



Managing Pink Lady™ Harvest and Storage for Optimum Fruit Quality and Out Turn

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The New Zealand Pink Lady Growers Association has initiated the following report that will assist growers to focus on the key issues relating to the management of the forthcoming Pink Lady™ harvest and storage for optimizing fruit quality and subsequent out turn.

This report is the second prepared by John Wilton and Craig Hornblow. The first, titled "Thinning, Crop Load and Quality Management of Pink Lady™" was issued to all Cripps Pink growers in October 2003. Both documents prepared by Agfirst should be read in conjunction with The South African Pink Lady™ Gower Manual recently distributed by the NZ Pink Lady Growers Association.

New Zealand Experience

New Zealand has been exporting Pink Lady™ for a number of years. To date, the main problems have been issues with greasy fruit and marginal Brix levels leading to lower eating quality than the Pink Lady™ benchmark setting Australian product.

So far New Zealand has had little problem with the widely reported flesh browning disorder, which has caused serious storage losses for other producers. The main reason for relatively little problem with this disorder has been that most New Zealand Pink Lady™ has been marketed in the early part of the selling season before sufficient time has elapsed for the flesh browning disorder to express itself.

Even so, there have been some lines of New Zealand fruit which developed internal browning disorders (IBD) indicating that given conditions conducive to the disorder our fruit could be at similar risk to that of other producers.

Rapidly expanding South African and South American Pink Lady™ production will tend to move the New Zealand market slot later into the July - August period, which will involve longer storage and therefore higher storage risk for the New Zealand Pink Lady™ crop.

IBD and also the greasy fruit problem are closely linked to advancing fruit maturity at time of harvest. Setting up the Pink Lady™ crop for rapid harvest as soon as the fruit's internal maturity parameters indicate it is ready for harvesting is absolutely critical to high quality out turn.

Getting export colour up early and uniformly through the tree is the key to harvesting the bulk of the crop at export maturity.

Preparing The Crop For Harvest

Light open canopy exposing fruit sites to 50% or better light levels as harvest approaches, is required to enable satisfactory early colour development.

Thin fruit to preferably ones and no more than bunches of two fruit.

Remove any shading, unwanted annual shoot growth - NOTE Pink Lady™ fruit is very sensitive to sunburn so do not over prune during periods of high light and temperature.

Laying down reflective mulch three to four weeks prior to harvest will hasten fruit colour development in the lower canopy where colour development is often slow.

Retain®

Retain® has not been widely used on New Zealand Pink Lady™. It has been extensively trialed in both South Africa and Australia on Pink Lady™. Pink Lady™ is considered a medium response variety similar to Braeburn.

Applied 21 to 28 days before harvest it may delay harvest maturity by up to seven days or by about two picks, i.e. first pick Retain® treated fruit happens at time of third pick of untreated fruit.

South African studies report:

- Improved colour due to harvest delay into weather conditions more conducive to colour development
- Bigger fruit size - fruit grows 1mm/week through harvest
- Greener background colour
- Firmer fruit in storage
- Fewer incidences of greasy fruit
- Reduced pre-harvest drop

Initial observations in Nelson showed a small reduction in greasiness, greener background colour and no negative impact on foreground colour, further work needs to be carried out to see if the other benefits will occur under New Zealand conditions. It may have potential as a risk management tool to move harvest period of part of the Pink Lady™ block into a different weather pattern and enable the harvest to be spread over a longer period.

Maturity Parameters

Pink Lady™ is a premium variety harvested to tight maturity and quality standards.

For longer-term storage it has to be harvested during the relatively short optimum harvest maturity period. Objective maturity monitoring needs to be commenced two to three weeks before expected start of harvest.

Minimum maturity parameters for commencement of harvest are:

- SPI 3.5 on European 10 point scale* = 1 to 1.5 on ENZA SPI chart. A copy of the 10 point SPI chart is included with this document. Additional copies are available from the NZPLGA.
- Commence harvest as soon as clear area moves outside of core area.
- Brix > 12.0
- Pressure >8kg f for long term storage and > 7.5kg f for medium term storage
- Background colour F3 to F5 on Pink Lady colour swatch blush > 40%
- Over colour intensity - R3 to R5 on Pink Lady™ colour swatch = bright pink.

Studies of maturity advancement in South Africa indicate that:

- Fruit grows 1mm/week through harvest
- Fruit pressure declines about 0.3kg/week
- Sugar lifts 0.3 to 0.50 Brix/week

Sugar levels increase during storage. For optimum maturity first harvest fruit 1.5 to 2.0 Brix lift is possible. Later picked fruit with more advanced starch degradation may only lift 0.5 to 1.0 Brix during storage.

Maturity needs to be regularly monitored through harvest. It is recommended that export quality Pink Lady™ be harvested over a 10 to 14 day period in three or more picking passes. Fruit showing SPI > 3 on the ENZA SPI chart are considered over mature for medium term storage.

Fruit for long-term storage need to be picked in the first half of the harvest window - i.e. within seven to eight days of the go date.

Bruising

Although a firm fruit, Pink Lady™ is easily bruised. It needs careful handling. Do not harvest while fruit is wet and temperatures are cold.

Selective Picking

Pink Lady™ needs to be selectively picked by colour every four or five days to minimise mixed maturity within the line.

Storage

Internal Browning Disorder (IBD)

IBD has become a serious problem in fruit that has been stored for medium or longer terms. There is a comprehensive international research programme investigating IBD.

Preliminary findings indicate:

- There are possibly three different types of IBD
- Expression appears to be harvest maturity dependent. The more advanced the harvest maturity the higher the risk of IBD.
- Dwarf rootstock fruit, and fruit from trees that have been girdled are more prone to IBD - perhaps fruit from these trees has more advanced maturity than SPI readings suggest.
- Fruit from cooler growing districts is more at risk.
- Fruit from low crop load trees has higher risk (lower crop load tree fruit reaches harvest maturity earlier than heavier crop trees).
- There is a tendency for high N or high N : P ratio fruit to show higher risk (too much N suppresses colour development leading to more advanced maturity harvest at export colour).
- Low fruit density less risk than fruit with high density - lopsided fruit more at risk than uniform shaped fruit. Anecdotal evidence suggests that "off" type "Fat Lady" strain fruit more at risk than normal Pink Lady™ fruit.
- CO₂:O₂ ratios > 1 in storage increases IBD risk. O₂ levels in storage should be 1% to 1.5% above CO₂ level with CO₂ < 1%. NZ experience suggests, however, that O₂ at 2% with CO₂ at 2% has been satisfactory. Optimum storage atmosphere maybe CO₂ 1%, O₂ 1.5% to 2%.
- IBD expression increases with longer storage for "at risk" fruit.

Greasy Fruit

Pink Lady™ grown in cool climates is susceptible to the development of greasy fruit during storage or shipping. This fruit is unacceptable to the market. Development of greasy fruit increases as harvest maturity advances. Pre-harvest treatment with Retain® may reduce risk "SmartFresh®" is reported to reduce risk.

Managing Pink Lady™ to achieve export colour specification early in the harvest window will minimise the greasy fruit problem.

Scald

Harvesting Pink Lady™ at maturities required to minimise IBD and greasy fruit will pre-dispose fruit to superficial scald expression in medium and long-term storage. Post-harvest treatment will be necessary for scald control.

The options are:

- DPA drenching
- Pre-storage SmartFresh treatment

Storage Conditions

In normal air storage Pink Lady™ fruit will lose fruit quality, particularly fruit pressure. Air storage is only suited to short term storage. CA storage is recommended for fruit stored 12 weeks or more, and will improve out turn compared with air-stored fruit for fruit held for 6 weeks to 12 weeks.

Pink Lady™ is susceptible to chilling injury so needs a step wise chilling programme to lower to long-term storage temperatures gradually. Hold at 3.0°C to 4.0°C for first two weeks then drop to long-term storage temperature of 0.5°C to 1.0°C. Optimum storage atmosphere 1% CO₂, 1.5% to 2% O₂.

Smartfresh™

When applied, within seven days of harvest provides excellent superficial scald control and could be an alternative to DPA drenching.

Trials show fruit treated with SmartFresh™ retains greener background colour longer, are firmer, and will be less greasy.

Fruit needs to be at the correct maturity at harvest - for best results the correct maturity is close to that which would normally be stored using CA.

Information Sources

- Burmeister D et al (2001) "Storage of Pink Lady" Hort Research project: HR OOP08.02
- 2003 Colloque on Pink Lady - CD available from Pink Lady group
- South African Pink Lady Handbook - Revised December 2002 by Richard Hurndall - Deciduous Fruit Producers Trust.
- Jane Turner (2004) AgroFresh NZ. Personal communications.

Disclaimer

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