

G *Australian Stonefruit* **rower**



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December 2016

Pollination plan bee



John Moore's China trip
**Water-stressing fruit for
better flavour**
Quarantine breakthrough

plus

**All the latest
research**



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Good buzz

Our cover story this issue is about bees. Of course, we all know how important bees are for pollination, but there is much to understand about how to optimise their use in orchards and keep both bees and trees satisfied.



Dr Doug Somerville of NSW DPI will be running a series of workshops on bees for orchards, so it seems timely to take a look at just how bees operate.

The big news in this issue is all about the first shipments of Australian nectarines to China. John Moore spent more than a month over there at the start of the season, and is now back there again for the second round of Now in Season promotions.

It sounds like the Chinese have really taken to “Mr Nectarine” (see page 5), let’s hope they take to the real nectarines with just as much enthusiasm!

It was a bit of a shaky start to exports, and indeed the season in general, with cool weather delaying harvest and reducing sugar accumulation in fruit. I know some of the first fruit I bought at the supermarket were, well, not ideal.

“It’s also really heartening to hear that the systems approach to fruit fly management is working.”

Despite this, the low-chill growers are reporting a bumper season, with both volumes and prices excellent. This is partly due to the delay in harvesting southern fruit, which resulted in a perfect season dismount – as one finished the other started. If only we could arrange things so well every year!

It’s also really heartening to hear that the systems approach to fruit fly management is working. The loss of dimethoate and fenthion has been a source of intense anxiety for years, and even resulted in growers leaving the industry. It is fantastic to hear that we are successfully growing great quality stonefruit without using these chemicals. Good news for growers, the environment, and consumers as well.

-Jenny Ekman



Growing trade with China

I recently spent over a month in China overseeing the start of Australian trade. It was an extremely busy but, I think, a very productive time.

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iFresh Trade Show, Beijing

The iFresh trade show in Beijing was held on 14–16 November. It was extremely well attended; 18,000 visitors on day one, another 12,000 on day two and 5,500 on day three. This was the first opportunity to really showcase Australian nectarines – in this case supplied with the special assistance of the Beijing embassy, T&G Global and the Australian Riverland producer.

The event was featured on CCTV, Fresh Plaza, and more widely. The exposure for Australian fruit was excellent, and added further to awareness that was already at a high!

Our mascot in China is “Mr Nectarine”. He has been an excellent advertising tool and has really captured the Chinese imagination. Even the Hon Luke Hartsuyker (Assistant to the Deputy Prime Minister) did a special Facebook video with Mr Nectarine to post to his personal Facebook page. If every photo taken of Mr Nectarine was worth 100kg of fruit, there wouldn’t be a nectarine left for Australian supermarkets.

“

Our mascot in China is “Mr Nectarine”. He has been an excellent advertising tool and has really captured the Chinese imagination.

”

Huizhan Market, Shanghai

The Huizhan Market is home to all of Shanghai’s importers. We had a walk through the markets with Mr Nectarine, handing out Riverland fruits. This was a real show-stopper, with enthusiasm really reaching fever pitch.

The much-awaited first commercial shipment arrived the following day. This was also the first test of the Chinese inspection system, and it went through without a hitch.

CEO's Report



Mr Nectarine proved extremely popular with the crowds visiting the i-Fresh trade show in Beijing.

The fruit arrived chilled and fresh and was all sold within the next few days. A specially arranged Riverland pallet was the first e-commerce fruit on-line. "New Australian nectarines, sweet and crunchy". The price is 5 pieces for 99 Yuan, or \$3.93 per piece of fruit

I put in an order for some Australian nectarines that had been advertised online and coming from Guangzhou. It cost 180 Yuan (\$35.80) for 12 pieces of fruit. As you can see from the picture at right, these nectarines were unfortunately small, poor quality fruit.

Jiangnan Market, Guangzhou

This is the largest fruit and vegetable market in Asia. The fruit section alone is over 20ha. There are hundreds of traders, who sell produce from here to more than 30 different Chinese provinces.

Around 80,000 containers of fruit enter China each year and 60% of these arrive through Guangzhou. Certainly, it is the major route into China, whether through the official route or across the Hong Kong border.

There is no doubt it has been a difficult start to the season for all Australian stonefruit producers. Cool, wet weather has delayed fruit maturing, and kept sugar levels low. Some of the major exporters have delayed sending fruit as a result.

Online advertisement for Australian nectarines, price is \$3.93 per piece of fruit.



Australian nectarines sold online and home delivered in China.

CEO's Report

Using my pocket refractometer, I tested numerous batches of Australian white-fleshed nectarines (Polar Lights) over the time I was in Guangzhou (21–25 November). Brix ranged from 7.2 to 9.7, with an average of around 8.0. I was particularly dismayed at three pallets which averaged 7.2–7.6 Brix.

Although an average opening price for generic brand nectarines was around \$90/box, by the end of that week it had fallen to \$53 or lower. Operators were very unhappy about paying 130 to 150 Yuan (\$25 to \$30) to move product from Hong Kong to Guangzhou, only to be unable to sell it due to the poor quality. As one trader said: “Firmness is very much, but sugars MUST be”. This is a market that demands sweetness above all, and Australia supplied them with third-grade fruit.

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Chengdu

Chengdu is a major population centre for inland China. This area is the source of both the Yellow and Yangtze Rivers, and Chengdu, together with nearby Chongqing, has a population greater than that of Shanghai with 10.5 million inhabitants in the combined built-up area including Xinjin County and Deyang's Guanghan City.

As of 12 December, regular direct flights have started from Adelaide to Chengdu City. Together with the ready availability of quarantine inspection facilities and cool stores, this represents a great opportunity for Australian exporters to expand this market.

To grow our first year of exports, industry plans for the “Now in Season” campaign are already well in place. These will commence just after our New Year and will



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target the Chinese New Year (January 28) build up in the tier one cities of Guangzhou, Shanghai and particularly Beijing. It is understood that both yellow and white flesh nectarines will be very acceptable in northern China.

Stiff competition despite improvements

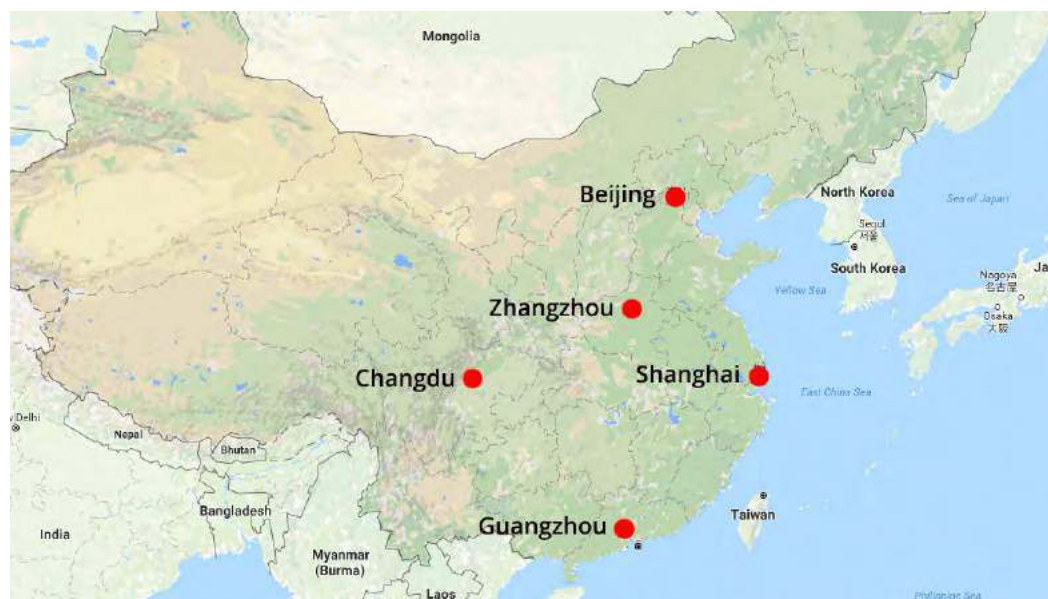
At the end of November, the first Victorian-grown nectarines arrived in Huizhan Market in Shanghai. These contained 11 – 12 Brix, a major improvement, and generated considerable interest from traders and e-commerce companies.

The trouble is, at almost the same time cherries started arriving from Chile. At first by air, then shortly afterwards by sea, tons of cherries flooded into the Chinese market. Brix in the cherries was around 18 – 19; even the best Australian nectarines were around 13.5 Brix.

Many of the air freighted cherries arrived direct by charter flights into Zhangzhou in Henan province. Here they swing into repacking mode, producing clam-shells of cherries for direct retailer orders. Apparently the various consortiums are planning 90 such charter flights before Chinese New Year, each flight carrying 110 tons of fruit. Stiff competition for Australian fruit.

Poor seasonal conditions have really put pressure on the Australian Summerfruit industry's reputation. However, as the season progresses we will no doubt see larger, and sweeter fruit entering the market. Certainly that is the hope both here, and in China.

– John Moore



What do Chinese consumers want?

With a population of more than 1.3 billion, China represents a huge yet challenging market which is showing increasing diversity among consumers. More than 55% of the population now lives in cities. The result has been large increases in the number of supermarkets, hypermarkets and convenience stores.

Food is an essential part of family life as well as social interaction. Research by Statista online statistics portal has shown that more than three-quarters of Chinese cook for friends and family at least two to three times a week, with many cooking daily.

Most Chinese shop in supermarkets two to three times a week, while nearly all of those surveyed indicated that where food came from and quality was very important. Chinese consumers are also very attracted to labels, whether private, national or organic.

The good news for Australian nectarine exporters is that although Chinese think that buying local is important, given a choice they will usually opt for an imported brand. The survey found that 55% of consumers would choose the imported product, compared to only 8% who would choose the Chinese label. The remainder had no preference.

And the next question is, how much are they willing to pay for that?

– Jenny Ekman



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We've had 'interesting' weather of late

With this year's harvest at about the halfway point, it's a mixed bag of results, with the unpredictable spring climate conditions experienced in Australia in the last quarter of 2016.

Almost every Summerfruit production region in Eastern Australia has run at least one week – and in places up to two weeks – later than what would be considered normal. The much cooler than average September and October resulted in many pre-Christmas varieties struggling to achieve acceptable size and, in many cases, brix levels that were well below expectations.

Smaller sizes have resulted in significantly lighter yields and less returns. However, in stark contrast to this, I recently saw photos of the most magnificent apricots you could ever hope to see and a plum crop that every grower would be delighted to call their own on a farm at Swan Hill. Understanding the ways in which weather impacts on agriculture and how to counteract the effects still requires a lot of perfecting.

On the road to China

We saw in late November the first direct consignments of Australian nectarines into mainland China as a result of the protocol announced in May, 2016

The difficult growing conditions experienced in eastern Australia in the spring has created challenges for the Summerfruit industry to deliver on the expectations that importers in China had for the first direct access Australian nectarines. The lower brix levels, and an understanding of the quality of fruit that Chinese consumers prefer, led a number of Australian growers and exporters to choose to not send direct shipments until quality levels improved. Or, indeed, to send only small lines of fruit that were specially selected to meet those expectations.

These decisions should be applauded by the industry because it demonstrates a long-term view to a commitment in developing a reputation for Australian nectarines and positioning us as a supplier of high-quality product. Unfortunately, this commitment is not shared by all of those involved in the Summerfruit industry, which has resulted in some low brix, poor quality early season fruit arriving in markets in China. The actions of a few can impact upon the rest of industry by creating a poor initial impression of new season fruit from Australia. It is disappointing to see, following years of investment, negotiating and hard work by industry and DoAWR to secure this direct market access.

Chairman's Report

A significant improvement in fruit quality as a result of improved growing conditions that have been experienced in our major production areas since December has seen recent shipments of Australian nectarines arrive in China that are far more suited to Chinese requirements.

With the arrival last week of the first nectarines from Chile, Australian fruit will need to be of a high standard in order to achieve acceptable farm gate returns for growers.

Backpacker tax issues resolved

A resolution to the "backpacker tax" was finally achieved, after what turned out to be a frustrating and anxious final week of Parliament in December for many Australian farming families and businesses in rural and regional Australia. Frustrating, because after months of very public negotiation with the Federal Government led by the National Farmers Federation and Australian tourism body, with significant input from organisations such as Growcom, Voice of Horticulture and Summerfruit Australia, politicians who had been conspicuous by their absence throughout this negotiation phase chose not to

support the resolved position and in so doing threatened to derail the whole legislation. If that happened then from January 1, 2017 there would have been no likelihood of being able to get the labour to perform work essential to plant, harvest and pack crops

Thankfully at the eleventh hour sanity prevailed and a workable outcome has been achieved, but surely the message to come out of this for politicians is that vast numbers of Australians and their families should never be subject to this sort of uncertainty just so that a few cheap political points can be scored. Everybody is entitled to their opinion and at times opinions will differ, but after months of very public negotiation choosing the Parliament to voice that opinion and potentially throw a spanner in the works is not acceptable. I am sure that I am not alone when I say that in this situation we expect better of our elected representatives.

- Andrew Finlay

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Change at the top

The Low Chill Association recently held its Annual General Meeting. One change you will notice straight away – I am not Mark Napper! The industry would like to thank Mark for the efforts he has put in over the last few years as President of the Association and acknowledge his contribution to the industry as a whole.

The remaining executive positions are unchanged and I am looking forward to working with all of you over the next year or more.

Here in southern Queensland we have well and truly finished picking. In fact, I finished by the end of November. From my point of view, it was a good season. There are a few different reasons for this.

Window of opportunity

The retailers stopped selling imported stonefruit as our season commenced, leaving us a real window into the market. Buyers were willing to pay a premium for Australian-grown fruit, with the result prices were high and stayed there. With domestic prices so good, there seems little reason to export at that time of the season.

There had been some concern about Chinese nectarines entering the market just as we started picking. However, this proved a non-event, with no real impact on sales. Quality issues, as well as consumer and retailer resistance to Chinese-grown fruit, seem to have halted imports just as they started.

Then, cool wet weather in the south delayed harvesting in Swan Hill by around two weeks. The upshot was that we could finish harvesting before southern fruit came onto the market in volume; a perfect dismount to the season.

It's true that some of the early season quality was a bit average. Cloudy weather meant fruit failed to develop the sugar levels that we would have preferred, although size was



President's Report

generally OK. I have found that using reflective mulch puts a bit more sunlight onto the fruit, which helps increase brix to acceptable levels. Could be a useful strategy for others perhaps.

Promotion

There was quite a lot of discussion at the AGM about promotion at the start of the season. We need to find ways to let consumers know that local fruit is now available, fresh and in season. There was even discussion of a voluntary levy for low chill producers to promote early fruit. Of course, there's no use promoting, unless quality is good. However, I think there is a real opportunity for promoting more seasonal eating to consumers.

Life after fenthion

The other good news was that the loss of Lebaycid (fenthion) has not been the disaster that some expected. The combination of bait sprays, male annihilation technique (MAT) and hygiene is proving effective at controlling fruit fly in orchards.

My orchards are netted, and this season I added white side-walls. As well as hail, these protect the fruit from flying

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foxes and birds. However, the nets are also proving a really useful tool against fruit fly. Although not made from fly-proof netting, they seem to reduce the number of flies entering the orchard – perhaps because they act as a visual barrier, and white is known to be somewhat repellent to flies anyway.

Applying bait is time consuming, but also seems to be really working. I try

to apply every five days instead of the recommended seven, just in case something happens and I can't spray when it's due. I also apply every second row, so female flies never have to travel far to find bait.

There were a number of low chill growers who left the industry after the loss of Lebaycid. They felt that without Dimethoate and Lebaycid it would just not be possible to grow stonefruit. Certainly it would be useful to have these chemicals available when we need them.

However, the systems approach, using all of the tools we have available, is so far proving an effective replacement. Let's hope it continues to do so.

– Rod Dalton





Less water, sweeter fruit

By Jenny Ekman

Mild water deficit produces fruit consumers like best, study finds.

Water shortages are most critical when they occur during the final stage of fruit development. At this time accumulation of water drives fruit expansion and, therefore, growth and yield.

If fruit are full of water, the concentrations of sugars and flavor compounds may be reduced. Conversely, sugars – measured as soluble solids (SSC) – can increase if trees are slightly water stressed.

However, some studies have found that increased SSC doesn't mean consumers will like them more. For example, even though water stressed Ryan Sun peaches had 5% higher SSC than normal peaches, consumers didn't like them as much¹. The researchers suggested this was because they seemed sourer, less juicy and had unappealing texture.

However, a new study just published by Spanish researchers² suggests that it is the degree of water stress that is important. They examined the effect of different

levels of water stress before harvest on both yield and consumer liking of nectarines. Trees received either:

- Full irrigation right until harvest (control)
- Full irrigation until 9 days before harvest, then no irrigation. (mild deficit)
- Full irrigation until 15 days before harvest then 15% of normal irrigation volume (moderate deficit)

Water status in the plant can be assessed using leaf water potential (LWP). This is a measure of the force required to extract water from a leaf. If the leaf is fully hydrated (as when beads of water form), no pressure is needed and LWP = 0 MPa. If the leaf is wilting, a strong vacuum is needed, so LWP may equal -2.0 MPa or less.

Previous research has shown that expansion of maturing nectarines is reduced if LWP falls below approximately -1.3 to -1.7 at midday³. For well-irrigated nectarine trees, LWP at midday generally ranges from -1.0 to -0.5 MPa, depending

on the climatic conditions.

In the Spanish trial, trees subjected to the mild deficit irrigation treatment had LWP of -1.0 to -1.5 MPa at midday. The moderate deficit irrigation treatment resulted in LWP of -1.5 to -2.0 MPa at midday. So, these deficits would be expected to possibly limit fruit growth.

The moderate deficit treatment increased SSC by 1–2%. However, as expected, it also significantly reduced the number of harvestable fruit per tree and average fruit size. Total yield was reduced almost 30%, probably making this treatment uneconomic.

In contrast, the mild deficit treatment did not affect fruit size or yield. Soluble solids concentration was also unaffected, or even slightly reduced compared to the fully irrigated controls. Despite this, consumers consistently graded these fruit as sweeter and more flavoursome. Over two harvest times, consumer acceptance was increased by 15 to 20% for the mild deficit irrigation fruit (Figure 1).

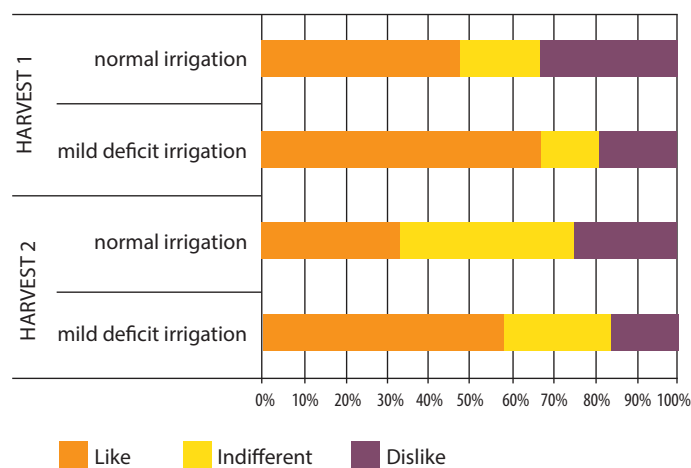


Figure 1. Consumer responses to nectarines grown with normal irrigation or with a mild deficit in irrigation.

The authors show that, over two seasons at least, consumer liking of nectarines had a strong relationship with midday LWP at harvest. That is, as LWP decreased (due to water stress), consumer liking increased (Figure 2).

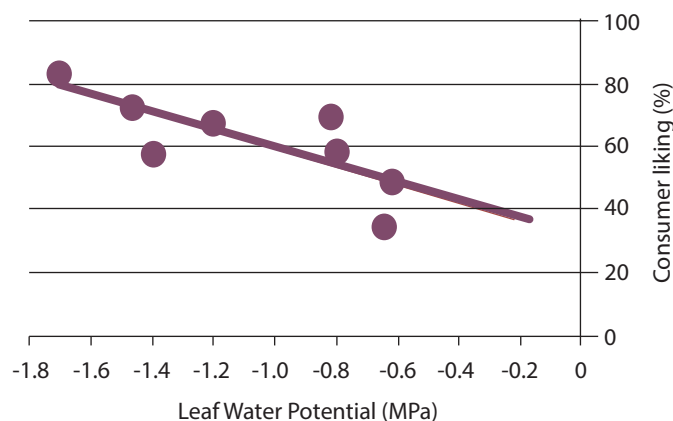


Figure 2. The relationship between Leaf Water Potential at harvest and the percentage of consumers who liked the nectarines.

It is not quite clear why this effect occurs. Whether people liked or disliked the nectarines was not easily linked to sugars, acid or firmness. It is most likely consumers were responding to fruit flavour.

Flavour compounds in many fruit and vegetables increase in response to stress. For example, aroma volatiles in apples have shown this effect. This may be one of the reasons some people think organic products taste better. The same could be true for stonefruit.

Alternatively, mild water stress may be advancing fruit maturity. Earlier research showed that the percentage of consumers who liked nectarines increased from 0 to 85% over five weekly harvests. Effectively, this study showed that delaying picking by 12 to 16 days from minimum harvest maturity increased acceptability to consumers by 26%.

Irrigation patterns before harvest can have a large effect on both yield and fruit quality. However, it is important that quality improvements are not at the expense of profitability.

Well-watered trees can produce large, but potentially somewhat flavourless, fruit. Too little water reduces fruit size, numbers and yield. However, just the right amount of pre-harvest water stress can leave yield unaffected, improve fruit quality and have customers coming back for more.

¹ Lopez G et al. 2011. Instrumental and sensory evaluation of fruit quality for 'Ryans's Sun' peach grown under deficit irrigation. HortTechnology 21:712-719.

² Lopez G et al. 2016. Water stress for a short period before harvest in nectarine: Yield, fruit composition, sensory quality and consumer acceptance of fruit. Scientia Hort. 211:1-7.

³ Naor A et al. 2001. The response of nectarine fruit size and midday stem water potential to irrigation level in stage III and crop load. J. Amer. Soc. Hort. Sci. 126:140-143.

⁴ Iglesias I, Echeverria G. 2009. Differential effect of cultivar and harvest date on nectarine colour: quality and consumer acceptance. Sci. Hortic. 120:41-50.

Bee pollinating a peach flower.

Photo: Fir0002/Flagstaffotos

There is plan bee

By Jenny Ekman

Everybody loves honeybees. In fact, humans have loved honeybees for thousands of years. Bees appear in Egyptian mythology, Greek legends, and even creation stories from the Kalahari desert.

Honeybees provide honey, wax, and a whole range of products with potential health benefits. They are also, of course, efficient pollinators of many crops.

Most varieties of apricots, peaches and nectarines are self-fertile. However, bees are far from redundant. Flowers are “designed” to be visited by insects, and peach pollen is too heavy to be carried by wind. Fruit set and yield increase significantly if bees visit the flowers. Research back in the 1970s clearly demonstrated that honeybees can double or even triple yield for some varieties compared to relying on self-pollination alone.

In contrast, many varieties of plums are self-incompatible, so must be cross-pollinated with another



variety to guarantee fruit set. Trees may still produce a few fruit with wind and visits by other insects, but bees are essential to get a commercial crop.

While flies, beetles, or other bee species can also pollinate flowers, honeybees truly reign supreme. This is because their furry bodies pick up and distribute pollen as they forage; the prickly bodies of flies and smooth carapaces of beetles are far less efficient.

Bees are also extraordinarily active. One study found that honeybees foraging on plum trees visited nine flowers per minute, and 27 flowers per tree¹. Only flowers that received at least three visits from honeybees formed fruit, with around 31% of such flowers developing into a plum.

A honeybee colony commonly contains 20,000 to 60,000 worker bees. Compare this to our tiny native stingless bees – *Trigona sp.* – whose colonies only reach 7,000 at most. Not only are such native bees harder to manage, you would need 7–9 colonies to replace a single honeybee hive.

Managing bees

Bees collect both nectar and pollen. However, they usually collect only one of these at a time – they very rarely collect both at once. Nectar is food for bees, while pollen is food for the larvae.

The sugar content in nectar can range from only 5% to 50%. Unsurprisingly, the higher the sugar content, the more strongly bees will be attracted. The nectar content of flowers varies a lot depending on circumstances, including tree health and flower age.

Bees that aim to gather pollen visit young blossom. It is these flowers that really need their services, as the stigma (female part) of the flower must be fertilised. Stonefruit flowers only remain receptive to pollen for about three days after they first open – a relatively short window of opportunity for both tree and farmer.

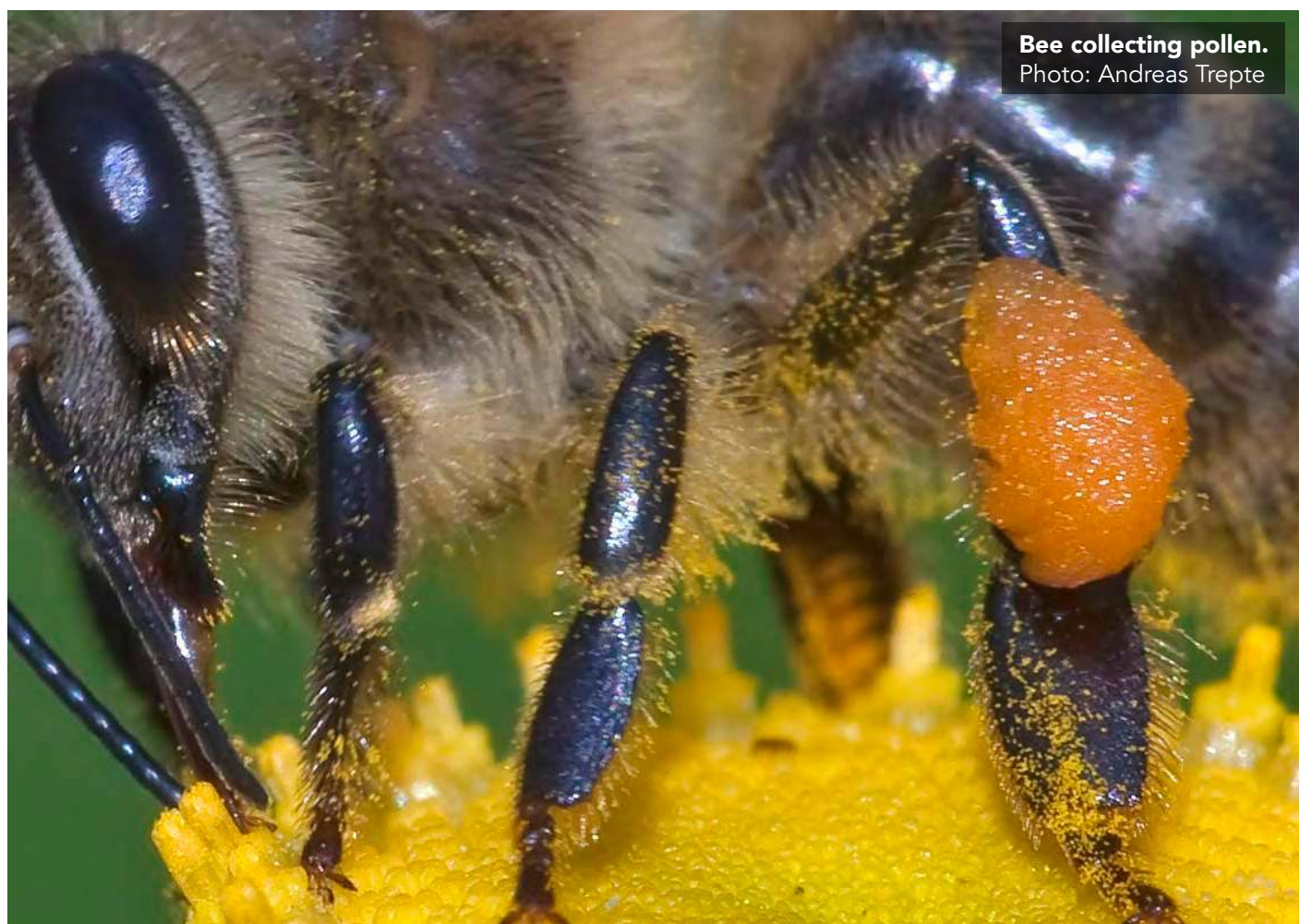
Manipulating the colony so that bees actively seek out fresh pollen enhances fruit set. For example, trials using “pollen catchers” on hives, which rob incoming bees of much of their load, increased the amount of time bees spent foraging for pollen.

Unfortunately, stonefruit blossom is not a particularly good source of either nectar or pollen. If bees have better options they will go to them instead. For this reason, it is important to consider what else is flowering when the orchard blooms.

Inter-row plants and adjacent areas of native bushland that flower at different times can help keep wild bees and other pollinators fed, thus maintaining a base population in the area. For example, orchards next to rainforest areas have been shown to have better rates of pollination than orchards that are isolated from such natural refuges².

¹ Benachour K, Louadi K. 2013. Inventory of insect visitors, foraging behavior and pollination efficiency of honeybees on plum in the Constantine area Algeria. *Af. Entomol.* 21:354-361.

² Blanch KR, Ludwig JA, Cunningham SA. 2006. Proximity to rainforest enhances pollination and fruit set in orchards. *J. App. Ecol.* 43:1182-1187.



However, a flowering field of canola provides a nutritious and attractive source of food for bees, so represents stiff competition if it flowers at the same time as the orchard.

Such competition isn't limited to the field next door. If the weather is suitable – temperatures in the mid 20s – a foraging bee can travel up to 4km in search of a good food source. This means 50 sq km are available for searching. Even a large stonefruit orchard seems relatively insignificant on this scale.

However, the distance bees travel depends partly on the hive. A small colony is more likely to stay local, whereas a large colony will forage more widely.

Bees can also be trained. Netting is generally a negative for pollination. Bees can find navigating under nets difficult and may end up getting stuck as they try to escape. However, young bees born into such an environment adapt to the conditions. After all, if a net house is all they know, they don't feel the urge to try to get outside it.

Moving a hive while the older bees are out foraging seems cruel. However, it is one way to reduce colony size and allow the younger generation to come through. These bees may be just what is needed to stay around the orchard and pollinate opening flowers.

What bees like

According to NSW DPI Technical specialist on honeybees Doug Somerville, one of the big problems is that bees are not considered when planning an orchard.

“Hives need to have the right aspect with minimal shading in early spring. Where the hives are positioned has a huge impact on how active the bees are. Ideally, bees need morning sun, and warm conditions. Beekeepers put hives where the grower wants them, but that's often not the best place for the bees themselves”.

While bees can start to move about at 12–14°C, flight doesn't really begin until temperatures reach 16°C. Activity

Feature

is also greatly reduced if it's cloudy or raining, although bees may still fly short distances in light showers. If winds reach 24km/h then that will reduce activity as well.

According to Doug, "it's a lot of work for beekeepers loading and unloading hives, and moving them knocks the bees around as well. Bees go backwards in stonefruit orchards – they don't produce as much honey as they could with a better food source, and the relatively small amount of pollen gathered from stonefruit reduces breeding".

Then there is the issue of pesticides. "Bees are the livestock of beekeepers, and keeping them healthy is their first priority" says Doug. "There is now plenty of evidence that all pesticides, including fungicides, can impact on bee health. Even though the effects are sub-lethal, they accumulate within the colony. Production of larvae is greatly reduced. This is probably one of the causes of colony collapse, where many of the hatching bees have

"Bees are the livestock of beekeepers, and keeping them healthy is their first priority"

a very short life expectancy and the colony population declines".

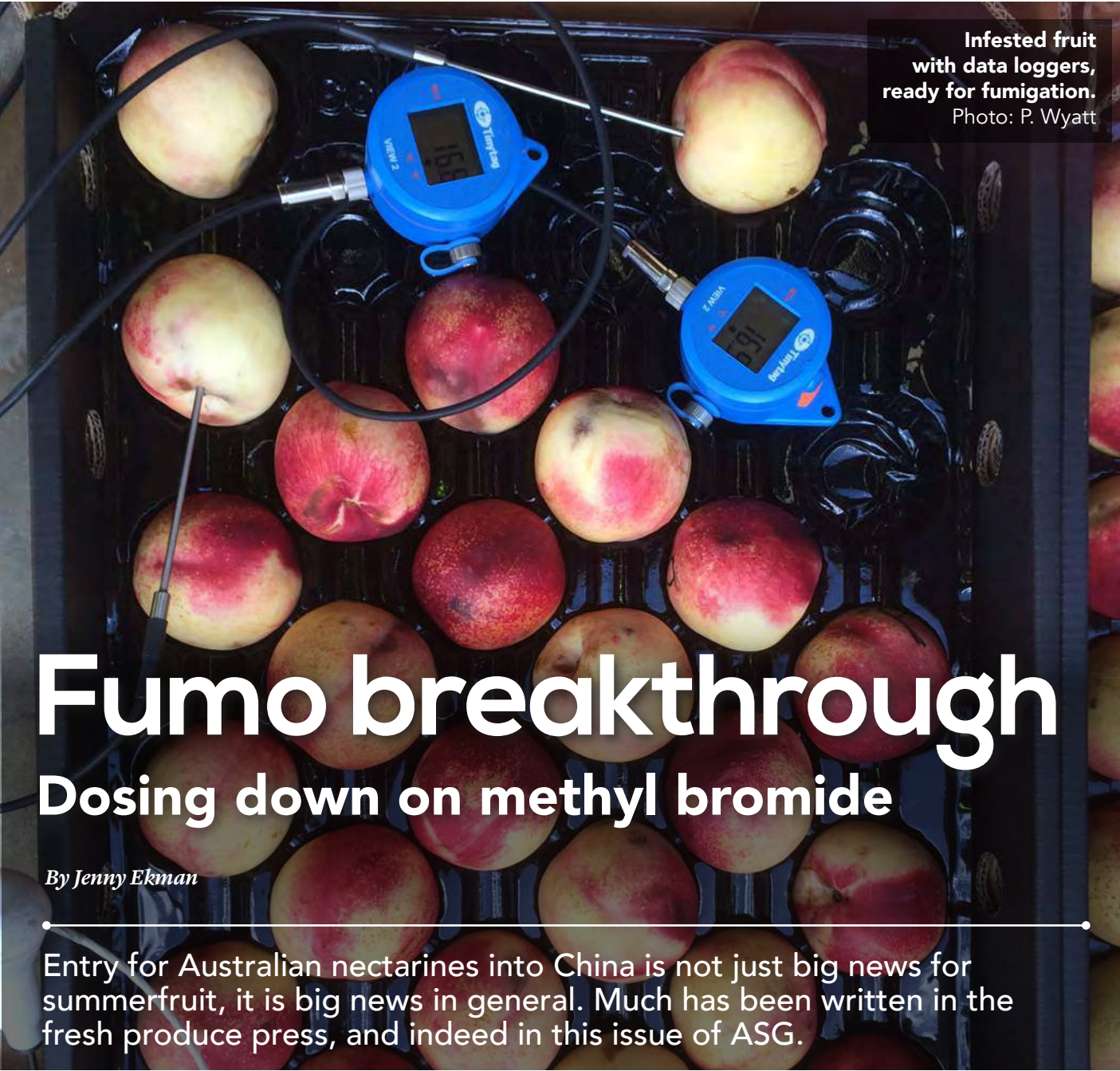
Given the range that bees can fly to forage, pesticide use on farms is a big issue for beekeepers. For many beekeepers, the risk is just not worth it, especially as they are sacrificing honey production to pollinate the orchard.

So, understanding the best way to use and manage bees is just as important for orchardists as it is for beekeepers.

To help address this issue, Dr Doug Somerville is now developing a one day course on "Using bees for pollination" with NSW DPI. Three events are planned, to be held in the Riverina, North coast NSW and Tocal on March 7, 14 and 28 respectively. See the Tocal college website www.tocal.nsw.edu.au/courses for details and to register.



Moving a hive while older bees are foraging seems cruel but it is one way to reduce the size of the colony and let younger generation of bees to come through. Photo: Jiri Lochman, Lochman Transparencies



Infested fruit
with data loggers,
ready for fumigation.
Photo: P. Wyatt

Fumo breakthrough

Dosing down on methyl bromide

By Jenny Ekman

Entry for Australian nectarines into China is not just big news for summerfruit, it is big news in general. Much has been written in the fresh produce press, and indeed in this issue of ASG.

This breakthrough in trade is only possible due to agreement over quarantine protocols. These are primarily designed to disinfest the fruit of (potential) fruit fly infestation – the major barrier to fresh fruit trade between Australia and many overseas markets.

It is not easy to develop a new quarantine protocol. Large data sets are needed detailing treatments and numbers of insects killed. These must meet the requirements of both the Department of Agriculture and Water Resources (DAWR) and authorities in potential importing countries.

Developing protocols

Protocols also need to meet the needs of industry; the treatment has to be economical, fit with supply chain logistics and, obviously, avoid damaging the product.

There are a number of options for killing fruit flies. These include cold, heat, irradiation and fumigation. Cold takes a long time so generally has to be done in transit – which can be a risky business given the precise temperature control that is needed. Heat damages stonefruit and irradiation is not approved in many markets.

This leaves methyl bromide (MeBr) fumigation. However, MeBr is not without its own issues. The biggest is “fumo burn”. Symptoms do not always appear immediately after treatment, but can develop during storage and transport – doubly bad news when fruit has already travelled several thousand kilometres.

Most current schedules for treating with MeBr use concentrations of 32g.m3 or more. For example, the current interstate schedule requires application of up to 40g.m3 MeBr for 2 hours at 15 to 21°C. Indonesia requires fruit to have been treated with 64g.m3 MeBr for 2 hours at 21°C.

Nectarines were infested by placing them into cages of mature Queensland fruit flies, and allowing the flies to oviposit naturally into the fruit. Photo: P. Wyatt



Chief investigator Dr Pauline Wyatt, QDAF.

“Low dose fumigation is a new concept. This treatment uses less than half the usual amount of methyl bromide, but with more than double the time to be effective.”

Longer but lower

It seemed possible that if treatment time was longer, the dose could be reduced. Less MeBr for longer is likely to be just as effective at killing insects, but less likely to also kill the fruit.

Pauline Wyatt and her team at DAF Qld are experts in fumigation. While normal fumigation has been studied on many crops, their recently completed HIA project on “Low dose methyl bromide against fruit flies to improve market access for summerfruit” is the first time a complete data set has been gathered on this method.

According to Pauline, “Methyl bromide is a very old method of disinfestation, and already used all around the world for disinfesting fresh products. However, low dose fumigation is a new concept. This treatment uses less than half the usual amount of methyl bromide, but with more than double the time to be effective”.

“Low dose methyl bromide can avoid damaging products, but still be effective against pests. In fact, we believe this is a world-first, having produced a



The 1m³ fumigation chamber used for trials. Photo: P. Wyatt

comprehensive data package showing that this method is effective against all four life stages of Queensland fruit fly”.

The researchers infested nectarines by allowing fruit flies from their captive colony to lay eggs directly into the fruit. The fruit were fumigated after one day (eggs) or after allowing the larvae to develop to first, second or third instar maturity.

In total, 30,000 individuals of each life stage were treated with 18g.m³ MeBr, and not a single insect survived. This is the highest level of confidence required by any importing authority, equating to >99.99% mortality.

However, this is no use unless the fruit is still good quality. “Methyl bromide can damage fruit, reducing shelf life,” Pauline said. “We conducted fruit quality assessments at different storage times to check whether the doses we were using affected quality or shelf life.

“The results were excellent, as there were no significant effects of fumigation on colour, rots, firmness, sugars or acids, even at slightly increased times and dosages”.

As a result, there are three treatment options available for stonefruit growers wishing to export to China from areas not fruit fly-free:

1. Cold treatment, being 3°C for 18 days (east coast) or 2.1°C for 21 days (west coast)
2. MeBr fumigation with 32g.m³ for 2 to 3 hours at 21°C followed by cold treatment for 3 to 4 days
3. MeBr fumigation with 18g.m³ for 5½ hours at 18°C

Option 3 is therefore not only a world-first, but has successfully opened the way for Australian stonefruit into China. John Moore’s report in this magazine confirms that low dose MeBr fumigation is resulting in fruit arriving in China in excellent condition and getting top price in the big city markets.

Chile is also entering the Chinese market this season, having recently finalised negotiations over entry protocols – just as Australia has. Their fruit will also have to be treated against fruit fly. However, without a protocol that avoids damaging fruit, they may find themselves in the bargain bins.

Looking to the future, fruit fly trials and fruit quality assessments have also been completed for white fleshed peaches. The next step is to repeat the trials on plums, which is happening this season. This should open the way for export of both peaches and plums in the next few years.



Technical officer and fruit fly wrangler Thelma Peek, QDAF. Photo: P. Wyatt

Acknowledgement

This project, SF12016, was funded by Horticulture Innovation Australia using the summerfruit industry levy and funds from the Australian Government.

By Penny Measham

The SITplus facility in Port Augusta, SA.



Game-changer for Q-fly management

South Australia's world-leading \$3.8 million fruit fly facility will provide a new line of defence against one of horticulture's most damaging pests.

The centre, opened in November, will produce 50 million sterile male Queensland fruit flies each week. The flies will be released to mate with females, collapsing wild populations in fruit fly affected horticulture growing regions.

South Australia is the only mainland state to be declared fruit fly-free with the State Government committing around \$5 million each year to fight the threat of fruit fly.

The SIT facility is supported by SITplus, a national research and development effort, which now has a combined program budget of \$45 million. Research undertaken at the SIT facility is a game-changer for the future management of Queensland fruit fly.

The SITplus program is led by Horticulture Innovation Australia Ltd, in partnership with Primary Industries and Regions SA, South Australian Research and Development Institute, Victorian Department of Economic Development, Jobs, Transport and Resources, CSIRO,

Plant and Food Research Australia, NSW Department of Primary Industries and Macquarie University – all with interconnected interests in the development and uptake of science solutions for the management of Q-fly.

“To develop the centre, our researchers travelled to Austria, Spain, Israel, Guatemala, Mexico and the USA to investigate similar, leading operations,” Horticulture Innovation Australia Chairman Selwyn Snell said.

“This facility combines all the best aspects of that research, making it one of the most progressive and advanced in the world.

“The \$45 million SITplus initiative complements this state-of-the-art facility with cutting-edge fly production and release technology development.”

Each year, the pest is estimated to cost the industry more than \$300 million in lost markets and through damaged produce both pre-and post-harvest.

Flesh good, kernels bad: apricots under the microscope

All stonefruit are rich in phytochemicals. Readers will already be familiar with the Queen Garnet plum, which is incredibly high in anthocyanins – potent anti-oxidants with many potential benefits for human health.

Apricots also contain high levels of natural anti-oxidants, including polyphenols, anthocyanins and flavonols. Apricot puree has been found to contain 606mg/100g, 697mg/100g and 429mg/100g anti-oxidant compounds, compared to 697mg/100g in plums and 429mg/100g in peaches.

Apricots could therefore find themselves investigated as part of the newly announced \$10 million ‘Naturally Nutritious’ research project. Funded through Hort Innovation Australia, the University of Queensland and the Queensland Government, this is the same team that discovered the Queen Garnet ‘superplum’ as well as developed a SuperGold sweetcorn that protects against macular degeneration.

While the flesh of apricots is undoubtedly good for you, the kernels are not. Apricot kernels have been widely promoted by alternative medicine groups as a cure for cancer. They claim that this is due to the presence of amygdalin (marketed as Laetrile), which kills cancer cells while leaving normal cells untouched.

In fact, despite years of research, there is no scientific evidence that amygdalin cures cancer.

“Apricot kernels contain high levels of a toxin, cyanogenic glycoside, which can release cyanide into the body when eaten.”

However, it is absolutely certain that eating apricot kernels can cause cyanide poisoning. There have been several documented cases of poisoning, and even death, linked to amygdalin.

According to FSANZ CEO Steve McCutcheon “Apricot kernels contain high levels of a toxin, cyanogenic glycoside, which can release cyanide

into the body when eaten. I think consuming

a very small amount of raw apricot kernels can cause potentially life threatening cyanide poisoning”.

Food Standards Australia New Zealand (FSANZ) outlawed sale of apricot kernels as food in December 2015. Before the ban, about 20,000kg of apricot kernels were being sold for human consumption in Australia every year.

Despite its prohibition, sale of imported kernels (usually from Turkey or Armenia) has continued. In October this year a second NSW business was fined for on-line sales of apricot kernels as a cancer treatment. Other businesses have also continued to trade, although the kernels are marked as being for cosmetic use only.

In summary, apricots are good for you. But stick to the fresh fruit; imported kernels will do far more harm than good.

By Annabel Hutch, Growcom

Changes to the backpacker tax

From 1 January 2017, tax rates have changed for working holiday-makers who are in Australia on a 417 or 462 visa. These rates are known as "Working holiday-maker tax rates".

What does this mean for employers?

If you employ a working holiday-maker in Australia on a 417 or 462 visa:

- From 1 January 2017, you should withhold 15% from every dollar earned up to \$37,000 with foreign resident tax rates applying from \$37,001. Please see the following link to the new tax tables: <https://www.ato.gov.au/Rates/Schedule-15--Tax-table-for-working-holiday-makers/>
- You must register with the ATO by 31 January 2017 to withhold at the working holiday-maker tax rate. Please see the following links to more information and the registration page: <https://www.ato.gov.au/business/registration/work-out-which-registrations-you-need/taxation-registrations/employer-registration--working-holiday-makers/>
- See also <https://www.ato.gov.au/twhm/>

If you can't register via the online registration form, you can register with the ATO over the phone on 13 28 66. Ensure that you have your ABN readily accessible for this process.

If you don't register, you will need to withhold at the foreign resident tax rate of 32.5%. Penalties may apply if you employ holiday makers but don't register.

If you already employ working holiday-makers you will need to issue two payment summaries (with different rates)

this year – one for the period 1 July 2016 to 31 December 2016 and a second for any period from 1 January 2017 to 30 June 2017.

There are two distinct time periods which need to be accounted for, therefore there will be two separate payment summaries. Most payroll systems only allow you to produce one payment summary per person per year. If this is the case for the payroll system that you use, a solution may be to terminate your continuing employees on 31 December 2016 and re-employ them on 1 January 2017 under the new tax rate to allow you to produce these two payment summaries.

However, this might not be the case for your payroll system. It is highly recommended that you contact your payroll service provider about this issue to ensure that you are setting this up correctly.

Your employees who were employed before 1 January 2017, do not need to submit a new TFN declaration for the new period, and the new tax scales will automatically apply. There is no new TFN declaration form, although the residency rules have changed, so no working holiday-maker will be residents for tax purposes.

If you have any queries or comments about this information, please don't hesitate to contact Growcom Workplace Relations Team on 07 3620 3844 or email wrtteam@growcom.com.au

AREA WIDE MANAGEMENT OF
QUEENSLAND FRUITFLY UPDATE

Stopping fly migration

By Penny Measham

Summerfruit have different harvest windows – some early, some late. Some are harvested before fruit fly numbers build up. But that doesn't mean you can forget about the flies – fruit fly management needs to consider fly movement and behaviour for the entire year – pre-harvest and postharvest. Any fruit left on trees after harvest creates a risk. They may still attract flies, or allow maggots to develop, and that can increase the Qfly population going into winter.

Dr Penny Measham is a Brisbane-based researcher and the Queensland Fruit Fly Area Wide Management Coordinator at Horticulture Innovation Australia. For more information please contact: penny.measham@horticulture.com.au | P: 0417 525 904

Hygiene is a critical tool in fruit fly management. In susceptible perennial crops, a small number of fruit left on trees has the potential to significantly increase fly populations.

It is therefore really important that fruits left after harvest are removed from trees.

Other late season and post-harvest treatments will help reduce fly numbers on your own orchard in the current season, but remember that flies move. The local fly population will build up over the remaining warmer months if there are nearby places or orchards that allow them to breed or overwinter.

Are there other fruit orchards nearby? Or backyard fruit trees? If fly populations can build up in other areas then they can re-enter your orchard the next spring – flies move!

Dispersal and movement of flies over large distances is rare. But, smaller scale

Research

movement across adjoining properties is likely. This is where area wide management has an advantage – all habitats being managed within an area. Knowing the drivers for fruit fly movement, the population dynamics on a local scale, and the appropriate management strategies to get the biggest bang for your buck will help inform this approach.

We need to know:

- Where do flies come from in the spring?
- How likely is it that I will be affected if my neighbour has flies?
- When and where do I tackle them?

The biophysical research component within the Adaptive Area Wide Management (AAWM) of Qfly project aims to address these questions and to investigate their importance for successful area wide management.

Katharina Merkel (QUT) and Florian Schwarzmüller (CSIRO) are looking at ecological parameters such as movement triggers, distances covered and overwintering strategies and their importance for QFly population dynamics.

“Complex environments provide a management challenge because of the availability of different fruit at different times, and the number of ‘hiding places’ in the landscape.”

Complex environments provide a management challenge because of the availability of different fruit at different times, and the number of ‘hiding places’ in the landscape.

Models are being developed which combine existing knowledge about Qfly and its life cycle, the parameters of fly-movement, and the spatial distribution of hosts in the landscape.

Complex landscapes that contain

different crops have always provided a challenge, but building an accurate and transferable model will ensure the model works in different regions and environments.

This way, we can decide the best management strategies to use in different areas. Knowing what triggers population growth after winter, and where flies come from in spring, will inform early intervention strategies. This can get your season off to the best start possible.

In areas such as Shepparton and Swan Hill, one of the objectives of Area Wide Management is to reduce Qfly populations so that the Sterile Insect Technique (SIT) can be used effectively.



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