Focus Orchard and Trials Update - Southern Victoria & Tasmania
July 2019

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Southern Victoria Focus Orchard Update

Montague Orchards, Narre Warren

Goals
It’s important on any orchard to set goals and then monitor your progress. There were three clear goals with this Focus Orchard:

1. To be more precise with setting crop loads & fruit size. Take the guess work out.
2. To consistently grow high-quality fruit – reduce pack-out losses; minimise Pit & Blotch, Lenticel breakdown and stem splits.
3. Young Tree Development; To fill the allotted space as quickly as possible

Montagues hosted the June/July 2019 Southern Victorian Futures Orchard Walk. Many topics were discussed including pruning, crop load, nutrition and drainage.

Crop load

*Smitten blocks J1 & J2*

These blocks are double planted twin stems spaced at 400mm providing 11,904 stems/ha on a V-trellis training system.

Setting the optimal crop load on the young intensively planted Smitten blocks are important. Too high and it will stunt the growth of the leaders to reach the top wire. Too light and you sacrifice economic yield. Crop load also influences fruit quality. For young trees, setting crop load based on the trunk circumference area (TCA) is a reliable way to determine fruit numbers per tree.

Smitten (J2), planted in 2016 had their first harvest in 2019, achieving 22T/ha. Severe birds and bats attacks meant 25% of this fruit didn’t make it to the pack house. This year the target is 38 T/ha, or 19 fruit per stem picked so the post-hand thinning target is 21 fruit/stem (10% loss from thinning to harvest).

Smitten (J1), a year behind J2, made excellent growth last season and have now almost caught up to the J2 block. The target this year is 14 fruit/stem picked so targeting 16 fruit/stem post-hand thinning. This equates to 6 fruit per TCA. Based on an average fruit weight of 170 grams, this will achieve a yield of 30T/ha.
The field walk participants agreed that these crop loads will hit the target of maximising Class 1 yield whilst also still achieving canopy fill.

Figure 1. Smitten block J1. V-trellis, Planting density 4.2m x 0.8m, double planted, twin stems, leaders 0.4m apart, 11,904 stems per ha

Fruit Size

*Buckeye Gala*

This block was planted in 2005 on M9 at 3600 trees/ha and trained as on a V-trellis 2D system with branches trained into a horizontal position. It consistently crops at 75-78T/ha year-in-year out. The main issue is small fruit size. Fruit size has been getting smaller each year. It’s currently averaging at an 80 count (12 kg box) which equates to a 150-gram average fruit. The goal is to lift fruit size by ½ - 1 count size.

There are a couple of management practices to help with fruit size which will be tried this season.

Renewal pruning. It was noted that there is far too much old wood in the trees. Research from many years ago demonstrated that 2 year and 3 year old wood gave the best sized fruit in Gala. Pruning this year will focus on retaining more renewal wood. The aim is to start to replace some of the older less productive branches over the next few seasons. This strategy should help improve fruit size over the medium-term as the trees are rejuvenated.

The other strategy which may help in the current season is a Double C girdle. The idea here is to intercept the carbohydrate flow in phloem back to the roots and thereby hold the carbohydrates up in the canopy for longer in the growing season which in-turn increases fruit size. Timing is crucial to gain maximum effect. Going too early will lead to less thinning affect of the chemicals and hence not aid fruit
size. Going too late limits the trees ability to heal the girdle before harvest leading to advanced background colour. Late November was recommended.

It will be interesting to follow this block following the implementation of these strategies and monitor the changes in fruit size.

Figure 2: A/Buckeye Gala. M9. Planted 2005. 3,600 trees/ha (3.65m x 0.76m). V trellis. Cropped at 130-150 fruit/tree. 150 gram/fruit. Target: 75 – 78 T/ha.

Southern Victoria Trial Update

In Southern Victoria two trials were conducted by the local FLA, Camilla Humphries (EE Muir and Sons).

1. To assess Dormancy breaker sprays on flowering and harvest timing.
2. To assess ReTain on fruit colour, pressure, drop and storability.

The Retain trial has yet to be concluded but the dormancy breaker trial has been finished. This update provides a brief summary of the findings from the dormancy breaker demo trial.

Dormancy Breaker Trial

The aim of this trial was to compact the flowering period of Jazz and bring forward the harvest date. The trial also investigated how these changes impacted on orchard management and fruit quality.

Two commercially available dormancy breaker products were used, Erger™ and Waiken™.
Treatments.
The trial was split into two blocks each with an untreated control. Block 1 received an early application of Erger™ with the aim of advancing flowering. Block 2 received two treatments of Waiken™ and Erger™ which was applied later with the aim of compacting flowering (Table 1).

Table 1. Treatments.

<table>
<thead>
<tr>
<th>Block</th>
<th>Treatment</th>
<th>Application Date</th>
<th>Predicted days before bud break</th>
<th>Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Erger®</td>
<td>01/08/18</td>
<td>40</td>
<td>advance flowering</td>
</tr>
<tr>
<td></td>
<td>2. Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1. Erger®</td>
<td>14/08/18</td>
<td>35</td>
<td>compact flowering</td>
</tr>
<tr>
<td></td>
<td>2. Waiken™</td>
<td>15/08/18</td>
<td>35</td>
<td>compact flowering</td>
</tr>
<tr>
<td></td>
<td>3. Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results.
The early Erger application was the only treatment that had a significant effect. Flowering starting 5 days early with full bloom 6 days earlier than the control. Flowering was also more evenly distributed throughout the tree. Harvest started 4 days earlier and was more condensed, finishing within a 13-day period compared to control which was over a 17-day harvest window. The other treatments had no effect over control (Tables 2a & 2b)

Table 2a. Results summary.

<table>
<thead>
<tr>
<th>Blk</th>
<th>Treatment</th>
<th>Application date</th>
<th>Green-tip date</th>
<th>Full bloom date</th>
<th>Harvest start date</th>
<th>Harvest finish date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Erger®</td>
<td>01/08/18</td>
<td>10/09/18</td>
<td>30/09/18</td>
<td>17/03/19</td>
<td>30/03/19</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>01/08/18</td>
<td>10/09/18</td>
<td>06/10/18</td>
<td>21/03/19</td>
<td>08/04/19</td>
</tr>
<tr>
<td>2</td>
<td>Erger®</td>
<td>14/08/18</td>
<td>19/09/18</td>
<td>06/10/18</td>
<td>21/03/19</td>
<td>17/04/19</td>
</tr>
<tr>
<td></td>
<td>Waiken™</td>
<td>15/08/18</td>
<td>19/09/18</td>
<td>06/10/18</td>
<td>21/03/19</td>
<td>17/04/19</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>18/09/18</td>
<td>04/10/18</td>
<td>21/03/19</td>
<td>17/04/19</td>
<td></td>
</tr>
</tbody>
</table>
Flowering assessments were carried out on the 29/09/18, 01/10/18 and 08/10/18. The early Erger application when assessed on the 01/10/18, petal fall was about to commence while the untreated control was still at 37% flowering (figure 1). Photos taken on the 01/10/18 clearly show the difference (figure 2.)

![Early Erger application (01/08/18)](image)

**Figure 3.** Percentage flowering on the early Erger treatment compared to control.
Figure 4. Photos taken 01/10/18 from the early Erger treatment verses control. Note the more advanced flowering with the Erger treatment at 80% full bloom compared to control at just 40% full bloom.

**Key Findings.**

1. The early Erger spray applied 40 days before green tip date was the only treatment that was effective by:
   a. Advancing full bloom date and producing a more even flowering distribution throughout the canopy.
   b. This led to earlier fruit set and the fruitlets being more even in size. Secondary thinning sprays were consequently more effective.
   c. Harvest date was advanced and more compact. This allowed harvest to be completed within the ideal maturity window. This is likely to improve fruit quality and storability.

2. This trial highlighted the importance of timing of dormancy breaker sprays. Every season is different and will impact on bud burst and flowering dates. Growers are encouraged to monitor and record:
   a. Localised chilling data. Use the Chill Calculator website to access and accurate local winter chill data. [https://hort-science.shinyapps.io/ChillCalculator/](https://hort-science.shinyapps.io/ChillCalculator/)
   b. Green-tip (budburst) dates (5% of buds showing green tip).

Collecting this data over time will provide more reliable guidance as to the need for dormancy breaker sprays and then the best timing of application for optimal effect.

**Acknowledgements**

Special thanks to our FLA, Camilla Humphries (Southern Victoria) who conducted this trial, the growers whom kindly allowed these trials on their orchard, David & Sue Finger (South Victoria) and the local Community Orchard Groups who supported this work.
Hansen Orchards hosted the recent Future Orchards walk for the Tasmanian region. It was held at the Derwent Valley block. Of interest was the Jazz block.

This block is coming into its 5th leaf this season. It produced 50T/ha last year of good quality fruit. Not bad for just its second crop. Unfortunately there has been virtually no extension growth and the tops are struggling to full in their allotted space. If we cannot invigorate the block, then full canopy will be hard to achieve, and yields will plateau well below the optimum potential. Water management, pruning, soil health and netting are all management inputs than could help.

Water management.
The irrigation system is currently a single-line drip. The very dry and hot summer opened deep cracks in the soil and effectively created drainage channels for the irrigation water. So, despite enough water being applied, the distribution of this water via the drip was being directed away from the feeder roots. The suggestion was to install a second drip line on outriggers down the row as shown below in Figure 5.

Figure 5. Drip irrigation on double tram lines.
Pruning
There is far too much bud in the tops (Figure 6). High bud density will lead to high flower load and lower vigour. Prune to optimum bud load which we believe is 2-2.5 buds per target fruit. Lower fruit numbers in the tops with help promote more growth. Consider also GA applications in the tops only.

Figure 6. Jazz. Un-Pruned tree on left, pruned tree on right. Note the dense bud numbers on the un-pruned tree and the poor extension growth if any. The challenge is to reinvigorate the tops so they can fill their allotted space.

Neting
The post structure is already in-place waiting for netting. Netting will help with soil moisture conservation, less sunburn, less wind rub, higher photosynthetic efficiency so more growth.
Tasmanian Trial Update

Envy Apple Eating Quality

The Future Orchards Demo trial in Tasmania for the 2018-19 season set out to investigate Envy apple eating quality. Envy apple is marketed on its superior and unique taste. A consistently excellent eating experience is important for this variety to deliver on the marketing promise of “taste the difference”.

Envy is a relatively new variety to the Tasmanian region and growers have expressed concerns over variability in Envy eating quality. The Tasmanian COG (Community Orchard Group) were interested to find out if the variability is related to crop load, maturity or dry matter differences.

Sophie Folder, Tasmanian’s FLA, conducted the trial on Hansen Orchard in the Huon Valley, Tasmania. This update is a brief summary of her work with a special focus on the taste test results which were conducted during the recent orchard walks.

Treatments

The Trunk Cross Sectional Area (TCA) of the trees in the trial block were measured. Five crop load treatments were allocated as follows:

1. 2-4 fruit per TCA
2. 5-6 fruit per TCA
3. 9-11 fruit per TCA
4. 13-14 fruit per TCA
5. 16-19 fruit per TCA (un-thinned control)

Hand thinning took place in late November to set the desired crop load as per treatment.

Measurements

Fruit dry matter (%) was assessed 3 weeks prior to harvest. Maturity assessments at harvest included Background colour (BGC), Pressure (kg), Brix (TSS), Starch Pattern Index (SPI), Greasiness and Fruit Weight (g). Fruit were placed in cool storage for 10 weeks. Maturity assessments for BGC, Brix, Pressure & Greasiness were reassessed post-storage.

An important component of this trial was a taste test. This was conducted during the recent Future Orchards Orchard Walks on the 05/07/19. Fruit from all the treatments were removed from cool storage 7 days prior to the taste testing assessment. This was to bring the fruit to ambient temperature and simulate the retail environment of fruit on the shelves. Growers who attended the orchard walk were invited to participate in the taste panel.
The following results focus on the testing results. The full report will not be available until later in spring where Sophie will present them in the upcoming Spring/Summer Future Orchards orchard walks.

**Taste Test Interim Results**

Growers were invited to rank fruit from each treatment on a scale of 1 - 5, where 1 is a poor experience and 5 an excellent experience. Four categories were assessed; Texture, Juiciness, Sweetness & Flavour (figure 3).

![Taste Panel Interim Results](image)

**Figure 3.** Taste panels interim results; Flavour, Sweetness, Juiciness & Texture

The treatment with the cropload of 5 - 6 fruit per TCA was consistently higher across all four categories. The treatments with the higher crop loads was much more variable across the taste categories with Juiciness performing well but Sweetness and Flavour coming much lower.

The taste panel was then asked to vote for their favourite apple. Again and overwhelmingly the 5-6 fruit per TCA treatment came in top receiving just over 40% of the votes followed by the lowest cropload treatment. The high crop load treatments again were considered the least tastiest with only 4% of the vote (figure 4).
Figure 4. Votes for favourite Apple

Figure 5. Sophie setting up the taste test.

Figure 6. Growers participating in the taste test
Would you purchase that fruit again? This is the key question. Would you come back for more? Here the 5-6 fruit per TCA treatment really stood out (Figure 7). The high crop load treatments came in much lower and reflected the inconsistent experience they had in terms of Flavour, Sweetness, Texture and Juciness.

![Bar chart showing chance of purchasing fruit again](chart.png)

Figure 7. Taste panel interim results: Chance of purchasing that fruit again

Summary

This demo trial appears to link crop-load with consumer taste experience. There will be a crop-load sweet spot where the tree is neither under or over cropped trees. Reducing variability across the orchard with the appropriate crop load strategy will be important to consistently deliver an excellent taste experience of Envy.

It will be interesting to see how this taste test results relate to the emperical data gathered in-terms of Dry matter, Brix and Pressure. Look out for the final report due out in the Spring.

Finally it was pleasing to see the growers who attended the orchard walk were highly engaged and enjoyed participating in the taste test and contributing to this most relevant demo trial.

Acknowledgements

Special thanks go to Sophie Folder (Tasmania) who conducted this trial, the growers whom kindly allowed this trial on their property, Hansen Orchard (Tasmania) and the local Community Orchard Groups who supported this work.