

# Focus Orchard Learnings 2012-2014

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This paper is an attempt to summarise some of the key learnings that have come out of the Focus orchard program 2012-2014.

This paper is intended to complement the powerpoint presentation that will give specific orchard examples.

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## Lifting Australian pipfruit yield potential ~ a paradigm shift (RW)

Refer case study: Is 100 t/ha of high quality fruit possible?

Australian growers have proven that with regionally specific environmental management, worlds best practice yield can be achieved in Australia. It is hard, but it's not impossible.

Over the 2012-14 Focus orchard term there have been a number of Focus orchard grower that have set new benchmarks in tree performance. Where once it was not uncommon to hear growers say that "high yields of good quality fruit were impossible in Australia", we now have many growers actually doing it.

Oakleigh Orchard set itself a goal of achieving 100 tonnes per ha on Blk 17 Rosy Glow and in the 2014 harvest achieved that with a crop that picked 108 t/ha, 90% class 1 with an average fruit size of 170 gms. Oakleigh also set a target of 50t/ha off every ha in the orchard but unfortunately came up just short at 47t/ha in 2014 due to severe bird and heat damage to the Gala.

Sanders Bros have set themselves a goal of achieving 60t/ha off every ha they farm by 2016, including the non-producing area. In 2014 they achieved just under 50 t/ha so are well on the way. Not only have they achieved a good overall farm result but have achieved the magical 100 tonne with a block of pinks doing 103 tonne of quite impressive fruit.

Flavells Orchard in South Australia keep complaining that they need to keep buying bins to store all this additional production, but really they're not complaining, they're very excited about where new management techniques can take their orchard business.

So the myth that it can't be done in Australia has been well and truly busted. But how are these dynamic growers actually achieving it. What are the keys to their success?

1. Their high performance canopies are capable of 65% light interception. Their tree height = row width  $\pm$  0.5 m. The base of the tree is as wide as a 1.2-1.3 m tractor will allow. And it's consistent over the entire row length. Eg Oakleigh Blk 17 canopy, Sanders canopy, Veterlargo canopy,
2. The canopy is full of low vigour, calm fruiting units, all in their own space. (see Blk 17 examples)
3. Vigour control is achieved with the dwarf rootstocks achieving 20-30cm growth and vigorous rootstocks 30-40 cm annual extension.
4. The canopy texture or branch type and density, achieves sufficient light in the bottom of the tree to grow good quality fruit.
5. Net is critical to sustainable high yield in most Australian growing environments maybe with Tasmania being the only exception. Not only is it preventing hail damage but also minimizes the negative effects of heat stress, sunburn and bird damage.
6. Crop load management strategies are used that achieve optimum fruit numbers asap. Preferably all hand thinning is completed by Xmas with winter pruning and chemical thinning doing 80% of the job. Pinks can be stretched to late January providing hand thinning is not removing large fruit numbers.
7. Water, nutrition inputs are traditionally higher but not always, they key is to ensure water or nutrition are not limiting factors. Excess water and nutrition are as harmful as not enough.
8. Execution ~ the basics are done properly and on time.

### Developing young canopies (CH)

OK we've now proven that we can achieve worlds best practice on mature canopies but we need to get there quicker with our young blocks. Young orchard world best practice is to achieve 200 tones per hectare in the first 5 years, this can only be achieved with good tree canopy (TRV). The objective then is getting close to full canopy as quickly as possible.

All regions and most Focus Orchards have identified young tree growth as an issue that needs improvement. FO Trials have focused on a range of solutions, fertilizer, fumigation, crop load, GA3 etc.

It is unlikely you will ever get the ideal tree to plant or the ideal location with unlimited water so you have to understand how you can maximize what you do have. Growing young trees well is about integrating a number of factors, which at time are hard to execute. Each location has slightly differing limitations and therefore the solutions will be varied.

Young tree growth FO learnings are:

1. Sterilisation has become the norm. If replant disease is likely to be an issue it is 99% harder to deal with after planting. Chloropicrin seems to have come out on top on our FO trails as the best commercially available sterilant for most sites.
2. Tree Density is a way of influencing a few uncontrollable factors of tree quality and soil type. Most FO growers are now planting their new blocks intensively however Plunkett Orchards have also started down a path of twin stem plantings as a way of improving early canopy through density.
3. Once planted water is the first and most important aspect to be looked at when young trees are not growing. Early irrigation is essential as the root zone is small and dries sooner than larger trees. Soil Type can be modified a little with mulch's to improve soil moisture holding capacity and nutrition.
4. Irrigation frequency rather the total amount being applied is commonly creating short-term root zone deficits in young orchards prematurely terminating growth.
5. GA3 use is increasing as a way to keep canopies growing during the season. Favaro's orchard has found that high water volume applications of GA3 have increased shoot growth 60cm, less in non netted blocks suggesting irrigation regimes need revising.
6. Fertigation, last on the list but in the same principle as water little and often usually has the best impact, focus mainly on Nitrogen and Phosphate.

### Growing Gala successfully in Australia (RW)

Achieving world-class Gala yield and quality in Australian microclimates is extremely challenging. Being an early harvest variety, it suffers badly from heat stress and is often knocked around with significant bird damage. In many years where there are water shortages, any available irrigation water from late February is directed toward cropping varieties such as Pink Lady leaving Gala to survive under drought conditions. This results in weak buds and weak flower next spring contributing to a vicious cycle.

Throughout the course of the 2012/14 Focus Orchard term, we have worked with many of the Focus Growers to try and improve Gala performance. Our conclusions over that 2-year period are, that it is not easy. Gala as a variety is not as suited to the Australian climate as either Granny Smith or Pink Lady. We

conclude that many Australian microclimates prevent world-class yields of say 70 tonne/ha of Class 1 fruit. However world class yield are not critical to achieving good profitability. It is still in every grower's interests to manage the variety to the best of his/her ability within the limitations of each microclimate. There are many things that can be done as has been demonstrated by various members of the focus orchard panel.

The keys to Gala success that we have witnessed include:

1. Overhead netting is required in most Australian regions to avoid, hail, heat stress and pests eg birds.
2. A relatively large (> 13000m<sup>3</sup>), calm canopy that is capable of intercepting a minimum of 65% direct light, e.g. Ian Armours, Top Qual, Oakleigh. Battunga are researching new canopy forms e.g. Auvil V that can improve that goal.
3. Appropriate bud to fruit number ratio. Our monitoring suggests that this is unique for each block based primarily on vigor but the recommended range is 1.3 - 2.0 winter buds per fruit, with higher bud numbers required on more vigorous canopies to minimize a strong vigour response.
4. Thinning to target as early as possible in the season. Battunga's chemical thinning policy placed more emphasis on bloom thinning rather than secondary thinning. Sanders blocks that were hand thinned early achieved the best fruit size and pressure outcome.
5. The right amount of irrigation (see section below)
6. Good KPI monitoring including such things as bud no, fruit no, and fruit growth monitoring eg Oakleigh Block 1 Galaxy. Also refer to Jason shield presentation.
7. No pest issues that have the ability to decrease yield , eg WAA casing bud damage at Battunga and late mite infestation decreasing photosynthesis at Sanders.
8. Maintaining tree photosynthetic rate post harvest has been a critical improvement area. There is widespread acceptance that the time between harvest and leaf fall is critical to maximize reserves and bud strength going into the following season. This is done with prudent water, nutrition and pest and disease control inputs.

### Solving the Biennial Bearing Conundrum

*Refer to Solving Biennial Bearing paper Nov 2013.*

Biennial bearing has been identified as a major production limitation in Australia. Whilst it is a limitation everywhere that apples and pears are grown, it is more significant in Australia due to the hot summer temperatures exacerbating the problem. When temperatures exceed 30oC, pomefruit tend to shut down and because Australian microclimates have a high proportion of days

> 30oC , the plant reserves are decreased and biennial bearing becomes more pronounced.

The Focus orchard panel have worked on this problem and below we attempt to list the key strategies that have made a difference.

- Winter bud no's have been lifted generally to a minimum of 2 buds per fruit and often up to 3 buds per fruit. We have learnt from many researchers that in a biennial variety, at least 50% of the spur bud should be resting to ensure sufficient flower the following season. Hence greater than 2 buds per fruit is entirely logical if you want to try and thin to predominately singles. Eg Flavells Fuji
- Vigour Control is imperative. A vigorous canopy will always be more prone to biennial bearing than a calm canopy due to carbon partitioning to annual growth rather than buds within the plant. Oakleigh, Flavells and Batlow Coop, have used root pruning successfully. Most focus growers have changed tree architecture to pendant rather than upright branches, which has resulted in good vigour reduction.
- Chemical thinning using products that are known to promote return bloom eg Ethrel, ATS and Benzyladenine (BA) as the key thinners for a biennial variety. eg Oakleigh Fuji
- Early hand thinning has also been a focus as we now know how important it is to get seed load in the tree down to target asap. Biennial varieties need to be thinned early e.g. Sanders issues
- Growth Regulators ~ Ethrel and summer NAA are now being used by many Focus growers to help increase return bloom following the insightful messages of prof Steve McCartney. Anecdotally the results are very encouraging.

### Business Planning (RW)

One of the first roles that Agfirst played with each Focus Orchard was to sit down and create a business plan. For many of them, this was the first time anyone had ever taken the time to commit their vision and objectives to paper.

We will ask them all personally during the field-day how they found the process but from where we sit, it appeared to be a very productive 4-hour session. The key learning's that came out of the process included:

Succession planning ~ many Australian fruit growing businesses are family businesses with succession being one of the hardest business challenges they face. Too often succession is put into the too hard basket. As a result the generation farming the land are often working in a vacuum of knowledge, which can lead to frustration and a lack of motivation. We recommend the topic be given the time, resources and professional help it needs. "You must address the elephant in the room".

Using a facilitator and a business planning template structure helped to capture the key attributes of an orchard business plan. (refer to the FO website for the template)

Involve all key stakeholders during the business planning session as they all need the chance to debate and agree on direction.

Undertake a robust SWOT analysis as your objectives will flow out of that process easily. Your objectives should aim to maximize strengths and opportunities and minimize weaknesses and threats. Use SMART objectives (smart, measurable, achievable, relevant, time bound)

Keep referring to the business plan throughout the year to keep you on track and make sure that what you agreed, does get done.

### Good information systems (CH)

It is very hard to manage when we don't measure.

The upper quartile growers measure nearly every thing that's possible and almost to the point of being obsessive at times.

It was common when we started with the Focus Orchards, that some had limited monitoring systems in regard to areas and production history. During the past two years, all have significantly increased what they monitor. It could be just bud numbers for pruning or gross margin by block. It could have been fruit size, tree growth or irrigation usage, what ever was monitored it help manage and overcome a limitation in the orchards performance.

Great execution is backed up with excellent information:

1. Financial: not only annual accounts but a series of financial reports detailing the profit by block (gross margins). The ability to budget and track the key inputs by task and understand their impact is critical.
2. Physical: Key productive benchmarks drive physical performance. Production, packout, fruit size and bud numbers per tree. Having good objective productive numbers really helps motivate and improve communication in an orchard team.
3. Other inputs: e.g. soil moisture and nutrition need regular monitoring to ensure their benefits are maximized.

Please refer to Jason Shields notes from his presentation on this loop of a grower who is passionate about information systems.

## Implementation, gaining confidence, and convincing others.

Identifying a limitation on the orchard is the easy bit, finding a solution a little harder, but the real payback is integrating it over the whole business.

Taking small steps with a few, well monitored variations in management (on orchard trials) can give the information you need. Can you implement the new technique on a wider scale at relatively low risk? The key is “well monitored”. Set out to capture the information that will answer the question: does the benefit exceed the cost?

Some times small steps are needed to gain confidence with change and or convince others in the business that change is a good thing. Sometimes it's several others in a large business and sometimes its just trying to convince Dad it's a good idea. Batlow Coop thought they needed to try changing pruning strategies to improve fruit quality and profit. They set out to measure the impact of simple rules in pruning and were impressed to calculate at the end of the season an \$18,000/ha benefit. Several other Focus Orchards have also tried a small area of more detailed pruning resulting in improved fruit distribution and bud quality, giving them confidence and the ability to show others in the business changing strategies will be positive.

Lenne's orchard are increasing their investment in apples in a strategy to become less reliant on process pears which has been their major production to date. Getting young orchards growing quickly is important. We undertook some small trials, which showed that the benefit of blossom thinning was significant. So now the goal is to implement it over the whole paddock. By taking a few small steps they saw the benefit first hand and are now prepared prepared to invest more.

Now the next question comes, When to cover the new block with netting? How do they make the decision? 5 different orchards would have 5 different answers based on a range of factors which could include location, variety, yield, quality benefits and probably most importantly attitude to debt and risk.

You can't take small steps and only put a little net up, what's needed is a different approach, gather the information you can from others and then model the outcome on business's budget. In this situation costs and benefits can be gleaned from other growers. Once you have this then it's the ability to model this into your own financial systems to understand the impact on the business and then discuss the attitude to risk and debt.

Getting confidence to implement new strategies can come from:

1. Small steps (trials) can reduce the risk and give you the information you need to take bigger steps
2. Good financial systems will enable you to model the benefits and get everyone on the same page.