



Outline & Final Report

2013-14 Simple Pruning Rules & Post Frost Root Pruning Demonstration

Batlow Fruit Co-op Ltd, Jilba Orchard, Batlow

Report prepared by

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Department of
Primary Industries



Future Orchards Trial Outline 2013-14

Project title:	Batlow Fruit Co-op – Jilba Orchard Pruning Demo Plots
Region:	Batlow, NSW
Contact:	Kevin Dodds FLA – Batlow District
Projective Objective:	<ol style="list-style-type: none"> 1. Build on local experience and confidence in pruning principles and methods in order to increase the adoption by local growers and staff. 2. Demonstrate basic principles and the value of pruning rules. 3. Address growth and/or productivity issues on two varieties at Jilba Orchard. <p>This is a continuation of the Pruning Demo Plots in the Cottage Fuji & Gala which commenced in 2012-13. This year we will focus on the older style trees to continue to build on the messages of last season.</p>

Outline/method/ (what we will do did):	<p>June 2013 Future Orchards OW held at the Cottage Block Fuji & Gala pruning demo plots. Discussion of next steps held to canvas ideas for the second season of the demos.</p> <p>1st August 2013 Meeting of the Batlow COG (Dodds, McMahon, Wilson & Oag) to re-confirm planned pruning strategies for the demo plots in 2013-14</p> <p>w/c 5th Aug 2013 Winter pruning of the Gala Plots to be completed Only Winter pruning in Fuji to be very limited large limb removal in upper third of canopy of pot No. 3</p> <p>Collection of initial bud counts post-prune</p> <p>Late Sept 2013 Pruning of Fuji Plots in lead up to flowering once flower bud numbers are evident and pruning can be better informed based on flower numbers.</p> <p>November 2013 – Future Orchards OW visit pruning demo plots.</p> <p>December 2013 Hand Thinning & Shoot ripping where needed in pruned plots.</p> <p>Nov 2013 - Harvest 2014 Fruit size measurement in Fuji & Gala on weekly schedule.</p> <p>March-April 2014</p>
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	<p>Pre-Harvest fruit assessments. Avg Size, Fruit Count, Yield, Maturity, Colour</p> <p>June 2014</p> <p>Final Report to the June Future Orchards OW outlining findings over the two seasons of the pruning demo plots.</p>
<p>Block Issues, Pruning Objectives and Rules</p>	<p>Cottage Fuji</p> <p>Vigour and Cropping are out of balance in this block in favour of growth. Variety is in a biennial bearing pattern with the 2012-13 season being an off year. Identity of central leader has been lost and needs to be re-established over time.</p> <p><u>Objective of pruning</u> : Should be coming into an “ON” crop year. However due to some uncertainty, pruning in all plots will be delayed until just prior to flowering at a stage when bud fruitfulness is known.</p> <p><u>Pruning Rules</u> :</p> <p>PLOT 1 – Simple Pruned in 2012-13. These trees look much better than their unpruned neighbours as at Winter 2013. The simple pruning seems to have had a benefit to the incoming season in terms of bud strength, degree of vegetative re-growth and openness of the canopy. The strategy for this plot in 2013-14 will be as follows;</p> <ol style="list-style-type: none"> 1. Where’s my buds? 2. 6\12 O’Clock shoots removed (avoid removing fruitful buds if possible) 3. No large structural cuts this season. 4. Select a single new leader to re-establish tops of the trees. 5. If flowering appears to be strong, prune heavily to a target fruit load in September to reduce load early and aid the correction of the biennial cropping habit. <p>PLOT 2 – This was an unpruned routine plot in 2012-13. The strategy for 2013-14 will be the same as it was for plot 1 last season.</p> <ol style="list-style-type: none"> 1. Where’s my buds? 2. 6\12 O’Clock shoots removed (avoid removing fruitful buds if possible) 3. Avoid large cuts this season that will remove too many of the few fruitful buds. 4. Select a single new leader to re-establish tops of the trees. <p>PLOT 3 – New Plot for 2013-14. Was a routine plot in 2012-13. Strategy will be as follows;</p> <ol style="list-style-type: none"> 1. Where’s my buds? 2. 6\12 O’Clock shoots removed (avoid removing fruitful buds if possible) 3. Make 1 to 2 significant cuts mostly in the top third of the canopy to

try to re-establish a narrow top.

4. Select a single new leader to re-establish tops of the trees.

Cottage Royals

Production has been increasing over last three years, but is still below desirable level in these trees and vigour is a problem. Identity of central leader has been lost and needs to be re-established over time. There are many buds on coral like spurs along the main stem which are likely to produce fruit of questionable quality.

Objective of pruning :

To continue to retain sufficient bud numbers to ensure growth in production in this block. Continue to shift the balance from old spurs, shaded and weak buds to young exposed health buds by reducing coral formations. Start to re-establish leader.

All of the above objectives from 2012-13 were achieved in the simple pruning rules plot (PLOT 1) last season. In 2013-14 we will establish two additional plots as follows.

Pruning Rules :

PLOT 1 - Simple pruned plot in 2012-13.

1. Where's by best buds?
2. 6\12 O'Clock shoots removed.
3. Continue to remove or reduce bulk of "Coral Wood" from main stem.
4. Long prune laterals to simplify structure and encourage weak pendant laterals.
5. Simplify tops and select single leader.

PLOT 2 – Routine Pruned in 2012-13....To be simple pruned in 2013-14 same approach as plot 1 last season.

1. Where's by best buds?
2. 6\12 O'Clock shoots removed.
3. Remove or reduce bulk of "Coral Wood" from main stem.
4. Long prune laterals to simplify structure and encourage weak pendant laterals.
5. Simplify tops and select single leader.

PLOT 3 - This was a routine pruned panel in 2012-13. Strategy for 2013-14 will be as follows;

1. Where's my buds?
2. 6\12 O'Clock shoots removed (avoid removing fruitful buds if possible)
3. Make 1 to 2 significant cuts mostly in the top third of the canopy to try to re-establish a narrow top. Select a single new leader to re-

establish tops of the trees.

NOTE : The panel above PLOT 1 Gala was pruned according to recommendations given to BFC by Marcel Veens – Horticultural Consultant in July 2013. On observation 1st Aug 2013, there seemed to be several major structural cuts on each tree. Other than that, the pruning strategy seemed to be very similar to that employed in Plot 1 last season.

Milestones	Planned Date or Completion Date
Trial defined	Aug 2013
Trial setup	Aug - September 2013
Records Measurement 1 Photo evidence	September 2013
Field day	November 2013 & June 2014
Records measurement 2 Photo evidence	Harvest 2014
Reporting	Final report June 2014
Presentation growers	June 2014 OW

MAP & Layout: Batlow Fruit Co-op Ltd – Jilba Orchard Map showing location of 2012 pruning demo plots.



Cottage Fuji's

Observations during pruning included;

Plot 1 simple pruned last season, was much easier to prune in this second season. There was more settled wood in the trees and less upright vegetative growth to contend with. Trees were generally more open and less overlapping branches compared with last seasons routine plots.

Plots 2 and 3 much more difficult to prune than Plot 1.

Early impressions of return bloom were that flower numbers were much lower than anticipated (when observed at early pink stage). When pruning was carried out (at early bloom stage) there seemed to be much more flowers visible and certainly enough for a strong crop across all Fuji plots.

Figure 1 Cottage Royal Gala Plot 1 (Second season of demo pruning - rules unchanged)

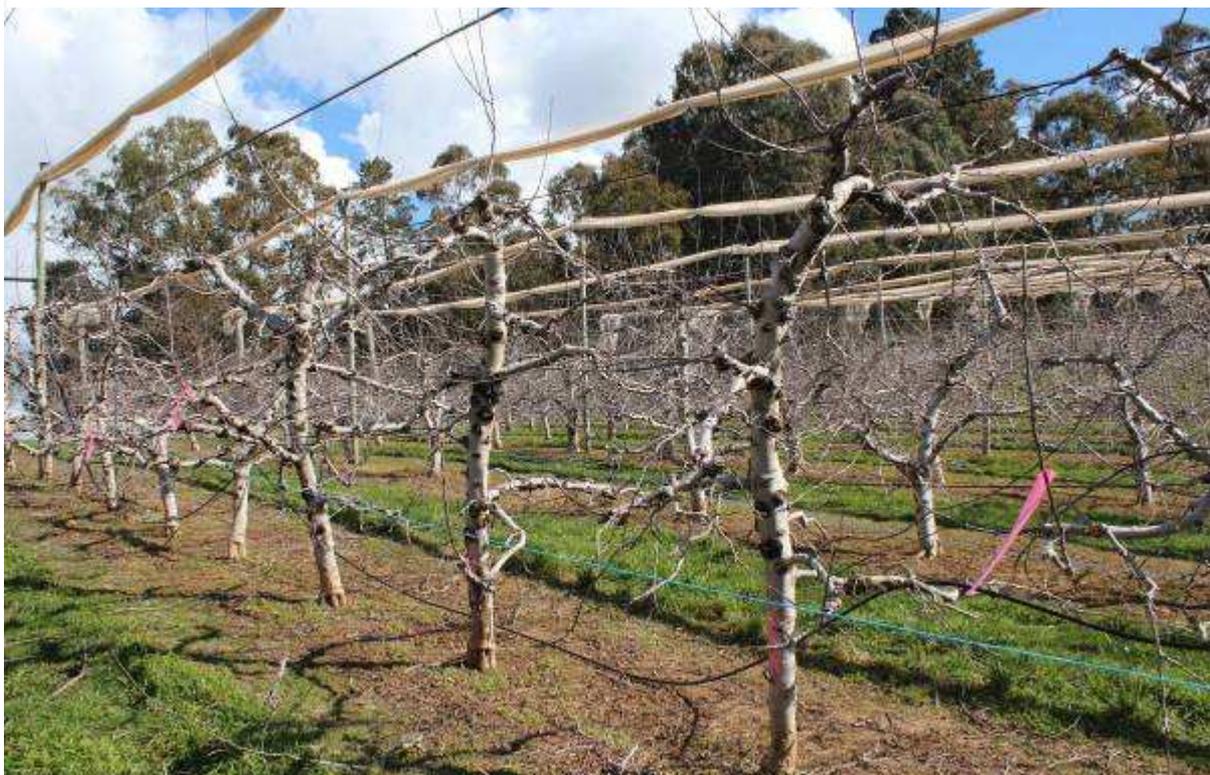


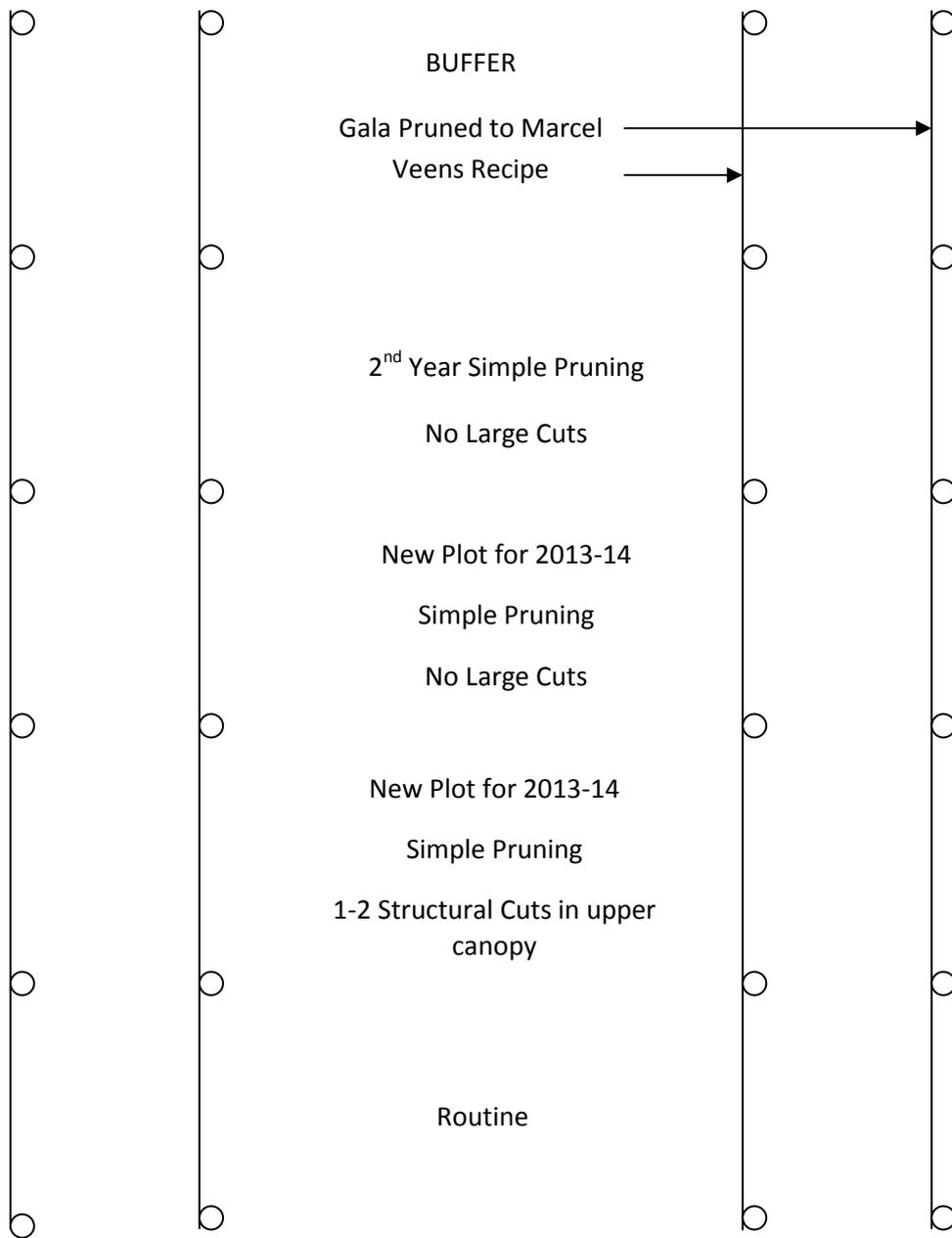
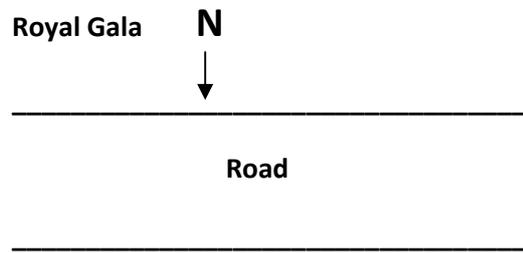
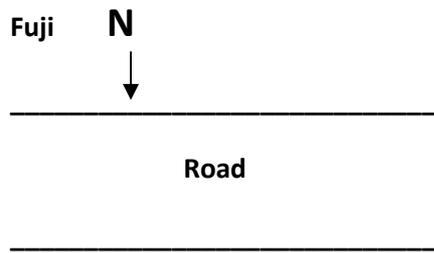
Figure 2 Cottage Gala Plot 2 - First year of simple pruning (rules same as for plot one last season)



Figure 3 Cottage Gala Plot 3 - First year of simple pruning (Rules as per plots 1&2 plus on or two structural cuts from the upper canopy)



Plot Layout 2013-14



Future Orchards Trial: Final Report

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Outline/method/ (what you did):	<p>June 2013 Future Orchards OW was held at the Cottage Block Fuji & Gala pruning demo plots. Discussion of next steps held to canvas ideas for the second season of the demos.</p> <p>1st August 2013 Meeting of the Batlow COG (Dodds, McMahon, Wilson & Oag) to re-confirm planned pruning strategies for the demo plots in 2013-14</p> <p>w/c 5th Aug 2013 Winter pruning of the Gala Plots to be completed Only Winter pruning in Fuji to be very limited large limb removal in upper third of canopy of pot No. 3</p> <p>Collection of initial bud counts post-prune</p> <p>October 2013 FROST Severe frosts impacted the South West Slopes and Tablelands during flowering in October 2013. The most significant of these occurred on 18th October. It was estimated that the frosts caused losses totalling 30% of normal production at Batlow.</p> <p>Frost damage in our trial block at Jilba was very severe. This block is known to be in a frost prone area and although it is equipped with an overhead frost system (which was activated during the frost), damage in the block resulted in nearly 100% flower and crop loss.</p> <p>The frost damage at Jilba meant that our simple pruning rules trials in both the Gala and Fuji trees were compromised and for this reason the trial was abandoned.</p>
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November 2013 - Future Orchards OW

At the November orchard walk we visited the frost affected trial block. A discussion was held on the impact of the frost and the circumstances that led to the failure of the overhead frost protection system. Although it was disappointing that the system had failed, the discussion at the OW was very useful and the grower was given some suggestions on how to assess the performance of the frost system to determine the cause of failure.

At the OW it was also agreed that one management method for the frost effected trees was to employ root pruning for vigour control. It was decided that there was an opportunity to switch the focus of the trials from "Simple Pruning" to "Root Pruning".

22 November 2013

Following the OW, root pruning plots were established in the same panels as the now defunct simple pruning trial.

The new root pruning plots were designed to compare the following treatments in both the Gala and Fuji;

1. Un-Root Pruned Control
2. Angled Blade x One Side Ripped
4. Vertical Blade x One Side Ripped
5. Vertical Blade x Two Sides Ripped

Ripper Settings were not strictly controlled for this add-on trial as the distance of the blade to the trunk was partly a function of the changing canopy width along the row. However, in general the setting were;

Angled Blade Treatments

- Blade Angle = 45°
- Blade entry point distance to trunk = 50cm
- Travel Speed = 5km/hr

Vertical Blade Treatments

- Blade Angle = Vertical
- Blade entry point distance to trunk = 60cm
- Travel Speed = 5km/hr

The trial presented a good opportunity to test the vertical blade of the Boreco pruner, as this method had not previously been used at Batlow.

A layout of the plots is included in this report.

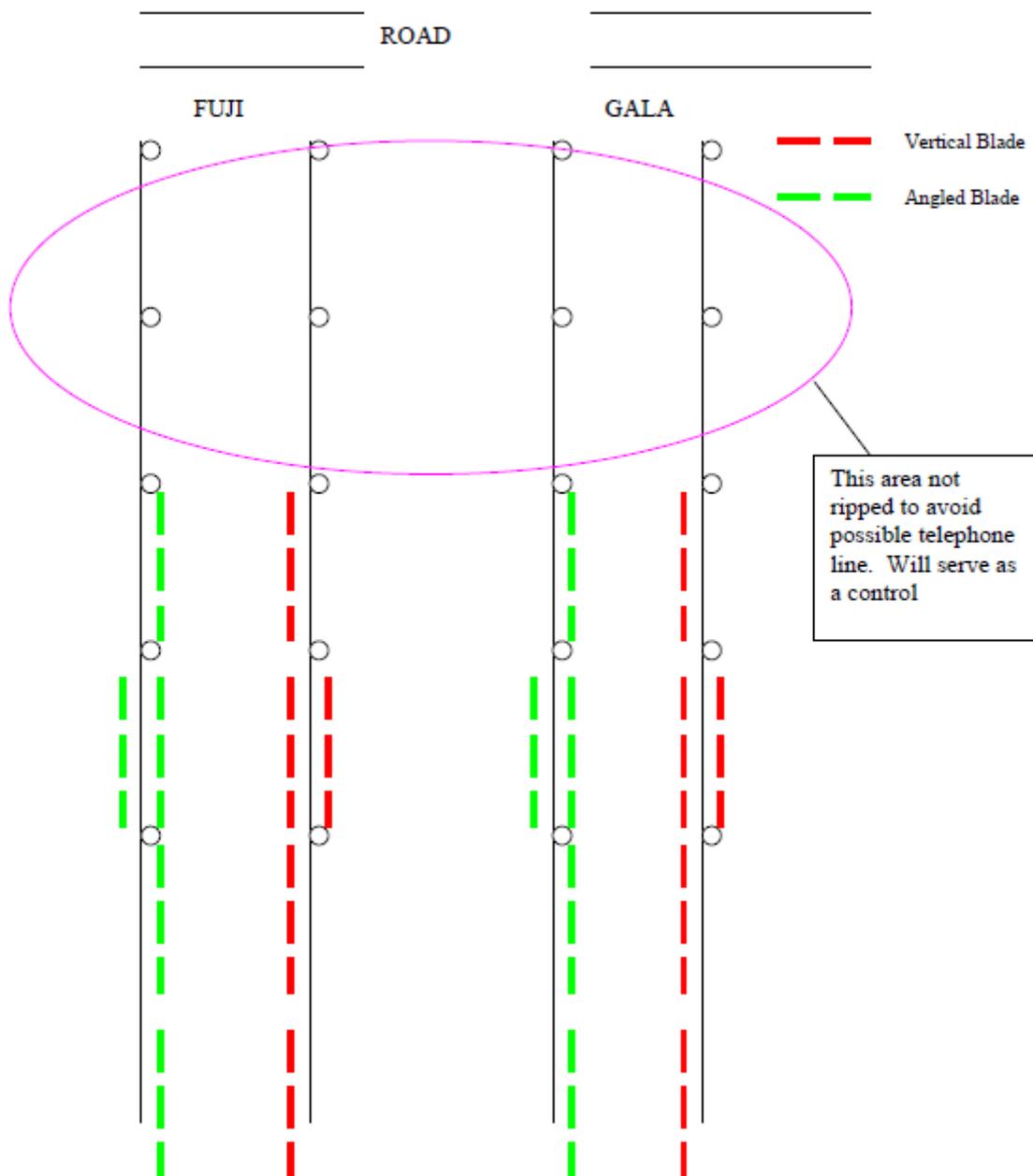
	<p>January – April 2014</p> <p>The root pruning plots were inspected on several occasions between January and April 2014, with the intention being that if significant visual differences in vegetative re-growth was evident, measurements would be conducted to assess the degree of difference.</p>
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Some of the few fruit remaining at the time of the root pruning (one month after the frost).

Post Frost root ripping treatments in Jilba Cottage Gala and Fuji Blocks

Date : 22/11/2013



Results Summary (measured and observations, photos, photos of control area if applicable)

Inspections of the root pruning plots between January and April revealed no clear visual differences between the un-root pruned control and the root pruned trees. Another confounding factor was the varying level of crop remaining along the row and between trees following the frost. Where trees did seem to have less vegetative growth, often this was associated with a greater number of remaining fruit on that particular tree.

Surprisingly, even some of the double sided root pruned trees showed very strong vegetative re-growth.

Figure 4 An example of the vegetative re-growth in frost effected Gala.



For the reasons given above, a decision was taken not to undertake more detailed assessments.

Implications

What did we learn?

Season 1, (2012-13) was a very successful year for this field demonstration. In the absence of any significant frost damage, we were able to establish and monitor an effective demonstration plot which showed local growers the benefits of applying some simple pruning rules in the orchard.



Figure 5. Routine pruned tree (left), Demo pruned tree (right). demonstrating differences in fruit size, uniformity and colour at approximately 2 weeks prior to harvest.

Key outcomes from this demonstration in year 1 (2012-13) included;

1. Simple pruning rules work! Taking this approach at pruning time can significantly improve the outturn of crop.
2. Pruning rules work for old style seedling and semi-dwarf blocks...like these Royal Gala.
3. Know your potential crop load before you start Winter pruning. If you don't, how can you effectively plan your pruning?
4. There are clear fruit size and quality gains to be had.

Season 2, (2013-14) - The importance of frost management and mitigation in the orchard was a key learning outcome from this trial in 2013-14. The trial clearly demonstrated that many invested labour hours can be lost through extreme weather events like frost. The lesson was that all practical and economically viable options to manage events like frost in the orchard should be employed. In the case of frost protection systems, it is vital that checks be carried out on the system prior to the critical danger period of flowering to ensure the investment in capital is effective.

This will be a message that will be delivered to growers via the June 2014 Orchard Walk at Batlow.

Whilst the post-frost root pruning plots did not yield any hard data this season, the informal visual assessments were a worthwhile exercise. We did learn that even the fairly drastic treatment of double sided root pruning in some situations may not be effective as a stand alone vigour control tool following complete crop removal in large MM106 / N.Spy trees. Better results may have been achieved if the root pruning was part of a multi pronged treatment regime, including chemical growth regulators and or girdling.

How will this impact on the business ?

The management of Batlow Fruit Co-operative Jilba Orchard and other growers present at the November 2013 Orchard Walk, benefitted from the discussion of lessons of the failed frost protection system. It is hoped that these lessons will help local growers to better understand the limitations and maintenance needs associated with overhead frost protection systems. It is hope that these lessons are taken back by individuals and employed to effect change or improvement in the management of their own orchards.

What will we change?

Jilba Cottage block was originally selected as a trial site because of its poor performance in terms of poor productivity, poor fruit quality and excessive vigour. The frost prone nature of the site has exposed the orchard to periodic crop loss which has been a significant driver of the aforementioned issues.

The frost prone nature of this site makes it a great candidate for studying this climatic problem and its effects on apple production. However, it also means that trials or demonstrations focussed on other issues can be easily derailed / compromised. For this reason, any future trial / demonstration work that focuses on any issues other than frost impacts, should be located at a site with a low risk of frost, thereby ensuring a higher probability of meaningful outcomes.

What are the road blocks/obstacles to change?

Frost has been an issue in the Jilba Cottage Block for a long time. This is the reason why an overhead frost protection system was installed in the first instance. It is likely that this particular frost system has failed in previous seasons and this raises the question why the shortcomings of the system have not been addressed.

A lack of knowledge relating to the engineering, calibration and maintenance of overhead frost protection systems is a likely road block / obstacle to successful adoption and use of such systems. There may exist an opportunity to provide industry with an education / extension package to aid the correct adoption and use of Frost Protection Systems.

Acknowledgements

The Future Orchards FLA would like to thank the following people for their contribution to this study;

Batlow Fruit Co-operative Limited – for allowing us to work within the Jilba Cottage Block for the purposes of this demonstration.

Matthew McMahon – Technical Services Manager (Batlow Fruit Co-operative Ltd) for his assistance with establishment, measurements and assessments of this demonstration.

The Batlow Future Orchards Community Orchard Group (COG) consisting of Ralph Wilson, James Oag, Steve Spark, Jesse Reader & Matthew McMahon, for their contribution to discussions and ideas relating to this demonstration.

For more information on this field demonstration please contact;

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