Focus Orchard Trial: Alternative treatment to reach full canopy

Orchard: Battunga Orchard

Orchardist: Mark Trzaskoma

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Objective

Block 31 at Battunga Orchard is 1.3 ha of Brookfield Gala on M9 planted 2006, at 3.7m by 1.5m (1800 trees/ha). It has never achieved good production primarily due to very poor canopy development (Fig1).

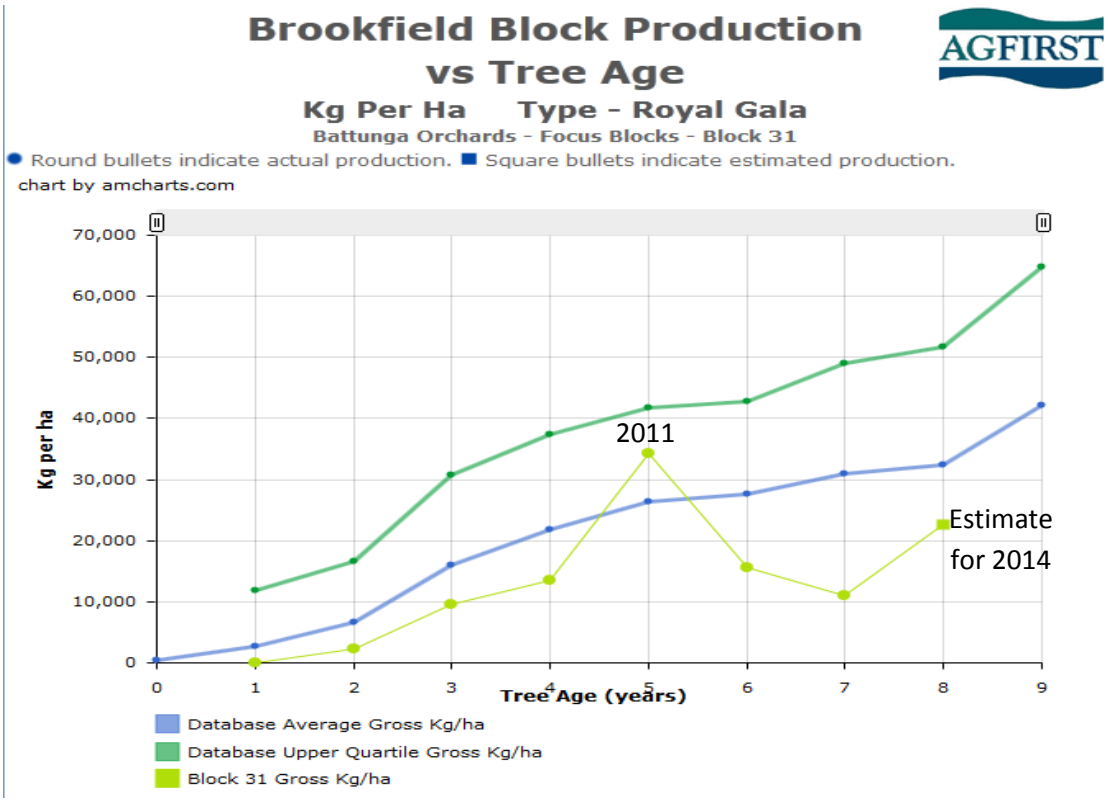

Figure 1 Yield history

The Question

Planted in 2006 this block of Brookfield Gala was well below full canopy in 2012 (Year 6). It producing 34.2 t/ha (20t/ha increase) in 2011 (5th leaf), but the following yield in 2012 (6th leaf) was back down to only 15t/ha. Clearly something needed to change.

In the 2012/13 growing season, Battunga's manager, Mark Trzaskoma decided that he needed to do something drastic to try and increase canopy development. The Focus Orchard COG agreed and decided to add some additional treatments as a trial.

All trees were severely pruned to try and encourage leader extension (Figs 2 and 3). Other than hard pruning, the treatments that were investigated included:

1. a heavy nitrogen fertilization program,
2. gibberellic acid applications,
3. reduced crop load (reduced by 82%) or very low crop load (reduced by 55%)

Figure 3 Pre Pruning

Figure 2 Post pruning

The Treatments

Table 1: Treatments

Treatment 1 - GA-3				
Location	Applications	Date	Target	Rate
Row 32 Bay 2	1	25-Oct	Entire tree	100mg/100L
	2	20-Nov	Top only	
	3	10-Dec	Top only	

Treatment 2 -High N and P fetilization				
Location	Aplication	Stage	Target	Rate (g/tree)
Row 33 Bay 2	1	1-Sep	Hand application	150 MAP
	2	1 Oct		50 CAN
	3	1 Nov		50 CAN
	4	1 Dec		50 CAN

Treatment 3 - Reduced Crop Load				
Location	Control		Hand thinned reduced crop load	
Row 33 Bay 1	22.3 t/ha	75 fruits/tree	12.2 t/ha	41 fruits/tree
			18.4 t/ha	62 fruits/tree

Treatment 4 - T1,2 and 3 combined	
Location	Row 32, Bay1

Treatment 5 - Control	
Location	Row 34, Bay 1

ProGibb G.A. 4ml/L (10% a.i.), 10L/treatment, Translates into 400ppm and 200L/ha

Applied with a knapsack, **Every bay was 10 trees

Results

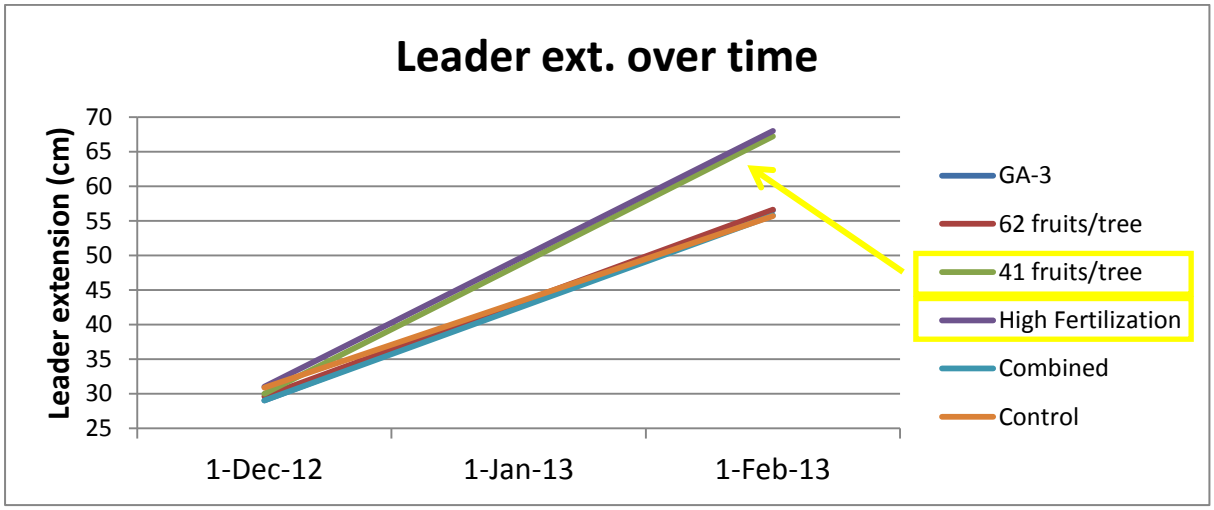

Figure 4 Leader Extension under the various trial treatments

Data represented in Figure 4 shows 2 treatments; very low crop load (41 fruits/tree) and high fertilization, clearly achieving greater leader extension with an average of 68 cm compared to GA-3 application, reduced crop load (62 fruits/ha) and the combined treatment which produced on average only 56 cm. A clear 12 cm difference is separating these 2 groups. Considering the control yielded 55.7 cm, the same as low yielding treatments, it suggests that the hard winter pruning applied on the entire block is responsible for most of the growth in all treatments.

Gibberellic acid was applied at the same rate as the New-Zealand formulations recommended for apple trees (400ppm). The application with a knapsack was equivalent to 200L/ha, a fine mist without runoff. It was applied under good absorption conditions and was not mixed with any fertilizer or pesticide. All conditions for successful results were present except the pH of the water was not buffered. Giberellic acid is ideally applied in acidic water (pH around 5) to maximise uptake.

Water mixed with GA-3 had a pH of approximately 8, significantly higher than the recommended level. This may be one of the reasons why the Giberellic acid treatment had no effect.

The combined treatment did not express combined beneficial effects as would be expected. It was thinned to approximately 62 apples/tree; which on its own, had similar results to the control. It also had 3 GA-3 applications as described in treatment 1. GA-3 on its own also had similar results to the control. On the other hand, high fertilization on its own yielded successful results but when combined with reduced crop load and GA-3 application, showed disappointing results.

When setting up the trial and selecting bays for each treatment, great attention was given to their physical location and variability across the block in an effort to eliminate external factors' impact on results. In a proper scientific experiment, treatments would be randomized however this was not practical for this applied trial. It is possible that the lack of randomisation has contributed to the unexplainable leader extension results.

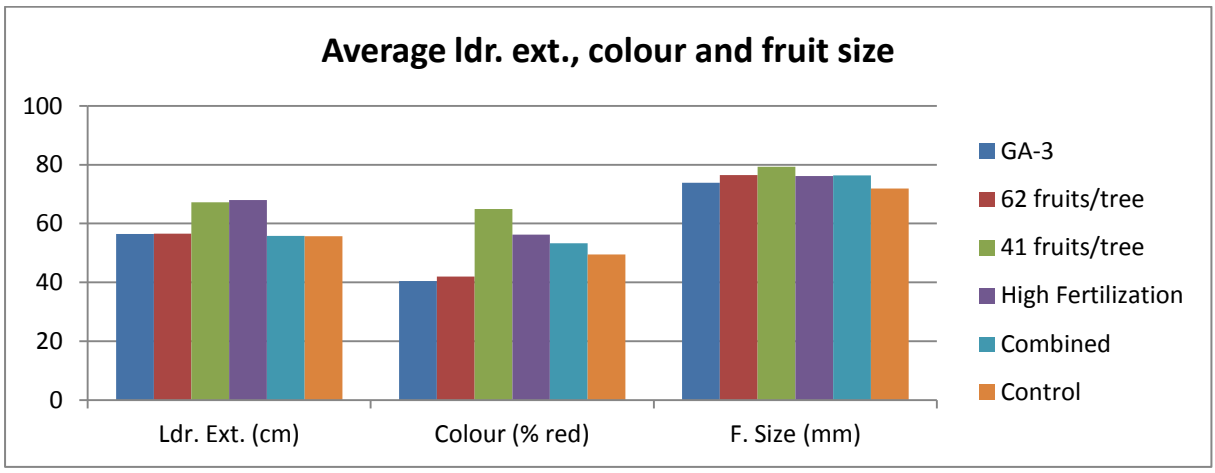

Figure 5 Leader Extension, Colour and Fruit Size

Fruits size average per treatment was 71.9 mm diameter in the control, 79.4 mm on the very low crop load (41 fruits/tree) followed by reduced crop load (62 fruits/tree) with 76.5 mm. The high fertilization treatment is not far behind with 76.2 mm. These results well represent what was expected.

Fruit colour measurements are more surprising with heavy fertilized trees producing fruit with on average 56% of the fruits' surface being red. Most coloured fruits were on very low cropped trees and GA-3 sprayed trees had the worse results for colours with an average of only 42% of fruits' surface being red. This type of data is unfortunately much more subjective than leader extension and fruit size.

These treatments are on a very small scale with only 10 trees per treatment at the most (reduced crop lead and very low crop load only had 5 each) and may not be fully representative.

Summary

The grower is extremely happy that the block overall achieved approximately 50cm leader extension which is well up on any of the previous years. Clearly the heavy winter prune and lighter crop loads established achieved a good vigour response. Of the additional treatments that were imposed, the very light crop load and the heavy N fertilisation gave additional growth. The GA3 treatment had no additional effect but this may have been due to the very high pH water that was used. Some of the unusual results e.g. the non effect of the combined treatment is probably due to the lack of randomisation, which is a limitation of many applied trials.

Overall though some very good learning. The COG may want to repeat a GA3 treatment next year on younger trees using more water, acidified water and the addition of a spreader sticker.