcium foliar fertilisers following their respective programs to reduce the onset of bitter pit. Bitter pit is a physiological disorder of apples causing serious losses of fruit which is unmarketable. Bitter pit may not be evident at harvest but develops in stored fruit and can result in extensive loss from storage.  Photo 1: Classic bitter pit symptoms

Outline/method:	**Location:** Atlanta Orchards, 1194 Stumpy Gully Road Moorooduc VIC 3933 **Demonstration trial design:** The trial was set up as a large block un-randomised design consisting of three treatments: 1. First treatment with Wuxal Ca (complex calcium fertiliser) 2. Second treatment Standard calcium chloride - STOPIT 3. Control (untreated row of apples) The variety was Golden Delicious which is known to be susceptible to bitter pit. The block also has a history of bitter pit. Plot size was two rows per treatment and one row for the untreated.

Photo 2: Farm map of where trial was located

Photo 3: Trial rows

Rates of application and timing:
Wuxal Calcium applied at 8 L/ha (product label recommendations)

Calcium Chloride at 10 L/ha (product label recommendations)

Treatments were applied seven times between 11 November 2015 and 10 February 2016 at approximately 2 week intervals using a commercial air-blast sprayer.

Commercial Harvest Date: 08 March 2016

Assessments:

Assessments were timed to be 12 weeks after commercial harvest to allow time for bitter pit expression of symptoms to occur.

	Assessment Date: 02 June 2016 **Assessment method:** At harvest on 08 Mar 2016 the orchard was inspected for visual signs of bitter pit risk such as excess vigour as well as a visual inspection of the fruit. The fruit was stored in controlled atmosphere At 12 weeks after harvest Assessment were conducted on the external and internal symptoms of bitter pit. 100 fruit were randomly selected and inspected for presence or absence of external bitter pit. Severity was not assessed because from a commercial standpoint the fact that the disorder is slight or severe is not particularly relevant as the fruit is unmarketable. In addition, 10 fruit were randomly selected, cut open and inspected for internal bitter pit.

Results and Discussion:

Fruit which was stored showed more external signs of bitter pit rather than internally. The main result from the external assessment were:

Treatment	**Percent Fruit Affected**
Wuxal:	2% damage
Standard Calcium Chloride:	3% damage
Untreated control:	11% damage

Both treatments gave good and similar control of bitter pit compared to the untreated control.

Due to the un-replicated design these are considered numerical differences where no statistically meaningful results can be determined. Even so, the differences show that both calcium based treatments had a role in the reducing the incidence of bitter pit compared to where no calcium treatments were applied.

The internal inspection had just one fruit show internal symptoms of bitter pit from the untreated and as a result no treatments responses were seen.

This trial reinforces that calcium plays a major role in reducing the disorder but does not cure it. Calcium programs need to start from petal fall and continue frequent applications up until harvest.

Many other factors contribute to bitter pit which are most commonly low water availability, climatic factors (eg: hot days shut down transpiration in leaves and calcium transport), nutrition imbalances (in particular N, K, Mg), excess vigour, crop load, and the susceptibility of the variety all play a role.

Photo 4: Golden delicious with bitter pit taken on 02 June 2016

Photo 5: Fruit bin of untreated control 11% damage taken on 02 June 2016

Photo 6: Top of fruit bit treated with standard calcium chloride program with 3% damage taken on 02 June 2016

Photo 7: Top of fruit bin treated with Wuxal calcium with 2% damage taken on 02 June 2016