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Consultant fruit production

In the early 20th century, researchers in California, Germany, South Africa and Australia reported that Williams' fruit had no seeds.

The full name of the variety, Williams' Bon Chretien, is also referred to as WBC or Bartlett.

The term parthenocarpy was introduced, and is defined as the development of fruit without fertilisation of the ovules. Fruit can set and grow to full size without fertilisation.

Two forms are distinguishable:

• Vegetative parthenocarpy—fruit set and development without pollination or fertilisation

• Stimulative parthenocarpy—fruit set and development with pollination but without fertilisation, also called self-pollination.

In some seasons in Australia, vegetative parthenocarpy was evident, while in other seasons stimulation of self-pollination appeared necessary for high fruitfulness.

Williams' trees set heavy commercial crops of parthenocarpic pears under favourable conditions (as in California, South Africa and Australia), but fail to set commercial crops without cross-pollination in other countries and locations. Hence this variety has been classified as self-fertile in one part of a country and self-sterile in another.

Effect of temperature at bloom on fruit set in Williams' pears (part 2)

Effect of temperature at bloom on fruit set in Williams' pears

Continued from last issue

Effect of temperature at flowering on fruit set

It is well documented that Bartlett pears in California set fruit via vegetative parthenocarpy —that is without pollination or fertilisation.

University of California researchers described this phenomenon in 1954.

After a five year study, they determined that in California, Bartlett pear is self-fertile, not because it pollinises itself, but because fruit growth occurs without benefit of any type of pear pollen.

They concluded that temperature during bloom was the stimulant. They found that maximum temperatures through bloom must be above 15.5C (60F), the threshold needed to stimulate parthenocarpic set.

Of course, many growers may have stories of improved set using bees during cold, rainy bloom days. This is probably because bee pollination activity will continue down to 13C (55F), which is 2.5C (5F) below the parthenocarpic set threshold.

It is easy to confuse the effects of rain versus temperature on fruit set. Rain itself is unlikely to reduce set. However, rainy periods in spring are often accompanied by cold temperatures.

Rules of parthenocarpic set

So, what are the 'rules' of parthenocarpic set?

Although statements vary somewhat, the consensus is that for about a 10 day period encompassing the main bloom, there must be



Have a look at the temperature records of your Williams' pear blocks during bloom time. It may explain the level of fruit set.

15.5C maximum temperatures for three days or more (72 hours).

Or more ideally, greater than 15.5C (60F) for two days (48–50 hours), or 21C (70F) for one day. One source states that more than 150 hours of over 15.5C (60F) will set a bumper crop.

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Orchard plant protection guide us fruits in NSW 2020-21



Managing disease, pests & disorders

This information is from the Orchard plant protection guide for deciduous fruits in NSW 2020-21, published by the NSW Department of Primary Industries.

It is reproduced here with permission and thanks. The auide 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.

What are degree days?

Temperature is a key driver of insect development. Degree days (DD) is a measure of temperature over time and it is used to predict the timing of life stages of certain insect pests.

A degree day model counts the total time that temperature is above the minimum required for the pest to develop (lower developmental threshold).

There are established DD models for codling moth (CM), light brown apple moth (LBAM) and oriental fruit moth (OFM). These are best at predicting the first generation of activity and typically become less reliable with subsequent generations as the season progresses.

For this reason, some insecticide labels for these key pests include DD recommendations for timing of the first sprays.

Knowing how to calculate DD will help the grower to time their first sprays effectively.

What do you need?

To use DD for your first spray timing, you will need:

- pheromone traps to determine biofix
- thermometer (max-min or weather station)
- calculator or spreadsheet

Calculating degree days for moth pests

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Calculating degree days for moth pests

What is biofix?

Biofix is the date of the first sustained flight of adult moths recorded in pheromone traps.

It is used as a starting point for the accumulation of degree days and to guide the timing of the first spray.

How to determine the biofix

Deploy traps at a density of about one per hectare, ensuring coverage of the warmest part of the orchard and any known hotspots where damage occurred in the previous season(s).

Establish traps at least a week before bloom for codling moth and oriental fruit moth, but budbreak for light brown apple moth.

The aim is to record at least a couple of weeks with zero moths in the traps before the first flights begin. This will increase your confidence in determining the biofix when moths do emerge from their overwintering pupation sites and fly into the canopy.

Moth pest	Lower developmental threshold (°C)
Codling moth	10.0
Light brown apple moth	7.0
Oriental fruit moth	7.5

Table 1. Lower developmental thresholds for three key moth pests.

Checking traps daily until the first sustained moth flight is recorded will increase the accuracy of the biofix date that you set.

Calculating and accumulating DD from biofix

A simple formula for calculating DD using daily maximum and minimum temperatures and the lower developmental threshold for your pest is shown in Equation 1.

The lower developmental thresholds for CM, LBAM and OFM are listed in Table 1.

Degree days = (max temp $^{\circ}C$ + min temp $^{\circ}C$) - lower developmental threshold $^{\circ}C$ 2

Example calculation

For codling moth (with a lower developmental threshold of 10 °C; see Table 1) on a day where the daily maximum temperature was 18 °C and the minimum 7 °C, the DD for that day would be 2.5. Calculated as follows: Degree days = $(18 \degree C + 7 \degree C) - 10$

2

DD = 25/2 - 10DD = 12.5 - 10DD = 2.5

Equation 1. A formula for calculating degree days.

Moth pest	Lower developmental threshold (°C)
Codling moth	10.0
Light brown apple moth	7.0
Oniontal furrit mosth	7 5

SEE MORE www.treefruit.com.au

Calculating degree days for moth pests

Date of temperature recording	Maximum temperature (°C)	Minimum temperature (°C)	Degree days	Cumulative degree days
3/10/19 Biofix	12	5	0.0	0.0
4/10/19	22	6	4.0	4.0
5/10/19	25	10	7.5	11.5
6/10/19	19	8	3.5	15.0
7/10/19	27	12	9.5	24.5
8/10/19	24	10	7.0	31.5

Table 2. An example of a codling moth DD record sheet showing degree days (DD) and cumulative degree days (CDD).

DDs are calculated daily from biofix and added together to give Cumulative Degree Days (CDD). If using a max-min thermometer, this is best housed in a Stevenson screen (Figure 1) to ensure accurate



Figure 1. A Stevenson screen is the recommended housing for temperature recording in the orchard

measurement of ambient temperature, which can be recorded in a spreadsheet or on paper.

Some weather stations with inbuilt models will track DD accumulation and predict first spray timing.

Table 2 provides an example of how to accumulate degree days in a spreadsheet format.

Label recommendations for spray timing

Most insecticides for CM, LBAM and OFM target the start of egg hatch (i.e. larval stages).

The active ingredient fenoxycarb (e.g. Insegar®) is a notable exception that only controls newly laid eggs.

Codling moth and oriental fruit moth egg hatch occur on average at about 110 CDD from biofix, whilst LBAM egg hatch occurs around 140 DD.

Refer to product labels for recommendations on timing applications based on cumulative degree days.



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Benefits

Orchards

Beloukha is a non-selective, bio-degradable, broad-spectrum, foliar applied herbicide that acts exclusively on contact, attaching and destroying the cell membrane of the plant epidermis causing rapid tissue dehydration.

680g/L Nonanoic Acid

Features

Rate: 6 - 8L of product/100L of water

Applied in 200 to 300L of water/Hectare

Fast acting with visible effects on green plant tissue Derived from natural occurring substances Biodegradable

Many use patterns

Extra use patterns Available in 1L, 5L, 20L, 200L & 1000L packs



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Most weeds show effects within hours of applications

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Lower use rates per treated hectare

Rate range to give more flexibility

More treated hectares per spray vat

Sourced from Sunflowers to kill weeds

Spot spraying in lawns and turf

A pack size for every situation

Breaks down into carbon dioxide and water

Old apple ground can harbour apple replant disease (ARD) which reduces new tree growth and production by about 20% a year for each year of the tree's life.

In 2017 a trial was set up by the apple industry (a Future Orchards[®] trial) to assess options for managing apple replant disease by observing the growth rate of a new planting of Fuji apples on MM106 rootstock into old apple ground under five different pre-plant treatments.

The treatments consisted of two biofumigation mixes, beneficial bacteria, chloropicrin, and the standard practice of metham sodium fumigation.

The trial was conducted in an orchard at Manjimup in Western Australia and is now in the third leaf.

Two treatments stand out at the end of the third season and trees planted with these treatments have performed exceptionally well. They are:

• Treating the soil with the chemical fumigant chloropicrin. Although a well-known ARD treatment elsewhere, chloropicrin treatment has not been a standard practice in the southwest of WA due to the expense of hiring certified contractors from outside the area to apply the fumigant.

• The relatively new approach of application of beneficial bacteria onto the root system during planting to improve soil health.

Treatments

The demonstration site tested:

- biofumigant seed mixes of mustard and rocket
- mustard and Ethiopian cabbage
- a beneficial bacteria product (Serenade[®] Prime)
- the chemical fumigant chloropicrin (Rural Telone C-60 applied by an accredited contractor)
- the standard grower practice treatment of metham sodium.

A block of Fuji was planted on 12 October 2017 onto ground that in the previous years had grown Fuji apples at 5m row spacing and 3m tree spacing on MM105 rootstock.

The new planting was planted at $3.5m \ge 0.8m$ spacing on MM106 rootstock under sprinkler irrigation.

Each treatment strip is 20m wide across the block and five trees in the centre rows of each treatment have been monitored throughout the project.

Susie Murphy White, Project Manager, Pomewest, Western Australia

Soil treatments for Apple Replant Disease

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Soil treatments for **Apple Replant Disease**



Cutting a biofumigation planting.

Biofumigation

Biofumigation is the practice of using specialised plants from the Brassicaceae and Sorghum families that naturally produce chemicals that suppress soilborne pathogens and break the life cycle of pests and diseases.

The brassica crop is mulched at early flowering stage. The maceration process breaks down sulphurcontaining glucosinolates in the plant to release isothiocyanates that are toxic to soil-borne pests and pathogens.

Biofumigation has been shown to have some control of soil-borne pathogens including Sclerotinia, Rhizoctonia, Alternaria, Colletotrichum, Fusarium, Phytophthora, Pythium, Verticillium wilt, as well as root-knot nematode.

The demonstration trial tested two different biofumigation seed mixes.

Mix 1 consisted of 90% mustard and 10% rocket planted at 20 kg/ha. Mix 2 consisted of 75% Ethiopian cabbage and 25% mustard planted at 10 kg/ha. Both were planted on 22 May 2017.

Both mustard mixes were seeded and grown until they reached flowering. They were then cut, mulched and ploughed in and left for three weeks so that the biofumigation activity could occur and the plant material could break down.

The site received over 100 mm of rainfall in this time which assisted breaking down plant material and helping release the biofumigant gas.

Beneficial Bacteria

Serenade® Prime was applied via a soil drench to each tree at a rate of 35 mL per tree at the time of planting. continued next month

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Cherry harvest and the looming labour issues

Australian cherry growers remain concerned about the availability and willingness of harvest labour—not just for their crop, but for all crops that need fruit pickers.

Cherries in particular have a short shelf life and harvesting cannot be delayed more than a day at the most during the warm to hot months.

Growers are finding it difficult enough having to deal with things like the weather and changing market forces, let alone having to comply with the added rules of engagement brought on by Covid-19.

Casual labour is often too casual

I've had some experience trying to assist with harvest jobs for unemployed pickers in the past.

Once a large group of people have agreed to start, one third do not show and one third should have stayed home.

Only about a third of the original group are grateful for a job and turn out okay.

Is it any wonder then that growers turn to contractors to fulfil their labour needs, as it's costly and a waste of valuable time for the grower and worker to fill in the necessary taxation paperwork and superannuation forms only to find that the workers do not stay long enough to qualify.

Dealing with constantly changing rules

There are many unknowns when it comes to issues such as quarantine requirements for overseas workers (and even Aussie workers crossing state borders). Growers have to deal with rules that constantly change to fit changing circumstances.



By the time some workers arrive in a regional area to begin work, that harvest may have been completed, and the next fruit or vegetable might be ready to harvest.

A not so rapid response

All industry bodies have been united in raising this problem as an issue that requires solving, but will anything be done in time for this harvest? Only time will tell.

Politicians both state and federal say they are listening and understand the issues, but the issue about harvest labour has been looming since the end of last season's harvest!

It seems to take a long time even to start something that may bring about a meaningful change to remedy the labour situation.

As the cherry harvest is now well under way, one can only hope that timely progress can be made and that lessons can be learned that will assist other horticultural harvests across the country.

Entrust® Organic—naturally derived, highly effective, fast-acting

In the summer of 1982, a research scientist took a well-earned holiday in the sunny Caribbean. While touring the local sights with his wife, he visited an abandoned rum distillery on a tiny tropical island.

Quietly wandering through the old buildings, he was struck by the ghostly, eerie silence. In a climate where the incessant buzz of insect life droned 24 hours a day, the sudden quiet was deafening.

Intrigued, he took some soil samples and transported them back to the United States for testing. What he and his team discovered was a unique soil bacterium that produces active metabolites (spinosyns) that gave excellent control of certain insect pests.

Development and testing

Years of development and exhaustive testing followed, culminating in the release of Entrust[®] Organic, a product characterised by its efficacy equivalent to synthetic insecticides, but with the safety and environmental profile of a biological. Entrust Organic received regulatory approval by the Australian Pesticides and Veterinary Medicines Authority (APVMA) in July 2020, and will be available this October.

Organic certification & suited to IPM

Naturally derived, highly effective and fast-acting, Entrust Organic has long been anticipated by the Australian agricultural market. Its organic certification, favourable environmental profile and selectivity to key beneficial insects make it ideally suited to many Integrated Pest Management (IPM) systems.

Entrust Organic belongs to a unique insecticide group known as the 'Spinosyns'. A

group 5 insecticide for resistance management, shared only by one other product, Success® Neo.

New resistance management tool

The introduction of Entrust Organic offers organic growers a new resistance management tool for the selective control of some of Australia's most damaging pests.

As with all insecticides, it is beholden on users to rotate between different chemical Modes of Action (MoA) in accordance with label directions to prevent the onset of resistance.

The broad label covers more than 80 registered crops, including a wide range of fruit and vegetables, making it extremely versatile for farmers with mixed enterprises.

Effective control of several pests

Entrust Organic offers growers effective control of several damaging Lepidoptera species including Diamondback moth, Heliothis, Cluster caterpillar, Light brown apple moth and many other caterpillar pests including loopers. It also controls Western flower thrip, leaf miner and Cherry slugs (Diptera).

The recent arrival of Fall Army Worm (FAW) in Northern Australia earlier this year presented significant challenges for organic producers. Subsequently, the APVMA approved an emergency use permit (PER89870) for the use of Entrust Organic which is welcome news for growers struggling to control FAW.

Performance

Corteva Agriscience Marketing manager Nick Koch said "Biological products are often associated with lower levels of performance compared to that of synthetic insecticides."



"Contrary to belief, this could not be further from the truth when assessing the performance of Entrust Organic.

"Growers will be delighted with the speed of control and activity across multiple life stages. The largest larval instars prove to be no match for Entrust Organic".

Trans-laminar activity is a useful feature of this product. The active ingredient moves into the leaf tissue allowing it to control pests, such as leaf miner. However, it is not systemic, and thorough coverage is required to protect the entire crop and repeated application to protect new growth.

Environmentally sustainable

"It's hard to imagine a product that is so effective at controlling pests being environmentally sustainable, but this is certainly the case," said Mr. Koch. "Entrust Organic degrades quickly through exposure to sunlight light, breaking down into carbon dioxide and water within a matter of days which means producers can grow a healthy crop and maintain a healthy farm".

"Organic and conventional producers of fruit and vegetables now have a pest control option that ticks all the boxes. They can rest assured knowing that their crop protection choices will provide them with a sustainable future for this generation into the next."

Entrust® Organic will be available in limited supply from October. To register your interest, visit www.entrust-organic.corteva.com.au or call Corteva Agriscience toll free on 1800 700 096.

Grochem launches Beloukha, a new organic herbicide

Leading supplier, Grochem Australia, has launched a new non-selective, organic herbicide in a major breakthrough for the horticulture sector.

Beloukha herbicide gives growers and their advisers a naturally derived option for effectively managing broadleaf and grass weeds around orchards, vineyards, nurseries and a host of other situations.

The new herbicide has organic certification from the National Association for Sustainable Agriculture Australia (NASAA).

Alternative for weed management

Welcoming the launch of Beloukha in Australia, Grochem Australia's general manager Ben Coombe described the new herbicide as a welcome alternative for weed management.

"Beloukha is fast acting, non-selective, biodegradable and foliar applied," he said.

"It is based on 680 g/L nonanoic acid derived from naturally occurring substances found in sunflowers."

Beloukha works best on a wide range of seedling and young annual and perennial weeds such as blue top, capeweed, clover, couch grass, fat hen, nut grass, potato weed and sow thistle.

Mr Coombe said Beloukha has the highest loading of nonanoic acid on the market, which means lower use rates per hectare, fewer drums and more efficient storage and transport.

Contact herbicide

The herbicide is fast acting with visible effects on green plant tissue within hours of application.

"This is a contact herbicide which attacks and destroys the cell membranes of the plant



Ben Coombe from Grochem Australia says Beloukha herbicide is a breakthrough for growers looking for an organic alternative to control weeds.

epidermis, causing rapid burndown of both annual and perennial broadleaf and grass weeds," Mr Coombe said.

"For the best results, we recommend flexible rates of 6-8 L/100 L of water mixed in 200 to 300 litres of water per hectare when young weeds are most susceptible at the 4-8 leaf stage."

Established and perennial weeds may require a second application seven days later.

Biodegradable

Even though Beloukha is tough on weeds, it is biodegradable, breaking down into carbon dioxide and water.

"We see Beloukha having a key role to play for band spraying in orchards and vineyards, for general purpose weed control, and for spot spraying," Mr Coombe said. This latest addition to the Grochem Australia range is available in 1L, 5L, 20L, 200L and 1000L containers.

For more information: P 1800 777 068 E grochem@grochem.com.au W grochem.com.au

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Additional benefits

NetPro net products provide additional benefits by reducing plant stress, sunburn and wind speed, and in certain situations, the nets can significantly reduce transpiration rates.

Value of Netpro products

Growers have discovered the value of Netpro products when they need to be counted on.

Under a NetPro canopy, entire fields suffer minimal damage in comparison to crops that remain uncovered and may be completely destroyed.

Long term investment with quick pay back

Most clients have reported that canopy pay-back time is about four years. The structure will last upwards of 12 years food for thought.

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Stoller's Plant Stress Recovery Program

Extreme temperatures affect fruit trees and lately, the weather has been all over the place.

It can be difficult for plants to recover after damaging weather conditions such as excessive heat, hail, frost and flood. However, Stoller's *Plant Stress Recovery Program* helps trees bounce back after a stress event.

Stress Recovery program

Treat trees with Bio-Forge and WL Zinc Chelate before or after the stress event.

These products protect trees and increase root growth, therefore maximising yield potential even during difficult conditions.

Feed new growth with an application of Foli-Zyme, which gives fruit trees their best chance at recovering yield.

Protect your crop

Stoller's *Stress Program* protects and encourages root growth and protects your crop, improving yield, quality, and profitability.

For more information on how Stoller's products can help in times of stress: phone our office 1800 337 845 email info@stoller.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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