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ClickSales—ads with feedback!

Consumers prefer highly coloured fruit. Consequently, retailers require minimum percentages of blush on fruit as delivery standards.

Nectarine colour development & quality (part 2)

Dario Stefanelli#, Madeleine Peavey, Madita Lauer and Ian Goodwin

#Authors: Department of Jobs, Precincts and Regions, Agriculture Victoria

Modern stone fruit cultivars are bred to have a high percentage of their surface naturally coloured.

However, there can be substantial variability in colouring within the canopy, mostly due to shading—which can be more pronounced under certain training systems (for example the bottom parts of vase, or behind upright shoots in vertical leader).

The lower colouring percentage fruit becomes noticeable on retailer shelves when mixed with fruit with a higher colouring percentage.

Continued from last issue

Observations

Fruit size was not affected by light exposure or tree side, only by the number of fruits, with the low crop load showing the bigger fruit, as expected. **Blush colour** was affected differently by the light exposure and tree side.

Crop load did not influence blush colour.

Monitoring of colour development during the season showed that exposed fruit were slightly redder than shaded fruit, but the difference diminished close to harvest.

Nectarine colour development & quality

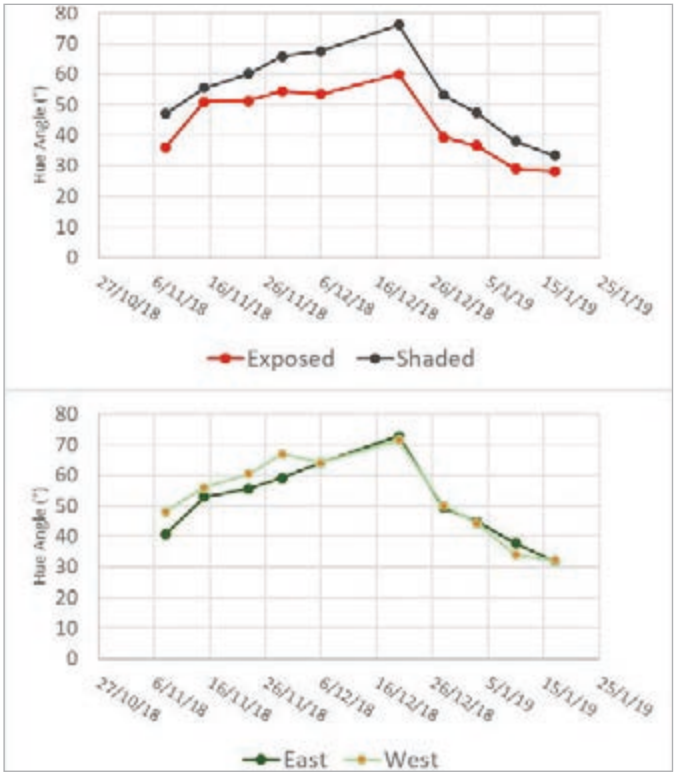


Figure 1: Effect of shading (top) and tree side (bottom) on fruit blush colour (Hue angle). Decreasing Hue angle values indicate increased redness.

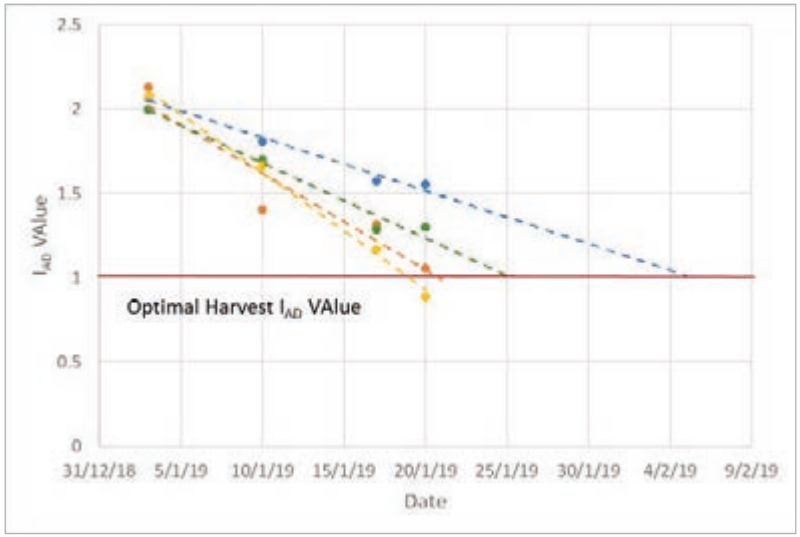


Figure 2: Effect of shading and tree side on fruit maturity measured as IAD.
Points (solid circles) represent the measured IAD values and dotted lines represent the fitted linear relationship in order to predict harvest date.
Optimal IAD at harvest for nectarine 'Autumn Bright' was set to 1.0 (horizontal red line).
Yellow lines represent exposed fruit on the west side; red lines exposed fruit on the east side; green lines shaded fruit on the west side; and blue lines shaded fruit on the east side.

Tree side did not affect fruit blush colour. Fruit from the west side were slightly redder than fruit from the east side up to early-December, after which fruit showed the same amount of red (Figure 1).

The observed influence of light exposure and tree side on fruit colour could be a combination of a direct effect of light on fruit maturity and the chemical compounds responsible for the red colour.

In fact, **fruit maturity** was affected by both light exposure and tree side.

Low crop load had an effect on maturity with fruit maturing two days earlier (i.e. to the target IAD = 1.0) than the other two crop loads.

Shaded fruit ripened approximately nine days later than exposed fruit.

Tree side also had an effect on maturity: there was up to two days difference between tree side for the exposed fruit (fruit from the east side was later) while shaded fruit on the west side matured up to five days later and shaded fruit on the east side matured up to 16 days later (Figure 2) than their respective exposed fruit.

Fruit sweetness (°Brix) was slightly affected by light exposure and crop load; the lower crop load generally resulted in sweeter fruit than the other two crop loads, and exposed fruit were sweeter than shaded fruit.

No differences in fruit sweetness were found between fruit from the east and west sides.

The only other noticeable fruit quality difference at harvest was that the exposed fruit were **firmer** than shaded fruit.

Overall there was a very strong effect of light exposure and tree side on **fruit maturity** with up to 16 days difference between exposed fruit from the west side and shaded fruit from the east side.

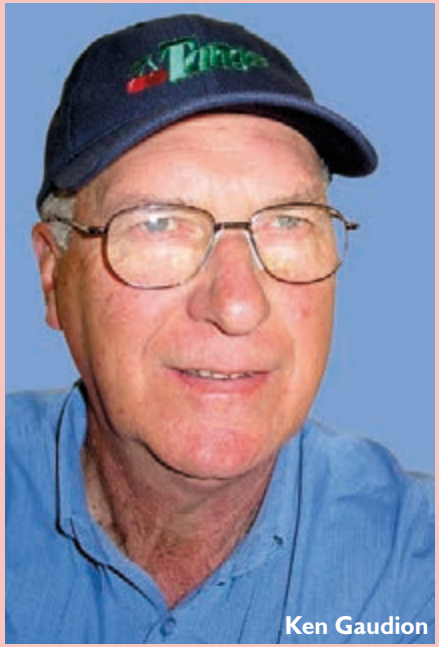
Some effect was also noticed on **colour**, but this may have been influenced by fruit maturity.

Results

The results from this study suggest that from a practical perspective, to reduce fruit maturity variability (which would also improve fruit sweetness and colour), it would be better to expose fruit (by summer pruning) on the east side of trees earlier than the west side.

Considering that we did not see any sun damage on the fruit it would also be beneficial to reduce fruit shading (assuming similar conditions to this study).

Under conditions where sun damage is an issue, it would be beneficial to generally shade fruit, taking care to reduce shading on the east side to decrease the delay in maturity.



For information and professional advice,
contact Ken mobile 0400 652 258
e-mail k.gaudion@bigpond.com

All about
CHERRIES

Research: nitrogen in cherry orchards

In a recent video*, Tasmanian Institute of Agriculture (TIA) researchers Dr Nigel Swarts and Dr Peter Quin talk about new research findings that may change the way we manage nitrogen fertiliser in cherry orchards.

They answer the big questions:

- When is the best time to apply nitrogen, based on tree uptake
- How much nitrogen does a cherry tree need to produce premium quality fruit
- Are alternative nitrogen forms as effective as traditional fertilisers.

The project is funded by the Australian Dept of Agriculture, Water & Environment through the More Profit from Nitrogen program, with co-funding from Hort Innovation. Industry partners are Cherry Growers Australia, Reid Fruits (Andrew Hall), and Wandin Valley Orchards (James Clements)

*The video is available at:
www.youtube.com/watch?v=jQyR8hKcSXg

*The fact sheet and more information about the project can be found ***here***:
www.utas.edu.au/tia/research/research-projects/projects/nitrogen-use-in-cherry-orchards

Key points from 2020 project update

- Conventional and biological fertilisers perform well under field conditions
- Time to establish change in fertiliser regimes needs to be taken into account
- Substantially less N than current grower use is required to achieve adequate fruit quality.

A summary of the project (from their fact sheet*) is presented below

Project aims

The research project, *Optimising the efficient use of nitrogen in cherry orchards* aims to maximise nitrogen use efficiency in the Australian cherry industry to increase productivity, profitability and improve environmental management.

Nitrogen uptake and storage

Nitrogen (N) is an essential nutrient for cherry tree development and fruit production, but the timing of a tree's demand for N is not clear. Nor is it known how much N a tree stores during dormancy for use in the following season.

To help answer these questions a three year trial has been established at Wandin Valley Orchards, Rosegarland, using 6-year old Lapins on Colt rootstock.

Nitrogen sources

Cherry trees can access nitrogen from three sources: **Soil Nitrogen**, including the soil solution; **Stored Nitrogen**, in roots, trunk, branches, buds, leaves and fruit; and **Supplementary Nitrogen**, applied to the tree as fertiliser.

By supplementing the tree with labelled ^{15}N calcium nitrate, we can answer many questions about how N is used, distributed, stored or lost to the environment over time and which source of N is most important at any given time.

The first series of trials traces the fate of labelled N applied at various times throughout the growing season and how this relates to uptake and storage.

Research: nitrogen in cherry orchards

Timing of N	Pre Harvest				Harvest	Post Harvest			
Week	1	2	3	4		1	2	3	4
Pre Harvest	N	N	N	N					
Post Harvest						N	N	N	N
Split	N		N			N		N	
Control (0N)									

■ = 22.5 kg N/ha applied as calcium nitrate

Fig 1: Nitrogen treatments applied to cherry trees.

Nitrogen (N) timing 2017–2018

The four treatments received a total of 90 kg N/ha split into four equal applications over the season, applied at different times (Fig 1).

Labelled ^{15}N calcium nitrate was applied by drip fertigation to the treated cherry trees. The first application was on 8 November 2017.

We analysed the total N and ^{15}N content of leaf samples taken throughout the season followed by fruit at harvest and falling leaves captured with nets after harvest. Fruit yield and quality was also assessed at the normal harvest time.

Digging up trees in the name of science

We will excavate whole trees in winter 2018 and again just before harvest in late 2018. This will establish how much stored N has been remobilised and how much the tree has drawn from soil resources.

This will help pinpoint critical times for nitrogen application and the formulation of efficient N-application strategies for growers.

Does nitrogen timing affect fruit quality?

At this early stage, no significant differences were found in fruit quality that related to the timing of N application.

^{15}N analysis will reveal if previously existing soil N or N stored in the trees from the previous season is masking this effect.

Rainfall and nitrogen loss

After heavy rainfall in December 2017 we measured significant losses of nitrogen as emissions to the atmosphere as the potent greenhouse gas nitrous oxide (N_2O).

Over an 8-day period the emissions spiked with an equivalent of 334 g/ha/day of N_2O-N emitted from above the drippers of trees fertigated a week earlier.

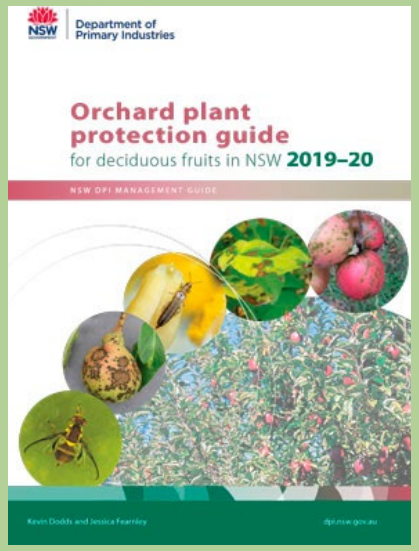
This rate of emission was more than 12 times greater than a similar period experiencing average rainfall. This emphasises the importance of trying to avoid N-fertilisation when heavy rain is imminent, especially as leaching of nitrate-N is known to remove large quantities of N to below the root zone.

Rates and sources of nitrogen application

An additional three year trial has been established at Reid Fruits' Honeywood Orchard at Jericho, to examine the effect of different rates of calcium nitrate application on tree development.

It will also compare a standard rate of this fertiliser with an equivalent quantity of N applied from organic sources.

Another treatment includes a microbial soil inoculant, to test its influence on N uptake.



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.*

Managing crop load in deciduous trees

Dr Sally Bound, Senior Research Fellow,
Tasmanian Institute of Agriculture,
University of Tasmania

Irregularity in cropping is a major economic constraint in many fruit tree orchards. Understanding the mechanisms involved in flowering and fruit set can help orchardists to manage crop loads, resulting in improved yields, fruit quality and returns.

Flower initiation and bud quality

Apples, pears and cherries flower and bear fruit on spurs, short shoots and one-year-old wood, while almonds, peaches and nectarines flower laterally on one-year-old wood. Apricot and plum flower on both one-year-old wood and spurs.

Flower initiation occurs in the spring–summer of the season before flowering. Buds on spurs and short terminal shoots begin initiation 3–6 weeks after bloom in the preceding season, while axillary buds on extension (first year) wood are formed later in the season, usually as shoot growth slows in mid–late summer.

Once flower buds have been initiated, the quality of the developing buds will be reduced by anything that lowers the amount of assimilates produced through photosynthesis, or that diverts these assimilates away from the buds.

Late-initiated flowers often develop only partially and are usually poor quality.

Factors that can lead to reduced assimilates available to the developing buds, thus reducing their quality, include:

- excessive vegetative growth
- lack of light or shaded buds
- poor leaf quality through inadequate nutrition, irrigation or disease/insect attack
- heavy crop load
- high temperatures during the bud development phase causing trees to shut down.

Biennial bearing

Common in many fruit tree species, biennial bearing is the production of a heavy crop one year followed by a light crop the next year.

In pome and stone fruit, biennial bearing is due to lack of floral initiation in the on-year, which leads to poor return bloom the following year.

The seeds in the developing fruit produce auxins that inhibit flower initiation, thus the heavier the crop load during the flower initiation period, the fewer flowers are initiated.

Biennial bearing can also be induced by climatic conditions, stress or orchard management practices.

In apples, some cultivars are less prone to biennial bearing than others. These regular bearers have a high incidence of natural spur extinction.

Fruit set

In fruit trees, flowers differ in their potential to set and retain fruits. This is described as flower quality, and there is a correlation between flower size and eventual fruit size.

Flower quality is commonly estimated by measuring the effective pollination period (EPP).

High quality flowers have an EPP of 4–5 days, while an EPP of one day is classed as poor quality; these flowers set fruit only when pollinated on the day of opening.

The time window for effective pollination and fruit set is much smaller for poor quality flowers compared with high quality flowers, so the aim is to encourage high quality flower production on spurs and short terminal shoots.

Why is early crop load management so important?

The natural fruit drop observed in fruit trees, particularly apples, in early summer is insufficient to achieve optimum crop loads, fruit size and quality, or to prevent biennial bearing.

continued next month

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

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

Irrigation, water savings and avoiding excessive stress

In addition to the strategies outlined in this article, conversion to drip irrigation offers an opportunity to reduce water consumption.

Use of drip irrigation from planting does not adversely affect growth or yield of pear trees. Irrigation of a mature orchard converted to drip should be managed conservatively in the first season to allow trees to adjust to the new wetting pattern.

Concerns regarding irrigation practices (deficit or otherwise) can be alleviated by equipping yourself with the knowledge to accurately calculate crop water requirement and auditing your irrigation system to ensure it is operating efficiently with a good distribution uniformity.

Experiments in the Goulburn Valley have shown that pear trees seldom reach high levels of stress due to soil waterholding capacity and summer rainfall patterns.

In other environments, care needs to be taken to avoid excessive water stress.

In Israel, severe water stress in pear appeared to slow flower organ development, leading to reduced flowering intensity and lower fruit set compared to a moderate level of water stress (Naor et al., 2006).

Growers contemplating imposing a severe irrigation deficit should plan to monitor soil moisture or use a plant-based indicator of water status, such as stem water potential, and discuss these options with their agronomist or Agriculture Victoria staff.

Drought Strategy (Year 1)	Cost	Water Saving (%)	Yield Penalty (%)	
			Year 1	Year 2
Conversion to drip	High	20–25	0	0
RDI	Low	30	0	0
Post-harvest cut-off	Low	30–35	0	0
Parking trees	Low	70–80	100	?

Relative costs, water savings and yield penalties of water saving options.

Avoid mite stress

Monitoring of mite populations is particularly important during dry conditions, regardless of irrigation strategy.

Pear trees with high mite populations are prone to flower in late summer and autumn if they become stressed and are then irrigated. Control of mite populations and avoidance of excessive water stress will minimise this risk.

Contact Ian Goodwin Research Leader, Tatura
Email: ian.goodwin@agriculture.vic.gov.au Phone: 03 5833 5240
Acknowledgements: Financial support was provided by DEDJTR project 102303 *Managing disruption to water supply in perennial horticulture in a changing climate*. Experiments were conducted at Boumbis Orchards and H.V. McNab and Son and we thank the families for their involvement.

Ian Goodwin, Lexie McClymont

Water vs pear crop (part 6)

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Transtak® fruit bin trailers suit Aussie orchards

Transtak® Engineering & Equipment manufactures a range of trailer sizes to handle bins for different fruits and scales of operation.

Most suited to Australian conditions are the Transtak: • 1500L 3-bin trailer • 1500LE 3-4 bin trailer • 2500L 4-bin trailer • 3000LT 6-bin trailer • 3500NS 6-bin stacking carrier.

Self-loading

These registered designs of trailers are self-loading allowing the trailer to function independently of forklifts to load and unload from orchard to packhouse or store. The trailers will move between 100 and 200 bins a day.

Transtak 3500NS

The Transtak 3500NS carrier can load, stack and transport 200–250 bins a day.

This carrier is usually front mounted and has forks side-shift to stack the plastic bins.

Transtak 1500L/1500LE/2500L

The basic 1500L/1500LE/2500L model trailers have a 300 mm lift height with bolted drawbar height and fork angle adjustment.

There is just one half-inch QRC hose to plug into the tractor.

Transtak 3000LT bin trailer

The 3000LT bin trailer has 500 mm lift with forks tilt to assist with loading and transport.

Smooth ride, minimal maintenance

All the Transtak trailers are equipped with rubber and hydra-pneumatic suspension for a smooth ride.

The trailers have no chains or motors to wear out or create employee safety issues; and require only regular greasing of wheel hubs and pins.

Product specifications can be viewed on the Transtak website.

Agent: Konigs Shepparton
Leo: 03 5821 4411 machinery@konigs.com.au
Transtak: 0064 3528 8218
sales@transtak.co.nz www.transtak.co.nz

Transtak 3500 NS

Transtak 1500LE

Transtak 3000LT bin trailer

How to reduce canopy installation costs

Lindsay Adams, horticultural specialist with NetPro, shares some insider information regarding the requirements for installing a NetPro canopy over an orchard, and keeping installation costs down.

"Our crop protection canopies are individually designed to your location, crop and variety," Lindsay said.

Canopy size matters

"The bigger and the more even the shape of the structure (as close as possible to a square or rectangle), the cheaper the canopy will be."

Lindsay said it's all about the span of net and the cost of the infrastructure.

"If someone is considering a one hectare trial, the costs per hectare can be prohibitive, however, if covering three hectares, then the cost is only marginally more and there is three times the cover."

Orchard location also affects the net size and structure choice.

"Once these factors are considered, canopies yield significant irrigated water savings, and reduced water, wind and sun damage," Lindsay said.

The structures are professionally engineered and designed to last.

Access and terrain matter

Lindsay said terrain and orchard access can also affect installation costs.

"The ideal situation is where a block is cleared and there is plenty of room for machinery to move freely," he said.

"However, as long as there is enough room around the perimeter of the block for poles and anchors, and for machinery movement, installation will be a breeze.

"So, allowing enough access around the block is important."

Integrating poles and trellis requirements

Integrating the canopy supporting structures and internal poles into the trellis system, is efficient and cost-effective.

"This can be achieved on new ground and in existing orchards," Lindsay said.

"Kiwifruit grids for instance, are installed under the canopy and incorporated into the structure."

Type of net

The type of net is the next consideration for cost reductions and maintaining pollination requirements.

Lindsay determines the light requirements of the bee area and makes provision for the incorporation of a product that allows access for bees to ensure pollination success.

"Our netting covers reduce crop burdens such as heat, hail, birds, bats, wind and sun that are affecting your final pack out," Lindsay said.

"Our goal is for the client to consistently produce first-class fruit with a high pack out rate from year to year.

"The design considerations we employ involve the correct type and colour of net for each enterprise, and the varieties of fruit that are growing or are proposed—as different fruits require different shade levels."

Planning: key to success

Lindsay tries to keep the canopy design as simple as possible so that the installation can be completed quickly—and the way clients can ensure the construction goes smoothly, is to discuss the project with him and follow his guidelines.

Contact NetPro, phone 1300 638 776
www.netprocanopies.com

Netpro is the market leader in the protective canopy business. Our netting covers protect everything from abalone in S. Australia to lychees in North Qld and kiwifruit in NZ. When thinking about a protective canopy think NETPRO. We will help you every step of the way from conception to completion.

Spray failure: why it happens and how to avoid it

A critical aspect of growing any crop is providing protection from damaging pests and diseases which can have a detrimental effect on crop yield and quality. In this regard, pesticides play an important role.

However, what happens when you apply a pesticide and it does not solve the problem?

Often these days, and especially with insecticides, the first thought is that the pests have become resistant to the chemical being used to control them. While this is of course a possibility, it is less likely to be the case than a range of other options.

Investigate poor insect control

Most insect control failures are not due to resistance. Before assuming insects surviving an insecticide application are resistant, eliminate other possible causes of poor control such as:

- An incorrect rate of pesticide was used, or the pesticide was applied in an improper manner
- The pest was not identified correctly, and the wrong pesticide was used
- The pesticide was not applied at the appropriate time (i.e. pest target was not in the area at the time of treatment, was entrenched, or was in a life stage not susceptible to the pesticide)
- Pests re-infested the area following the pesticide application.

As you can see from above, the most common reason for a spray failure is that the pesticide was incorrectly applied.

Not only will this cause a failure to control the pests on this occasion, but it can also speed up insect resistance to the product.

For this reason, it is crucial that any spray application is applied correctly.

Correct spray application

- Prior to spray application you should ensure that your sprayer is calibrated correctly. Calibrating just once at the start of the season will not allow for crop or canopy growth, meaning your product may not be reaching the intended target.
- Check your nozzles. Any nozzles that are worn or damaged should be replaced. A worn nozzle that has 10% increased output can prove a costly fault when spraying over a large area.
- Read the spray directions on the product label to ensure that you are using the correct volume of water and ensure that you are using clean water with a neutral pH. The quality of water used when spraying agricultural chemicals can have significant effects on chemical efficacy.

Minimise pesticide resistance

Having stated that improper application is the most common cause of spray failure, pesticide resistance is undoubtedly an important issue.

Any pest exposed to the same chemistry mode of action over time will eventually develop a level of resistance. That is why it is important for all growers to follow industry resistance management strategies.

These strategies will include, but are not limited to:

- Rotation
  If applying multiple insecticides within a season, rotate chemistry mode of action as outlined on product labels and insect resistance management programs.
- Cultural practices
  Utilise non-chemical control options that suppress pest populations.
- Monitor
  Use economic spray thresholds to guide chemical applications. Apply pesticides at the correct time.
- Consider your beneficials
  If chemical application is deemed necessary, use selective chemicals in place of broad-spectrum options. This will allow beneficial insects to assist with pest control.
- Read the label
  Comply with all directions for use on product labels and ensure proper application coverage.

Correct application vital

New crop protection products are taking longer to develop and register. They are also demonstrating a shorter active lifespan due to developing resistance.

For this reason, it is imperative that growers apply crop protection products correctly and employ resistance management strategies that prolong the effective life of these products.

A guide to spray application in tree crops is available from Corteva Agriscience. To request one, call Toll Free 1800 700 096
www.corteva.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.

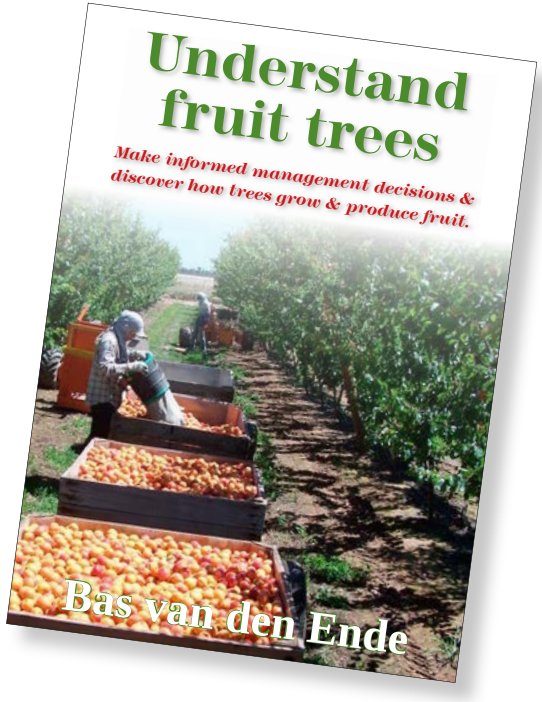
Manual aims to enrich grower knowledge

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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