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# PACKER NEWSLETTER

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## History never repeats.

**Peter Taverner**

*SARDI*

I was recently reminded of a helpful quote: “Those who refuse to learn from history are condemned to repeat it.” This set me looking through some early Packingshed Newsletters written by Barry Tugwell and Kevin Gillespie. I was interested to see what the issues were back then and to find out if they are still relevant today.

An article in October 1987 warned of the dangers of fungicide resistant moulds after a sample had been returned from Singapore identified as resistant to thiabendazole. In this instance, the packer involved was notified and changed their fungicide from thiabendazole and imazalil. The article also mentions that mould strains resistant to guazatine were found in NSW. There was some good advice on avoiding fungicide resistance, with

an emphasis on packed fruit being shipped out promptly before any decay can occur. As they wrote, “for the propagation of resistant mould spores there must be a cycle of treatment and re-inoculation of fruit”.

I felt that the article could have been written today, except for a few modern variations. For instance, packers today put all their ‘fungicides’ eggs in the same basket (i.e., they use both thiabendazole and imazalil together) and the options to remedy resistance may be less straightforward than 25 years ago.

Digging deeper in the pile, I found the December 1986 newsletter, written 25 years ago; it had articles on stem end rind breakdown (SERB), the importance of waxing and putting postharvest fungicides on promptly. It all reads uncannily similar to the advice we would give today.

So, I thought, let’s reprint those articles in this newsletter and see if they look out of place. I would like you to read them and think about what advice holds true today and what may not be as relevant. If you wish, you can compare your thoughts with mine. I will offer my opinion at the end of the newsletter. But, no peaking until you finish the article! ★

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## Timely advice from 25 years ago.

(Reprint from Packingshed Newsletter, Dec 1986)

### Stem end dehydration of Valencias

Good quality Valencia oranges are becoming unsalable soon after harvest due to fruit being harvested in a wilted condition and then being exposed to hot dry conditions prior to packing.

Stem End Rind Breakdown is a collapse and subsequent darkening of the rind around the stem end of oranges. A narrow band of rind around the stem usually remains undamaged.

The collapse of tissue develops within a week of harvest and is due to excessive moisture loss from the rind prior to harvest. Hot dry conditions between harvest and waxing the fruit merely aggravate the problem.

During hot weather, water moves from the citrus rind back into the tree causing fruit to wilt. Fruit that feels soft when harvested is likely to develop Stem End Rind Breakdown.

Trees with a heavy crop of small fruit with thin rind are more likely to develop Stem End Rind Breakdown.

Growers can prevent the development of Stem End Rind Breakdown by irrigating Valencia oranges prior to harvest during warm and hot weather conditions.

Harvested fruit continues to lose moisture rapidly. Fruit is obviously wilted when it has lost 5% of its original weight. At a temperature of 25°C oranges can lose 1% of weight per day and this will increase to 2% per day at 35°C.

Under summer conditions unprotected fruit can become unsalable due to shrinkage within 3 days of harvest.

Growers harvesting Valencia oranges for fresh market during warm weather should carry out the following procedures to avoid shrinkage of fruit and the development of Stem End Rind Breakdown.

- \* Irrigate Valencia oranges prior to harvest
- \* Do not harvest obviously wilted fruit; water it first
- \* If possible, pick fruit for fresh fruit marketing early in the day
- \* Harvest and handle fruit carefully. Bruised fruit

with damaged rind can lose moisture and shivel at twice the rate of carefully harvested fruit.

- \* During hot weather wet down the fruit in bins and placed filled bins in the shade
- \* Move filled bins of fruit to the packingshed as soon as possible after harvest

Citrus packers can also minimise weight loss and development of Stem End Rind Breakdown by:-

- \* Ensuring that filled bins of fruit are transported to the packingshed for dipping within 24 hours of harvest
- \* Avoid delays in packing fruit. Fungicide treated fruit is best held in a cool room if it cannot be put through a packingline promptly
- \* Apply a good coating of wax to fruit prior to packing. 1 ½ litres of wax per tonne of fruit is required to reduce weight loss by 30%.
- \* Hold packed fruit at less than 15°C prior to marketing.

### Why are citrus fruits waxed?

Citrus fruits require washing before being marketed. At harvest they are often covered with unsightly spray residues, dirt and occasionally sooty blotch and sooty mould. These latter disorders are caused by surface growing fungi which live on the sugary exudes produced from scale and other insects. This produces an unsightly black blemish on the fruit.

In the washing process fruit normally passes through a detergent bath, or foam curtain and then over revolving brushes which are sprayed with water. This treatment is effective in removing most surface contaminants on the fruit, however it also disturbs the cuticular wax platelets which normally prevent excessive moisture loss. The end result of washing can thus be an *increase in the rate of moisture loss from fruit* and rapid softening of tissue.

It is therefore necessary to compensate for this disturbance of the natural platelets by applying an artificial wax coating over the fruit surface. The wax covers the stomatal pores and fills around the edges of the wax platelets. This then results in the reduction in moisture loss. Because of the benefits

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of waxing it has now become the normal practice in citrus marketing throughout Australia.

The wax treatment applied is normally a water based wax emulsion. Formulations vary depending on the manufacturer, but most contain mixtures of polyethylene, shellac and/or resins.

This wax coating has several effects on fruit appearance and storage life. Under commercial conditions waxing should reduce weight loss by at least 30%, enhance the appearance and maintain market condition for a longer period of time.

### **Fungicides need to be put on promptly**

A recent trial in which we were assessing the sporulation control of T.B.Z. brought home this point once more. Fruit which had been inoculated with Green Mould (*Penicillium digitatum*), held for 23 hours and then treated with fungicide was completely free of mould when assessed seven days later.

Other fruit which had been inoculated at the same time but had treatment delayed to 43 hours after inoculation was 100% mould affected.

Since most infection of fruit in the field occurs because of damage during harvesting, it is clear that delays in fungicide treatment, once the fruit has been picked, can be risky and expensive. ★

## **1986 revisited in 2011.**

**Peter Taverner**

SARDI

These are my comments on the articles above. If you haven't read the above article; do it before you read on!

### **Stem end dehydration of Valencias**

Well! I guess I should give up my job and just reprint old articles. This tells the story of Stem End Rind Breakdown very nicely and offers advice as relevant today as 25 years ago. However, I do have a few extra comments:

The suggestion to hold fruit below 15°C still is true but it is a reminder that recommended carriage temperatures have reduced over recent decades. In fact, above 12°C was suggested to avoid chilling injury. Lower temperatures were justified for longer voyage (3 weeks or more) but the temperature was usually started at 10°C before stepping down to 5°C into the voyage. This was a sensible strategy to minimise chilling injury

but the trade-off was that quality was lost during higher temperature storage. Today, the emphasis on avoiding chilling injury has disappeared, with a change in emphasis to maintaining quality through the cool chain. Confidence has been gained using cold disinfestation of fruit fly, which requires precise low temperature control, and regularly results in blemish-free fruit. However, it is still a tradeoff; as in some seasons chilling injury can be severe.

The recommendations for growers during harvesting were good but the stress on fruit travelling long distances is often over-looked. In more recent times, fruit doesn't go to the packer nearby but can be hauled long distances to the packer of choice. It should be remembered that loss of condition during long hauls in summer can contribute to Stem End Rind Breakdown. Some sage advice from Dr. Bill Grierson, who recently passed away, was to 'get enough sackcloth to cover the load three-thick. Then drive under a stand pipe and soak the whole load thoroughly before leaving'. Don't underestimate the damage that can be done during long hauling in hot conditions.

### **Why are citrus fruits waxed?**

What? You mean to tell me that we don't wax citrus just to make it shine better!

This is a great article reminding us that waxes replaces the natural coating on fruit removed with washing. This is probably even more important with the increase on use of high pressure washes in packinglines.

Another really important point is that wax flows over the fruit indiscriminately and 'covers the stomatal pores'. This leads to reduced water loss but the stomata normally regulate gas exchange in the fruit. This loss of regulated gas exchange can lead to physiological disorders (blemish) and off flavours (especially in mandarins) during storage.

To compensate for a loss of gas regulation, waxed fruit is usually rapidly cooled to reduce the metabolic rate, and thus the need for high gas exchange. Some gas exchange can still occur in waxed fruit depending on the type of wax, % solids content and the application method. The thickness of the wax applied is largely in the hands of the packer. The packer may be entirely focussed on shine but needs to recognise the consequences of too little or too much wax on fruit quality as well as appearance.

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The article indicates that wax formulations 'contain mixtures of polyethylene, shellac and/or resins'. Modern coatings often contain shellac &/or carnauba wax, but there are other ingredients. The constituents allowed in coatings are much more regulated in recent years and should at least meet Australian standards. If in doubt, you should check with your supplier. If you export, there may be different standards in overseas countries. For instance, the European Union (EU) does not allow morpholine in waxes. Morpholine is used as an emulsifier and solubility aid for shellac. This is a common ingredient and you should source a specific product without morpholine from your supplier if exporting to the EU.

### Fungicides need to be put on promptly

We were giving the same message earlier this year in the Packer Newsletter special edition. We evaluated some different fungicides but the message remains the same.

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### Major contributors:



## Anthracnose – a short precautionary tale.

Peter Taverner

SARDI

We normally remind packers about anthracnose in March prior to degreening because the stress of ethylene 'brings out' the symptoms of anthracnose. However, anthracnose has appeared on late season fruit while still on the tree this year. Markets have been depressed and some growers held fruit on the trees hoping for better late season prices only to discover anthracnose rampantly spreading through the orchard. The pathogen is probably always present but anthracnose only shows after the fruit has been stressed or, in the above case, fruit is very mature.

Unfortunately, there is no late season treatment to control anthracnose on very mature fruit. The infection occurs earlier in the season when spores produced on dead wood in the tree are washed by rain onto immature fruit. The spores germinate on fruit and form microscopic 'appressoria' that stay dormant for many months until fruit becomes susceptible. The 'appressoria' are very resistant to chemicals and control is best targeted earlier in the season on spores, and before the 'appressoria' is formed.

The late incidence of anthracnose this season is a timely reminder to consider the following in-field controls early to avoid problems next season.

- ✓ The fungus responsible for anthracnose harbours in deadwood. Good cultural practices to reduce deadwood should be encouraged.
- ✓ Field sprays of copper-based fungicides or Mancozeb® may inhibit spore germination. Heavy rain may wash off a copper application and allow infection. There is also an emergency permit use for iprodione and azoxystrobin in Queensland. An article by Andrew Miles (Qld DEEDI) on their use can be found at: <http://www.citrusaustralia.com.au/latest-news/emergency-use-permits-achieved-for-two-new-fungicides>.

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