

Thinning, Crop Load and Quality Management of Pink Lady

Comments by John Wilton (Agfirst Hawkes Bay) and Craig Hornblow (Agfirst Nelson)

The New Zealand Pink Lady Growers Association has initiated the following report that should help growers here focus on the key issues in producing quality Pink Lady. A second report will be produced in January 2004 discussing issues of harvest and storage management.

Two other resources that will be useful to growers will also be circulated shortly

- *The South African Pink Lady Handbook*
- *CD of Colloque Pink Lady (proceeding from an international conference in 2003)*

1 Objective

Past experiences with growing Pink Lady under New Zealand conditions shows that the variety has high yield potential, but often suffers low packout due to problems with colour development as harvest approaches.

In addition there have been reports of internal flesh browning problems developing during storage in recent years, which have caused significant financial loss to some lines of fruit.

While the causes of the flesh browning problem are not fully understood, there is sufficient anecdotal evidence to show that the disorder is associated with advancing fruit maturity at time of harvest.

This would suggest that the key factor in attaining high performance out of Pink Lady with minimal post-harvest disorder risk lies in managing the crop for consistent early colour development so that the crop can be harvested before maturity advances to the stage where the post harvest disorder “flesh browning” becomes a significant problem.

Fruit size within the variety tends to be good, even with heavy crops, and on younger trees with good vigour can be too large for market requirements. As trees age and settle down, average fruit size falls. Also acceptable market outlets are now being found for larger fruit. When these factors are considered, ***crop loading emphasis needs to change from avoidance of oversized fruit to addressing the problems of undercoloured and undersized fruit.***

For high quality fruit with minimal post-harvest disorder risk, notably greasy fruit, and flesh browning disorder, ***Pink Lady needs to be picked early in the harvest window.***

Orchard management, therefore, needs to focus on attaining satisfactory fruit colour early in the harvest window.

Factors known to influence colour development include:

- Thinning and crop loading.
- Maintaining low to marginal nitrogen status.
- Good tree vigour control.
- Open canopy management to allow good light exposure to the fruit.

2 Thinning and Crop Loading

Good data on specific crop loading is not available. Australian data suggests 5 to 6.5 fruit/cm² for MM106 will give average fruit size of 100 to 112 count.

Dwarf rootstocks should be capable of specific crop loads of about twice this level – ie, 10 to 12 fruit/cm².

Biennial bearing is not a high risk, but exceptionally heavy crops on young or vigorous trees can lead to poor return bloom.

Due to the emphasis on fruit colour development chemical and hand thinning strategies should set out to achieve no more than 2 in a bunch.

3 Chemical Thinning

Pink Lady tends to behave in a similar manner to Royal Gala. Very easily thinned where vigour is high, and branches upright and becomes more difficult to thin with lower vigour and flatter branches.

Australian data suggests NAA 7 to 10 ppm at full bloom followed by Ethrel 7 days later to mop up lateral bud one year wood, or Ethrel at full bloom followed by Cylex to give good results.

Potential Blossom Thinners

- NAA 7 to 10 ppm plus Regulaid
- Ethrel 100 to 200 ppm depending on temperature
- ATS 1.5 % sequential sprays from 80% king flowers open on target wood.

NAD (Amid-Thin) 60 to 100 g/100 l (widely used in Europe at petal fall) where vigour is high, or history of heavy natural fruit drop use of primary thinners is risky.

Secondary Thinners

CyLex at 100 to 150 ppm
Carbaryl at 100 to 160 ml

In difficult to thin situations, the higher rates or CyLex/Carbaryl combinations may be necessary.

Hand Thinning

On completion of natural drop, within 40 days of full bloom, thin to singles or doubles to attain target crop load. Pink Lady is sensitive to sunburn, so remove over exposed fruit on lateral bud one year wood, and any small fruit, as well as shaded fruit.

4 Nutrition

Pink Lady is very sensitive to excess nitrogen which suppresses colour development, and low magnesium levels which causes poor foliage health.

Target nutrient levels are:

Nutrient	Leaves (Jan/Feb) Australian Data	Fruit at Optimum Maturity**
Nitrogen	2.0* - 2.2 %	0.167%
Calcium	> 1.5 %	0.038%
Phosphorus	0.18 - 0.2 %	0.07%
Potassium	1.2 – 1.5 %	0.85%
Magnesium	0.26 – 0.4%	0.031%
Sulphur	?	0.03%
Trace Elements		
Copper	6 – 20 ppm	3 ppm
Manganese	?	10 ppm
Iron	?	20 ppm
Zinc	?	5 ppm
Boron	?	20 ppm

* Some overseas reports recommend nitrogen leaf levels under 2%, even as low as 1.6 to 1.7% range. At these low levels there is a real danger of weak return bloom and poor fruit set.

** This report (E Melvin-Carter, Pome Fruit Aust Jan/Feb 1997, pp 4-5 “Growing Better Pink Lady”) indicates optimum fruit calcium:nitrogen ratio to be 1:45 and poor colour will occur if fruit calcium < 0.021% and fruit nitrogen > 0.255%.

Recommended nitrogen fertiliser rates for Pink Lady are 0 to 100 kg N/ha. Many New Zealand orchard soils have too much nitrogen for good quality Pink Lady and will not need nitrogen, and may need techniques to lower nitrogen availability.

Foliar magnesium sprays are necessary in situations where deficiencies occur.

Do not apply excess Potassium to Pink Lady – this increases the risk of magnesium deficiency.

5 Techniques for managing high vigour, high nitrogen status and enhancing colour development.

Grassing down

Elimination of, or reducing the herbicide strip and replacing it with a non-leguminous grass sward. Tight growing low grass such as chewing’s fescue is showing good promise for this purpose.

Root Pruning

Root pruning 50 to 60 cm out of the trunk between late dormant and full bloom, or 4 to 6 weeks after fruit set has produced good results where excess vigour and low colour is a problem, and soils are of sufficient depth to allow root pruning to be carried out without excessive stress to the tree.

Note: good irrigation and soil moisture management is necessary to minimise the potential adverse effects of root pruning.

On shallow soils single sided rather than double sided root pruning has been shown to give a good effect.

Root pruning will reduce fruit size.

Trunk Girdling

Trunk girdling, or scoring, either at petal fall where vigour is very high or later up to within 4 weeks of harvest will lower nitrogen levels and enhance colour development. Treating before natural drop will enhance fruit retention and may increase hand thinning costs. Petal fall girdling reduces vigour about 50 to 60 %, with later treatment giving proportionately less vigour reduction until terminal buds form.

Where girdling is carried out, harvest management becomes more critical in regard to maturity. Girdling treatments advance maturity, increase fruit size, raise brix levels and compress the harvest window.

There are reports that girdling may increase the incidence of flesh browning disorder. It is not clear if this is a direct effect of the girdling treatment, or an indirect effect of harvesting at a more advanced maturity stage.

Girdling lifts starch levels in the fruit so it is possible that optimum harvest period for fruit from girdled trees may occur at a lower starch index rating than for fruit from non-girdled trees.

Light Management in the Canopy

Apples need at least 50% ambient light exposure for satisfactory colour development with Pink Lady being more sensitive to light exposure than most varieties in regard to colour development.

Pink Lady is also sensitive to sunburn damage if fruit suddenly exposed to direct sunlight during the latter part of the growing season.

It performs best with open canopies that allow dappled rather than direct sunlight to reach the fruit.

Good canopy management requires:

- Non-invigorating winter pruning regime which arranges fruiting wood in a single horizontal plain at individual branch level in the lower tree. In the middle and upper tree branch structure needs to be simple, without significant sub-branches, arranged to allow light to pass between the branches into the lower fruiting arms.
- During late spring/early summer, any water shoot growth should be pruned or plucked out to maintain good light penetration to the fruit bearing zones. This should be done before temperatures reach the level at which sunburn could occur.
- Twenty days prior to harvest, excessively shaded fruit needs to be exposed to light. In Australia this is often done by leaf plucking or pruning back shading laterals to 2-3 leaves.

Laying down reflective mulch has been shown to achieve similar results. Trials from the Hawkes Bay focus orchard have shown an increase of 12% harvested in the first 2 picks where cloth was used compared to no cloth.

6 Information Sources in New Zealand

Pipfruit New Zealand Ltd, Technical Bulletin #002 “Crop Loading and Thinning – a Guide for New Zealand Orchardists”.

Publications held by NZ Pink Lady Growers Association:

- The South African Pink Lady Handbook
- CD of Colloque Pink Lady

In addition, the Pipfruit New Zealand Library holds a bibliography of the Pink Lady material to be found in their library.