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Tree Fruit

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In this issue

The aim of this article is not only to develop an understanding of the importance of temperature management, but also to ensure that orchardist can grow a quality product that is big, dark, sweet and firm, and will have a reasonable shelf life.

Maintaining cherry quality after harvest (part 7)

Bas van den Ende and Ken Gaudion

High quality cherries also must have a low incidence of defects such as pebbling (rough pebbled texture of the skin), pitting, stem browning, shrivel, decay and softening.

People love to eat fresh cherries but few realise how difficult it is to keep cherries fresh.

The reason for this is that the cherry is a non-climacteric fruit. Non-climacteric means that what you harvest is what you get. Internal quality does not improve after harvest.

Cherries are also highly perishable because of their high respiration rate. When cherries are picked from the tree they are removed from their life support system and senescence begins. They also lose water easily during picking, packing, storage and transit because the cuticle (a waxy layer coating the outer wall of epidermal cells) is poorly developed.

Maintaining cherry quality after harvest

Continued from last issue

Types of damage

There are three types of damage to cherries caused by vibration, impact and compression.

Vibration

Vibration damage is the type of injury which results from cherries rolling around in bins while the cherries are being trucked to the packinghouse.

Warm cherries have greater susceptibility to roller or vibrational bruising than cold cherries.

Compression

Cherries on the bottom of the bin are subjected to compression forces while those on the top are bounced and rolled.

Since both compression and vibration forces damage warm cherries more than cold cherries, it is obvious that cooling cherries before transport will reduce damage.

This is especially important since an amount of fruit coming into the packinghouse is already bruised and damaged from compression forces.

Compression injuries cause bruising that ultimately leads to decay.

Compression bruising tends to be worse when the cherries are warm and can be caused by jostling fruit when it is transported from the orchard.

Cherries can also suffer compression damage at the packinghouse if they are stacked above the water level when they are emptied into the flumes.

Cherries with high soluble solid levels are less susceptible to compression injury because they also contain more water that increases the turgor pressure, making it harder to compress them than cherries with low soluble solid levels.

Hydrocooling cherries in bins at receiving areas quickly reduces temperatures and raises relative humidity within the bin. This is important in keeping good fruit quality.

Impact

Impact forces will damage warm cherries less severely than cold cherries. This is in direct contrast to compression forces which damage warm cherries more than cold cherries.

Studies in the USA have shown that cherries are more easily damaged at lower temperatures than at higher temperatures. Thus, to minimize pitting damage to cherries, the fruit should be run over the packingline as warm as possible.

This means, you must balance fruit quality against pitting damage.

We know that cold cherries are of higher quality since they respire and lose water at a slower rate than warm cherries. If pitting damage is a major problem, then you know that warm cherries suffer less pitting damage than cold cherries. If cherries are to be run over the packingline soon after receipt and pitting damage is a problem, then the cherries should probably not be cooled.

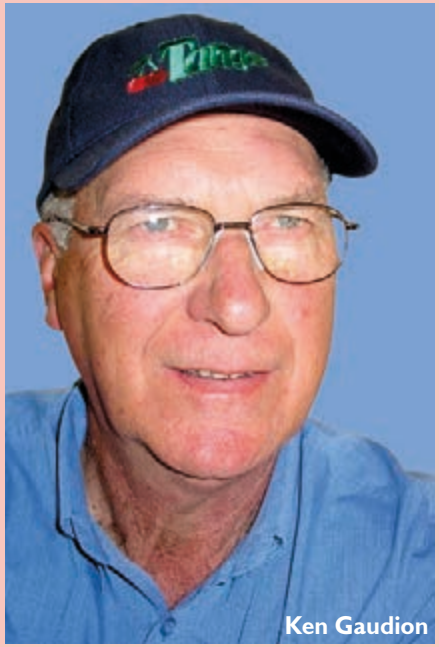
It is a trade-off between the inherent ability of the cherry to resist the impact forces applied during the packing process, the amount of impact forces the particular line applies to the cherries, and the length of postharvest life.

If cherries are held before being packed, cool them immediately. Hydrocooling or forced-air cooling will cool cherries 2.5 times faster than room cooling. However, studies in the USA showed that there was no difference in the cherries' reaction to impact or compression forces when the cherries were room air or hydrocooled. Stem colour and shrivel were also unaffected.

Since hydro-cooling increases relative humidity and reduces the vapour pressure deficit, it should help keep cherries firm.

Sorting, packing and transporting cherries

continued next month



For information and professional advice, contact Ken mobile 0400 652 258
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All about CHERRIES

Beware of exotic pests

There have been some close calls recently in regard to the entry of exotic pests that could have adversely affected the cherry industry in Australia.

They are the spotted winged drosophila and the brown marmorated stink bug.

The latter was recently found at an Australian port in a shipment of cars from South Korea. Thanks to the diligence of our biosecurity officers, the ship was not allowed to unload, and the cherry and other horticultural industries were spared a potential outbreak.

Similarly, in the case of spotted winged drosophila, biosecurity officers' quick and decisive action closed down a possible outbreak in the north of the country.

Basic information

In the interest of assisting cherry growers to identify these pests, included is some basic information about them, and a link to the Plant Health Australia website for more information.

Although the risks from international travel is currently low due to the restrictions imposed to minimise the spread of COVID-19 (coronavirus), it always pays to be vigilant about pests that may arrive from overseas.

As growers, be grateful that our biosecurity systems are world-class and assist horticulture to continue to grow and market domestically and internationally, produce that is also world-class.

If you see anything unusual, call the Exotic Plant Pest Hotline 1800 084 881
visit www.planthealthaustralia.com.au


Adult male flies have spots on the ends of their wings.


Adult females do not have the spots on their wings.

Spotted winged drosophila (SWD, *Drosophila suzukii*) is an emerging pest in North America.

It is a small fly that attacks a range of soft skinned fruit and reduces crop yield and quality through direct feeding damage and secondary infection of the fruit.

This pest has a significant impact on fruit production as the larvae feed on maturing fruit, not just over-ripe or decaying fruit.

Preferred healthy fruit include a range of berries, cherries, nectarines, plums and grapes. Apples, pears and other fruit with thicker skins are also hosts when fruit begins to rot.

Description

Adult SWD are yellow-brown coloured flies with dark bands on the abdomen and red eyes. They are 23 mm in length. Males have a small dark spot at the front edge near the tip of each forewing (unlike females).

Larvae are cream or white coloured and about 3 mm long.


Pupae on damaged fruit.

Pupae are red to brown, 2-3 mm in length and cylinder shaped with two small projections on the end.

Adult SWD look almost identical to the regular vinegar fly (*D. melanogaster*). SWD are distinguished from other *Drosophila* species present in Australia by the black spot on the wing tips in males.


Adult brown marmorated stink bug.


Late instar, showing white bands on legs, antenna and edge of body.

Brown marmorated stink bug (BMSB) has about 100 reported hosts including cherry, apple, pear and peach.

Description

- Eggs are smooth and pale in colour, about 1.3 mm in diameter by 1.6 mm in length and are laid in clusters of 20–30.
- When they hatch, they are brightly coloured, black and reddish-orange and remain clustered about the egg mass. They move away after moulting to the next stage of development.


Newly hatched egg mass.

- They are variable in size and colour: adults range from 12–17 mm in length, and 7–10 mm in width.
- The backs of adults are brownish in colour with a marbled or mottled pattern.

Damage

- BSMB damage flowers, fruit and leaves.
- Feeding by adults and nymphs on fruit results in sunken areas.
- Late season injury causes corky spots on the fruit. Feeding may also cause fruiting structures to abort prematurely.
- Necrotic areas may form on leaves, and feeding damage may be seen on the whole tree.
- There is frequently a distinct edge effect as BMSB moves between orchards en masse.

During the Millennium drought, options for minimising irrigation applications to pear orchards were investigated by Agriculture Victoria.

Ian Goodwin, Lexie McClymont

Water vs pear crop (part 3)

This article was first published in *Australian Fruit Grower*. Reproduced here with permission and thanks. Visit APAL.

Parking trees and post-harvest irrigation cut-off were evaluated in terms of potential water savings and the impacts on current and future production and are discussed here.

Regulated deficit irrigation (RDI) has been established as an effective technique to control vigour and maintain yield, with the added benefit of lower water use, and is also discussed.

Continued from last issue

Post-harvest cut-off

Post-harvest water application for Australian orchards is substantial.

This creates an opportunity to cut-back on irrigation with limited impacts on the developing flower organs in the reproductive buds.

A study on post-harvest deficit irrigation of pear (*Pyrus communis* Williams' bon chrétien) in a commercial orchard in the Goulburn Valley showed not irrigating during the postharvest period had no effect on subsequent yield or fruit quality (Table 1).

Five irrigation treatments (0, 50, 100, 160 and 200 per cent of the grower's normal irrigation volume) were applied during three seasons.

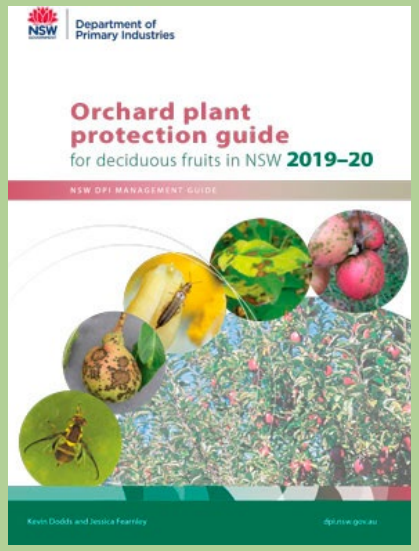
Irrigation of the 100% treatment ranged from 141 to 290 mm depending on rainfall.

Measurements showed no difference in yield between treatments, with mean yields of 45.3; 56.8; and 61.5 t/ha in the three subsequent seasons.

continued next month

	Post-harvest irrigation treatment				
	0%	50%	100%	160%	200%
2008 Post-harvest I	0	145	290	470	600
2009 Yield	47.7	45.6	38.8	54.1	40.2
2009 Post-harvest I	0	112	225	364	463
2010 Yield	48.5	67.6	49.9	61.1	57.0
2010 Post-harvest I	0	70	141	227	289
2011 Yield	58.6	60.1	57.2	70.0	61.6

Table 1. Post-harvest irrigation (I, mm) and yield (t/ha) in subsequent seasons. Trees were irrigated relative to grower practice (100% treatment).



Managing disease, pests & disorders

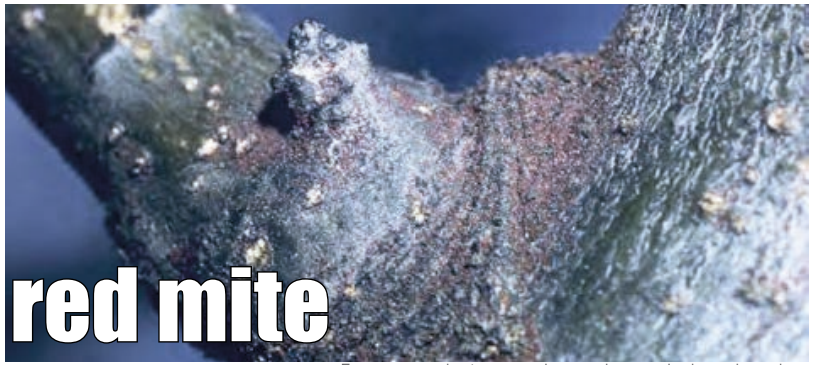
This information is from the *Orchard plant protection guide for deciduous fruits in NSW 2019–20*, published by the NSW Department of Primary Industries.

It is reproduced here with permission and thanks. The guide is available here

NOTE: *Any chemical recommendations are based on chemicals and products registered for use in New South Wales, Australia. Readers from other jurisdictions should check product registration status and label recommendations for their country, state or territory.*

Female European red mite.

European red mite



European red mite eggs clustered around a branch angle.

European red mite (ERM) is a serious foliage pest of apples and pears.

Severe infestations can result in defoliation, particularly in pears.

The pest also occurs in stone fruit trees, but this is less common.

Identification

Adult ERM females are about 0.4 mm long and rounded. They are dark maroon coloured with prominent white spines on their body.

In contrast, adult males are smaller than females and lighter in colour. They have a less rounded body and have a pointed angular abdomen.

ERM eggs are light red, round and have a slight depression on top. When infestations are heavy, eggs will be found clustered in hundreds around branch angles and buds.

Damage

ERM feeding will cause mottling on the upper leaf surface. Heavy infestations result in leaf bronzing and premature leaf fall, leading to reduced photosynthesis.

Prolonged feeding can affect fruit size and colour and may affect bud development for the following season.

There are several ways to quantify the risk posed by mite populations including counts, presence or absence, percentage of leaves infested and cumulative leaf infested days (CLIDS).

Your local IPM consultant or chemical reseller should be able to assist with more advice on applying these methods in your orchard.

Monitoring

During the growing season, and particularly as spring and summer temperatures increase, monitor the undersides of leaves for ERM and their eggs.

Presence of webbing can also indicate that mite populations are present in the canopy, although this is more common with two-spotted mite.

Scouting the orchard for plant damage such as bronzed or yellowed leaves can be a quick way to identify pest mite hotspots.

Monitor for ERM fortnightly in the field using a hand lens or by taking a random sample to the office or lab for closer inspection under a light microscope.

Commercial mite monitoring services may be available in some districts.

When monitoring, record both pest and beneficial insect activity found on the leaves. It is a good idea to record both mites and predators as a percentage of leaves infested. This way, from sample to sample you will know if the infestation is getting worse or if the beneficials, such as predatory mites, are maintaining control.

Keep an eye out for ERM eggs among the branches while pruning, especially in winter. This can help identify potential pest pressure and hotspots for the next season.

Management

Cultural and physical

Physical management of ERM can include measures to reduce heat and dust in the orchard and ensuring adequate soil moisture, thereby minimising any tree stress.

Biological

The predatory mite *Galendromus pyri* (formerly *Thyphlodromus pyri*) can be a very effective biological control agent for ERM.

G. pyri adults are about the same size as adult ERM but have a pear-shaped body. When combined with the effects of other beneficial insects including lacewings and stethorus beetles, and with a soft (selective) insecticide program, full biological control of ERM is possible.

Predatory mites are often found on the underside of leaves close to the mid-vein. Before feeding on pest mites, the adults have an opaque white or cream colour as do their oval-shaped eggs. After feeding, the gut of the predatory mites take on the colour of their prey and they become more visible.

If predatory mite numbers are low or absent from an orchard, they can be seeded by transferring leaves and shoots from a block known to have a good population.

Chemical

Decisions to spray for ERM are best made based on the results of regular mite monitoring.

Measuring soil moisture

Maintaining soil moisture at optimum levels can increase crop yields and profits by:

- Maximising nutrient and mineral availability
- Ensuring fertilisers are not flushed from the root zone
- Reducing disease susceptibility
- Increasing oxygen levels in the soil
- Improving soil structure
- Minimising the effects of moisture stress
- Maximising fruit size and quality.

Available water for the crop

It is important to realise that the same percentage of water in different soil types yields different amounts of 'available' water for the crop.

An instrument that gives a direct indication of water availability (i.e. how difficult it is for the crop to draw that moisture from the soil) would therefore be much better than one that indicates the percentage of water in the soil.

Capacitance and some other probes indicate the percentage of soil moisture, whereas tensiometers (such as the Soilspec Tensiometer System) indicate soil moisture availability.

Cost effective and reliable

The combination of an accurate soil moisture measurement tool and a good irrigation strategy allows for informed decisions to be made.

A record of soil moisture readings reveals how changing conditions affect water requirements and can help plan future irrigation strategies.

Measuring soil moisture can be expensive and difficult but tensiometers remain a simple, cost effective and reliable method to measure soil moisture availability, especially when numerous sites are required.

T.K Systems 03 5962 5211
soilspec@tksystems.com.au

Understand fruit trees: an orchard manual that enriches grower knowledge

Unfortunately the answers to many questions about why and how fruit trees grow and produce fruit are found in scientific journals. These are not written for orchardists.

Grower magazines, seminars, conferences and field days are supposed to translate much of the results from the scientific work.

Extension officers, representatives of chemical companies and consultants all play their parts in bridging the gulf between the researcher and the ultimate user, you, the fruit grower. But are we doing this well enough?

Fundamentals needed for progress

Producing fruit successfully in today's competitive world–market, requires that you constantly aim to maximise crop value by optimising yield, maximising fruit quality, and improving production efficiency.

To achieve these goals you must integrate new production technologies with your fundamental knowledge of tree performance.

Fundamental knowledge of tree performance often means going back to the basics of how fruit trees grow and produce fruit.

Grower understanding is key

It takes an entire chain of events to grow the fruit and then guide it from the tree to the packing house and the supermarket shelf. But it all begins with the fruit grower.

> *Understand Fruit Trees* links sunlight, root growth, soil and water so you can see the big picture. This will equip you with enough basic knowledge to make sound decisions.

You must make the early decisions on how you plan to obtain the best yields of the highest quality fruit, while keeping cost of production to a minimum.

The pressure for tomorrow is to be more productive than today. To survive in the 21st century, fruit growers must produce more and better fruit, for less.

'Knowledge' needed to maximise productivity

We are at a time when all aspects of fruit production have become management and information intensive. You have to have the knowledge about fruit production—and know how to use it.

Knowledge is fundamental for problem solving and maximizing resources in the orchard.

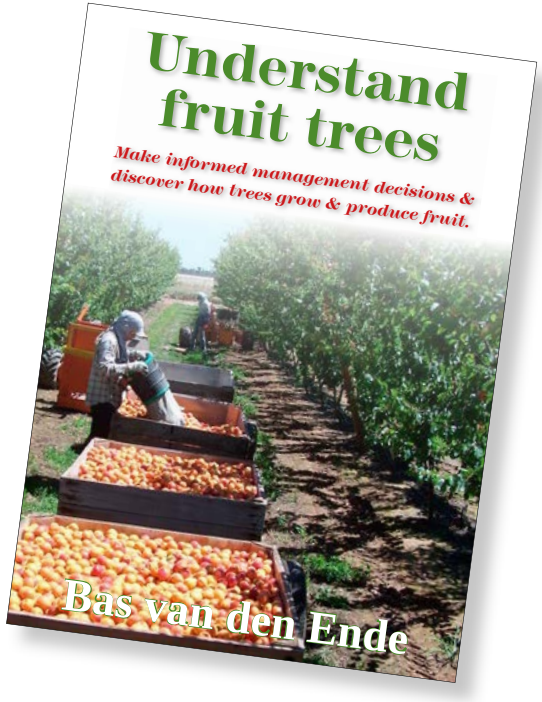
Manual aims to enrich grower knowledge

Our latest orchard manual, *Understand Fruit Trees* is written to enrich your knowledge—it provides the basic information needed to help you manage cultural practices in a timely manner, and to make more informed decisions.

It is an adjunct to the other orchard manuals written by the same author.

Understand Fruit Trees links sunlight, root growth, soil and water so you can see the big picture. This will equip you with enough basic knowledge to make sound decisions.

For more information or to buy this manual, visit treefruit.com.au or orchardmanuals.com.au



***Understand Fruit Trees* is written by Bas van den Ende.**

Bas's involvement and interest in the fruit industry spans 60 years, during which he has written or co-authored more than 300 scientific papers, Agnotes, chapters in horticultural books, articles in national and international horticultural journals and magazines, and orchard manuals.

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