

## Future Orchards Trial Final Report: Managing crop load on young Envy plantings

<b>Project title:</b>	Managing crop load on young envy plantings
<b>Region:</b>	Tasmania
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<b>Projective Objective:</b>	To compare the impact of crop load on tree growth in a year 2 Envy apple planting

<b>Outline/method/</b>	<p><b>Background</b> Several young Envy plantings have been established in Tasmania in 2015-16 season. As Envy is a new variety for Tasmania growers are still learning the best way to establish these plantings and what crop load can be carried in year 2 without jeopardising the growth of the young trees. Advice from NZ growers and consultants suggests not over cropping in year 2 as it will jeopardise tree growth and fruit quality at harvest.</p> <p><b>Method</b> <u>Aim:</u> to compare the effect of varying crop load on tree leader growth and canopy cover in a year 2 Envy apple planting.</p> <p><u>Location:</u> The trial was undertaken on a Year 2 Envy planting (planted in 2015) at Hansen Orchards at Grove in the Huon Valley region Tasmania.</p> <p><u>Treatments:</u> Trial treatments were:</p> <ol style="list-style-type: none"> <li>1. Nil fruit on tree (Control)</li> <li>2. 2 fruit per TCA</li> <li>3. 4 fruit per TCA</li> <li>4. 6 fruit per TCA</li> </ol> <p><u>Method:</u> Treatments were planned to involve a set crop load on trees according to measured trunk cross sectional area (TCA) ranging from 0 – 12 fruit per TCA. Due to variable flowering there was insufficient fruit set to enable hand thinning for crop load within the trial area. Naturally set crop load and tree growth was assessed on 40 trees in the trial area in February 2017. Trees were grouped to a crop load per TCA treatment according to the February 2017 assessment and ranged from 0 – 6 fruit per TCA.</p> <p><u>Measurements:</u></p> <ul style="list-style-type: none"> <li>• Trunk Cross sectional area (TCA) (August 16, February 17)</li> <li>• Crop load (February 17)</li> <li>• Central leader growth (Feb 17)</li> <li>• Lateral limb numbers and growth(June 17)</li> <li>• Photos (August 16, September 16, January 16, February 17 &amp; June 17)</li> </ul>
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## Results Summary and Discussion

### Observations

A full list of the trial activities and observations is listed in Table 2 found in Appendix 1 of this report.

### Flowering

There was variable flowering and poor fruit set in trial site, which meant that the planned crop loads for the trial were unable to be set at the time of hand thinning in November. It was suggested that the stronger trees had less flowers it was thought that gibberellic acid use on these trees in the previous season may have possibly affected bloom.

### Crop Load

Crop load and TCA was measured on 40 trees in the trial area in February 2017, results are shown in Table 1.

**Table 1: Measured crop load per TCA & number of trees per treatment, 24 February 2017**

Treatment	Crop load per TCA	Number of trees
1	0	14
2	2	11
3	4	6
4	6	8
-	8	2

Crop load in the trial area ranged from 0 to 99 fruit per tree with an average of 27 fruit per tree. Fruit per TCA ranged from 0 to 8 fruit per TCA and averaged 3 fruit per TCA.

The data was excluded for the 2 trees with 8 fruit per TCA trees as there was insufficient replication of this crop load to be considered as a treatment.

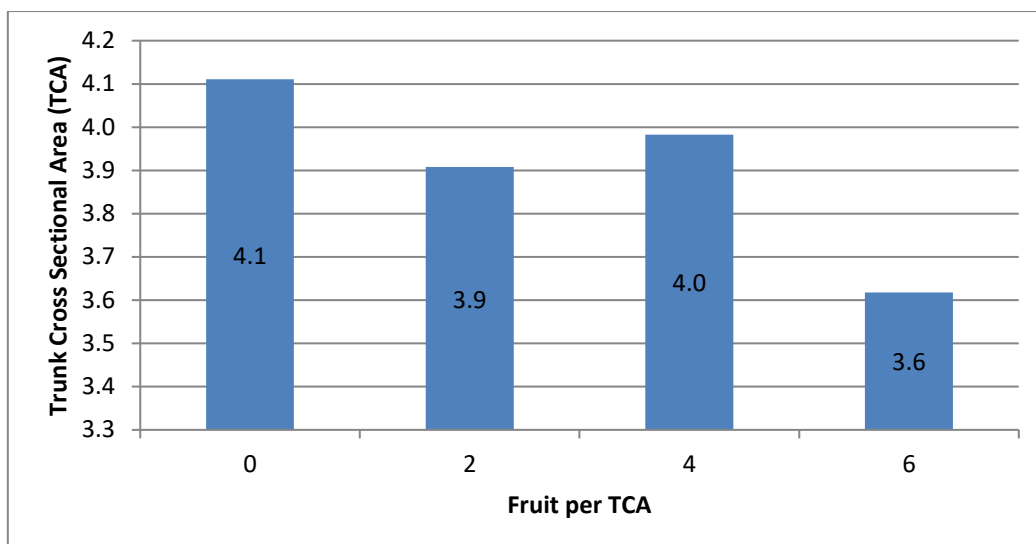
### Tree growth

Tree growth was measured by recording TCA, central leader growth, lateral limb growth and the number of limbs on the trees.

TCA growth was calculated by comparing TCA measured in August 2016 and February 2017. The TCA growth compared with tree crop load is shown in Figure 1. There is little difference in TCA growth between the trees with 0, 2 and 4 Fruit per TCA ranging from 3.9 to 4.1 TCA growth. This suggests these crop loads were not high enough to significantly impact on trunk growth over the growing season. The trees with 6 fruit per TCA recorded on average lower TCA growth of 3.6 Cm<sup>2</sup>, suggesting a possible impact of crop load on trunk growth.



**Image 1: Left: Low crop load (0 fruit/TCA) vs Right: high crop load (8 fruit /TCA) 24/02/16**

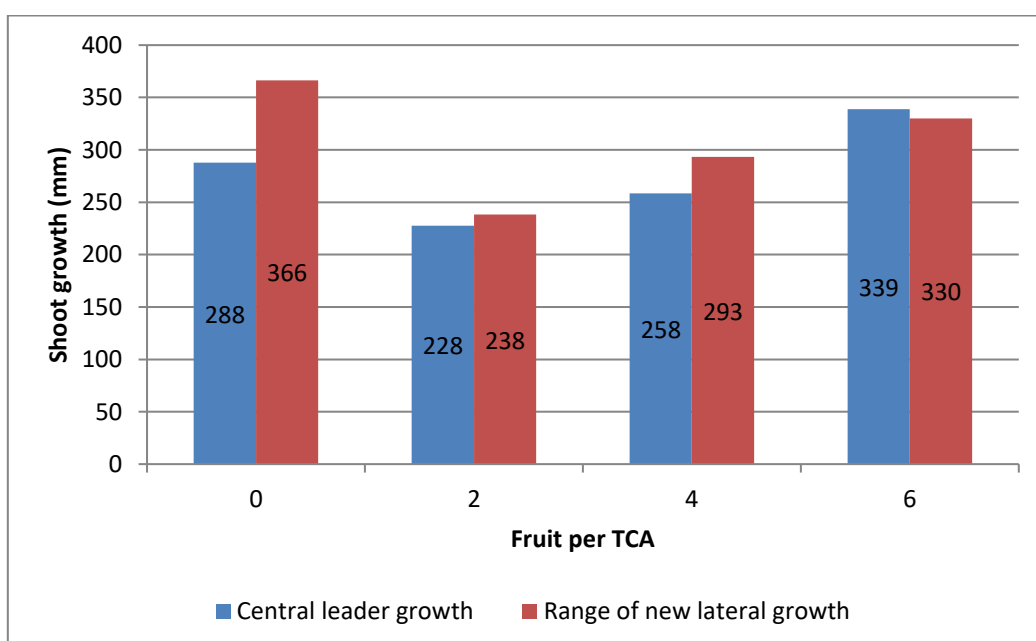


**Figure 1: Crop load vs TCA growth (August 2016 – February 2017)**

Central leader growth was measured in February 2017; results are shown in Figure 2. There was little effect of crop load on central leader growth. A powdery mildew infection in the trial area in January 2017 impacted central leader growth and is thought to have led to an earlier than expected termination of growth in February 2017.

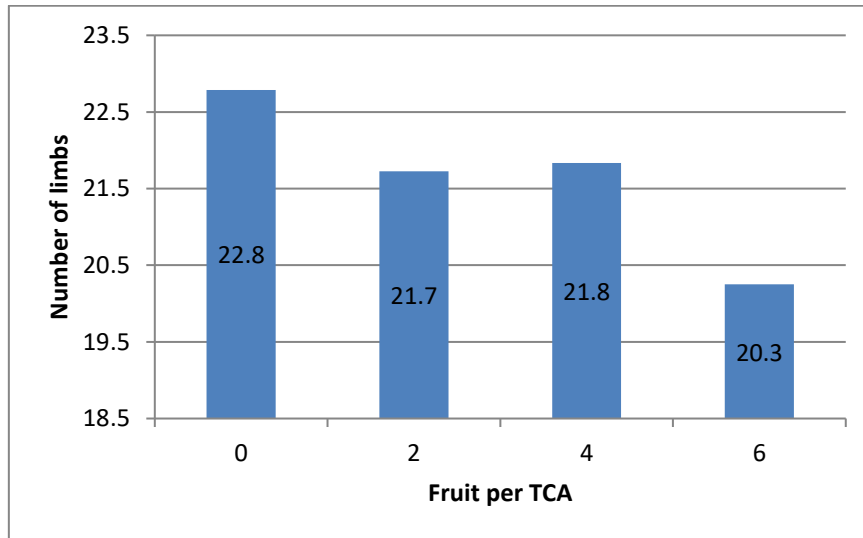
Lateral growth was measured as the minimum and maximum lateral limb growth on the tree above the second wire of the trellis. The average range of new lateral growth was then calculated; results are shown in Figure 2.

Trees without crop load recorded on average a greater range in new lateral growth for the season with 366mm. These trees had a larger range of new lateral growth compared to central leader growth as shown in Figure 2 in comparison to the trees with a crop load.

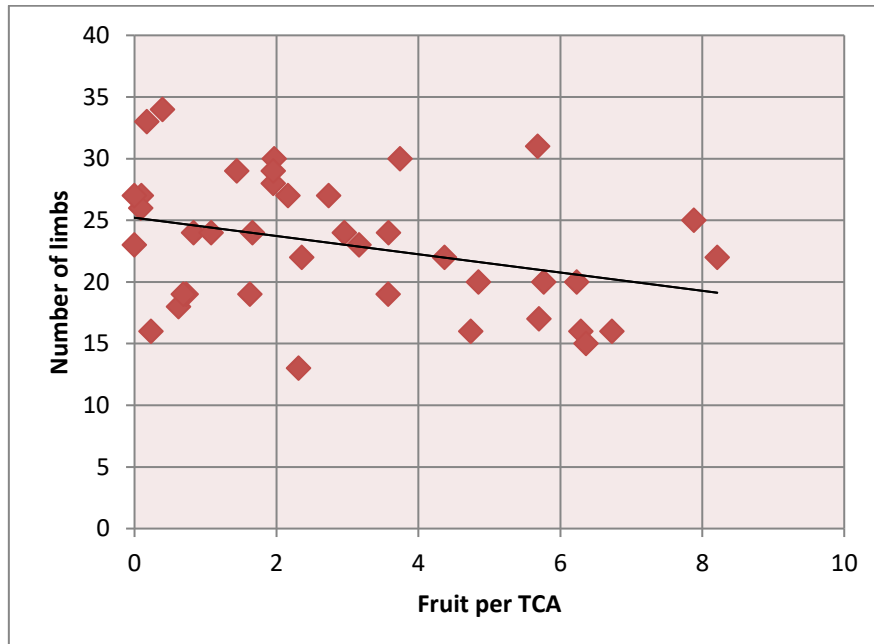


**Figure 2: Crop load vs tree growth (central leader and lateral), February & June 2017.**

Number of limbs was recorded in June 2017; results are shown in Figures 3 and 4. The results show a slight trend in crop load vs number of limbs with the higher crop load (6 fruit / TCA) recording on average less limbs (20.3 limbs) than the control (22.8 limbs). The scatter graph in Figure 4, showing all trees assessed for crop load and number of limbs also demonstrates this trend for less limbs with higher crop load.



**Figure 3: Crop load vs average number of limbs per tree, June 2017.**



**Figure 4: Crop load vs number of limbs per tree**

## **Implications**

It is difficult to draw conclusions from the trial due to the high fruit set variability in the trial area. Although the following points can be drawn from the results;



- Trees without any crop load had a higher range in lateral growth recorded at the end of the season.
- There was a slight trend in less lateral limbs per tree with higher crop loads.





## **Recommendations**


The following recommendations can be drawn from the trial.

- That the trial be repeated to allow for setting of higher crop load.
- That the link between gibberellic acid use on young trees and bloom the following season be investigated by a literature search or future trials.

**Appendix 1: Activities undertaken**

Milestones	Date	Comments & observations	Photos
<p><u>Trial setup</u>                      Measure TCA of trees in trial area and assign crop load based on TCA measurement.                      Take photos.</p>	<p>Late August 2016</p>	<p>Measured average tree row volume for the trial block.                      Photos taken.</p>	 <p>Trial view August 2016</p>
<p><u>Trial visit</u>                      Take photos</p>	<p>September 2016</p>	<p>Photos taken</p>	 <p>Trial view September 2016</p>
<p>Planned hand thinning to set crop load on selected trial trees</p>	<p>Late Nov 2016</p>	<p>No fruit to hand thin on trial site, therefore crop load was not set according to the original trial plan.</p>	

Milestones	Date	Comments & observations	Photos
<u>Records Measurement 1</u> Take photos	Early January 2016	Photos taken. Measurements not completed due to poor fruit set. Powdery mildew infection present in trial area.	  Trial view January 2017      Powdery Mildew infection
<u>Trial re-defined &amp; records measurement 2</u> Measure central leader growth, crop load and TCA Take photos	24 February 2017	Measuring central leader growth, trunk circumference / TCA and fruit numbers (crop load) per tree. Photos taken. Crop load measured on trees ranges from 0 – 8 fruit per TCA (based on Feb TCA measurements). Central leader termination noted in trees.	  Counting fruit numbers      Measuring central leader growth
<u>Orchard walk / field day</u>	24 March 2017	Orchard walk look at trees and discuss block growth and management for the season.	

Milestones	Date	Comments & observations	Photos
<p><u>Records measurement 3</u>            Measure Lateral Limb numbers and growth.            Take photos</p>	<p>9 June 2017</p>	<p>Lateral growth was measured by counting the number of limbs on each tree and the range on limb growth (minimum and maximum) above the second wire, see blue line indicated in picture.            Photos taken.</p>	 <p data-bbox="1610 596 2040 625">Number of limbs: left 34 vs right 14</p>