

Future Orchards 2012

Harvest management considerations

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Why are we doing this?

Stakeholders in the apple business only make money when the consumer buys an apple, is satisfied and buys another. It's not the grower, packhouse or the marketer that creates the revenue, it is the consumer, so we have to focus on what they want first.

In Australia and most countries in the world, consumers want to eat the apples.

Over the Christmas break, I did an informal survey of family and friends, 50 people in total;

- All loved apples when crisp
- All would eat more apples if they could find a consistent experience of crisp flavoursome apples.
- When you have good apples in the fruitbowl they are gone by tomorrow and the bowl needs filling again,
- Mealy soft apples stay in the bowl for a week and are put in the compost.

Why do we struggle with delivering this?

An Australian Study found that after purchasing a bad apple, consumers respond by changing cultivars (58%), purchasing fewer apples (31%), stopped buying apples (17%), switched to other fruit (24%).

That's a huge reduction in the sales. That's worse than a 17% production loss.

The biggest impact on eating quality, texture and flavour is harvest timing. Post harvest technologies can then help preserve the potential but the potential needs to be there first. The fruit is like a fuel cell and we can decide to use the fuel up during harvest or during storage.

Understanding and Reducing Variability.

We need to focus on the "Mars Bar" as our competition; we are in the snack food business. Consistency will be a key success in increasing consumption of apples and the ability to improve pricing points.

Variation and inconsistency create disappointment from the consumer and wastage by not meeting market specifications, both are very costly.

We quote many things in our business as an average and all of them have variation about the average and some vary a lot more than others. For example 2 lines of fruit averaging 8kg in pressure are not the same; one has fruit ranging from 7.6-8.5 and the other 6- 9 both have an average of 8 kgs. These lines of fruit will outturn very differently just because of the variation within the line.

When need to start understanding variation and the impact on our business.

Sources of variation we need to address in respect of fruit quality are:

- Block to Block: We do have a lot of variation between blocks and lines of fruit and more often than not these lines of fruit are combined, packed and sold similar.
- Orchard management: Variation within a block can come from variation in crop load, soil type, irrigation, nutrition, pruning etc.
- Harvest strategies: strip picking, selective picking, the time between picks influences the variation in lines.

Understanding variation means we can manage it and make better choices to optimise quality. Future technologies will help manage some variation but to maximise these and reduce wastage variation needs to be reduced within the orchard with specific micro managing the points above. (block to block, orchard management and harvest)

Maturity parameter or not?

Foreground colour and pressure are not directly linked to maturity, and are more influenced by crop husbandry.

Pressure is a linear relationship with time so the longer we delay harvest the lower the pressure at harvest and the lower potential outturn pressure.

I have seen growers focus too much on fruit pressure or foreground colour at harvest to the detriment of fruit eating quality. The rate of change of these two parameters may help us understand movement of maturity but to optimise eating quality we need to focus more on starch degradation and background colour as key indicators of maturity.

What stops us picking to optimise outturn quality?

Let's assume we understand the maturity process and want to pick to optimise fruit quality but what holds us back, what prevents us from picking at the right time?

- Knowing my options
I have been surprised at the number of growers who are not monitoring maturity block by block regularly. Not all blocks are the same both in when and how quickly they mature. It is very important to monitor all blocks and know where to go to next.

It sounds logical but a number of growers have a harvest rotation that they have done for years and stick to it. I have seen in the past few years variation in spring weather changing flowering dates within orchards and therefore influencing harvest dates within orchards.

- “Horse power”
The ability to get the job done with the people available, planning is a key to this and we have talked earlier about yield estimation and its role in harvest planning by week. As well as good yield forecasts the assumptions of picking days per week (allowing for weather and rest) and bins per day per picker over the season, allow for effective planning. Be realistic about these assumptions, go off history, a number of growers each year tell us these assumptions are going to change but they rarely do.

With all the best planning, at times we all get caught out and tough decisions need to be made. When you get behind, be prepared to move past some blocks and focus on where the better revenue is. There is no point staying on a poor paying variety while a higher paying variety waits and starts to go over mature.

Beware of the bow wave: it is better to move across blocks quickly focusing on consistent maturity and return sooner than slow down and achieve only one or two large picks of mixed maturity.

- Crop load
Crop load has a very big influence on the relative and the rate of change in maturity. Last year in Nelson lighter crop loads in Cox shifted the harvest dates forward 5-7 days. Being the first variety to be picked we could react easily, but the impact on predicted fruit size and therefore volume to be picked was huge. The converse also happens, large crop loads delay harvest significantly. Variation in crop load across blocks or within blocks also needs to be considered for the same reasons.
- Weather
Is a major influence on harvest plans we all have to deal with and yes some deal with it better than others. Weather is out of our control but how we react is the key “knowing your options” and “horse power” are critical to managing through the vagaries of the weather during harvest.
- Fruit colour poor
When growing bi colour apples we need to do everything possible to improve colour. Foreground colour is not a maturity parameter and waiting for colour when everything else is indicating to pick will not deliver excellent tasting fruit.

All the husbandry techniques we have talked about previously need to be optimised to achieve good colour:

- Tree architecture and light levels,
- nutrition,
- crop load,
- Irrigation management
- Use of reflective foils
- variety strain

Tools that help

There will be a number of new technologies available in the next years that will make our job easier but with all technologies new and old they perform best and give the best return on

investment when applied on the better fruit, they may give some benefit to poor fruit but “a hospital pass is still that, a hospital pass”.

We have talked about these tools before in previous talks, but I just want to make a few specific observations.

- SmartFresh

In a number of situations SmartFresh is used on low quality fruit in the hope fruit will stay in specification for the market but it is still fruit that should not be picked and sold or sold first. Our best fruit is expected to last many months so why not lower the risk and make it better.

Trials have shown early harvested fruit with lower maturity (low SPI) has much more impact from SmartFresh than fruit of higher maturity (Higher SPI) (Table 1 & 2).

Table 1. Harvest values for ‘Gala’ apples. Fruit were held overnight at 70 °F prior to analysis. Values are average of 20 apples.

Harvest Date	Starch (1 to 6 scale)	Firmness (lbs)	Ethylene (ppm)
Aug. 20	2.9	19.0	2.6
Aug. 27	4.3	17.6	3.0
Sep. 3	5.1	17.3	3.4
Sep. 17	5.9	14.7	8.6

Table 2. Firmness of ‘Gala’ apples after storage in air at 32 °F, plus 7 days at 68 °F.

Harvest Date	3 months		6 months	
	Control	1-MCP	Control	1-MCP
Aug. 20	12.7	17.3	13.0	16.5
Aug. 27	12.5	15.8	12.2	14.9
Sep. 3	12.4	14.3	11.4	13.3
Sep. 17	11.4	12.2	9.7	11.0

- Cloth

Extenday Reflective cloth is a recent technology that is hard to beat, although costly nearly all return on investment analysis I have done or seen are very positive. Increasing foreground colour as discussed before enables choice to harvest. As well as increasing the recovery or pickout from a block, a key benefit has been a significant shift in the quality from being able to pick lower colour blocks earlier in their harvest window.

- ReTain

3 major benefits are to help:

- spread harvest to help logistics and labour flows.
- Increase in size with delayed harvest
- Less variation of maturity within the tree at harvest

We have found a reduction in foreground colour on early season varieties, be wary of application on low colour Royal Gala.

Applications should be closer to 28 days pre harvest than 21 as the biggest gain is holding the early fruit.

- Picking machines
Maybe be more productive but may not give a great return on the capital, they do allow the use of a new labour pool. One that would not usually be able to carry a picking bag all day.