

## Future Orchards Article for the Australian Fruitgrower March 2012

### Mid-Late Season Orchard Husbandry Management

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By now most of the early to mid season varieties should be well through harvest, with later varieties such as Cripps Pink, Fuji, Granny Smith and Cripps Red still to come.

At this time of the year then, your focus needs to turn to harvesting and marketing these later varieties to achieve the best commercial outcome. In addition, the post harvest period prior to leaf fall is a key time of the growth cycle to begin setting up the tree for next year's production.

### Managing Late Variety Harvest, Storage and Marketing

A significant portion of the later variety crop is destined for long term storage, so it needs to be harvested in optimum condition for storage. This is particularly important for Cripps Pink, which is prone to a number of maturity related post harvest disorders.

As a general rule, fruit destined for long term storage needs to be harvested during the first half of the harvest window, before advancing maturity impacts adversely on storage potential. Fruit reaches its highest potential quality early in the maturation cycle, usually around SPI of 1 to 2 on the 6 point scale, or between 3 and 4 on the 10 point CTIFL chart that is recommended for Cripps Pink. Fruit at this stage of maturity is not the best eating straight off the tree, but will be the best eating out of long term storage because fruit maturation processes continue to progress, slowing during storage. By the time it comes out of storage and experiences up to several weeks going through the marketing chain, most of the starch present at harvest is now sugar, so that apple is no longer tart and will taste much more like a freshly picked fruit harvested in ready to eat condition. On the other hand fruit, harvested in ready to eat condition has limited storage potential and after two or



Figure 1: Poor colour Cripps Pink strains often have a significant portion of the crop remaining after harvest. The fruit remaining on this tree is over mature and if it does colour will only be suitable for immediate sale.

three months in store has lost its good sugar acid balance, essential for good flavour, and will begin to express senescent breakdown symptoms that are associated with fruit harvested at advanced stages of maturity .

Fruit position on the tree is also a major factor in its quality potential. Generally speaking, in the absence of sunburn injury, fruit in the upper canopy and outer zones of the lower canopy, where there is good light exposure, has highest quality and longest potential storage life. This is the fruit that needs to be set aside for long term storage. It colours earlier, so is less likely to be over mature at harvest than the slower colouring fruit further into the canopy.

Where early harvest premiums are high there is often strong temptation to divert this high quality fruit to the fresh market immediately, rather than capitalise on its long storage life potential and hold it for later sale.

Harvest strategy with Cripps Pink, in particular, can make a big difference to its out turn. Over exposed fruit is often affected by sun burn or, if flowering was rather spread out, there will be a small proportion of the fruit on the tree that will have more advanced maturity or because of the sun injury very limited storage life. This fruit needs to be skimmed off before the first main pick and this is the fruit that should supply the fresh market immediately, because you do not want it to be part of your long term storage line. Later pick fruit, particularly where harvest has been delayed for colour, is generally unsuitable for longer term storage, so this is the fruit that needs to be sold first, even though it is later harvested.



Figure 2: Reflective mulch is a very effective tool for advancing colour development.

Stephen Tancred presented some excellent data during the Future Orchards 2012 Orchard Walks in January 2009, which reported a significant proportion of the Cripps Pink crop was harvested at SPI levels beyond those recommended for long term storage.

Waiting for colour development is a key reason for harvest delay in this variety, so techniques to advance colour development are important tools for improving Cripps Pink Fruit quality.

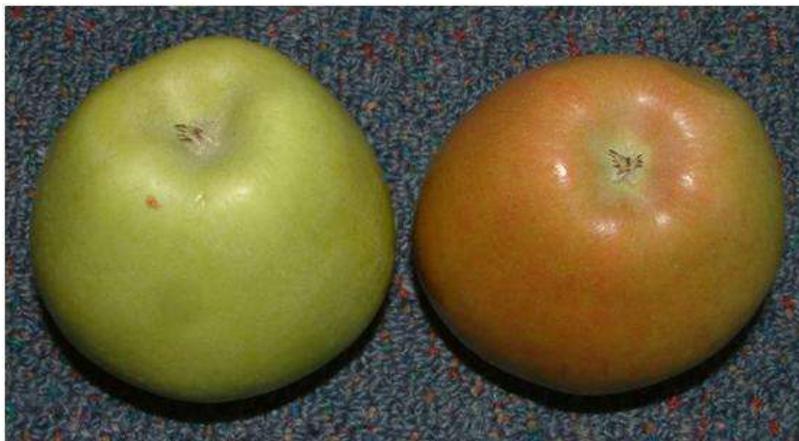


Figure 3: The apple on the right shows the effect of reflective mulch on fruit colour development after only 10 days with reflective mulch. The one on the left had no reflective mulch, and was in a similar position in the tree.

Reflective mulches are the most effective tools we have found for improving fruit colour development. Fuji, in particular, is very responsive and there is also ample evidence to show good colour improvement in Cripps Pink when reflective mulch is laid down three or four weeks prior to harvest.

Cripps Pink is also very responsive to leaf plucking, where leaves adjacent to fruit are removed several weeks prior to harvest. This practice, however, is very labour intensive and may adversely affect next year's bud health, so may not be a viable long term practice should the margin between production cost and returns narrow.

Incidentally, there are very good red sports of Cripps Pink now available, so standard colour Cripps Pink blocks with a history of tardy colour development need to be given high priority for redevelopment to a high colour strain.

Figure 4: Replacing standard colour Cripps Pink with a high colour strain enables harvesting at optimum maturity for long term storage, due to better colour development as the bin in the foreground shows compared to the standard colour Cripps Pink in the rear bin.



## Flesh Browning Disorders

Cripps Pink has a history of post harvest disorders that are associated with harvest maturity, the growing season and storage management.

In 2008 Horticulture Australia Ltd put out an excellent bulletin on the management of flesh browning disorders of Cripps Pink apples.

This bulletin reports there are three distinct flesh browning disorders:

- **Diffuse Flesh Browning** – found in districts with cool growing season and associated with chill injury.
- **Radial Flesh Browning** – found in warmer districts and associated with senescent breakdown. Risk of this disorder increases with delayed harvest.
- **CO<sub>2</sub> Injury** – all Cripps Pink apples are susceptible to this injury, unless CO<sub>2</sub> levels in the storage atmosphere during storage are kept below 1%.

Incidence of these disorders increases markedly when susceptible fruit is kept beyond four months.

## Setting up the Orchard for Next Season

Early harvested varieties, particularly Royal Gala types, often exhibit a secondary growth flush after harvest. This new foliage is very susceptible to scab and powdery mildew infection, so if this occurs will increase infection pressure next spring from these diseases. Application of protectant fungicides prior to significant autumn rain events should be considered in orchards with active vegetative.

Where there are problems with scab, leaf fall urea sprays at 5% concentration (5 kg/100 l) to hasten leaf decay and suppress spring ascospore release should be applied.

In excessively vigorous orchards, pruning out large high vigour shading branches immediately after harvest will have a devigorating effect on the tree as a whole, because their removal reduces the amount of photosynthate translocated back into the tree. This will also improve light penetration into the more shaded parts of the canopy to strengthen bud development in these areas for next season.

Figure 6: Fruit set was poor on this Fuji tree due to low nitrogen. Note pale leaves, compared to Fig. 5 with the good fruit. Spring leaf nitrogen levels on this tree were 0.5% lower than the level of the leaves on the tree in Fig. 5.



Figure 5: There is good fruit set on this Fuji tree due to adequate nitrogen available for fruit set.



Post harvest nutrition should not be over looked either. It is our opinion that low yield in many Australian orchards may be due to low nitrogen status over the critical fruit set period. There is also ample evidence from the scientific literature to show that biennial bearing problems are accentuated by low nitrogen levels, as well as budbreak in the spring.

Last year I was in South Africa, a nation with similar poor soils to much of Australia, and was told that yield of Cripps Pink for them had been poor while they were following a low nitrogen input regime aimed at maintaining mid-summer leaf nitrogen levels in the 2 to 2.2 % range. They have since elevated nitrogen fertiliser input to bring leaf nitrogen levels into the 2.3 to 2.4 % range and as a result have lifted Cripps Pink yields from the 40 to 50 tonne/ha range towards 70+

tonne/ha. They claimed fruit colour development was still satisfactory at these higher leaf nitrogen levels.

Post harvest foliar nitrogen application, possibly several sprays two or three weeks apart at 2 kg urea per 100 l while the leaf is still in good condition, is an effective way to boost bud nitrogen levels without leading to significant increase in soil nitrogen. Post harvest nitrogen application is particularly important following heavy crops to rebuild reserves.

With high colour strains the importance of low fruit nitrogen content for satisfactory colour development becomes less critical, so it is possible to lift nitrogen inputs to increase yields and still achieve satisfactory fruit colour with these strains.

Incidentally, tree vigour is a relatively poor indicator of tree nitrogen status, because lack of crop due to insufficient nitrogen for fruit set or excessive pruning can also be responsible for high vigour problems. Leaf fall behavior is a better guide. Trees with low nitrogen status tend to show brilliant autumn colour and drop their leaves early, whereas those with too much nitrogen stay green well into autumn and do not show much in the way of autumn colour.

## Phytophthora Root Rots

Apple trees are prone to this disease when grown in soils prone to water logging. Trees on MM106 are very susceptible, but our experience is that most apple rootstocks show some susceptibility to *Phytophthora* root rots when conditions favour the disease. Even M9, which is reported to have good tolerance to the disease, will succumb to it.

After many years of drought, some Australian fruit growing districts are experiencing above normal rainfall. These are ideal conditions for *Phytophthora* root disease.

Application of post harvest Phosphorous acid sprays while the leaves are still green and healthy is a good precaution against this disease.

## References:

Jenny Jobling and Hannah James (2008) "Managing the Flesh Browning Disorder of Cripps Pink Apples – A summary of Australian research investigating the causes and management of the problem" Applied Horticultural Research, [www.ahr.com.au](http://www.ahr.com.au)

Stephen Tancred (2009) "Harvest Maturity", Future Orchards 2012 Library