Growing for Your Market

Getting the Harvest Right

Relative to many advanced western economies, fresh apple consumption in Australia is considered low. There is obviously considerable scope to grow the market.

The key to growing the market lies in presenting the consumer with a great eating experience that will persuade them to buy again. Consumers want crisp, juicy, flavoursome apples and the guarantee that every time they select an apple, the eating experience will be similar. Pears need to be melting, sweet and juicy.

Craig Hornblow, in the paper he prepared for the Future Orchards 2012, January 2009 meetings included this quote, “An Australian study found that after purchasing a bad apple, consumers respond by; changing cultivar (58%), purchasing fewer apples (31%), stopped buying apples (17%), switched to other fruit (24%)”. This demonstrates how easy it is to shrink, rather than grow your market.

Consistent product that meets or exceeds the consumer’s expectation will grow the market and in this regard, it is the crisp, crunchy, juicy fruit that brings them back, not the tired, dry, mealy over-mature fruit.

Every piece of fruit you sell needs to match or better consumer expectation. By this stage in the growing season, early varieties are being harvested, or about to be, mid season and later varieties well on towards harvest, so there is not a lot more to be done with the crop, except harvest it.

By now the objective should have been to grow the crop to the stage where the fruit on the tree meets market requirement and specification in regard to size range, colour, fruit finish and pest and disease status.

This should definitively be the case with early and mid-season varieties. With later varieties, there is still some opportunity to groom the crop to ‘improve’ its outturn with touch up thinning, adoption of practices to improve colour such as reflective mulches, summer pruning or leaf plucking.

Figure 1: Reflective mulch is the most effective tool for advancing fruit colour development, so that the crop can be picked at optimum maturity, rather than when over mature.
Harvest Maturity

Once you have done everything to get the crop right before harvest, stage of maturity at harvest and post harvest management of the crop are the main determinates of eating quality.

For longer term storage, the fruit needs to be harvested relatively early in its harvest period, because a certain amount of ripening will proceed over the storage period. As ripening proceeds the fruit becomes sweeter, softer and eventually dry and mealy, a stage at which no one wants to eat it. This is a common problem with fruit that is picked too late in the maturation cycle. Harvesting over mature fruit is undoubtedly responsible for the large majority of poor quality fruit offered to the consumer.

Steven Tancred from Orchard Services in Queensland, wrote an excellent paper on harvest maturity for the Future Orchards 2012 programme in January 2009. This paper gives details on how to assess fruit maturity, as well as providing hard data on historical fruit maturity stage at harvest, for a number of fruit lines harvested by Australian growers. The data he reports shows that well under half of the lines studied were suitable for long term CA storage due to over maturity at harvest.

He also reports some in depth maturity data on Pink Lady™ for the 2008 harvest season, which showed that less than 10% of the lines analysed had starch readings in the optimum range for recommended for Smartfresh™ treatment. The other 90% plus, already had higher than recommended starch readings. This is an iconic Australian variety which is about to come up against some stiff competition in the eating quality stakes from domestically produced Jazz™, which is an apple with exceptionally high eating quality in regard to flavour, flesh texture and juiciness. If Pink Lady™ is to continue to dominate the premium end of the Australian apple market, a much better job on harvesting it at optimum maturity will need to be done.

With virtually all varieties except Granny Smith, the grower faces the harvest dilemma. Do I wait for increased fruit colour and size or do I pick at optimum maturity? In the ideal world you can achieve all these, but life is never perfect.

Typically growers are sacrificing eating quality to achieve a minimum colour specification. Therefore, you must do everything that is commercially sensible to increase foreground colour. A number of management
inputs are possible and have been well documented in previous Future Orchard papers. Go to the library and refresh your memory.

**Measuring Fruit Maturity**

Maturity testing should commence around 14 days before anticipated harvest date, then repeated at regular time intervals, usually weekly or more often, if maturity appears to be progressing rapidly.

Maturity development is determined by the objective measurement of starch degradation as measured by starch iodine patterns, fruit firmness by pressure testing and sugar levels (soluble solids) by brix testing of juice with a refractometer and back ground colour against green/yellow swatches. Sometimes titratable acidity levels are measured and very sophisticated maturity testing may also measure internal ethylene content of the flesh.

Titratable acidity reduces as maturity advances and can be a key determinant of flavour in some varieties, particularly those that tend to be bland and sweet if over mature, such as the Royal Gala group.

For practical purposes, particularly for tracking maturity in the orchard, the starch iodine test and fruit pressure measurement are the most convenient and present a good indication of fruit maturation stage.

Brix measurement is a good companion test to starch measurement and can provide early warning of conversion of starches to sugars in fruit with high starch content that may be well advanced in their maturity, before a starch degradation pattern appears. If brix readings are high and there is little starch movement this suggest that it is time to pick, even though the starch pattern may be telling you it is not quite there yet.

Conversely delaying harvest when starch and pressure testing shows the fruit should be picked because brix levels are low, is likely to lead to over maturity and poor out turn.

The low brix is just telling you that the fruit is not going to have acceptable sugar levels, because if starch degradation is already advanced there is not a lot left to convert to sugar, so irrespective when you harvest the fruit, there will not be much lift in sugar. The smart thing to do is harvest such fruit at optimum starch and pressure, so it will still be crisp and juicy in the hands of the consumer and still an acceptable eating experience, because these characteristics usually override other fruit qualities.

**Tackling the Uniformity Problem**

Presenting the consumer with a uniform product is a very critical factor in growing the market. As Craig Hornblow says in his presentation to Future Orchards 2012, ‘Harvest Management Considerations, January 2009’, “We need to focus on the ‘Mars Bar’ as our competition: we are in the snack food business. Consistency will be the key success in increasing consumption of apples and the ability to improve pricing points.”

Unlike the ‘Mars Bar’, apples are a natural product and do not come out of a machine that makes each one to the same specification, some variability in the product is bound to occur, the challenge is to minimise this variation. Harvest is your last chance to smooth out variation in the crop, because it largely relates to the tree and orchard factors, so once it is harvested and in the coolstore it is no longer possible to segregate on the basis of tree and orchard factors.
Sources of Variation:

- Block to block and even within block eg. soil type, rootstocks, variety strain.
- Orchard management – variation in tree vigour, crop load, irrigation, pruning etc.
- Harvest Strategies eg. strip verses select picking, interval between picks.

The level of variation across the orchard needs to be recognised, maturity monitoring based on it and harvest strategies designed to minimise the variation within the crop.

AgFirst continue to be astounded at the number of growers that measure the success of a crop by the least number of picks required.

One of the most significant ways you can reduce variability of a line is to multipick it. The aim is to ensure each individual fruit is picked to optimum colour and maturity.

**Seasonal Variation – The Ultimate Curve Ball**

The only thing that is certain about growing fruit is that every season is going to be different. Your growing season, particularly in Australia, has a profound effect on the crop you grow.

The 2010/11 growing season has been one of extremes, near record rainfall for spring and early summer in the Eastern States, while the West has had it pretty dry.

I do not know what the weather nearer and over the harvest period will bring, but you have already had abnormal growing conditions that will impact on your crop.

In the districts with the above average to extreme spring/summer rainfall events, trees will have been a lot more growthy, leading to more shade and colour problems. Fruit size will be larger, softer and probably lower in soluble solids than normal.
Our experience indicates that in seasons that have a lot of dull cloudy weather, the fruit is not well acclimatised to bright sunny or hot weather, so sun tinting damage to the fruit becomes a bigger problem when the sun finally appears.

Fungi diseases, particularly summer rots such as anthracnose, can be a major problem, unless robust protectant fungicide programmes were applied over the wet weather periods. Dr Colin Little, in the paper he wrote for September 2007 Future Orchards 2012 programme, presents data on the effect of different seasonal weather patterns on fruit behaviour. Looking at his findings, this season is likely to give earlier ripening, low sugar and poor colour. High tree vigour may also increase bitter pit type problems.

I would also be keeping a wary eye out for fungal rots, including progressive core rots in susceptible varieties such as Red Delicious and Fuji. Fruits affected by core rots usually ripen prematurely with advanced colour and can be culled out of the crop prior to harvest.

Summer rots tend to lie dormant after infection and then as the fruit ripens, begin growing into significant lesions. At risk blocks usually have a few rots showing by harvest. Royal Gala is particularly prone to these rots. The ones you see before harvest are usually the tip of the ice berg and many more can be expected to appear after harvest. If you have suspect lines hold a few samples at ambient temperatures for a couple of weeks to see how many more rots appear.