Australian STONEFRUIT GROWER

incorporating the **Low Chill Stonefruit Grower**

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IN THIS ISSUE –

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Summerfruit Conference

The link to all the Combined Fruit Industry conference presentations –
http://apal.org.au/events/biennial-conference-innovate-or-real-estate/conference-presentations/

Mark Wilkinson's outgoing address delivered at the *Innovate or Real Estate Combined Conference* held 17-19th July at the QT Hotel, Surfers Paradise.

This is my second and final Chairman's address, since I am leaving the Board of Summerfruit Australia. I wish the Board and **Brett DelSimone**, my successor as WA director, all the best. An election in which over half the electors returned their ballots is a victory for democracy.

The Summerfruit Industry has finished the season in much the same financial position as last season. The weather was better so volumes were higher and quality through the supply chain increased. Prices were depressed and fruit was hard to move from the grower's cool room at a decent return. Export increased by 22% over last year's volume but for low returns for most markets.

The future is positive with the fall in the Australian dollar and the easing of production costs as the mining boom comes off, leading to better export potential.

SAL supports the work on low dose methyl bromide protocols for disinfestation and a refocus by Team Australia on gaining access to China for our most available products, nectarines and plums, rather than attempting the simultaneous entry of plum, peach, apricot and nectarine at one time. This push is made more important by the decrease in trade through the Hong Kong border into mainland China, glutting the local Hong Kong market. We have been represented by our CEO at trade shows in China and maintain good relationships with the Chinese import regulator. Other Asian markets are becoming increasingly attractive with Indonesia, the Philippines and Taiwan taking increasing volumes of fruit from a low base.

The negatives are the almost total lack of action by governments at any level to provide any financial or regulatory support for control of Fruit flies with the honourable exception of South Australia who are now dealing with two medfly outbreaks in Adelaide. The attitude of the Victorian Government towards the Pest Free Area almost guarantees that it will fail, with great effect on the table grape and citrus exports and Summerfruit production. The raising of a levy by growers within the pest free area is of prime importance to maintaining this for the interim until a sterile male insect release program is developed for Australia.

The removal of our use of Fenthion by the APVMA used much time and effort by the board in attempting to reduce the effects on our growers in a year where the Med and Q Flies were particularly active and caused localized crop loss. SAL successfully applied for a permit allowing three sprays of Fenthion and a 21-day withholding period. The extra-ordinary efforts of the Hills Orchard Improvement Group in Western Australia caused the APVMA to see fit to issue a permit for a regional use of Fenthion with a 7-day withholding period but the same MRL as the rest of Australia. SAL has provided APVMA the results of residue tests we commissioned to support our use of Fenthion with a withholding period of less than 21 days. We await their decision.

Summerfruit Australia Limited often presents to the world as one person, our sole employee and ever present CEO John Moore. The summary of meetings attended and representations made during the year over-run a page and the efficiency of this one man matches industry bodies with a multiple employees.

My term as Chair of Summerfruit Australia has been interesting and I hope was of some value to industry. I wish that Andrew Findlay, who is the new Chair, will find the position equally interesting and not too stressful, personally or to his business.

Thank you

Mark Wilkinson

2013-2014 Board

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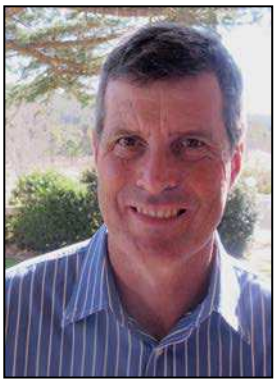

From the Summerfruit Chairman -

As you read this, winter is almost over and the earlier production areas will have their growing season well and truly underway. The trees will be in flower and in the low chill areas. Crops will be at fruit development stage.

Along with the change in season, there has also been a change in the SAL Board with the 2012/2013 SAL Chairman, **Mark Wilkinson**, being replaced as the Western Australian Director by **Brett Del Simone**. Mark spent a lot of time in his role as Chairman of SAL, out of his orchard working on issues for the benefit of all Australian stonefruit growers and, on behalf of all growers, I would like to take this opportunity to thank him for his dedication.

Brett comes onto the SAL Board having been a driving force within the Hills Orchard Improvement Group located in the Perth Hills and brings with him a love and passion for the stonefruit industry.

July saw the arrival first United States stonefruit …

The last week of July saw the arrival of the long talked about (but uncertain as to when it was actually going to happen) first United States stonefruit onto the Australian market. The quality of this first fruit was reported as being very good with wholesale prices in the range of $8.00 - $10.00/kg.

Although largely counter-seasonal to Australian production, the arrival of shipments from the last weeks of the US harvest have the potential to provide impact on the market for the first of the new season Australian stonefruit coming out of the low chill areas in September and October. At the time of writing, it is still unknown as to what quantities will be arriving or how the shelf life of the fruit will be affected by the quarantine procedures that it has been subjected to.

One bright note … a 22% increase in exports for 2011/2012.

One bright note out of what was a financially depressing past season for many growers was a 22% increase in the quantity and value of Summerfruit exported over 2011/2012. The decreasing value of the Australian dollar will certainly help make us more competitive in many of our export destinations where Chile is a major competitor. Nectarines and peaches gained 30% with the strong Hong Kong trade and reinforces the importance of negotiating for direct access into China.

Export only represents 1100 tons out of a national crop estimated at around 100 000 tons

Unfortunately, even with this 22% increase in export volume over 2011/2012, this still only represents 1100 tons out of a national crop estimated at around 100 000 tons. With no reason for levels of supply to be reduced for the upcoming season, and with a tightening Australian economy, it would seem as though we are headed for another year of prices that, for many growers, will herald another tough year.

If we want to change the outcomes that we are experiencing, then we must be prepared to change the way we have been operating. While we continue to plant more trees but as an industry we vote to spend no additional money on market development or promotion, then history would tell us to expect more of the same results – a lot of hard work for little financial reward.

So where to from here?

$600,000 per annum on a domestic marketing campaign …

We can continue to make a similar investment in marketing and research + development as we do now by allocating approx. $600,000/annum to run a domestic marketing campaign and supporting Australian summerfruit in the 11 different export destinations that we supply. Our marketing people run an excellent campaign on a shoestring budget but the level of funding provides limited opportunity to try and grow our market share in a very competitive marketplace.

$1.2 million per annum on research and development …

Similarly, as an industry, we spend approx. $1.2 million/annum on research and development projects. When we have a situation of the scale of the current one we are dealing with in looking to find alternatives to **dimethoate** and **fenthion** for **fruit fly control** and where large amounts of our research dollars need to be allocated, unfortunately many extremely worthwhile projects have to be left unfunded. Contributing to the total of $1.8 million are around $1 000 000 from fruit grower levies and $800 000 of matched

funding from HAL (Horticulture Australia Ltd). We are only able to fund those projects that are of absolute necessity and often at a level well below optimum.

Alternatively, we can decide to increase investment in the future by investing in projects to increase demand for our fruit, not only within Australia but overseas as well. We need to invest in research. Research that, in the past, has been done by various State Government Departments of Agriculture and now, even when work is being undertaken by state agriculture departments, there is often the expectation that industry will be a major contributor to those projects. The purpose of this investment ultimately is to achieve a decent return for our fruit and the investments that we have made in our businesses.

If you are reading this and are thinking that things are humming along okay and don't have the need to receive a greater return for the fruit you are producing - then you really do not need to give much thought to what I am about to propose. If however, you think that you should be receiving a better return than you have over the past two seasons, it's time to keep your mind open.

For an increase in market promotion and market development to happen and for a greater amount of research and development to occur, quite obviously additional funding is required.

At the recent AGM a motion was passed to ask the Levy Revenue Services Dept. of the Australian Taxation Office to investigate possible levy evasion. The collection of unpaid levies is one possible source of increased funding.

The second alternative is to increase the levy from the 1cent/kg that we currently pay. For the process to look at increasing the levy to commence, it will require the widespread support of growers throughout all regions. You know how to contact SAL, so please share your thoughts with us. It is only a few years since a levy increase was last proposed and rejected. That small amount of money per carton would make a very real difference now towards putting a better return in growers' pockets. I leave you with this thought – ***only change can bring about change***.

With the 2013/2014 season getting underway, what will we see? Maybe a new government, Australia regaining the Ashes in Australia, winning the Bledisloe Cup or, most importantly, a year of good quality and better prices for Australian stonefruit!

All the best for the coming Summerfruit season

Andrew Finlay - Chairman

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CHECK OUT THE LOW CHILL AUSTRALIA INC. WEBSITE www.lowchillaustralia.com.au

From the LCA President – Mark Napper

So far this year growers on the East Coast of Australia have experienced a mild wet winter. In Northern New South Wales of the 180 days to the end of June we have had 100 rain days! The mild temperatures and wet conditions are great encouragers to our old foe Brown Rot.

Growers have had a continual battle to maintain spray regimes during these conditions. It was timely then to have a field day where Dr Oscar Vilalta *Senior Plant Pathologist* with Agriculture Victoria who has been working on a HAL and SAL funded project Brown Rot Control, gave growers an outline of his findings and some practical tips to implement these controls to reduce Brown Rot/Blossom Blight in Stone Fruit.

A wag at a local producers meeting when asked for a report on his industry sector said, *"there is no problem with us growers, we are perfect. It is the consumers, wholesalers, agents and retailers that have all the problems!"* Whilst said in jest, it did make me wonder whether by our actions or inactions that is how are being portrayed to the wider community.

It is important for all businesses, growers included, to continually invest and innovate and where there is market failure to work collectively in that investment and innovation for the good of the industry. At the recent Combined Fruit Industry Conference we were challenged, encouraged and motivated by innovation that is occurring at the blue sky level to the more practical on farm applications. Presentations are available on the SAL website.

Sadly, our investment via levies is minimal. Full credit to our researchers and marketing teams who achieve much with little funds. There are major issues that our industry is facing and to ensure our future we need to be investing more in those areas.

For example fruit fly control is one of our major issues which affects domestic and export markets. It is pleasing to receive an interim report from NSW DPI on their levy funded "Alternative in-field chemical control for Queensland Fruit Fly" which is showing positive results for Clothiandin at both suppressing adults and the development of offspring. Whilst it is not, at this stage, producing 100% mortality levels, further research may well be able to increase these levels. However are the funds available for further research on this or other alternatives?

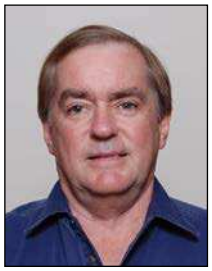
Another new and major issue for the industry is the arrival of the first shipment of USA fruit. Whilst there appears to be shelf life issues the quality of the fruit is reportedly excellent. Do we have sufficient marketing funds to create and implement an effective marketing campaign for Australian stone fruit or are we going to let or expect "someone else" do something or worse still just do nothing? Do we have the funds to ensure we can compete against imported product by delivering a memorable eating experience all the time, every time.

We have a great product that consumers get excited about. We have a great story to tell about our growing standards and expertise. We have great market opportunities. We do have major challenges on our door step. So let's come together to invest and innovate to secure the exciting future for our industry.

Regards

Mark Napper – *President* –

Summerfruit CEO Round Up …



A sensational Combined Conference program and a full house meant that attendees got real value and lots of take-home information. The interaction was excellent and congratulations to those of you who attended. It was worth the effort trekking to the Gold Coast to find each session was so informative.

The trade show was popular throughout the duration of the conference. A sincere *Vote of Thanks* to those presenters who are reading this newsletter. The subject matter was fantastic and really topical. If you would like to revisit the presentations please try this link – http://apal.org.au/events/biennial-conference-innovate-or-real-estate/conference-

My only downside was the lack of support for our *Annual Levy Payers* meeting and *Annual General Meeting*. If we are to keep our Industry motivated, attendance at conferences and AGM's are imperative. The networking opportunities were excellent and comradeship evident.

At the AGM, a motion from major Swan Hill growers and supported by a major Cobram grower will see the Board initiate discussions with *Levy Revenue Services* to review the levy collection process. Fellow growers present endorsed this directive to the Board.

To other industry matters

The much awaited SF12017 (maximum of 2 sprays with a minimum of 10 days between the two sprays and a 7-day WHP) report has been received by HAL and forwarded to the APVMA. I do not propose to speculate on the outcome of the independent review that will be undertaken but I will comment that the SAL-IAC Committee has been very proactive and a lot of industry levy funds have been expended trying to rescue the tool box against QFF and Medfly.

Along the journey research has identified a chemical that shows over 90% efficacy for Fruit Fly control and that is *clothianidin*. Steps are underway to have this registered for Fruit Fly across all Summerfruit categories. *Clothianidin* is registered for Oriental Fruit Moth in stonefruit, with a 21day WHP. The APVMA are aware of the urgency of this registration and it is hoped that approval is given before the season escapes.

Market Access activities are gaining momentum; Summerfruit has the highest priority, sanctioned by OHMA and DAFF at a high level meeting held in Beijing, 6th August with AQSIQ (I am traveling to this meeting at the time of writing this roundup). On the table will be Industry's willingness to accept an initial protocol for ITCT of 21days at 2.1degrees C

ALL NEW

A & A Holdings are proud to announce new machinery lines for orchards.

Firstly the New BMV hedger range which offers the grower a machine with versatility and power to do the bigger hedging jobs from their own tractor.
These machines are superbly crafted and come in a wide range of models to suit every type of crop. All BMV hedgers are controlled by electric joystick which gives the operator a magnitude of operating positions.
Normally these machines come with 500mm tungsten tipped saw blades for winter pruning and can be optioned up with slasher type blades for summer pruning.
Your average tractor can be used, using its PTO drive to power the hydraulic power pack which drives the saws and the tractors remote hydraulic outlets are used to control the movements. The front mounted saw machine is simply bolted to the front of the tractor.
The other new machine from A & A Holdings is the Blosi orchard elevating work platform. These machines come in many different configurations from one, two and three work decks.
The Blosi machines all come standard with hydrostatic drive, motorised high and low gear change. They each can be optioned up with 4 wheel drive, hydraulic side wings, automatic rear wheel centring, compressor and outlets, fruit bin handling and forklifts etc.

NBLOSI ORCHARD PLATFORM

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BMV FL600P

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These units are built for a long working life with features like a double plated 5mm shredder shroud. Robust 3PL sliding pickup point. The unit has a Very low profile to get under those low tree crops. The rear levelling roller bearings are robust and easily changeable.
The main hammer shaft rotor is made of special hardened steel to last the hardest of mulching jobs it also carries the largest heaviest hammer on the market cutting large wood with ease and on the main rotor is an innovative cutter setup to clear any stray wire pickups. Options available are hydraulic side shift, double plated front level wheels. Sizes range from 1.5M to 2.5M cutting widths.
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for nectarines and plums. The same protocol was tabled by AQSIQ to CGA for mainland cherries Australia. The consensus within our major exporting regions is that Industry can, as an interim, option work with this. I am confident we can reignite some positive willingness with the Chinese authorities to move forward with our market access application as it has stalled somewhat given "pressures" from within the Cherry industry to overhaul their protocol that has not suited the mainland growers.

SAL has a firm commitment that Stonefruit will be the focus and that Cherries may have to bide some more time with a protocol albeit to their disliking. It may suit Tasmania, that's another issue; Taswegians have an airfreight protocol, unlike the mainland. Furthermore, it puzzles me why Chileans can export their product to China, ITCT-32 days plus at < 2.1 degrees and our Cherry growers have difficulty at 21 days.

All industries with legal access are in the same predicament with 21 @< 2.1 degrees and similarly are looking forward to the IPPC ratifying 14 days at < 3.0degrees mid next year. The Chinese have been contesting the science for < 3 degrees and this has been frustrating our DAFF and Industry negotiators thus stalling market access progress. If the World Trade Court ratifies < 3 degrees and 14 days, obviously we will be seeking and incorporating a more tolerable ITCT protocol but for now, we are feverishly working a strategy of getting some fruit moving from the domestic market and flagging 21days @ < 2.1 as workable for nectarines and plums. In any event, any ship leaving Australia is wound back by 35% of cruise capability and, in fact, are taking 21 days to reach most of Northern Asia.

Of course we need to export peaches but until we have a commercial airfreight protocol, we do not want to overly stress the Chinese authorities. As you know peaches will not travel **as well** by ITCT as their cousins. We have some exciting work in progress targeting low dose Mbr. This work is a SAL levy funded project conducted in Brisbane and is achieving cutting edge results. In fact sectors from within China are looking to co-share the project outcomes for universal acclaim.

Everyone will have seen the news that USA stonefruit has arrived. Mixed thoughts abound and I hope we look at this with an open mind. If we are to export to any country we will face this overlap in an increasing dynamic. Reciprocal trade has not been forthcoming with the USA at this time, however we have lodged a ramped up reminder that this is a two way street.

Finally, I would like to remind readers who receive this by a third and fourth party that communication is paramount and if SAL has no knowledge of your existence, it can't be healthy for your business. The same applies to members that no longer receive commuincaes direct from SAL. It could be your contact details have changed and you need to update these details with SAL. I am led to believe there are over 700 producers of stonefruit with Australia and SAL has a database of 260. I cordially invite the critics of communication to rectify or help rectify this huge imbalance. Unless people provide their details, you're not going to be found. Please update your email addresses. Regional Bodies can play a pivotal role here and get this message through.

Thanks again for attending the conference.

John Moore – *CEO – Summerfruit Australia Ltd.*

For any further assistance, please contact

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NOTICE TO NSW GROWERS –

The *Orchard Plant Protection Guide* for deciduous fruits in NSW is the annual flagship publication used by growers. The 2013-14 edition is now available and includes a feature article on **Managing Queensland Fruit Fly without Fenthion**, written by **Dr Andrew Jessup**.

For logistical purposes and delivery could you please **contact Kevin Dodds** if you wish to receive a copy.

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Research …

Alternative in-field chemical control for the Queensland fruit fly

Olivia Reynolds, Andrew Jessup, Terry Osborne and John Archer – NSW Department of Primary Industries

The Queensland fruit fly 'Qfly', *Bactrocera tryoni* (Froggatt) (Diptera: Tephritidae) is the most significant insect threat to Australia's $7 billion-plus per annum horticultural industry. The use of dimethoate has been greatly restricted for Qfly control and the remaining option, fenthion, is soon likely to experience a similar fate. Therefore, there has been an urgent need to identify alternative field control options, of which the most immediate is to test alternative chemical controls for in-field Qfly management.

So, a project commenced last year (SF12012) to test alternative in-field chemical controls for Qfly that may offer a viable replacement for **dimethoate** and **fenthion** in stonefruit. A series of three bioassays were conducted to determine which of seventeen likely chemicals were the most efficacious under controlled conditions.

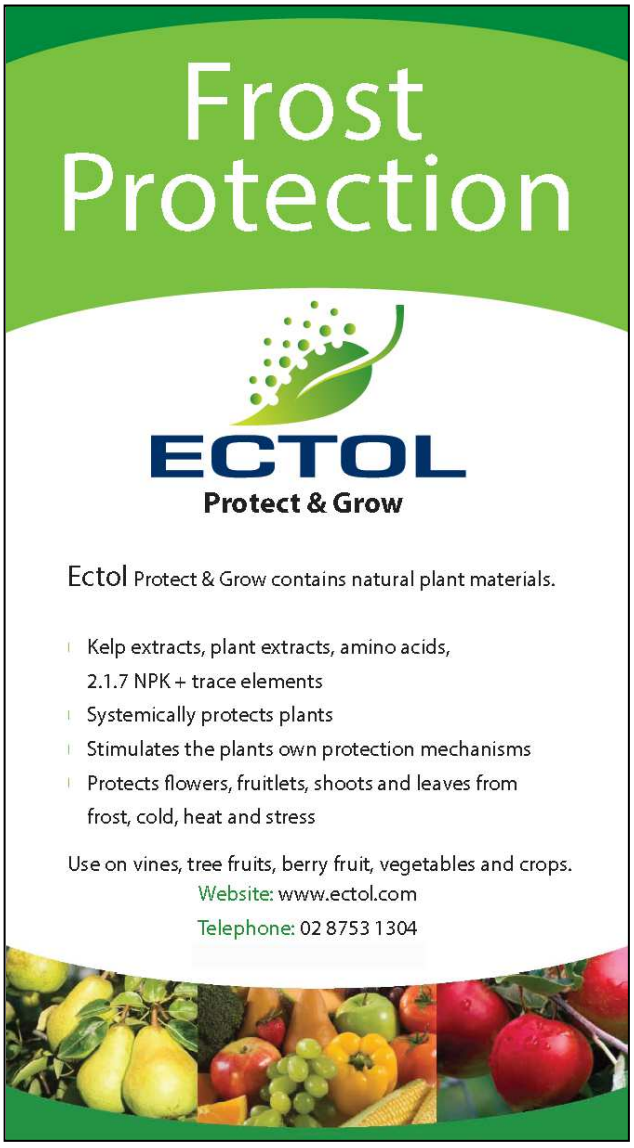
In the first of the three bioassays, stone fruit was either dipped in pesticide and then exposed to Qfly or pesticide was applied topically to Qfly and fruit. This bioassay revealed that Abamectin, Clothianidin, Dimethoate (Half-label rate), Emamectin-benzoate, Fenthion (half- and full-label rate) and Trichlorfon had the greatest efficacy against adult Qfly for both treatments. However, upon looking at the speed of kill or the time it took to halve the population, Fenthion (full and half-label rate), Acetamiprid, Clothianidin, Trichlorfon and Cypermethrin were amongst the quickest. This is important as the quicker the insecticide kills the insects after exposure the better, as this lessens the window of opportunity for the females to oviposit.

Although Cypermethrin was not tested further in the current study, based on the survival analyses and the rapid kill time it is recommended this insecticide is further trialled for its efficacy against Qfly.

The five most efficacious insecticides from Bioassay 1 (excluding Dimethoate due to the APVMAs current restrictions on this chemical it was decided not to pursue) together with the best performing neo-nicotinoid, Acetamiprid were subsequently tested for their effect on adult mortality, repellency and oviposition by dipping the fruit and allowing it to age for 0, 1, 3 & 5 days before being exposed to fertile adult fruit flies.

This study revealed that Fenthion (full- and half-label rate) together with Emamectin benzoate had the greatest effect on mortality which gradually decreased with increasing residual. Clothianidin performed quite well across all the residuals, although was most effective immediately after application and after 1 residual day.

Trichlorfon performed very well, but only when exposed to Qfly shortly after application. Its efficacy diminished rapidly with increasing residual times such that it had very little efficacy after just one residual day. Similarly for Abamectin, it only performed well when exposed to Qfly soon after application, although its efficacy was lower overall than Trichlorfon. Acetamiprid showed the least efficacy against Qfly.



The repellency of insecticide dipped stone fruit to Qfly was most notable against Clothianidin at nearly all residual and observations times when compared with water. No other chemical demonstrated such a strong level of repellence. Despite this repellence, based on the number of offspring (pupae and adults) produced Clothianidin did not perform very well but Acetamiprid was by far the least effective.

Fenthion (full-label and half-label rate) was the most effective with no and very few offspring produced respectively followed by Triclorfon, Emamectin benzoate, and Abamectin.

"In a final Bioassay, organic nectarines were first infested with Qfly and then sprayed with either i) Water (control), ii) Fenthion; full-label rate (standard); iii) Fenthion; half-label rate, iv) Emamectin-benzoate, v) Clothianidin, vi) Acetamiprid, vii) Imidicloprid or viii) Thiacloprid. Fruit treated with Acetamiprid, Fenthion (either half- or full- label rate) and Thiacloprid recorded no or very few pupae or adults. Conversely, Emamectin benzoate produced the highest number of pupae and adults, followed by Clothianidin and Imidicloprid."

These bioassays, together with knowledge of the chemicals informed the selection of four chemicals, Fenthion (full-label rate), fenthion (half-label rate), Emamectin benzoate and Clothianidin to be tested in a peach orchard under field conditions.

Fenthion (half- and full-label rates) were 100% efficacious in both controlling adult flies and preventing infestation.

Early indications are that Clothianidin is very effective at both suppressing adults and subsequent development of offspring (although not at the 100% mortality level) and could be useful as an alternative to Dimethoate and Fenthion for controlling Qfly.

As a result, a permit for the use of Clothianidin in Nectarines, Peaches, Apricots and Plums against Qfly was submitted by Growcom on behalf of Summerfruit Australia Ltd with the Australian Pesticides and Veterinary Medicines Authority (APVMA) earlier this year. The use pattern on the requested permit is identical to the existing label with respect to the number of applications and rates. However, a shorter 7 day withholding period has been requested, rather than the current 21 day withholding period on the label. It is expected an outcome will be heard before the coming stonefruit season.

HAL
Know-how for Horticulture™

This project has been funded by HAL using the Summerfruit industry levy and matched funds from the Australian Government.

RESEARCH …

Why Area-Wide management for fruit fly?

Area-Wide (A-W) management is a phrase being commonly spoken about with respect to fruit fly management in the post dimethoate and fenthion world. Internationally, A-W management is seen as critical for fruit fly control and it is commonly a core element for establishing market access under Areas of Low Pest Prevalence.

A-W management has been used in Australia for other insect pests, e.g. Heliothis in cotton, but it is less common or unknown for pest management in stone-fruit. This article explains why the biology of our fruit fly pests makes an area-wide approach so important.

There are three components of the biologies of Queensland fruit fly and Mediterranean fruit fly which need to be considered when developing management options against them: they are polyphagous, they are multivoltine, and they are mobile with active host orientation.

- ***Polyphagy*:** This term relates to the number of plants eaten by an insect. A monophagous or oligophagous insect feeds on only one, or a restricted group of host plants. For example black peach aphid (*Brachycaudus persicae*) is largely restricted to peaches and some closely related stone-fruit – it is referred to as oligophagous. By controlling the aphid on peaches the problem is generally solved. However, Qfly and Medfly are polyphagous, meaning they lay their eggs into a great range of plants. Indeed, each of these flies has been recorded from well over 120 plant types, covering commercial, exotic but non-commercial and native fruiting plants. This means these fruit flies will happily breed in pretty much any fruit out there. The size of the host range exhibited by these two flies is extremely rare in plant feeding insects – fewer than one species in 1,000 have such large host ranges.

- ***Multivoltine*:** In entomology, voltinism refers to the number of generations an insect has in a year. While there are exceptions, the common pattern is that in cold parts of the world insects are univoltine (one generation per year), and in warmer parts multivoltine (two or more generations). Multivoltine insects keep producing new generations so long as temperatures are warm enough and there is food available. Both Medfly and Qfly are multivoltine, breeding continuously in warmer weather if fruits are available. In temperate parts of Australia Qfly can have five to six generations in a year, in tropical Queensland as many as 18. For Medfly the lifecycle is slightly longer, about a month per generation in the south-west.

- ***Mobility*:** Fruit flies are mobile insects, capable of strong, self-directing flight and they actively orientate to a crop using visual and chemical cues. The distance an individual fly can travel in its life is dependent on many factors, but several kilometres is easily done, and up to 20 kilometres possible.

The combination of polyphagy, multivoltism and mobility means that fruit flies can breed up in large numbers away from the orchard before they invade the crop, they can then breed in the crop, and then will leave again to continue breeding elsewhere.

An effective systemic insecticide will protect the crop, but it does little or nothing to reduce the local fly population if they have other places to breed (which in most cases they do). In the absence of an effective systemic insecticide, the only alternative is to try and reduce the total population of flies in the local area – hence the need for area-wide management.

How big an area? This is the key question for A-W management, and probably the one for which we have least understanding.

It was once considered that fruit flies were highly mobile, flying up to 80kms and with large areas needed to be managed for effective area-wide control. It is now considered that such long dispersal is very rare (if it happens at all), and that much smaller areas can be managed successfully. While managing at the level of a production district is still considered optimal for A-W management, practice is showing that population management over even a few adjoining farms can lead to significant reductions in fruit fly numbers.

At a minimum, growers will still benefit from managing fruit fly breeding on their own farms, including managing flies in orchards still too young to be commercially picked, old orchards waiting to be pulled, late fruit post pick, house trees, brambles, etc.

Acknowledgements
This article was written by Tony Clarke of the Queensland University of Technology as part of HAL Project SF12013 "*Fruit fly IPM for Summerfruit, with a focus on developing an effective female lure-and-kill device*". This is the second of a series of articles providing information on fruit flies and their integrated control.

This project has been funded by HAL using the Summerfruit Industry levy and matched funds from the Australian Government.

"This is a wonderful opportunity to reward the forward-thinking leaders of our industry. Their achievements, whether spanning a few years or a lifetime, positively impact horticulture for all of us."

HAL CEO, John Lloyd

1. The prestigious Graham Gregory Award
Open to all professionals working in horticulture. With a $10,000 cash prize and a commemorative bronze medal, this award recognises excellence in horticulture from any point along the supply chain including research and development, education, training, technology transfer, and advertising or promotion.

2. The Kendle Wilkinson Award
Open to young scientists who have made a valuable contribution to the horticultural industry - bridging the gap between science and best farm practice.

3. The Young Leader Award
Encouraging the next generation of horticulturalists by recognising leadership in any discipline. It is open to all professionals aged 35 years or under.

Winners of all three awards will be invited to Sydney for the award ceremony which will be held the evening of our November Industry Forum on Thursday, 21 November, 2013.

Nominations close on 20 September 2013.

For a nomination form or more information go to the HAL Website or contact Sharyn Casey at **sharyn.casey@horticulture.com.au** or on **02 8295 2379**.

HAL Horticulture Australia

First arrivals of counter-seasonal California peaches and nectarines

The range of fresh fruits available for Australian consumers in Winter and Spring has now expanded significantly with the first arrivals of counter-seasonal California peaches and nectarines.

California Stonefruit

Until mid-October, yellow-fleshed peaches and nectarines and white-fleshed nectarines will be available. The arrival of counter-seasonal stone fruit provides consumers with more snacking fruit options at a time when there is limited choice.

The United States Ambassador to Australia, **Dr. Jeffrey Bleich**, says since the market opened in late July response by consumers and retailers has been very positive. In fact, because all the fruit is air-freight-fresh, it has been a challenge to find sufficient space to keep up with demand.

"Starting this week there will be more varieties of sweet tangy fruits here that you ordinarily couldn't get in Winter. The first shipment of California peaches and nectarines began arriving in Australia a few weeks ago, and I had a chance to buy and taste some earlier this week at the Sydney Wholesale Markets. They were just as juicy and delicious as I remembered. Many

people have worked hard to get these exceptional stone fruits Down Under – including Australian importers, wholesalers, and retailers.

"At present only peaches and nectarines meet the strict Australian quarantine requirements. This includes inspection of all fruit by Australian quarantine officials in California, before being shipped to Australia.

"The early welcome extended to California peaches and nectarines by Australian consumers and retailers has led California stone fruit growers to forecast the market could reach $50 million over the next five years, especially if plums are also permitted access to the Australian market," says Dr. Bleich.

California Stone Fruit is available now from supermarkets and independent green grocers.

For further information
Produce Marketing Australia
Tel: +61 2 9642 1555
Email: john@producemarketing.com.au
www.producemarketing.com.au

THE LEADING EXHIBITION FOR THE VINE AND WINE & FRUIT AND VEGETABLE AND OLIVE-GROWING SECTORS

The **26th** edition of **SITEVI**, an exhibition dedicated to the vine and wine & fruit and vegetable and olive-growing sectors, will take place from **26 to 28 November 2013** at the **Montpellier Exhibition Centre in France**.

Building on the success of the 2011 show and buoyed by an optimistic wine production market and the expansion of the fruit and vegetable and olive-growing sectors, SITEVI 2013 is pursuing its goals and setting its sights on the future. A leading exhibition for both sectors, it will provide a welcoming environment where industry professionals can meet and do business. Asserting its position as a dynamic international show, it will offer several new features, including an Olive-Growing Day, an Innovation Awards Gallery, a Jobs Village, and a Wine-Maker Experience Area. There will also be numerous events, such as international forums, practical workshops, technical conferences, an R&D centre and the Innovation Awards.

A DYNAMIC SHOW WITH CLEAR GOALS! Six months before the opening, exhibition manager Martine Dégremont is confident about the future: *"SITEVI 2011 was a big success and marked a major step forward. The 2013 show will build on this momentum. With help from our host region, and taking advantage of a renovated and modernised exhibition centre, we've set the bar very high. SITEVI can now realise its full potential and optimise its position as one of Europe's leading trade shows with visitors from around the world. The show will feature even more new products and services this year and provide professionals from both sectors with the tools they need to prepare for the future."*

SITEVI in brief – A leading trade show for the vine and wine, fruit and vegetable, and olive-growing sectors, SITEVI provides a showcase for a complete range of machinery, equipment, products and services. Its mission is to help industry professionals expand their businesses by offering them advice on the purchase of new equipment and providing information on new techniques, marketing, sales and sustainable development. The exhibition is being held at the heart of the Mediterranean basin, in the Languedoc-Roussillon region, France's number one wine-producing region in terms of surface area, and its leading fruit-growing region. Benefiting from an excellent location in Europe, SITEVI has global reach.

- 1,062 companies from 22 countries,
- 48,880 admissions, of which 1 in 5 were from abroad (54 countries)

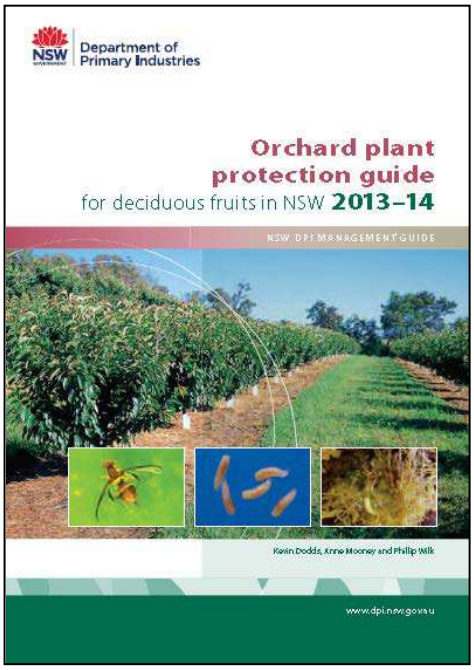
Industry professionals from **Australia** and **New Zealand** will be welcomed at the SITEVI as VIP guests.

Contact SITEVI's representative in Australia, **Sandra Trew**, to obtain more information. Level 35, 31 Market Street, Sydney NSW 2000
Ph: 02 9261 3322, Email: promosalons@optusnet.com.au – Website: www.sitevi.com

Industry Information …

Latest issue of the *Orchard Plant Protection Guide* available soon

This season's edition of the ever-popular *Orchard Plant Protection Guide* is back from the printers and will be available to NSW deciduous fruit orchardists from August 22.



"The 2013-14 Guide is **free** and will be available from NSW Department of Primary Industries (DPI) and selected Catchment Management Authority offices," Kevin Dodds, DPI Development Officer (Temperate Fruits) said.

"This 23rd edition of the Guide provides up-to-date information on all aspects of protecting your orchard from pests and diseases," he said.

"As well as having the most up to date registered crop protection options, the new edition includes a feature article on the management of Queensland fruit fly in the deciduous fruit orchard without fenthion by DPI researcher Dr Andrew Jessup.

"The article is very timely and contains useful information on the pest, its lifecycle and a range of control methods such as exclusion netting, trapping, baiting and cover spraying."

Mr Dodds said the guide also contains articles on the development stages for stone fruit blossoms; good management to control common diseases, pests and disorders in your orchard; nutrient sprays for deciduous fruits; weed management; and avoiding resistance to pesticides.

Crops covered in detail include peaches and nectarines, apricots, cherries, plums, prunes, apples and pears.

The guide is free to all NSW deciduous fruit growers and will be available for orchardists to collect from their nearest NSW DPI or CMA office from August 22.

Copies of the guide may also be obtained by contacting the NSW DPI Bookstore on 1800 028 374. The guide is also published on NSW Department of Primary Industries website at www.dpi.nsw.gov.au/pubs/orchard-guide

Product Information –

The New Cinch

Crop load management is vital for consistent crops of large, quality fruit. Blossom thinning has many advantages ~ especially competition for tree resources are reduced, leading to increased fruit size.

The New ***Cinch*** is a portable, string-style thinner that attaches to a ½"cordless drill, or to an air or hydraulic power source.

The ***Cinch*** allows the operator to thin blossoms on any tree style – vase, trellis central leader

- No special tree training needed – operator has full control for all limbs & laterals
- The aluminium rod holds special pliable tubing that knocks the blossoms off yet is lightweight, effective and causes effectively no damage to the trees

Available in 900mm, 1.2 and 1.5 m lengths

The ***Cinch*** can be used from pre-bloom to petal fall, but is most effective at balloon to full bloom

- Suitable for peach, nectarine, cherry and apple especially precocious trees like cherry on Gisela rootstock, low chill stonefruit and heavy setting nectarines.

The solution is a ***Cinch – order yours today***

Contact: Russell Fox – InSense Pty Ltd, 6 Sims Road, Cobram Vic 3644 Australia – Mobile: 0407 366 526
Email: russell@insense.com.au ***– Website:*** www.insense.com.au

EXPORT HIGHLIGHTS

By Wayne Prowse – Export consultant

11,123 tonnes – is the recorded export statistic for 2012/13 summerfruit season.

The Australian summerfruit industry has recorded its best export result since 2006. By value the Australian summerfruit exports were $31.81 million for the season to March 2013.

Key Australian summerfruit export results

October to March 2013 vs 2012

Volume	**11,123 MT**	**+22.5%**
Value	**$31.81m**	**+22%**

Hong Kong was the largest destination accounting for 50 per cent of the trade followed by United Arab Emirates. Summerfruit was Australia's largest horticulture export to UAE by value in 2012/13.

SUMMERFRUIT EXPORT BY MARKET BY TYPE 2012/13

Market	Nectarines & Peaches	Plums	Apricots	Total	share
Hong Kong	3,589	1,848	77	5,514	50%
United Arab Emirates	2,081	163	131	2,375	21%
Singapore	804	606	47	1,457	13%
Malaysia	209	219	3	432	4%
Taiwan	259	-	-	259	2%
Kuwait	122	26	11	159	1%
Saudi Arabia	100	8	29	137	1%
Qatar	114	7		121	1%
Vietnam	61	55	1	117	1%
Russia	66	35	6	107	1%
all other	261	116	49	426	4%
Total (Tonnes)	**7,667**	**3,083**	**353**	**11,123**	100%

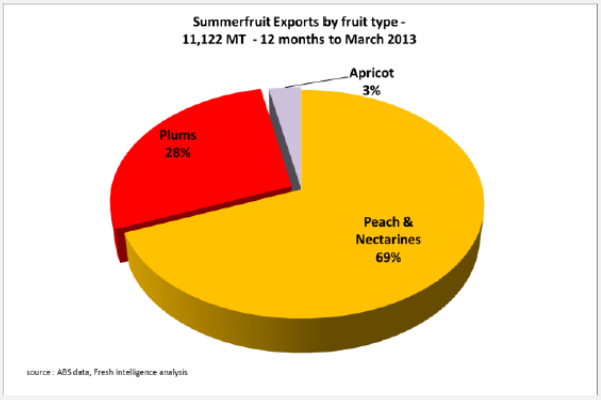
Source : World Trade Atlas based on ABS data; Fresh Intelligence analysis

Hong Kong, Singapore and Malaysia, which are unregulated markets without tariffs or quarantine barriers, were the main drivers accounting for 67 per cent of the export trade while Middle East markets combined accounted for an impressive 25 per cent of the trade. The UAE was the largest destination for apricots.

Hong Kong results are influenced by re export trade into China.

Taiwan, the main regulated market with the cold treatment protocol since 2011 recorded 2 per cent of the exports of which all were nectarines and peaches. Thailand has remained closed to Australian summerfruit since 2012.

Nectarines and Peaches accounted for 69 per cent of the total exports while plums and apricots were 28 per cent and 3 per cent resp.



Results by state showed Victoria as the leading state with 71 per cent of the total exports and New South Wales with 20 per cent. Whilst these figures mostly reflect the states from where the fruit is sourced there are instances when the recorded state is the exporter's home state rather than the grower. There were also 22 tonnes of fruit recorded as re-exported.

SUMMERFRUIT EXPORTS BY STATE

State	Tonnes	Chg LY	share
Victoria	7,943	26%	71%
New South Wales	2,279	67%	20%
Western Australia	479	-50%	4.3%
South Australia	247	71%	2.2%
Queensland	148	-55%	1.3%
Tasmania	2	-60%	0.02%
Other *	26	-22%	0.23%
Total Exports	11,123	22.5%	100%

* Other includes re-exports

Source: World Trade Atlas based on ABS data

Although the result is strongest in seven years many will remember the 20,000 tonnes exported in 2003 – the best ever during the year after Taiwan and China entered the World Trade organisation, Taiwan quotas were removed and the exchange rate was below 60 US cents. Since then droughts, floods, escalating exchange rate, rise of competitor exports to Asia, GFC and loss of access to Taiwan (2006 – 2011) and Thailand (2012 ...) has not been kind to export development therefore the 2012/13 result is encouraging to the industry. We hope it will continue.

International Research –

Current direction of international peach and nectarine research – Is the Australian summerfruit industry up to speed?

- John Lopresti, Glenn Hale, Dario Stefanelli and Bruce Tomkins (AgriBio Centre - DEPI Victoria)

Summer fruit researchers from around the world recently gathered at the 8th International Peach Symposium held between 17th & 20th June, 2013, in Matera, Italy. The program of oral and poster presentations covered many areas of interest and relevance to Australian summerfruit producers. The main areas of international applied research presented at the symposium were identifying rootstocks with specific agronomic traits, reducing costs of fruit production, increasing demand for fruit in domestic markets and improving fruit quality for export markets. Australian producers face the same issues, so the intention for this article is to briefly highlight research findings and directions that are considered relevant and of potential interest to our industry. Full proceedings of the symposium will be published in *Acta Horticulturae* in 2014.

Rootstock evaluation

The effect of rootstock on tree vigour, growth, fruit yield and fruit quality largely depends on its interaction with scion variety, climate, and soil type, thus current research is focused on evaluating new peach and nectarine rootstock performance for various summefruit cultivars under a wide range of growing conditions.

- Eighteen NC-140 *Prunus* rootstocks budded with 'Redhaven' peach were studied across 16 sites in a large rootstock trial across the **United States**. Significant differences among rootstocks and sites were found for survival, root suckers, growth, bloom date, harvest date, fruit size and yield. Earliest bloom by 1-2 days occurred on *'Bright's Hybrid #5'* and *'KV010127'* rootstocks in both years studied, while fruit maturity varied between rootstocks and sites by 50-60 days. These two rootstocks also advanced fruit maturity, while 'Penta' and 'HBOK 32' delayed maturity in both years. *'Viking'*, *'Bright's Hybrid #5'* and *'KV010127'*consistently produced the largest fruit and *'Fortuna'* the smallest. As expected, the highest yields were consistently obtained on vigorous peach, and peach x almond, rootstocks (www.nc140.org/plantings/2009peachrootstock.html).
- **Greek researchers** have evaluated three almond x peach hybrid rootstocks (KID2, PR204 and GF677) for growth and fruit quality after grafting on 40 peach and nectarine cultivars. They found that KID2 increased vigour and fruit fresh weight, whereas PR204 reduced fruit weight in some cultivars that was partly attributed to disturbances in water relations and reduced photosynthesis. The effects of rootstock on fruit size and tree physiology depended on scion cultivar and were usually less pronounced in late-season cultivars.
- Currently, peach seedlings that are easy to produce, productive and that have high grafting-compatibility, are often used as peach rootstock. **INRA researchers in France** are using information from the peach genome project (www.rosaceae.org/peach/genome) to characterize new genes and find molecular markers to explore *Prunus* genetic diversity, and to assist in selection of new rootstocks. Globally, highly-desired peach rootstock traits include nematode resistance, waterlogging, vigour control, calcareous soils and drought-resistance. Finding genes that can assist in selection of *Prunus* genotypes with the required traits will allow breeders to maximise new rootstock performance above that of existing rootstocks.

In Australia, DEPI Victoria scientists have begun a project *"Rootstock and training system to optimize early stone fruit bearing and growth"* funded by Summerfruit Australia, Horticulture Australia and DEPI. It will evaluate current and new rootstocks under local climatic and growing conditions, and explore the interaction between rootstock, tree training system and crop load and their effects on tree physiology and fruit quality. This cutting-edge research is aimed at enhancing the profitability of Australian producers by providing precise guidance on rootstock and training system selection to improve yields and fruit quality.

Peach breeding

The goals of current peach breeding efforts, other than fruit size and yield, are cultivars with good flavour and high sweetness, as well as slow-ripening characteristics on the tree and a long storage life after harvest to enhance export opportunities. These goals are being achieved by introducing non-melting canning peach and stony-hard germplasm into fresh market peaches.

- **Moderate chill peach varieties are being bred in the United States** with a slower-ripening rate on the tree than melting-types, using controlled crosses of non-melting and fresh market peaches. These new cultivars can be harvested at a more mature stage that allows the development of higher sugars, larger fruit size and more red blush prior to harvest, while fruit firmness is maintained to enable normal postharvest handling. Five non-melting cultivars have been released commercially from this program conducted by the USDA–ARS (Byron, GA), Georgia Agricultural Experiment Station, and Florida Agricultural Experiment Station, two of which are being widely planted by the US industry (http://hos.ufl.edu/sites/default/files/faculty/gdliu/Gulfsnow.pdf).

- **Italian researchers** have also crossed stony hard and fresh market peach cultivars resulting in a significant reduction in the rate of ripening on the tree and improved storage life. Improvements in fruit flavour have been achieved by selecting genotypes with high sugar content and crossing these with low acid cultivars, or through discarding genotypes within the breeding program characterized by excessive flesh acidity. They also found that good flavour was associated with new genotypic traits such as flat shape, full red skin colour, or with fruit flesh containing low anthocyanin concentrations.

Evaluation of pruning and training systems

Worldwide research is exploring various tree training systems to maximize yield and reduce orchard establishment and productions costs. In the Mediterranean region of Europe, training systems are rapidly changing from strictly geometrical/ highly-managed trees to 'free' systems for cultivars where tree vigour and productivity can be maintained or even enhanced.

Figure 1. Mature nectarine orchards in the Calabria region of Italy utilising a Spanish vase training system (above) and Y-trellis (below).

Spanish vase is becoming the most popular training system for new orchards for its early bearing, easy mechanization and relatively low labour input and establishment costs (Figure 1). **Spanish or Catalan vase** is a relatively small, up to 3 metres high, with an open centre, trained via repeated mechanical summer pruning in the first two years. Accurate winter pruning is begun in the second year to control yield and maximize fruit quality.

Among hedgerow systems, the free spindle is rapidly replacing the palmette system, resulting in an increased planting density, while Tatura trellis is only being used under plastic tunnels. Annual winter pruning is of critical importance in all training systems within mature orchards with the most common pruning approach being a combination of shoot and limb thinning, the degree of which is varied depending on cultivar. Choice of shoots with adequate vigour and orientation relative to fruiting structure of the cultivar can lead to a significant improvement in fruit quality.

A comparison of two training systems over three production years, small vase (SV) and Y-trellis (Y), in southern Italy showed that depending on cultivar, the SV system (888 trees/ha) performed similarly or better than Y-trellis (909 trees/ha) beyond the 5th year of production. Two peach (*Rich May* and *Summer Rich*) and two nectarine (*Big Bang* and *Nectaross*) cultivars were evaluated with the Y system resulting in 23% higher fruit yields but in 31% higher management labour and 17% lower labour efficiency (kg fruit/hr) than the SV system. Grower profit varied greatly depending on the cultivar with only *'Nectaross'* generating a higher profit in the Y compared to the SV system. Fruit unit value ($/kg) was similar in the two training systems.

Flower and Fruit thinning

In peach and nectarine production, regulation of crop load by flower and fruit thinning is important in producing a high quality crop. Costly and labour-intensive hand thinning is the standard method of adjusting crop load in trees thus research work continues to explore both mechanical and chemical methods to reduce thinning costs while maintaining fruit quality.

- **Italian researchers** have been evaluating the efficiency a German mechanical string thinner (Darwin 300), originally designed for apple flower thinning, in peach and nectarine orchards trained to narrow canopy systems (Y, U and central leader), that allow maximum string penetration through the tree canopy (Figure 2). Trees were mechanically-thinned at a rotor speed of 150-180 rpm and vehicle speed of 7 km/h, at bloom and early fruiting and compared to similar hand-thinned trees. In all cases mechanical thinning reduced labour costs in comparison to hand thinning and increased crop value due to larger fruit. Mechanical blossom and fruitlet removal ranged from 30 to 64% depending on training system and vehicle settings, while complimentary hand thinning of fruitlets reduced by 29 to 75%. No significant damage was detected on remaining fruit after mechanical thinning once vehicle settings were optimised for each training system and cultivar. US researchers have also previously evaluated the Darwin 300 in peach orchards (www.crec.ifas.ufl.edu/harvest/pdfs/posters/11_Reighard.pdf).
- Previous research on chemical flower thinning in peaches and nectarines has generally produced positive but inconsistent results from one season to the next. Work continues on finding suitable chemical thinners in the hope of reducing the costly practice of hand-thinning. **Researchers in the**

Figure 2. Darwin 300 mechanical string thinner mounted on a tractor used for

United States evaluated the effectiveness of both ammonium thiosulfate (ATS) and sulfur+fish oil (LSFO) as peach thinners over two seasons. In general ATS caused more thinning than LSFO with two sprays being more effective than a single spray. The optimum spray timing appeared to coincide with 30-40% open flowers and then at 80% bloom.

- **A Brazilian study investigated** the use of ammonium thiosulfate (ATS), applied at full bloom, as an alternative to hand thinning of fruit at 40 days after full bloom. ATS treatment at 1.5 g/L resulted in similar fruit diameter and yield to that found in hand-thinned trees. Higher rates resulted in excessive thinning and low yield, while lower rates led to high crop loads and small fruit as found in un-thinned trees. The researchers indicated that further studies over several more seasons are required to ensure consistency of preliminary results.

Fruit quality and harvest maturity

Maximising peach and nectarine quality at harvest while reducing variation in size, flesh firmness, soluble solids concentration (SSC), colour and maturity of fruit within trees is the main focus of research around the world. Over twenty research studies in this area were presented at the symposium, many utilising non-destructive measurement of fruit physiological maturity within trees at harvest using a DA meter (Figure 3), which provides an index (I_{AD}) that expresses the ripening stage reached by a fruit (www.freshplaza.com/news_detail.asp?id=110897).

Figure 3. Non-destructive DA meter for measuring peach and nectarine fruit maturity using index of absorbance (IAD).

In many of the studies, this new tool was used to determine the optimum harvest maturity for different cultivars and to determine the relationship between non-destructive measurements and fruit quality parameters such as flesh firmness. Several studies also considered the effect on fruit quality at harvest of flower phenology and fruit position within trees.

- **Japanese researchers** found that variation in fruit size and SSC within peach trees was closely related to fruit height within trees and on whether fruit were borne on early or late blooming flowers. Fruit weight and SSC were found to be significantly lower in fruit from the bottom of trees and in those fruit borne from early blooming flowers. They also found that removing early blooming flowers increased fruit quality and reduced its variation within trees, concluding that thinning by flowering time as well as position may improve quality.
- **Italian researchers** determined that differences in the time of flowering (asynchronous flowering) had an important effect on variation in fruit size within a tree at harvest. During fruit growth they found that fruit from earlier flowers were consistently larger from fruit set to harvest than fruit from later flowers. Higher accumulated growing degree hours also resulted in increased fruit size but differences in size could not be fully explained by accumulated thermal time, suggesting that asynchronous flowering is the main reason for significant fruit size variation within trees.
- **Greek researchers** undertook a large study to determine the relationship between fruit physiological maturity as measured by DA meter (Index of Absorbance, I_{AD}) and fruit quality parameters such as fruit flesh firmness, fruit size, colour and SSC. This study was representative of many that were presented at the symposium, using I_{AD} values that are closely related to fruit ethylene production and thus ripeness, to determine the optimum harvest maturity for different cultivars. In this particular research 26 peach and nectarine cultivars were studied, at harvest and during five days of ripening. It was found that at harvest fruit maturity (ie. I_{AD} values) and skin colour varied widely across cultivars whereas SSC had the least variation across cultivars. Within single cultivars decreasing I_{AD} values were highly correlated with decreasing flesh firmness but were less well correlated with increasing SSC and fruit skin colour. Considerable variation in I_{AD} values among cultivars at harvest emphasized the need to determine optimum harvest maturity indexes for individual cultivars.
- **Italian researchers** from the University of Bologna are developing a relatively simple model based on changes in fruit maturity (I_{AD} value) and fruit diameter during the final stages of fruit growth that can be used to predict the harvest window for specific cultivars to within 3-4 days. Thus the interception of fruit maturity, and diameter, growth curves will provide an estimate of harvest date as both factors are linear. Yield can also be estimated to within 5-10% accuracy if fruit weight is estimated from diameter, the two being very highly correlated. These models may eventually allow the prediction of harvest timing and fruit quality in crops managed under different training systems and cultural practices.

Evaluation of the current direction of peach and nectarine research around the world based on symposium presentations indicates that DEPI Victoria scientists based at AgriBio Centre (Bundoora) and at Tatura are at the fore-front in particular research areas. These include sustainable irrigation practices, fruit quality as impacted by orchard management, optimising harvest maturity, postharvest storage and consumer sensory evaluation. With the continued support of the Australian summerfruit industry over the next five years, DEPI researchers will focus on understanding the effects on fruit quality of multiple orchard factors including rootstock, tree training system and crop load. Outcomes from this research will provide Australian producers with a distinct advantage when competing in export markets, as well as enable them to grow consistently higher quality fruit for Australian consumers.

John Lopresti attended the 8th International Peach Symposium as a component of his PhD studies on summerfruit composition and quality, and was funded by Summerfruit Australia, Horticulture Australia, University of Western Sydney and DEPI Victoria.

Research –

Sterile Insect Technique for fruit fly …

The potential development in Australia of the Sterile Insect Technique (SIT) for use against fruit flies is currently one of the most important issues being considered in fruit fly management. The discussion is being carried out from politicians to growers and at every level in between. This article gives a background to the pros and cons of SIT.

Background

SIT is a biological pest control approach developed over 50 years ago by U.S. scientists. In theory the concept is quite simple. SIT works best for insects where the female mates only once, or very few times in her life – such insects include codling moth, many mosquitoes, African Tsetse fly, blow-flies and fruit flies. In such insects if the male the female mates with is sterile, then the female will lay infertile eggs. SIT operates by mass-rearing huge numbers (10s to 100s of millions) of the target insect, sterilising them (commonly with a radioactive Cobalt 60 source, but other technologies are becoming available), and then letting them go. If enough sterile males are released that they out-compete the wild males for partners, then most of the wild females will also then become sterile and the pest population will collapse. This approach, when used properly, can drive local populations to extinction. SIT does work and is used operationally for fruit fly management around the World, including limited usage in Australia.

Pros

There are several major benefits to SIT as a control strategy that make it appealing to growers, researchers and the general public.

(i) SIT is environmentally very safe as only the pest species is targeted and there is no potential for non-target effects. Additionally, if for any reason negative aspects do arise, the releases can simply be stopped. The released insects are sterile and so can't breed, so you can't have the 'cane-toad' effect of a released organism going bad.

(ii) SIT works really well within an Area-Wide Integrated Pest Management (A-W IPM) program as releases can target the pest insects anywhere in the environment, be it on-farm, in scrub, or in towns: for this reason SIT is generally regarded as a key element of AW-IPM. The long history of SIT and the strong international support it has received from multi-national organisations (see website 1) means that SIT is well imbedded in international protocols as a recognised component of pest risk reduction and market access.

(iii) Extensive research and technological expertise exists both internationally and domestically for fruit fly SIT. SIT currently operates at a low level in Australia and there are established SIT facilities for Qfly and Medfly in NSW and WA, respectively. The level of SIT application can also become highly sophisticated. In the citrus orchards of Spain, for example, orchard scouts check fruit fly traps in the morning, catches are entered into a tablet and the results sent back in real-time to a central computer. Positive trap catches are mapped and the number of sterilised flies required for release calculated. By the afternoon boxed, ready-to-go male flies are loaded into a light plane which flies on a pre-calculated and programmed flight path with the flies being automatically dropped in hot-spot areas. Control is effective and cost efficiency maximised.

Cons

In summary, the major cons are that SIT is expensive and operationally complex. The key element of SIT is getting enough mass-reared and sterilised males into the field so they can out-compete wild males for wild females. This requires many things to work.

(i) The 'over-flooding' ratio is the multiplier of how many more sterile males you need to release than there are wild males in the environment. Methods are available to calculate this in some detail, but operationally around the World the ratio is anywhere from 20:1 to 100:1 and general practice is to release from 1000-5000 males per hectare per week. Thus the number of flies needing to be reared to treat a production area is very large, from the tens to hundreds of millions per week. A moderate sized SIT factory in Valencia, producing 500-600 million sterile Med fly/week, cost Euro 8 million to build in 2007 (see website 2). The start-up cost and ongoing production costs make SIT an expensive control option.

(ii) Just because male flies are released, it doesn't mean they are competitive. Quality maintenance of mass-reared flies is a constant problem for SIT. To be competitive the released flies need to survive after release, they need to be able find females, the females need to choose them as partners, and the mating needs to physiologically inhibit the female from mating again. Shipping flies long distances, for example as would be required if Australia had one centralised SIT factory, can impact on quality. Flies ideally suited for temperate Australia may also not be ideal for release in humid Queensland. Moving the flies from a centralised SIT facility to where they need to be released, without delay and without stressing the flies, is a real challenge for Australia given the dispersed nature of our horticultural industry. There also needs to be a local infrastructure in place to carry out the releases once the flies arrive in a district.

(iii) SIT works best within an already established Area Wide program, as the lower the wild fly population the smaller the release numbers need to be and hence the cheaper and more effective the program. SIT in Australia cannot operate as a stand-alone program, but needs operating AW-IPM programs to be in place. This is particularly the case where flies are endemic, which very soon is likely to be most production areas.

(iv) Mass rearing and releasing males also means mass rearing and releasing females. Releasing females has two problems: (i) it doubles the factory and release costs as 50% of flies produced are useless; and (ii) even sterile females can sting fruit and potentially cause blemishes. Without a way to kill females early in the production cycle (i.e. as eggs or larvae) then this is a major problem. For Medfly male sexing lines are available through temperature dependent lethality (male eggs are more heat tolerant than female eggs and in the factory the eggs are floated through a temperature controlled water bath to kill the females), but a male-only line does not yet exist for Qfly.

Summary

SIT is considered by any fruit fly worker as a core tool in the fruit fly management tool-box. AW-IPM can operate without SIT, but it is generally regarded as harder. SIT is working well in other parts of the World and Australian growers can rightfully ask why it is not being done in Australia. However, SIT is operationally complex, expensive to establish and operate, and is not a silver-bullet. Even with SIT capability, other area-wide practices need to be in place. Technically Australia could increase its already existing SIT capacity to make SIT a routine part of fruit fly pest management, but whether there is the will and finance available to make it happen is currently a debate for growers, politicians and bureaucrats.

Website 1: FAO/IAEA SIT website
http://www-naweb.iaea.org/nafa/ipc/index.html
Website 2: News story on the opening of the Valencia SIT factory
http://www.iaea.org/newscenter/news/2007/medflyspain.html

Acknowledgements
This article was written by Tony Clarke of the Queensland University of Technology as part of HAL Project SF12013 "*Fruit fly IPM for Summerfruit, with a focus on developing an effective female lure-and-kill device*". **This is the fourth of a series of articles providing information on fruit flies and their integrated control.**
This project has been funded by HAL using the summerfruit industry levy and matched funds from the Australian Government.

Research –

Sensory evaluation of stone-fruit by consumers

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The popularity of stone-fruit is partly due to its seasonal nature but also to the diverse types of fruit available (peaches, plums, nectarines, apricots, cherries etc.). Variable fruit quality, particularly in taste and texture, has been identified as the major impediment to increasing sales of Australian grown stone-fruit on the domestic market.

Consumers dislike hard flesh texture, poor flavour and lack of juice associated with immature fruit. In comparison, quality loss with over-mature fruit is linked to soft and mushy flesh that often has off-flavours. Flesh firmness and sweetness are the main drivers of consumer satisfaction and both these quality attributes can be influenced by time of harvest and subsequent storage and ripening conditions. As the current market is consumer driven, it is important that growers meet consumer expectations by providing consistent high quality products.

Figure 1. Consumers evaluating stone-fruit samples for firmness and taste.

A Montague Fresh/HAL/DEPI study is being conducted to evaluate consumer preference for fruit firmness and sweetness of stone-fruit varieties available in major retail outlets within Victoria. In total, 27 varieties were assessed including 10 nectarines, 8 peaches and 9 plums.

A group of 30 consumers was trained prior to the 2011/12 stone-fruit season and 10 were randomly selected on a rotating basis and asked to evaluate up to 6 cultivars every fortnight for firmness (ripeness), taste (sweetness) and other fruit quality attributes (not described here). Consumers rated the firmness of each fruit on a 7-point scale (where 1=too hard, 4=ideal and 7=too soft) and sweetness on a 10-point scale from 1 to 10 (where 1=threshold, 3=low, 7=high and 10=strongest imaginable).

The remaining part of the fruit was then assessed for firmness after removing a small piece of skin and measuring destructively by an Effegi penetrometer (kgf) and soluble solids content - SSC (°Brix) with a hand-held Atago digital refractometer within 2 hours of tasting. Both fruit firmness and sweetness were then correlated with consumer responses.

Over the fruit season (November to March), the consumer sensory panel tasted fruit of varying maturities (Figure 1). The firmness range of fruit used for evaluation was 0.2-5.5 kgf (Figure 2). Nectarines contained fruit with the widest spread of firmness values (0.2-5.5 kgf), followed by peaches (0.6-5.0 kgf) and plums (0.3-3.1 kgf). In general, softer fruit with a penetrometer reading between 1.0-3.0 kgf were preferred by the consumer sensory panel (high-lighted pink zone in Figure 2).

This finding is supported by a previous consumer preference study (Jones et al., 2012) whereby the main driver of consumer liking, acceptance and purchase intent for peach and nectarine was fruit firmness. Consumers provided significantly higher scores for softer fruit than firm fruit.

Similarly, consumer panels evaluated the sweetness of peach, nectarine and plum cultivars. Prior to rating the fruit, the panel first calibrated their perception of sweetness against both a high and low reference sucrose solution. This was important to ensure that the panel were all using the same rating scale. The panel then tasted the fruit and rated it according to the high and low reference solutions for sweetness.

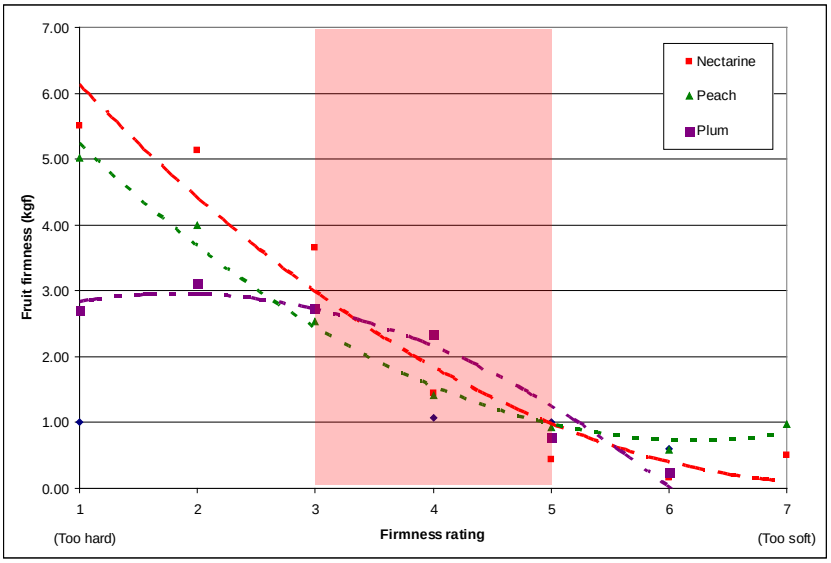

Figure 2. Relationship between flesh firmness (kgf) as measured by an Effegi penetrometer and fruit firmness as rated by a trained consumer panel over the 2011/12 season for for nectarine (N=99), peach, (N=73) and plum (N=88). Plotted values are the mean penetrometer readings and firmness rating for each fruit class. Flesh firmness range corresponding to the optimal consumer preference range highlighted in pink.

SSC as measured with a digital refractometer ranged from 8.8-15.9 °Brix for all fruit with plums having the highest SSC (12.4-15.9 °Brix) followed by peaches (8.8-13.3 °Brix) and nectarines (9.3-13.0 °Brix). Overall, consumers were unable to clearly distinguish between fruit containing high and low SSC, with their perception of sweetness correlating poorly with SSC of fruit. This may have been due to the relatively small range of SSC in fruit used for the consumer evaluation (<4.5 °Brix) within each fruit type, although Jones et al. (2012) found that consumers were able to perceive a difference in sweetness when there was more than 1.5 °Brix difference between fruit. SSC is a measure of the concentration of all sugars within the fruit flesh.

In stone-fruit these sugars include varying proportions of fructose, sucrose, glucose or sorbitol. As the relative sweetness of each sugar is different, sweetness as perceived by consumers will depend on the proportion of each sugar present in the flesh. The relative proportion of each sugar within individual varieties may thus be more strongly correlated with consumer ratings of sweetness than SSC.

Further investigation into the SSC:Acid ratio as well as separating fruit classes into high and low acid varieties for analysis may help to better explain this relationship between SSC and perceived sweetness by consumers.

This study showed that consumers like softer fruit as opposed to harder fruit with consumers preferring nectarines to be between 1.0-3.0 kgf, peaches between 1.0-2.6 kgf and plums between 1.3-2.7 kgf. This preference for softer fruit presents a major challenge to the stone-fruit industry. Supplying fruit at optimal maturity, flavour and firmness will benefit not only consumers but the industry as a whole.

This research was funded by Horticulture Australia Ltd (HAL) and Montague Fresh as part of the Victorian Premium Fruit project. For more info, contact Glenn Hale at DEPI Victoria on (03) 9032 7369.

Further reading: Jones, R., Hunter, D., Clark, C., Harker, R., Wohlers, M., White, M., Hale, G., Lopresti, J. and Tomkins, B. (2012). Development of objective fruit standards for stone-fruit through consumer research. HAL Final Report SF10021. 56p.

Research –

Brown rot risk management and sustainable control Project SF12004 (2012-2015)

Oscar Villalta and Simone Kreidl – *Biosciences, DEPI Victoria*

Brown rot research priorities

Brown rot, caused by *Monilinia fructicola*, reduces yield and orchard profit despite the use of fungicides in many Australian stone fruit orchards. Growers currently do not have sufficient information and/or tools required to make more informed decisions about the best fungicide strategy for controlling brown rot. Project SF12004 is therefore investigating key areas of Monilinia biology and brown rot epidemiology to develop two decision support tools to help growers improve the management of brown rot.

The first tool can be used to predict weather and crop related periods conducive to Monilinia infection during the growing season. The second tool can be used to predict the risk of latent (dormant) infection in fruit at harvest. Both tools are essential for improving decision making on fungicide use and thus disease control. The research is also investigating new control strategies and orchard practices that reduce disease risk to help industry devise more effective control programs, supported by decision support tools, for the sustainable management of brown rot. This article summarises key findings from the first year (2012-13) of the project.

Why do some fungicide programs fail to control brown rot?

Control of blossom blight and brown rot, caused by *Monilinia fructicola*, relies mostly on fungicide sprays applied preventively or post-infection in response to wet weather conditions. Sometimes spraying is done without considering the crop and orchard factors that influence the risk and severity of Monilinia infection. This approach may result in inadequate selection of fungicides and/or incorrect time of spray application leaving trees unprotected during wet periods when flowers, twigs and fruit are susceptible to infection reducing yield and productivity.

To improve brown rot control, growers need decision support tools to improve decision making on fungicide application. In addition, growers need to design a fungicide program that incorporates the right strategy for fungicide application to protect susceptible tissue/fruit against infection. This strategy must take into account cultivar type (e.g. early *vrs* late season), historical disease pressure (e.g. overwintering inoculum and insect pressure), key stages of crop susceptibility (e.g. bloom and pre-harvest) and whether green fruit requires protection. Growers also need new fungicides, with post-infection activity for use close to harvest when fruit is highly susceptible to infection.

Trial locations:

Several long-term trials have been established in commercial orchards located in Swan Hill, Cobram, Ardmona (Victoria), Renmark (SA) and Bangalow (NSW) to demonstrate the decision support tools and new control strategies. Weather stations with wireless telemetry provide the weather data at each site needed to determine infection periods. The trials are also investigating the influence of pathogenicity and latency, overwintering inoculum and blossom blight on brown rot epidemics to identify orchard and management practices that minimise spread and severity of brown rot. Other trials are evaluating new fungicide treatments in combination with existing fungicides to identify effective application strategies for the deployment of new treatments within brown rot fungicide programs.

Decision support tool for predicting Monilinia infection periods

Determining when conditions have been wet enough for Monilinia infection is crucial to improve application of preventive and post-infection fungicide sprays. The weather-based tool being validated for industry identifies wetness and temperature suitable for infection periods during the growing season. Information provided by this tool can be used to optimise fungicide selection and application and improve control of blossom blight and brown rot. It is important to remember that the severity of an infection period also depends on the amount of inoculum present and the susceptibility of crop. This project is collecting spore infection data for Australian populations of *M. fructicola* on four stone fruit crops to develop a weather and crop based model to predict infection period occurrence and severity on flowers and mature and immature fruit. The data also will be used to determine whether models developed overseas accurately predict Monilinia infection in Australia.

In the first year, the minimum requirements (wetness duration and temperature) for *M. fructicola* spore infection were determined on mature detached apricot, plum, nectarine and peach fruit in controlled inoculations. This information in combination with overseas criteria have been used to formulate a preliminary infection criteria model to be validated next season (Table 1). It is also important to notice that wounding of fruit increased fruit susceptibility in all four crops highlighting the need to control insect pests (e.g. Carpophilus beetle) to prevent fruit damage, especially close to harvest when fruit is most susceptible to infection. Under optimal infection conditions and high inoculum, the susceptibility of immature fruit decreased after the pit hardening stage suggesting low cost protectant fungicides could be used on immature fruit after pit hardening if disease pressure is high. Plums were slightly harder to infect than the other three crops probably due to fruit surface characteristic offering scope for less fungicide input on this crop.

Bottom line: Monitor infection periods during the growing season using weather data and the spore infection criteria to improve the time of application of preventive and post-infection sprays. In addition, use crop susceptibility information to determine suitable fungicides and interval of spray application according to infection pressure, for instance use short intervals (e.g.7 days) when crops are highly susceptible (e.g. bloom-shuck fall and pre-harvest) and longer intervals (e.g. 12 days) when fruit is less susceptible to infection if weather is wet.

Table 1. *Approximate hours of continuous wetness necessary for blossom blight and brown rot infections on nectarine and peach (infection criteria is under validation over the next two years).*

Average temperature during wet event (˚C)	Blossom blight	Severity of brown rot in mature fruit (assumes high inoculum and crop susceptible) Wounding increases fruit susceptibility	
	Hours of wetness required for blossom infection	Hours of wetness required for light infection	Hours of wetness required for severe infection
25˚C	2	3	4-6
20˚C	3	4	5-7
15˚C	4	5	6-8
10˚C	5-7	7-8	9-11
5˚C	11-12	14-15	>15

Criteria modified using project data, and infection criteria for peach (Tate's 1984 and 1999) and for blossom infection on nectarine and peach crops (Weaver 1950 and others). Requirements for plum and apricots and green fruit for all crops are under investigation.

Decision support tool to predict post-harvest rot risk

Inadequate control of brown in the field can reduce yield at harvest but also result in further yield losses in post-harvest due to latent (dormant) infection in harvested fruit. Predicting potential post-harvest rot risk at harvest is therefore key to improve post-harvest rot management and marketing decision making. An orchard based method was validated for its ability to predict post-harvest rot risk in fruit samples collected 7 days before commercial harvest. The method induces rot development in fruit samples by accelerating fruit ripening under moist and warm conditions (e.g. 20˚C). The method was validated in four commercial blocks of stone fruit in Victoria.

The validation involved determining a suitable number of fruit required per block collected before harvest to identify potential rot risk at and after harvest. Three sample sizes (60, 120, 180 fruit/ha) were evaluated and collected systematically from each block 7 days before commercial harvest. The accuracy of the pre-harvest test was determined by comparing rot levels detected before harvest with actual rot levels measured post-harvest.

Brown rot was not detected at two blocks where early season apricot and nectarine crops were harvested (Table 2). In the third block of late season peaches, brown rot incidence was very low (0.6-1.7%) and statistically similar across the three sample sizes after 7 days of moist incubation. In the fourth block, brown rot levels were relatively higher in white nectarines after 7 (4-8%) days incubation but disease levels were still similar across the three fruit samples.

In general, there was good agreement between levels of fruit rot detected in samples before harvest and after harvest but not between levels measured at harvest and post-harvest. This indicates that levels of brown rot measured on trees at harvest are not always a good indicator of potential post-harvest rot risk from latent (dormant) infection. Validation results indicate that if brown rot latent infection is likely to be very low to nil, then 60 fruit per ha should be sufficient to estimate the levels of latent infection shortly before commercial harvest. If disease is likely to be high, a 60 to 120 fruit sample per ha should also be sufficient to estimate brown rot latent infection.

Bottom line: The pre-harvest fruit incubation tool can be very useful for assessing rot risk and determining the need for post-harvest fungicide treatment in fruit batches for premium domestic and export markets. The occurrence of unprotected infection periods between pre-harvest sample collection and commercial harvest must be taken into account when interpreting rot risk using the pre-harvest test, especially if 2-3 picks are conducted. Insect damage which increases fruit susceptibility to infection should also be considered. Rot development from latent infection can be suppressed by cold storage but once fruit is warmed up rots develop quickly. Storage and shelf life of fruit with high levels of latent infection was significantly increased by treating fruit with the fungicide Scholar®.

No. fruit/sample (ha)	Apricot	Nectarine Early season	Nectarine Late season	Peach Late season
60	0	0	8.3	1.7
120	0	0	5.0	0.8
180	0	0	3.9	0.6
P value			0.618	0.798
LSD			ns	ns

Table 2. *Incidence of brown rot (latent infection) detected on three fruit samples collected 7 days before commercial harvest and incubated for 7 days under moist conditions at 20˚C*

Evaluation of new disease control materials

Field trials are evaluating new fungicide treatments with proven efficacy against Monilinia and market potential for stone fruit in Australia. These treatments are being evaluated in combination with existing fungicides to identify the best strategy for their use to control blossom blight and brown rot. Selection and time of application of fungicides is determined based on stages of crop susceptibility, frequency of infection periods and other orchard factors. An ongoing review process has identified Pristine® (mixture of boscalid and pyraclostrobin, BASF), currently with a minor use permit ONLY for cherries, as one of the fungicides that the stone fruit industry should consider for brown rot management. In the first season, two replicated trials on nectarines investigated the usefulness of Pristine for blossom blight and brown rot control. Pristine® was compared to Fontelis® (Dupont), currently registered for stone fruit, only in the pre-harvest period at one site.

Trial at Bangalow (NSW). In a wet season, Pristine used for blossom blight and pre-harvest brown rot control, in combination with protectants applied during the green fruit stages, significantly reduced brown rot by 94% compared to an untreated treatment (52% incidence on trees unprotected only during flowering and 3 weeks before harvest) (Figure 3). Pristine used for blossom blight only in combination with protectants during the green fruit stages and existing fungicides (e.g. Tilt and Rovral) in the pre-harvest period was slightly less effective than the Pristine-based program (88% disease reduction).

Trial Swan Hill (Victoria). Pristine® applied using a similar scheduling (blossom blight and pre-harvest) significantly reduced brown rot by 80% compared to an untreated treatment (41% incidence) in a relatively dry season and with Carpophilus pressure. Other treatments that involved Pristine® for blossom blight control and Fontelis® (DuPont) for pre-harvest brown rot control also provided similar disease control. Spray schedules using existing fungicides were slightly less effective than the Pristine-based and Pristine plus Fontelis® schedules. A preliminary economic analysis indicated that inclusion of Pristine® in the spray program can increase yield and profit and therefore can be cost-effective for industry. However, yield price, especially for late season crops, would be the key factor affecting potential adoption of new more expensive fungicide treatments.

Alternatives treatments including products based on the biological control agents *Trichoderma* spp. and *B. subtilis* are being trialled at an organic site for blossom blight and pre-harvest brown rot control. These treatments are being evaluated in combination with soft protectants that increase the pH on green fruit surfaces inhibiting spore germination. These treatments applied at the right time before infection periods have provided promising levels of disease suppression on apricot and nectarine under mild weather conditions in the pre-harvest period. Further work is required to fully develop these alternative treatments for managing brown rot.

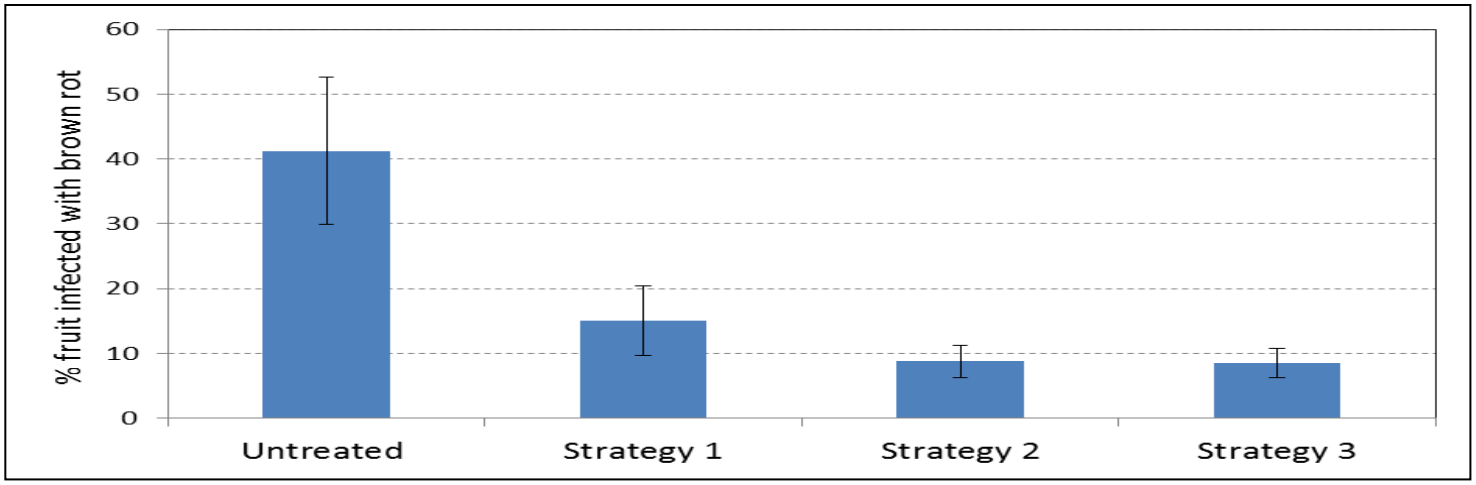

Figure 1. *Percentage of nectarine fruit with brown rot after harvest at Swan Hill trial, Victoria 2012-2013. Untreated trees only during bloom-shuck fall and pre-harvest period. Pre-harvest period was dry (only 1-2 minor dew-related wet events) but with insect pressure; strategy 1 = bloom-shuck fall (Chorus®, Sumisclex®, Syllit) and pre-harvest (Tilt®) for dew; strategy 2 = bloom-shuck fall (Pristine®, Pristine, Syllit®) and pre-harvest (Fontelis®); strategy 3 = bloom-shuck fall (Pristine®, Pristine, Syllit) and pre-harvest (Pristine). All trees in trial sprayed with protectant (Thiram) between shuck fall and pre-harvest period. Bars = SEM.* ***Please notice: Pristine® is NOT registered for use in stone fruit.***

Bottom line: The most efficient way to protect trees from Monilinia infection is to apply preventive treatments including protectant and systemic fungicides with protectant and curative activity before a potential infection period. This approach is more efficient in time, energy and resources than a regular application of sprays or relying on post-infection treatments which can increase the risk of Monilinia populations developing resistance to fungicides. Design a spray strategy that takes into account disease pressure (e.g. overwintering inoculum, insect damage), stages of crop susceptibility and frequency of infection periods. Use infection periods, estimated with the wetness/temperature based tool, to improve the time of spray application, especially during the flowering-shuck fall period and pre-harvest period when tissue/fruit is most susceptible to infection. Use protectant sprays at other times (green fruit stages) using suitable fungicides and spray intervals according to infection period occurrence and block disease pressure.

Fontelis® (penthiopyrad, group 7, DuPont) is a useful new product for managing brown rot.

It must be, however, used according to label recommendation to minimise the loss of efficacy due to overuse. Pristine® had good efficacy against Monilinia infection on nectarines, and therefore should be considered for registration or to develop a minor use permit for managing blossom blight and pre-harvest brown rot control. BASF will support development of a minor use permit for Pristine®. Other fungicides not available to stone fruit growers but with proven efficacy against Monilinia and market potential in stone fruit will be considered for inclusion in future field trials.

Photo: untreated fruit (left tray); fungicide program with new fungicide treatments (right tray)

Next step:

The first year's results are being discussed with industry through extension activities to increase awareness and adoption of new tools, control strategies and best management practices for controlling brown rot. In the second year, the project will continue evaluating and demonstrating the decision support tools and new control strategies at the trial sites. The research is funded by Summerfruit Australia, through Horticulture Australia, and the Department of Environment and Primary Industry (DEPI) Victoria.

For more information contact: Oscar Villalta, Victorian Department of Environment and Primary Industries; T 03 9032 7341; Email oscar.villalta@depi.vic.gov.au

Research –

TRICHLORFON RESIDUES IN STONE FRUIT

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Other key personnel: Bill Frost, Amrit Pannu, Amy Drewett

The purpose of the project was to determine what residues of trichlorfon will be found in stone fruit when applied as three pre-harvest applications. This project has been funded by HAL using the summer fruit levy and matched funds from the Australian Government.

Trichlorfon is currently registered for the control of Queensland fruit fly. Initial application is to occur when stings are first detected, at an application rate of 125 g ai/100 L, followed by applications at 75 g ai/100 L 7-10 days apart, with the last being applied at 2 days before the normal commercial harvest date. Maintenance of this registration and use pattern is essential for stone fruit growers to ensure access in domestic and export markets.

The MRL for trichlorfon on stone fruit is currently listed as T3. The temporary status indicates that the APVMA will likely require the submission of residue data to allow the establishment of a permanent MRL. The aim of this project was to determine residues of trichlorfon in peaches and nectarines, following this use pattern. This data will be available and will allow the APVMA to undertake both short-term and long-term dietary intake assessments, i.e., determine that residues do not exceed the acute reference dose (ARfD) and fit within the current acceptable daily intake (ADI).

Two field trials were conducted in the Goulburn Valley region of Victoria on peaches and in the Adelaide Hills region of South Australia on nectarines. Applications of trichlorfon were completed by hand spraying of trees on the schedule, then sampling fruit immediately following the final application, then at 2, 5 and 7 days later. Fruit was then analysed following a standard analytical method and the trichlorfon residue levels at each sampling date determined.

The whole program was conducted following the international OECD standard of *Good Laboratory Practice* (GLP). A detailed and fully compliant report has been prepared and presented to Horticulture Australia.

Following three applications of LEPIDEX 500 INSECTICIDE (500 g/L trichlorfon) as a foliar spray, the level of residues of trichlorfon detected in stone fruit ranged from 0.074 to 0.40 mg/kg (ppm) at 2 days after harvest to 0.067 to 0.12 mg/kg at 7 days after harvest. The highest levels of residues were detected in nectarines.

TECHNICAL SUMMARY -

The study consisted of two field sites at Echunga in the Adelaide hills region of South Australia, and near Shepparton in Victoria, Australia. The test item was LEPIDEX 500 INSECTICIDE – an emulsifiable concentrate formulation containing 500 g/L trichlorfon as the active constituent. An unreplicated, non-randomised single plot design was used at each test site.

The treatments and sampling times for both trials are given in the table below:

Treatment	Rate Applied	Application Times DBCH	Sampling Interval
1. Untreated control	-	-	2 DALA
2. LEPIDEX 500	250 mL/100 L 125 mL/100 L 125 mL/100 L	16 9 2	0, 2, 5, 7 DALA

DBCH – days before commercial harvest. The treatments were applied on three occasions as detailed above.
DALA – days after last application

The treatments were applied in a manner that simulated best commercial practice for the application of insecticides in stone fruits. Treatments were applied by motorised hand gun mounting a single solid cone or single hollow cone nozzle in a total volume of approximately 1000 L/ha.

At least 2 kg of fruit was sampled from at least 4 individual trees of each treatment plot for each sample. Two samples were taken for each treatment on each sampling date with one being the Primary Sample and the other the Reserve Sample.

Trichlorfon residues were determined according to the analytical method:

"Determination of Multi-Pesticide Residues in Plant using DSPE" AATM-S-60.1, Revision 3, Agrisearch Analytical Pty Ltd, December 2012.

Residues of trichlorfon in peaches were 0.25, 0.074, 0.12 and 0.067 mg/kg at 0, 2, 5 and 7 days after the last application, respectively.

Residues of trichlorfon in nectarines were 2.38, 0.40, 0.24 and 0.12 mg/kg at 0, 2, 5 and 7 days after the last application, respectively.

Recovery of trichlorfon from fortified peaches and nectarines ranged from 88% to 109%.

This data will be used by Summerfruit Australia to help determine the need for further work to support the continuation of this permit and the establishment of a permanent MRL.

Publication Details …

Australian Stonefruit Grower

incorporating the Low Chill Stonefruit Grower

- 2013 Publication Timetable -

Contributions are invited for the next scheduled publication - **AUGUST 2013**.

FEBRUARY	MAY	AUGUST	NOVEMBER
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