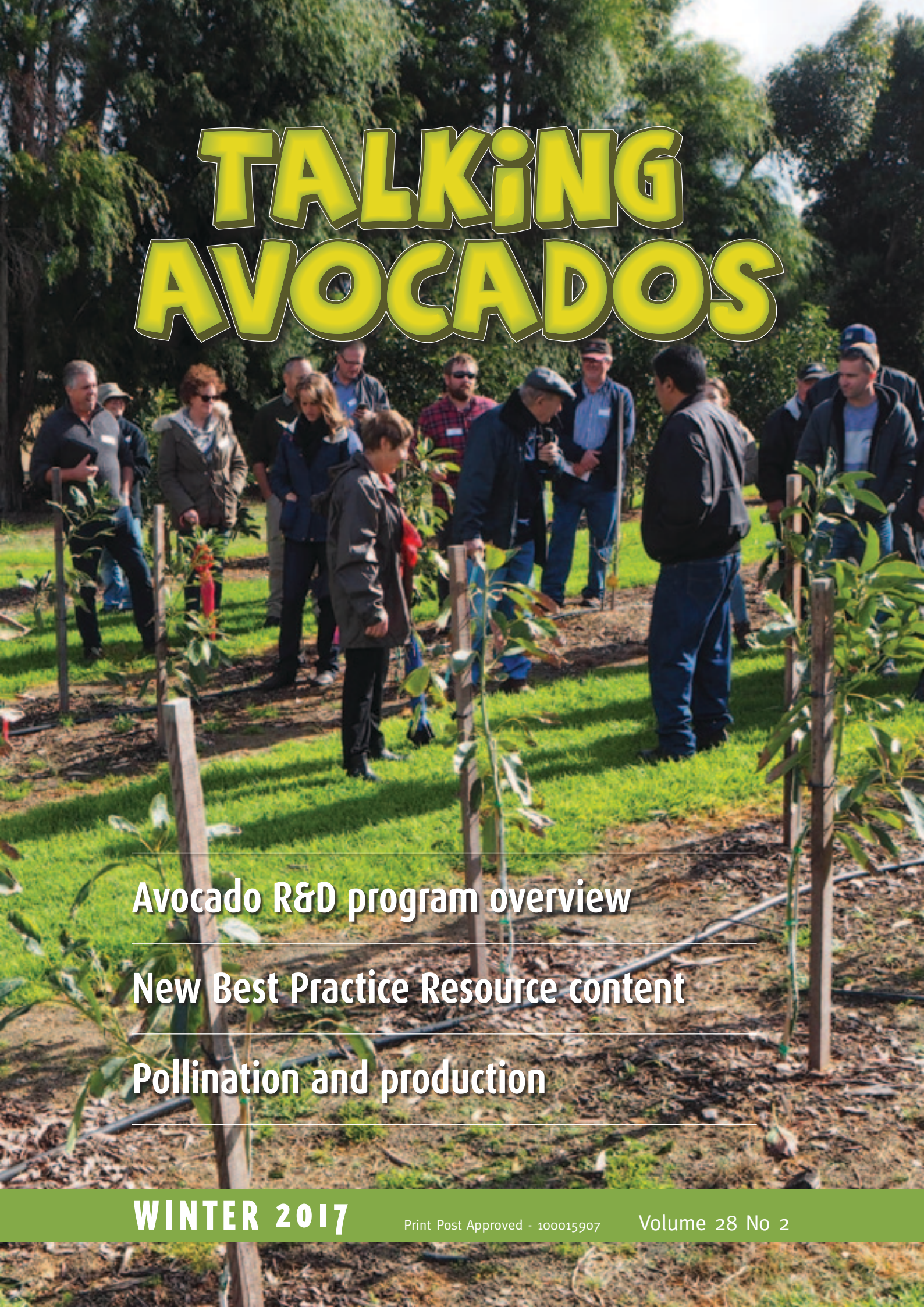

TALKING AVOCADOS

Avocado R&D program overview

New Best Practice Resource content

Pollination and production

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Cover: ***High density plantings at Carabooda, Western Australia.*** *Image provided by Simon Newett (DAF Queensland).*

Chairman's Perspective

It is not breaking news that our industry in Australia and globally is experiencing great publicity and success. This is not a "fortuitous accident" as some would believe. In Australia it is due to the investment that you, the grower makes, together with Australian Government contributions, to our levy system.

In 2006 our industry effectively doubled our levy rates and our R&D and Marketing funding increased to levels where we could achieve significant research and also marketing. As a reminder, our growers contribute 2.9c/kilogram to the R&D levy and 4c/kilogram to the Marketing levy and 0.1c/kilogram to the Plant Health Australia levy. These are some of the highest levies paid in horticulture in Australia and we should celebrate this fact and celebrate the success it has brought our industry and will continue to bring into the future.

In my opinion, the diligent use of our Marketing levy funds, to which the government does not contribute, has been the most effective in improving our position on the consumers' plate and their "share of mouth". At the Lima Avocado Congress in 2015 some South American (Mexico and Peru) delegates told the Australia Ambassador for Peru and Bolivia that Australia were leaders in the world for research and especially marketing of avocado because we were successful in introducing avocado to a multicultural population to the highest consumption rate in the non-Hispanic population. We currently stand at an average annual household spend on avocados of $38.40/year, an increase driven by people shopping for the fruit more often. In 2015/16 per capita consumption was 3.2kg/person, compared to only slightly more than 1.5kg back in 2003/04.

We have succeeded in improving our consumer base both in number and in frequency of purchase across most of the population. It is imperative that we continue to work to introduce avocado to more new consumers and to increase frequency of use across all consumer groups.

The main impediment to success in our marketing program is the quality of avocado presented to the consumer at point of sale and especially at the point of cutting the fruit open. Consumers in all categories will quickly go "off the bite" when quality drops off. The memory of wasting money and the missed opportunity to use the avocado lingers on the consumer's mind for a very long time.

Quality starts at the tree but it is also important for our industry to manage, or at least be involved, in all the steps in the supply chain from tree to kitchen bench.

Our industry is moving into a new era of rapidly increasing production in almost all Australian regions and we need to focus on building consumer demand here on our domestic market and the export market.

The simple message is for our industry to continue with improvements to quality at all steps in the supply chain to support the marketing program so we can build confidence and satisfaction to the consumers avocado experience, everywhere.

Simplezzzz. Eh.

Jim Kochi

Jim Kochi, Chairman, Avocados Australia Limited

CEO's Report

Season update

In the past few months we have again seen good returns for avocado growers with demand strong and supply steady, although the Central Queensland Hass harvest was well below forecast.

The outlook for the coming months is for continued steady supply as the harvest works its way down the east coast and across into the Tristate region. Western Australia is gearing up for a long season, with a record crop forecast for the coming spring and summer. Fortunately, New Zealand is on an 'off year' so the volumes of supply are expected to balance well with expected domestic consumer demand for the year.

New faces at Avocados Australia

In June, Sue Plunkett-Cole joined Avocados Australia in the role of Data Analyst, driving the three-year project **Avocado industry and market data capture and analysis** (AV16006). Sue comes to us with a strong background in data sciences and business process management, after a career in the university and research sector, and has a Master of Information Technology from QUT.

New Avocados Australia Data Analyst, Sue Plunkett-Cole

Sue is passionate about enabling access to relevant and timely data for decision making and planning across the avocado industry. In addition to ensuring our stakeholders have quality industry data at their fingertips, Sue is keen to investigate international avocado data to place the Australian industry into the global context.

I believe good quality industry and market data is paramount for the successful development of our industry and I am really excited that Sue is on board to take our data systems to the next level. With Sue now on board, we farewell Joanna Embry, who has been working with the Infocado system since the start of the year. We were very fortunate Jo was able to keep the program running effectively during this transition period. Jo, with Avocados Australia's Amanda Madden, did a great job to maintain the flow of data to and from industry, via Infocado.

Orchard data

An important part of our suite of industry data is capturing numbers of trees, areas planted, tree age and variety. This allows us to develop the long term production forecasts that underpin strategic industry planning.

The response from growers to the August 2016 OrchardInfo Tree Census was fantastic and I'd like to thank all growers who contributed their orchard data. We now have the best information about plantings that we have ever had. Also, I'm very grateful to those who provided yield data which enables us to monitor productivity over time – the results are very interesting. The level of contribution has really improved our confidence in the data and with Sue now on board we can revisit our long term forecasts based on this updated data set.

We are about to undertake the August 2017 OrchardInfo Tree Census. If you are a grower who is not aware of this program, please contact our office (07 3846 6566) so we can ensure your orchard data is included. Also, if you know any new growers that are planting, please ask them to contact us. The more contributors we have, the better the data, the better the planning. All individual data is strictly confidential and to provide an incentive, only those who contribute date receive the detailed aggregated reports.

You can read more on the results of the last OrchardInfo census on Page 15.

Communication program – we need your feedback

Industry communication is another core area for Avocados Australia and we want to continue to deliver the best service that we can.

Each year we survey our stakeholders to gauge what is working well and where we need to improve. It's not just a tick-box process for us; we have made changes based on the feedback over the past few years.

I know everyone struggles to find the time to complete surveys, but it is important that we continue to get your feedback, so please complete the on line communications survey by 7 August. The link has been included in the last few editions of the ***Guacamole*** newsletter or your can find it at *www.surveymonkey.com/r/AvocadosAustralia2017*.

R&D feature article in this edition

You will see on Pages 22-36 a summary of all avocado research and development projects current in 2016-17, managed by Hort Innovation. Many of the projects have been funded by the avocado R&D levy with contributions from the Australian Government. Some are multi-industry or across-industry projects with funding from a number of industry levies or all industry levies and one is funded directly through an Australian Government grant.

This is the most comprehensive update of the avocado R&D program available. The report provides a picture about how the projects are addressing the new Avocado Strategic Investment Plan.

New projects which are currently being tendered and are not included in this report are:

- Improving avocado orchard productivity through disease management (AV16007)
- Avocado industry biosecurity capacity building (AV16010)
- Implementation of recommendations from the ANVAS review (AV16013)
- Review of the National Biosecurity Plan for the Avocado Industry (AV17001)
- Avocado export readiness and market access (AV17000).

The industry's research program has been very strategically focused, and growers have contributed heavily since the introduction of a grower levy in the early 1990s. During the past decade there's been a strong focus on R&D to help drive consumer demand and consumption of avocados, along with work to better understand consumers and market opportunities.

This grower supported research has helped the industry to improve the retail quality of avocado, which is significantly more reliable now compared to 10, or even five, years ago. However, as our Chairman notes in his Perspective in this edition, there is more to do to ensure we always provide the best fruit we can, all the way to the kitchen bench. Once fruit is picked off the tree, it cannot get any better; we all have to work to maintain that quality as much as we can.

The industry R&D program during the next five years will be guided by the new Strategic Investment Plan that was developed through consultation with a wide range of industry stakeholders. This plan was featured in the last edition of Talking Avocados.

In the future industry will need to become even more globally competitive so the focus on improving production efficiency and continuity will be given greater importance moving forward.

Hort Code of Conduct introduced

The new Horticulture Code of Conduct was introduced on 1 April and we included information about this in our *Guacamole* newsletter. It is important that all growers dealing with agents or merchants have a Horticulture Produce Agreement in place in line with the new code. We have included a summary on Page 60 to remind you of your obligations and the ACCC website for further information.

John Tyas

John Tyas, CEO, Avocados Australia Limited

Around Australia

South Queensland Report

By Daryl Boardman,
Avocados Australia Director

As I write this report we have a cool wet morning in Southern Queensland. Harvest has begun and fruit quality looks good. It seems that yields will be down on last season but still a reasonable crop forecast.

We recently had latest Avocado Study Group workshop, at Esk. This was held at the civic centre, followed by a farm walk at Robert and Janet's property on the Esk/Hampton Road. The day was well attended and the topics covered were very good. The talks covered pollination, mulch, export and export readiness and planting preparation for young trees.

The work being done on export readiness for growers, I think, is a very important area. Everyone needs to keep export readiness in the back of their mind and be ready when the time comes that exports are common and no different than sending to Sydney or Melbourne.

Yes, there may be some different requirements and yes, sometimes the price may not be as good as the domestic price but as we have seen in the past, it is the pressure relief that enables the domestic market to stay at good levels.

With all the new plantings that have been put in the ground and are still going in, and topics at the regular study group events looking at tree planting preparation, no doubt a lot more will be planted during the coming years and export will become that bit more important.

Avocados Australia has been very active in progressing new market access and will continue to as this will be crucial to the viability of growers in the coming years.

2017 is the year the Southern Queensland Director position is up for election to the AAL Board. I will again stand for the position as I feel I can still add value to the Board, the industry and the Southern Queensland region as well as the export development of the industry. I am also passionate about making sure avocados remains a viable product for growers to produce and that it remains that way for the foreseeable future.

All the best for a prosperous harvest.

Central Queensland Report

By Eric Carney, Avocados Australia Director

For Central Queensland the picking season is almost at an end with just a couple of weeks in July left at the time of writing. All-in-all, fruit moved well through the system and enabled fantastic returns. There was no major protracted downturn in the market due to oversupply and I believe this can be attributed to the great start to the year and the momentum from February onwards. Most growers in the district had a reasonable Shepard crop, however, many Hass blocks were down on regular numbers, especially the oldest blocks.

Our current winter is almost a deja vu with last year. Highs are currently hovering around mid to high 20s (as at the first week of July) after a cooler June which has put some Shepard and Hass into an early flower. Hopefully we do not see a repeat of last year with energy spent on flowers then lost with a follow-up of colder weather.

Recent water allocations have been advised. Bundaberg Water Supply Scheme (WSS) – Burnett Sub-scheme sits at 88 percent for now with 905,869ML in storage. If anything like last year, we will likely see an upward revision in October/November and probably hit full allocation just after the rainy season.

I encourage growers to familiarise themselves and their staff with the BPR (Best Practice Resource) if they have not already done so. Great effort was put into making the site easier to navigate, more functional and more current with extensive content updates. Simply go to www.avocado.org.au and navigate to BPR to log in or request a registration.

Be on the lookout for your invitation to the next study group workshops in the region, on 17 August and 16 November.

Lastly, I hope everyone had a great season and hopefully some rest before the flowers hit and we start the cycle all over again.

Tristate Report

By Kym Thiel, Avocados Australia Director

The Tristate region has experienced some difficult growing conditions for avocados, highlighting the issues with successful production of avocados in our region. The impacts of the extreme heat in February have already been well documented but just as growers appeared to have come through this better than initially estimated, frosts during winter have come to once again inflict damage to crops.

Although not being over at time of writing the continuation of dry and freezing conditions means that we are all nervous before harvest begins in August/September. This is further exacerbated by the anticipation of a strong market for our product when we come on line. Damage or fruit losses so far has been limited to isolated pockets in the Sunraysia region but reports of leaf damage to young orchards has been more prevalent but thankfully not really an issue or widespread.

Yields for most growers for the upcoming harvest now appear to have come up to at least average after initial fears tonnages would fall well short of expectations. Size and quality appear good with limited amounts of blemish but all growers will be keeping an eye on the weather forecasts as the continuation of frosts are a real possibility given the dry conditions in the Murray-Darling Basin this winter thus far. Water allocations will

be healthy this financial year with any dry impacting only on future years.

Two more great study groups were well received in late July with one at the Costa Exchange Training Room in Renmark, South Australia, with a visit to Nick Hobbs' Chinoola Orchard and the other at Glenn Goldup's orchard near Nagiloc, Victoria. Some great information was presented by Lisa Martin, Ripe Horticulture, and Dr Harley Smith from CSIRO in Adelaide who talked about a new project on irregular bearing, with a focus on maximising yield and reducing the seasonal variation.

Sunshine Coast Report

By Robert Price, Avocados Australia Director

The Sunshine Coast seems to be experiencing an ongoing anomaly to its weather, missing out on seasonal carryover high rainfall or flooding. Rainfalls during the past six months have ranged from 460mm to 780mm, well below the 1200mm average. Again, management under these conditions will alter slightly as the benefit of rain surpasses that of irrigated water; monitoring the nutrient levels becomes more important to ensure balance is maintained. For those growers that suffered heavy hail damage, they might have noticed that some trees reacting differently to the trauma of the injury inflicted to the branches. More of a matter of interest than need, I had a Complete SAP Test leaf test done and found that most nutrient levels were optimal with slight variations. The phosphate and magnesium were high; it will be interesting when a soil test is done to see what the salt levels are as they must be up a bit due to lack of rain.

The Australian avocado industry is burgeoning with the almost exponential plantings of new trees which means established suppliers are struggling to keep up. Some suppliers are quoting 2019 delivery. However, it is good to see new nurseries entering the wholesale market to supply trees and take advantage of the shortfall. On the down side, the cost of tree appears to have risen about 50 percent during the past three to four years. Agh! The costs of production continually rise.

Movement in farm ownerships are another interesting development. Costa Group and Macquarie Agricultural Funds Management had already acquired Avocado Ridge, which has farms and packhouses in Childers and Kumbia, and now the consortium has purchased Lankester Avocado orchards in North Queensland. This shows confidence in the industry. Then on the other side of the continent, Busselton-based Jasper Farms has reportedly been sold, subject to the approval of the Foreign Investment Review Board.

Tamborine and Northern Rivers Report

By Tom Silver, Avocados Australia Director

In my last report for *Talking Avocados* I covered the extremes of climate with temperature maximums reaching 40°C and then rains from ex-Tropical Cyclone Debbie dumping up to 570mm of rain on some orchards. Well, in June we had another half a metre of rain, with 100mm falling in an hour, leaving some struggling orchards in greater strife.

This has meant our orchards have undergone the two extremes that don't favour avocado trees. The avocado tree roots are very close to the surface with no root hairs, meaning they aren't adapted to dry conditions. However, they are also very sensitive to too much water, which leaves trees susceptible to Phytophthora root rot.

Around Australia continued

Positively, neither extreme has impacted on the quality of the fruit we have harvested at the time of writing (early July). Harvest is in full swing in the Tamborine and Northern Rivers, with most growers reporting very good quality fruit.

Our region also recently hosted an avocado study group workshop, at Wollongbar in northern New South Wales, thanks to Simon Newett and the team at the Department of Agriculture and Fisheries Queensland. Feedback from the 50 growers who attended was that the topics on the day (ranging from industry updates to canopy management trials) as well as a visit to Alstonville's Centre for Tropical Horticulture (where NSW DPI's Craig Maddox and Ruth Huwer demonstrated using a fruitspotting bug trap hedge to monitor the pest) were very positive.

Western Australia Report

By Dudley Mitchell, Avocados Australia Director

In the last quarter leading up to Western Australia's season start, we had the lowest rainfall in the April to June period in the past 10 years for the southern growing region. July has, however, started off well and the dams are beginning to fill. The month of March was also a bit of an anomaly being the coolest March during the past 10 years contributing towards a greater than normal out of season flowering. How this will affect next year's crop is anybody's guess.

In the meantime, according to Infocado, WA is expecting its biggest crop on record beginning in the northern areas later this month. Personally I don't think we will quite get there but it will definitely be a fairly large crop extending into late summer. Market discipline, coordination and communication will therefore be absolutely critical and I would urge all packhouses to pay attention to and communicate about forecast volumes and anticipated dispatch volumes. The supermarket chains will be vital in moving our crop so quality delivered to DC must be of the highest specification – watch your dry matters this year due to the late flower and set. WA's strong selling point over New Zealand is our quality and freshness to market and while the crop in New Zealand is not that big, they are still going to be sending two million trays into Australia during our time slot. As a result we must make sure that we deliver to market in the best possible condition in the quickest time frame (preferably <14 days from pick to table).

While on the subject of time, our levy funded projects are moving ahead, although not so fast as some of us would like due to the complexities of the business. The new irregular bearing project has been signed off and we should anticipate the first milestone report later this year, being a literature review of current knowledge. Funding for market access and export development has been debated although I'm unaware of any new contracted projects as of this time. We will continue to do everything in our remit to ensure projects of benefit to the avocado industry occur, and are undertaken in a timely manner.

With that thought in mind I wish you well for the upcoming season, I think it's going to be a cracker!

Central New South Wales Report

By Ian Tolson, Avocados Australia Director

The recent Central New South Wales avocado workshop held in Comboyne on 1 June was once again very well attended. The local hall was a good choice for the presentations, due to the fact it had heating, before the orchard walk at Chris and Sue Nelson's property. Presenters on the day were Simon Newett, Graeme Thomas, Chris Searle and Peter Rigden. Thank you to all

involved.

The continuation of good prices has encouraged more plantings; it was nice to see some new faces at the workshop.

The purpose/aim of these workshops are to encourage through reinforcing and updating growers on how to maintain their orchards' health to produce the best possible avocados for consumers. The Best Practice Resource is another very useful tool for growers. To keep consumption increasing a consistent supply of quality fruit needs to be available for the consumers. Quality fruit equals a quality return.

After the drenching in April (20 inches recorded at Stuarts Point), the weather has settled down, with just the odd shower to keep everything topped up. Harvesting in the local area is well under way. It is unfortunate some orchards suffered some crop loss due to the extreme heat conditions experienced in summer.

Comboyne growers have commenced dry matter testing (as at the first week of July) and will look to start harvesting in the coming weeks.

North Queensland Report

By Jim Kochi, Avocados Australia Director

How quickly the seasons come around. The harvest is over for this year and we were blessed with good weather and good returns. The drier summer gave us a clean crop with less issues with post-harvest fungal problems. However, the reliance on copper-based fungicides has caused some problems with rejections of consignments at retailers because of visible fungicide residues. The problem also extended to visible residue from sunburn protectants so growers should seek ways to manage this problem.

The continuing dry summer is now impacting on water reserves and both Mareeba area growers and others on the Tinaroo Falls Dam irrigation scheme and those on the Atherton/Tolga/Kairi aquifers are now on around 50 percent water allocations. This is a serious impediment to our crop management for the next year.

The flowering season has just started for the Shepard variety and Hass are in early bud/early cauliflower stage as at 12 July which is at least a month earlier than last year.

If all goes well with the season we could expect Shepard avocados on the market earlier in 2018, possibly as early as January. Hass could be earlier as well, potentially in mid-March.

Major Australian orchards change ownership

By Lisa Yorkston, Communications Manager Avocados Australia

Two major avocado orchard sales occurred in late June and early July, with the sale of Lankester Avocado in North Queensland and the reported sale of Jasper Farms in Western Australia.

Jasper Farms

The West Australian newspaper first reported the sale of Neil Delroy's Busselton-based Jasper Farms on 29 June, with speculation of a North American buyer in a deal brokered by EY (formerly Ernst & Young). The operation is reportedly Australia's biggest avocado farm.

The newspaper reported the terms of the sale were believed to be confidential and subject to the approval of the Foreign Investment Review Board. The story noted the sale was potentially worth more than $100 million.

Earlier in the year the speculation was about a potential Chinese buyer for the more than 450 hectares of orchards (220ha of mature orchards and 240ha due for their first harvest in 2017). According to *Fresh Fruit Portal* on 3 March, Chinese A-share-listed company Shenzhen Kondarl (Group) Co, Ltd announced it intended to purchase the Delroy family avocado plantations in Western Australia.

However, *The Australian* reported on 6 March that the Chinese agriculture, agricultural product and food retail company's announcement that it was close to finalising a purchase for a reported AU$192 million was premature. Neil Delroy told *The Australian* that no deal had been done, but confirmed his two avocado farms were being offered for sale, via EY. In the article Mr Delroy noted he was "annoyed" by the announcement because of the confusion it caused between the properties he offered for sale, and those owned by his brother Russell Delroy, under the trading name Delroy Orchards.

Also back in March, the *Australian Financial Review's Street Talk* included the Costa Group as among the parties interested in Jasper Farms, citing 18 months of talks between Costa Group, Neil Delroy and his advisers EY.

At the time of *Talking Avocados* publication, there have been no reports confirming the details of the sale.

Lankester Avocado

Costa Group Holdings Limited has made two successful avocado orchard purchases since December 2016, the most recent an announcement on 5 July it had signed an agreement for the acquisition of the Lankester Avocado orchards and packing operations from the Lankester family.

"This strategic acquisition is another step in executing our strategy to build avocados into our fifth vertically integrated core produce pillar," Harry Debney, CEO Costa Group said.

"Our production and supply period will now span from February to August, bringing us closer to achieving 52-week supply and our ultimate goal to be the number one grower, packer and marketer of avocados."

Lankester Avocados has three farms located in the Atherton region of Far North Queensland. The business also undertakes packing and marketing activity for third-party growers. The Lankester family will remain with the business to perform key management and operational roles. The acquisition was expected be completed by the end of July 2017. The acquisition price will not be publicly disclosed.

There are total plantings of 130ha across the three farms with the season running from February through to June. An additional 60ha will be planted during the coming 12 months.

"With the current circa 370ha of avocados Costa has in Central Queensland and the South Australian Riverland, this acquisition will bring the Company's total plantings to circa 500ha and allow us to continue to build our production scale," Mr Debney said.

The acquisition agreement has been entered into in conjunction with Macquarie Agricultural Funds Management (MAFM). Under the agreement, MAFM will purchase the farms and enter into a 20 year lease with Costa to operate them.

This is the second acquisition under an arrangement between the two parties. The first was the purchase of Avocado Ridge orchards and packhouses in December 2016, from the Carney family. As with the North Queensland purchase, the Avocado Ridge farms were purchased by MAFM, with a 20 year lease by Costa to operate them. The Avocado Ridge farms network is largely comprised of young trees.

What's new in the Best Practice Resource

There is some exciting new content on the Best Practice Resource (BPR) of the new Avocados Australia website.

The BPR is Avocados Australia's free online one-stop-shop to support best practice throughout the Australian avocado supply chains. We encourage all of our stakeholders to register and access this vital resource: *www.avocado.org.au/best-practice-resource/*.

The roll out of the new Avocados Australia website has led to more than 100 new applications to access the BPR in recent months, from input suppliers to service providers to producers.

New Export module now in the BPR

A new Export section has been launched in the Best Practice Resource.

As Australian avocado volumes continue to grow during the next five to 10 years, the development of export markets becomes increasingly important to maintain industry profitability.

Fortunately, there is growing demand for avocados worldwide. This is especially so in Asia, where consumers are beginning to recognise the health benefits, convenience and versatility of the fruit.

Australian avocados have an envied reputation in export markets of being high quality, full of flavour and grown in a 'clean and green' environment – as such they are often able to command a premium price. However, to achieve this premium, all of the essential elements of exporting must come together.

Supplying an export market has greater inherent risk than supplying the local domestic market. There are many factors that need to be considered and managed to achieve a long term sustainable position in the market.

This new section of the BPR addresses:

- the current status of avocado exports
- is exporting right for your business
- selecting an export market
- doing the market research
- being export ready to trade
- the export process
- looking for help.

New in the growing section

The valuable content in the growing section of the BPR is kept up-to-date by the Queensland Department of Agriculture and Fisheries (DAF).

Study group event notes

The Sunshine Coast Study Group event notes from Meeting 3, held on 4 May, plus the latest presentations on canopy management principles, new Hass-type varieties, planting systems, and spotting bug management have been added to the Event Proceedings category of the BPR Library. All study group

event notes are added to the Library when available.

New avocado videos for growers

Two new videos have recently been added to the Best Practice Resource Library. The first is a video on how to plant an avocado tree from DAF Queensland. Correctly planting avocado trees is vital for establishing a healthy and productive orchard and the *How to plant an avocado tree* video provides step-by-step information from site selection and preparation, through tree selection to irrigation.

The second video covers the *Small Tree – High Productivity Initiative*. In 2013 work began on the *Small Tree – High Productivity Initiative* aimed at transforming the efficiency and productivity of Australian avocado, macadamia and mango orchards. The Initiative includes multiple areas of research, including comprehensive field trials on trees planted at low, medium and high densities.

The new video – *Unlocking the secrets to high orchard productivity* – outlines and illustrates the thinking behind the work and the key research areas.

What's new in the BPR

To make it easier to keep up with what's new in the BPR, we've added a handy link to the BPR welcome page. Once you have logged in, the welcome page will provide you with a link to what's new, where you will find a summary of new content and links.

Acknowledgement

The content of the Best Practice Resource is maintained through the project **National avocado industry communications program** (AV15002), which is a stategic levy investment under the Hort Innovation Avocado Fund. It is funded by Hort Innovation using the avocado research and development levy and contributions from the Australian Government.

More information

You can log in (or request access!) via *www.avocado.org.au/best-practice-resource/*.

Avocado Grower Study Group workshop success

Bus tours, pest monitoring demonstrations, canopy management discussions, showing new videos and updates on the latest research have all been features of the latest avocado grower study group workshops.

Study group workshops are hosted by a local grower and Simon Newett and Peter Rigden from the Queensland Department of Agriculture and Fisheries (DAF). Kaila Ridgway (DAF Mareeba) was the main organiser of the recent workshop in North Queensland. These workshops help equip growers with the knowledge needed to implement practices that will lead to more consistent high yields of good-quality avocados.

A North Queensland study group record of 115 attendees was set at the latest workshop run in the region, hosted by Henk Van Nierkerk of DBC farming at Dimbulah on 13 July. A major focus for the day was the management of spotting bug featuring the new monitoring lure for banana spotting bug, in addition two farm walks were held with the use of drip irrigation, novel planting configurations and the Maluma variety attracting a lot of interest.

A bus tour of three orchards in the Carabooda and Gingin areas north of Perth attracted 30 avocado enthusiasts on 22 June, and 80 people were at Lisa Roche's orchard near Pemberton on 20 June for a more traditional study group workshop. According to Mr Newett, the greatest interest at the Western Australian events was sparked by disease and canopy management, flowering observations and nutrient levels.

On 15 June, an event was held at Esk in Southern Queensland where 44 growers and others learnt about alternative pollinating insects, export readiness and the use of mulch, before an orchard tour on Robert Bowie's property.

At the Central New South Wales event on 1 June, almost 70 people were at the Nelson family's Comboyne orchard. The growers were particularly enthusiastic about the latest information on root rot management and root phosphonate testing by Graeme Thomas (GLT Horticultural Services), and developments in the mechanisation of selective limb removal

Chris Nelson leads a walk through his Coastal Avocados orchard at Comboyne on 1 June.

Dave Duncan (centre with microphone) shares a joke with the bus tour participants at his Carabooda orchard on 22 June.

One of the recent Western Australian events was a bus tour. These happy travellers are at Allan Harvey's orchard at Gingin.

in the Central Queensland region by macadamia and avocado consultant Chris Searle.

The most recent Northern New South Wales/Tamborine event was on 18 May, where feedback from the almost 50 people who attended was that the topics on the day (ranging from insect management to canopy management) as well as a visit to Alstonville's Centre for Tropical Horticulture to look at spotting bug monitoring hedges were very positive.

At all the recent workshops, the new video *How to plant an avocado tree* was screened as well as the video introducing the recently transformed Best Practice Resource (BPR) and the new video about the Small Tree High Productivity Initiative. All attracted very favourable comments and are available for viewing 24/7 on the BPR.

Henk Van Nierkerk and his brothers cooking up a storm for the barbecue lunch that was enjoyed by attendees at the recent North Queensland workshop.

Lisa Roche explaining some of her management strategies during the field walk at her Pemberton orchard in Western Australia on 20 June.

NQ workshop host Henk Van Nierkerk showing growers his recent canopy management work on overgrown Shepard trees.

Avocado Grower Study Group Workshops continued

Upcoming workshops

Dates (subject to change) for upcoming study group workshop events around Australia can be found on the Avocados Australia's Event web page (*www.avocado.org.au/events/*).

- Central Queensland – 17 August
- North Queensland – 12 October (*note new date!*)
- Central New South Wales – 2 November
- Central Queensland – 16 November
- South Queensland (Moreton) – 30 November

Are your details up-to-date with Avocados Australia? Final details for all events are sent via email with details on venues, times and workshop program plus a request to RSVP.

Acknowledgement

These workshops are part of **Achieving More Consistent Yields of Quality Fruit in the Australian Avocado Industry** (AV14000), which is a strategic levy investment under the Hort Innovation Avocado Fund. The project is funded by Hort Innovation using the avocado industry research and development levy, co-investment from the Queensland Department of Agriculture and Fisheries, and contributions from the Australian Government.

More information

If you are interested in offering your venue/farm to host an event, or have any further event enquiries please contact Simon Newett (*simon.newett@daf.qld.gov.au*).

The illustrated minutes from these workshops will be added to the BPR Library as they become available: *www.avocado.org.au/best-practice-resource/*.

Having high tree mounds is part of Coastal Avocados' philosophy to plan for very wet events.

NSW DPI's Craig Maddox and Ruth Huwer explaining to growers how to use a fruitspotting bug monitoring hedge to monitor the pest at NNSW/Tamborine avocado study group meeting held near Alstonville.

2016 OrchardInfo annual report released

By Sue Plunkett-Cole, Data Analyst Avocados Australia

In May, Avocados Australia released the regional 2016 Annual OrchardInfo Reports to contributors; and for the first time, a national report was also released which combines the summary reports from each of the eight Australian avocado growing regions.

We greatly appreciate the time and effort our growers invest in contributing their data to the tree census every year, and value the high engagement with both OrchardInfo and Infocado. The high participation rate for the 2016 tree census resulted in significantly more data than in previous years. Tree planting data captured through the OrchardInfo tree census has previously been below ABS figures, however, this year for the first time we reported higher numbers of trees than ABS. However, we do acknowledge that some growers choose not to contribute their data, so our figures still under represent the number of trees to some extent.

In appreciation of our contributors' efforts each year, the report is only released to those who participate, continuing the incentive to contribute to this important industry data set each year. However, all growers and other stakeholders ultimately benefit from the longitudinal collection of OrchardInfo data which is used in the:

- identification of trends over years in production and potential supply
- analysis of annual planting rates by variety and region
- comparison of productivity rates and trends over years
- comparisons of varieties and productivity by region.

As an overview, the tree census indicates that at 1 August 2016, the number of avocado trees planted in orchards across Australia was 1.7 million, of which 65 percent (1.1 million) were at least six-years-old and about 600,000 trees less than six-years-old. In the 2017 tree census, we are expecting to see an increase in the numbers of new plantings, as new planting activity has been noted by growers in many regions since August 2016.

The 2017 OrchardInfo tree census will open in August, with the resulting report to be published in December. We appeal to all growers to participate in the collection of this valuable and important data. Naturally, the more complete our data set is over the years, the more useful the long-term trend analysis can be for our industry. Continued improvements to simplify the data collection process are being sought, and we are very keen to hear feedback on both the data collection and reporting of OrchardInfo.

Acting on feedback from tree census participants, the data collection process was simplified for 2016 to only record tree count, area, age and variety. Orchard data on yield and other information is now collected only from a representative sample of 89 orchards each year. This group of orchards covers a good cross-section of Australian growers, representing all growing regions and a variety of orchard sizes and types. These growers have agreed to annually contribute productivity data to this longitudinal study about their Hass and Shepard trees (six-years-old and over).

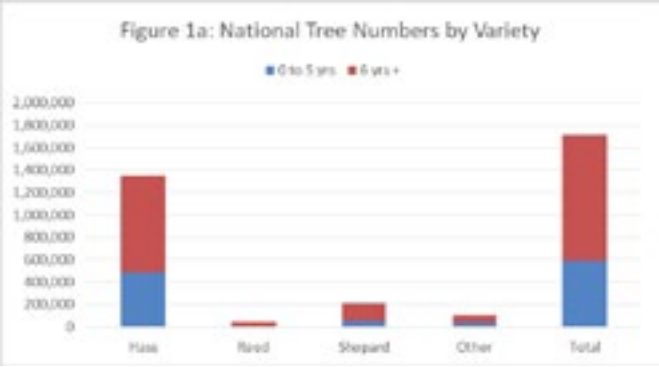
Avocados Australia would like to thank Jo Embry, Amanda Madden, and the whole team for their committed and thorough work collating and producing the 2016 reports.

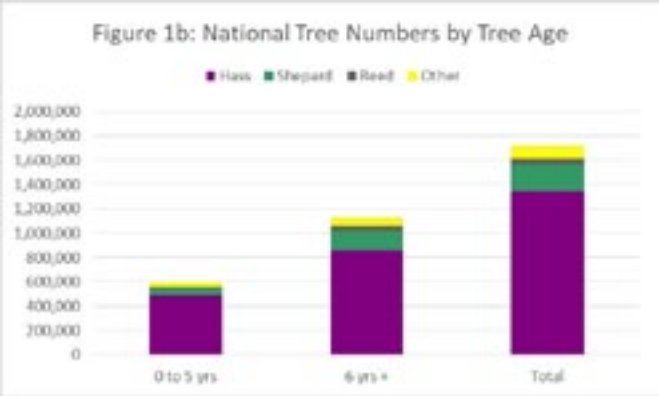
Acknowledgement

This data is collected through the strategic levy investment project **Avocado industry market data capture and analysis** (AV16006), part of the Hort Innovation Avocado Fund. It is funded by Hort Innovation using the avocado research and development levy and contributions from the Australian Government.

More information

For more information on how to contribute to OrchardInfo and receive the detailed reports, please contact Sue Plunkett-Cole on 07 3846 6566 or *supplychain@avocado.org.au*.





Look out for the citrus blossom bug!

By Simon Newett, Department of Agriculture and Fisheries Queensland

Adult citrus blossom bug with the distinctive heart or 'V' shape on its back. Photo: Sandra Hardy, NSW DPI.

The citrus blossom bug is a native mirid species (*Austropeplus* sp.) and is emerging as an insect pest to keep an eye on in avocado orchards. In citrus it is described as a minor pest which feeds on shoots, including flowers, causing wilting. Little is known about the pest in avocado but there is enough observational evidence to suggest that it may be a serious pest at flowering time and one that is worthy of monitoring and research.

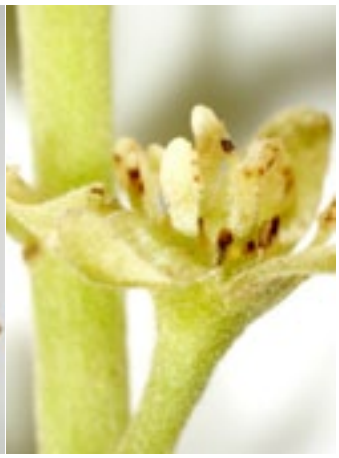
It first came to be noticed in significant numbers in avocado orchards in the Peats Ridge area just west of Gosford, New South Wales. A grower in that region reported poor set for several seasons until one year sprays were applied to protect the flowers. Subsequently, growers in the Stuarts Point area in the Mid North Coast area of NSW have reported similar stories. It has also been reported from the Cudgen and Alstonville Plateau areas.
The adult has also been seen in small numbers in other areas including Maleny in South East Queensland and on the Atherton Tablelands in Far North Queensland but without any associated crop losses being reported.

The nymphs are only about 3mm long, pale green in colour and with red and green banded antennae. They are about the same size and colour as flower buds and are difficult to spot until you get your eye in. Although the nymphs cannot fly they are quite mobile and they feed on the petiole and floret. One grower believes that it is the nymphs that do most of the damage to avocado flower panicles.

The relative size of the adult (about 5mm long) and the nymph (about 3mm long).

Nymphs of the citrus blossom bug. Note the red bands on the antennae.

Citrus blossom bug damage to avocado flower stem. Photo: S.Hardy NSW DPI.



Citrus blossom bug damage to avocado flower. Photo: S.Hardy NSW DPI.

The adults are about 5mm long with a distinctive green heart or V-shape in the centre of their backs and two reddish spots on the tips of their wing covers. The underside is mainly green and yellow. They embed their eggs into the growing tissue around the flowers.

Adults and nymphs are reported to feed on the flowers of avocado, citrus and macadamia in early spring and they have also been found on other plants including weeds during flowering. Visible damage is subtle and can be missed, it appears as small brown spots on flowers and stems with some brown staining extending from the feeding spots. Damage is more noticeable when large numbers are present but, as stated earlier, the pest has not been studied and there is very little known about them.

Until we learn more about this pest and its impact on avocados, growers are advised to monitor trees for nymphs and adults from just before and during flowering. No pesticides are registered for controlling citrus blossom bug.

If you have noticed this insect in your orchard the author would be very interested to hear from you: *simon.newett@daf.qld.gov.au*.

More information

The pest is illustrated and described in the *Avocado Problem Solver Field Guide* (pages 38 & 138) or the Best Practice Resource via *www.avocado.org.au/best-practice-resource/*.

Filling in the data gaps

By Sue Plunkett-Cole, Data Analyst Avocados Australia

Avocados Australia's recently secured project **Avocado industry and market data capture and analysis** (AV16006) has begun in earnest with a scan of current data capture, analysis and reporting processes, and the development of a stakeholder engagement schedule for this project.

The project's focus is on data analysis in the following avocado industry areas:

- dispatch forecasts and actual volumes (Australia and New Zealand)
- sale volumes (Australia)
- online retail prices (Australia)
- global trade
- orchard production and long term forecasts
- ABS data.

Due to the previous success of Avocados Australia's multi-year projects on data capture and management, several years' worth of data is already available in some of these areas. Importantly, the project scope includes the sourcing of data where not yet available with regard to global trade trends.

The project's main objective is to deliver benefits to the avocado industry by enabling data-driven decision making through the reporting of timely and relevant data, trends and statistics. To achieve this, the project will develop a ground-truthing and data integrity program. This will ensure that the extensive data set collected and maintained by Avocados Australia produces high quality reporting and analysis.

The delivery of the widely-valued Infocado and OrchardInfo reports will continue and along with the continued support and engagement of the contributors, are considered high priorities for this project.

Another key priority is to engage with stakeholders across the various areas to determine the types and formats of reporting and analysis needed and scope the requirements and capacity for this. Engagement with contributors to both the Infocado and OrchardInfo systems will further inform the continuous improvement plans for data capture and reporting from those systems. Opportunities to simplify and streamline the data entry process will be considered, with the possibility of leveraging mobile technology.

Following on from the course set by stakeholder engagement with the project, the project team will utilise data mining and analysis tools to investigate relationships between the supply, demand and price and potential predictability of the market.

Current outlook

The April 2017 Quarterly Infocado Report indicated that supply of Australian avocados during January to March 2017 was down compared to the same period in 2016; however, total supply from October to March was up by 13 percent from 6.8 million trays in 2015/16 to 7.6 million trays in 2016/17, dominated by New Zealand fruit.

The graph below shows the season outlook at the end of March 2017. The forecast shows that supply is expected to be fairly consistent over the next 12 months with WA to dominate supply during the coming spring and summer. Data for the July Quarterly Infocado Report is currently being collated and will provide an updated outlook for contributors.

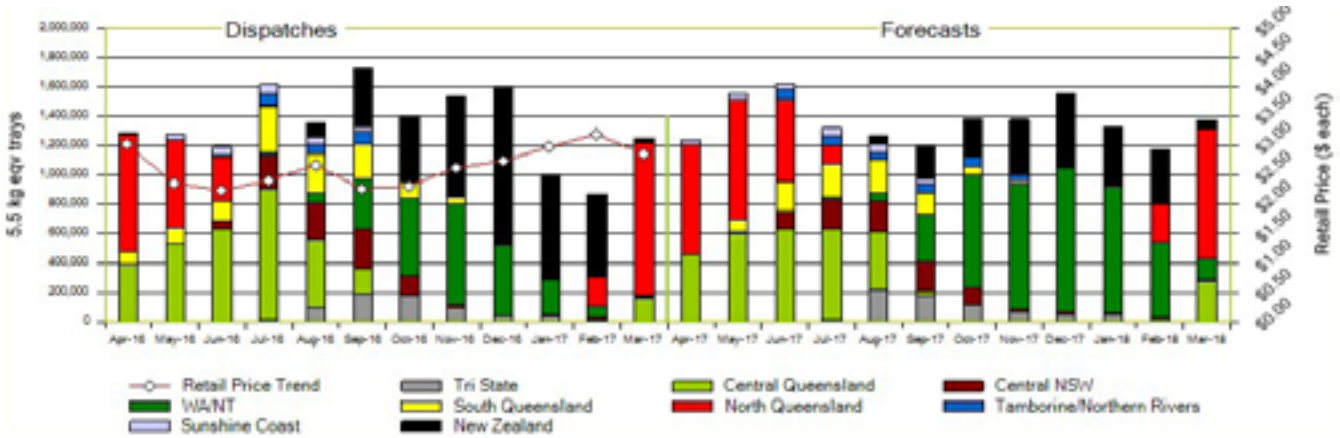
Acknowledgement

A strategic levy investment under the Hort Innovation Avocado Fund, the project **Avocado industry and market data capture and analysis** (AV16006) is funded by Hort Innovation using the avocado research and development levy and contributions from the Australian Government

More information

The project team is headed up by Sue Plunkett-Cole, the newly appointed Data Analyst at Avocados Australia, and supported by Amanda Madden, who brings a wealth of avocado industry knowledge to the project. If you would like more information about the project, or want to provide feedback or data, please feel free to contact Sue or Amanda at Avocados Australia (*supplychain@avocado.org.au*).

Figure 1: Australia & New Zealand Avocados: Apr 16 to Mar 17 Dispatch, Apr 17 to Mar 18 Forecast



Progress towards certification for fair employers

By Rachel Mackenzie, Growcom Chief Advocate

The Australian horticulture industry enjoys a clean, green, fresh and healthy reputation amongst consumers – so media stories about young workers (often overseas visitors) being mistreated, underpaid or exploited on our farms are highly damaging.

Growcom's Fair Farms Initiative provides a timely opportunity to coordinate industry efforts around this issue. Growcom is working closely with Freshcare to translate our Hort360 workplace relations module into an auditable national industry standard – enabling growers to achieve third-party certification of their fair employment practices.

The new employment standard, audit and certification process will be piloted with a least four production horticulture businesses later in 2017. The new certification will be available to Freshcare members by early in 2018. Growcom's Hort360 workplace relations module will provide the training requirement for the new certification.

An auditable industry standard for labour hire companies is also being developed through the Recruitment and Consulting Services Association (RCSA). The voluntary standard will allow labour hire companies to demonstrate a commitment to good and proper practice, providing growers with reasonable assurances that they are using a reputable firm. The certification process will assess if the firm is run by fit and proper persons, has systems for work safety, that workers are employed in accordance with immigration laws and paid correctly. Freshcare's Clare Hamilton Bate participates in the advisory group for the new certification, which will help to ensure consistency and alignment across the certification systems.

Further, the Queensland Government is developing a labour hire license scheme and strict penalties will apply for any host employer who does not use a licensed labour hire provider. Some Australian retailers have adopted the SEDEX system and associated SMETA audits for their suppliers, however, this covers a broader set of issues that are not all relevant in the Australian context. The Freshcare and RCSA certifications will offer a sound alterative to SEDEX and a stronger focus on the relevant fair work practices issues in Australia. Together, the certifications being developed for farm employers and labour hire companies have the potential to drive real improvements across the fresh produce supply chain.

Acknowledgement

The Fair Farms Initiative is supported by the Fair Work Ombudsman through the Community Engagement Grants Program.

More information

www.growcom.com.au/FairFarmsInitiative

Assistant Minister for Agriculture and Water Resources Senator Anne Ruston, Growcom Chief Advocate Rachel Mackenzie and Clare Hamilton-Bate from Freshcare launch the Fair Farms Initiative at Hort Connections 2017. Photo courtesy of: Ash Walmsley, Good Fruit & Vegetables.

Industry Profile

Henry Kwaczynski, Sunfresh Chairman

In May this year, Sunfresh launched a new avocado pulp product, primarily aimed at export markets, using new state-of-the-art technology developed on the Sunshine Coast by the Naturo Company, the Avocado Time Machine. Sunfresh Marketing Co-Operative is a Sunshine Coast-based marketing co-operative representing growers from the Atherton Tableland in Far North Queensland through to the Wide Bay-Burnett regions of Bundaberg, Childers and Gympie, the Sunshine Coast and right down to the Tristate. In 1995, Sunfresh Marketing Cooperative Limited was formed with 22 local producers - today it is a thriving enterprise with more than 175 members. You can find out more online (www.sunfresh.com.au), on Facebook (@SunfreshAvocado) and on Twitter (@SunfreshAvocado).

What inspired Sunfresh Marketing to create the avocado pulp product?

Sunfresh has been in existence for close to 22 years and part of Sunfresh's strategic planning has always been to develop opportunities, in addition to our fresh fruit activities.

The new pulp product is fresh, with no additives and no chemicals. We were working on this project, using state-of-the-art technology developed on Queensland's Sunshine Coast by the Naturo Company, for close to two years before we signed a contract. It's been a long process and a lot of work by staff members and the board over a long period of time.

What is the place of this avocado pulp in the avocado industry supply chain?

It allows us to enter markets that are currently closed to Australian fresh avocados because of biosecurity concerns, such as fruit fly. We have very loyal importers into South East Asia and this avocado pulp product re-opens the door for us.

Shipments have already been sent to Hong Kong and Thailand and we have so far had interest from Europe, the United States, the Philippines, Mongolia and Taiwan. All the ducks have started to line up and it's looking good.

Driving this interest was, in part, our attendance at this year's HOFEX (an international exhibition of global fine food, drink and hospitality products) in Hong Kong. We attended with the support of the Queensland Department of Agriculture and Fisheries and the product was very popular.

How does this new product provide opportunities for the Co-op growers?

Sunfresh has always been a strong advocate for export and this pulp product helps us with market access to countries that do not currently take our fresh fruit. It's not only a plus for Sunfresh but the wider industry as well.

Do you see processed avocado as a competitor to fresh avocados or is it a complementary product?

It's really not a competition, it's a supplementary market. Take for example Thailand, which closed its doors to Australian fresh avocados in 2014. This pulp product will help keep an Australian presence in that market because while the Thai people might not see fresh Australian avocados in the markets in Bangkok, they will now see this product.

The Sunfresh strategic call was always to start with export and keep Australian product in front of our export market customers. You need those local people to drive demand. The presence of the pulp may help when biosecurity protocols are reviewed, because it may well be our customers in those countries then ask for fresh Australian avocados as well.

What is the unique point-of-difference, compared to other processed avocado products?

It's an absolutely clean product, a processed pure avocado product that is good for a year and, once the packet is opened, for 10-14 days. In future, we have the chance to develop into providing avocado pieces or sliced fruit; it's only a matter of time and there's already demand.

What export opportunities and markets are you hoping to access with this new product?

There are opportunities throughout South East Asia. Already shipments have gone to Hong Kong and Thailand, and Japan is on the horizon. It's an open sky. The other major advantage is the fact that moving product between Australian and other countries can now be done in a matter of hours. Even Europe is less than 24 hours away!

Domestically, do you have a target market for this avocado pulp product?

We have not actively pursued domestic markets at this stage. Sunfresh's main focus was on renewing those export paths.

Where do you source your produce from? What standard does the fruit need to meet in order to be suitable for processing?

Sunfresh has about 170 growers on its books and we will source product from them, and others, as needed. As for standards, if it's a reject fruit it will not be processed. We have set standards; a fruit that is unmarketable cannot be processed. The staff members at our Coolum, Queensland facility are all well aware of the need to control quality and our standards are carefully monitored.

What volume of avocados do you require?

We launched the new product on 25 May, 2017 and we were processing one or two months prior. The future volume we will need is the $64,000 question. So far the interest is exceeding expectation but we're very mindful of supply and demand. We don't want to diminish our fresh fruit market and if the demand is there for larger amounts of the pulp product, we have to find a way to deliver without withdrawing from the fresh fruit market.

(From Left) Judy Prosser (Sunfresh Marketing General Manager), Cr Steve Robinson (Sunshine Coast Regional Council), Evan Heidemann (Sunfresh Marketing Deputy Manager), Jeff Hastings (Naturo Technologies), Henry Kwaczynski (Sunfresh Marketing Chairman) at the launch of the new Sunfresh pulp product.

Where would you like to see this processed avocado product portion of the Sunfresh business in five to 10 years?

The question has to be, does the processing take over the fresh fruit? In my view, there's room for both. It's a service industry and if you feel the need for pulp, you buy pulp, if you feel the need for fresh fruit, you buy fresh fruit. People in Asia now have more disposable income and they have an interest in healthy eating and fresh products. If we can provide affordable fresh and processed fruit, that would be good.

Henry Kwaczynski has been an avocado grower since 1988, and has been actively involved in the industry as a member of Sunshine Coast Avocado Growers Association, Sunfresh and Woombye Fruit Growers Co Op, as well as Australian Avocado Growers Federation and Australian Avocado Limited. Henry was awarded life membership by Australian Avocado Limited in 2014.

Avocado Strategic R&D Investment Program Overview

Prepared by Astrid Hughes, Relationship Manager – Tropical Fruit; Hort Innovation

Research and development are vital to the future of Australia's avocado industry. Each year, Hort Innovation manages funds to grow Australian horticulture. The funds invested through Hort Innovation are provided by the Australian horticultural industry (growers and supply chain), the Australian Government and co-investment partners. Hort Innovation invests these funds into research and development and marketing (growing demand) programs and activities that increase productivity, farm gate profitability and boost sales of Australian produce in Australian and overseas.

Investments are aimed at giving growers the knowledge and services they require to build a profitable, competitive and sustainable business. The avocado strategic levy investments in research and development address high priority industry needs, such as pest incursion control, communications and quality improvements through the supply chain. The following projects over the last 12 months have been funded through four different mechanisms. There has also been additional funding secured over and above the levy funds through the successful application for Federal grants by Hort Innovation. The different funding mechanisms are explained below in further detail:

1. avocado grower levies only (**AV projects**)
2. 'multi industry' projects where the avocado industry levy jointly funds a project with one or more industries (**MT projects**)
3. strategic industry investments are funded by Federal grants outside of the levy model (**ST/AI projects**)
4. across industry (AH) projects are funded through all horticultural industry R&D programs including avocados. (**AH projects** are reported at the end of the article.)

AV projects funded through avocado levies
ST/AI projects funded by Federal Government grants, or across industry funding
MT projects funded by avocado levies can be found below with the yellow shaded background
AH across industry projects can be found below with the blue shaded background

The following is a snapshot of the avocado program funded through Hort Innovation in 2016/17. The projects are reported on under the new strategic investment plan objectives, please note some projects meet more than one objective.

The Avocado Strategic Investment Plan 2017-2021 addresses the industry's major opportunities and challenges in four key outcomes:

- by 2021, increase domestic demand for Australian avocados has increased by 20 percent
- by 2021, over 90 percent of avocados received by consumers will meet or exceed their expectations of quality
- by 2021, over 10 percent of production will be exported to markets where customers have a willingness and a capacity to pay a premium for Australian avocados
- by 2021, productivity (marketable yield per hectare) has improved by 15 percent on average, without increased production costs per kilogram.

You can find full details of the strategic plan online: *www.avocado.org.au/industry-programs/about-industry-programs/.*

Objective 1: By 2021, increase domestic demand for Australian avocados has increased by 20 percent

Avocado Program Review and Consumer Insights (AV16004)

Service Provider	Review Partners
Project Leader	Paul Costantoura
Start Date	29/11/2016
End Date	01/03/2017
Funding Type	Levy

Summary

Review Partners were engaged to review the advertising campaign and data produced by Nielsen and BDRC. Market research was also conducted on avocados through focus groups, a sample size of 40 people and the high, medium, low purchase frequency groups. The key points are summarised below.

- There was a great deal of variation in the methodology and metrics used by Nielsen and BDRC to measure behaviour and attitudes toward avocados. Nielsen had a panel of 10,000 and claimed to provide an accurate record of actual behaviour. BDRC data was collected from people who agreed to complete an online survey. This required people to remember their behaviour and accurately report it.
- The differing methodologies highlighted some differences in the data. The assumption underpinning Review Partners is that the real data is somewhere between that of Nielsen and that of BDRC.

- The data consistently indicated that the barriers to purchasing avocados were price and quality (choosing and storing avocados). Avocado lovers and enthusiasts had strategies for getting around the quality barrier. Review Partners suggested more point of sale information about choosing the right piece of fruit would be helpful in allaying consumer concerns about quality.
- Should the industry extol the virtues of the health benefits of avocados? Paul Costantoura reported that through the data collected by Nielsen and BDRC and through his own focus groups, he found the health benefits of avocados to be well understood.
- Paul Costantoura advised that the participants in the Focus Groups he conducted had been drawn from each of the High, Medium and Low purchase frequency groups. The following findings come from the Focus Groups:
  - the barriers of choosing and storing avocados needed to be addressed
  - participants liked simple recipe ideas for using avocados, and often added their own twist
  - increase the focus on making avocados an everyday food rather than a sometimes food by embedding Avocado on Toast as an Australian breakfast food option, for example
  - learning more about avocados and their uses had changed intentions for use
  - avocados were not culturally aligned with some demographics, but the ''twist'' could be used to counter this (e.g. adding chilli)
  - there was a perception that avocados were a seasonal fruit
  - the price point at which buyers experienced resistance to purchase was identified as bet ween $2.50 and $3.00
  - participants knew that avocados contained "healthy fats"
  - there was not much recall from social media, but participants did remember the television advertising.
- Paul Costantoura outlined his suggestions for future messaging as follows:
  - the concept could be to discover your own simple, (healthy), creative pleasure with avocados
  - a strategy should be formed to overcome the lack of confidence light buyers had in purchasing good quality and ripe avocados, and
  - increasing consumption could be achieved through expanding the repertoire of simple recipes and providing information to inspire confidence about picking, ripening and storing avocados.

Avocado Industry and Market Data Capture and Analysis (AV16006)

Service Provider Avocados Australia Limited (AAL)

Project Leader John Tyas

Start Date 21/04/2017

End Date 31/07/2020

Funding Type Levy

Summary

The objectives of this project are to:

- produce high quality industry and market data to assist both short and long term industry planning and decision making
- support seasonal harvesting and marketing decisions by avocado growers and supply chain participants through the collection of robust, relevant and verifiable supply throughout, trade and retail pricing
- help maintain a supply and demand balance.

You can read more about this project on Page 18 of this edition of Talking Avocados.

Understanding the Purchase Behaviour of Fresh Produce Consumers (MT13061)

Service Provider Nielsen

Project Leader Graeme Yardy

Start Date 26/06/2014

End Date 30/09/2016

Funding Type Levy

Summary

The market research carried out in this project included the use of Homescan Consumer Data, Woolworths Retail Scan Data, professional analysis of the data collected and reporting of industry trends and market development strategies associated with the insights gained.

Retail Scan Data analysis and Homescan Consumer Data analysis was analysed in tandem by external experts to optimise their value. Participating industries received customised service, analysis and reports from a contracted analyst.

The data included market information, National and State splits on products with facts on volume and value sales. Over a two-year timeframe, annual average prices and four weekly average prices were also reported on. The data also included; household penetration, average weight of purchase, frequency of purchase and spend per occasion. The reports were delivered quarterly for the avocado industry.

Avocado Strategic R&D Levy Investment - Program Overview continued

Objective 2: By 2021, over 90 percent of Avocados received by consumers will meet or exceed their expectations of quality

Supply Chain Quality Improvement – Technologies & Practices to Reduce Bruising (AV15009)

Service Provider Department of Agriculture and Fisheries Queensland

Project Leader Daryl Joyce

Start Date 21/06/2016

End Date 31/05/2018

Funding Type Levy

Summary

Previous research has established that the flesh bruising problem is mostly caused at the end of the avocado supply chain. It is generally recognised that measures to effectively eliminate this mechanical (i.e., physical) damage issue are sorely needed. This project leads on from Hort Innovation projects AV10019 and AV12009 in particular. These and other preceding projects informed fuller understanding of the flesh bruising issue. Moreover, they identified areas for reviewing, reporting, awareness, and gap analysis towards lessening and ideally eliminating flesh bruising in Australian avocado supply chains.

The current research includes the following components:

- developing and testing alternative technologies that would reduce handling by retailers / consumers, including tools for identifying ripeness
- documenting best practice to prevent fruit bruising at retail for implementation in retail education via AV15011
- reviewing scientific evidence to identify any relationship between disease and flesh bruising and / or identify gaps in research that would elucidate this
- reviewing and documenting contributing factors to fruit susceptibility to bruising.

The project will be conducted by nationally and internationally renowned DAF Queensland avocado supply chain, postharvest, and fruit pathology experts. The project will qualify influences and interactions that cause and contribute to flesh bruising and will qualify, develop, and promote tools and technologies for reducing flesh bruising at retail.

For more from this project, go to Page 40 of this edition.

Supply Chain Quality Improvement – Cool Chain Best Practice Adoption (AV15010)

Service Provider Applied Horticulture Research (AHR)

Project Leader Gordon Rogers

Start Date 23/06/2016

End Date 31/01/2018

Funding Type Levy

Summary

This project aims to motivate all supply chain members to reduce the amount of damaged fruit on retail displays. The guiding principle is that if supply chain members, including retailers, clearly understand the financial benefit of reducing the incidence of damaged fruit, this will motivate them to make the changes required. The project will make a significant contribution to reducing the level of damaged fruit at retail. This will be achieved by:

- strong industry engagement with project activities directed by a grower-focused Project Reference Group, with regular reviews and updates
- building on existing relationships to collaborate with major businesses involved across the Australian avocado supply chain
- assessing current handling and management practices along the supply chain, to identify targeted areas for training and extension that will deliver increased demand for Australian avocados
- delivering targeted, appropriate training and extension with University of Sydney accreditation; this will be tailored to the needs of individual supply chain category groups and builds on previous investments by Hort Innovation, Avocados Australia Limited and the retailers themselves
- ensuring training and extension materials are customised to align with existing management systems.

The project will be delivered by AHR with its proven postharvest, communication, training and project management and Produce Marketing Australia (PMA), which brings avocado quality improvement and retail expertise and access to trained staff in Queensland, New South Wales and Victoria.

Supply Chain Quality Improvement – Retail and Consumer Education (AV15011)

Service Provider Produce Marketing Australia (PMA)

Project Leader John Baker

Start Date 12/07/2016

End Date 31/03/2018

Funding Type Levy

Summary

The objective of this project is to deliver a reduction in the level of damaged avocado fruit at retail from the current ~20 percent of fruit with more than 10 percent damage, to no more than 10 percent of fruit with more than 10 percent damage within three years. This represents a value estimated at $30 million gross value of production (GVP) per year. This will be achieved by working closely with a retailer consultative group, drawn from Woolworths, Coles, IGA and leading independent retailers, who have committed to the project. Key features of this project proposal are the team's ability to draw on significant experience and results in the areas of:

- avocado and other fruit merchandising
- Australian and international retail education and training
- close linkages across the spectrum of Australian retail
- product, retail and consumer research
- consumer education.

To maximise the outputs and outcomes of the project, and consequently the benefits to retailers and consumers, the project team engaged with a cross section of retailers from the inception to the implementation of the program. Major avocado retailers in Australia are on board and working with the project team to apply innovative solutions to reducing the incidence of damaged avocado at retail level.

Avocado Data Management and Quality Innovation Extension Program (AV15004)

Service Provider Avocados Australia Limited

Project Leader John Tyas

Start Date 11/01/2016

End Date 30/12/2016

Funding Type Levy

Summary

This one-year project addressed four key, information resource components for the avocado industry. These components being:

- maintaining Infocado
- maintaining OrchardInfo
- maintaining the online Best Practice Resource
- facilitating the adoption of Industry Data Management and Quality Improvement (Qualicado).

This project built on the previous project, **Coordination of Data Management and Avocado Quality Improvement and Extension Program** (AV12012), that was undertaken by Avocados Australia Limited to:

- coordinate a suite of supply chain projects
- establish, maintain and improve a quality improvement and extension program
- maintain Infocado, the avocado industry's crop forecasting system and the OrchardInfo system, used to collect production and productivity information.

This project also incorporated some of the activity undertaken in **Implementing Improvements in the Avocado Supply Chain** (AV12013) to maintain Best Practice Resources (BPR) available via *www.avocado.org.au*.

This project has now finished with a new contract AV16006 addressing the Infocado and OrchardInfo information resources. You can read more about this new project on Page 18 of this edition of Talking Avocados.

Avocado Strategic R&D Levy Investment - Program Overview continued

Objective 3: By 2021, over 10 percent of production will be exported to markets where customers have a willingness and capacity to pay for a premium for Australian avocados

Essential Market Access Data Packages (MT14052)

Service Provider Department of Agriculture and Fisheries Queensland

Project Leader Peter Leach

Start Date 30/11/2015

End Date 20/05/2020

Funding Type Levy

Summary

Current market access protocols for nearly all Australian horticulture export commodities are technically incomplete and there is a high risk that these markets could shut down until sufficient data sets on all pests of concern are complete.

An example is the avocado market to Thailand where significant investments have been made by both industry and government to expand this market. Recent market access changes now requiring a cold disinfestation treatment for fruit fly have rendered this market commercially unviable.

A preferred treatment option for the avocado industry is the use of fruit fly conditional non-host status. While this option is available for the domestic market, the lack of data for all species of concern has led to the rejection of this option by Thailand regulatory authorities.

Through this project, data will be developed to support a robust market access protocol for Hass avocados based on conditional non-host of fruit fly. Work will also be undertaken to support a short cold (but viable temperature) disinfestation protocol for Shepard.

This multi-industry initiative will allow researchers to urgently complete a large volume of research required to maintain current market access protocols. Currently all major species of concern (eight fruit fly species) are being maintained at laboratories in Cairns and Brisbane. In addition to the development of postharvest treatments the availability of colony flies will also provide benefits to other areas of fruit fly research.

The development of data packages for pest species of concern will allow negotiation of robust protocols based on science rather than relying on a trading partner's interpretation of a particular species pest status.

Export – Import Market Intelligence 2014 – 2016 (MT14006)

Service Provider Fresh Intelligence Consulting

Project Leader Wayne Prowse

Start Date 30/07/2015

End Date 30/11/2016

Funding Type Levy

Summary

Export development is a strategic priority for the multiple industries involved with this project.

A strategic approach to developing trade is essential and requires a deep understanding of the performance of target markets, actions of competitors as well as sound understanding of the exporting capabilities in Australia.

The project delivered strategic trade analysis and insights (monthly, quarterly and annual trade reports). The newly contracted projects under MT16010 and MT16011 now incorporate feedback from participating industries on the type of trade reporting that they require. Please refer to these codes for more detail.

Trade Facilitation (MT15029)

Service Provider Hort Innovation

Project Leader Sam Lawrence

Start Date 07/03/2016

End Date 31/12/2019

Funding Type Levy

Summary

Hort Innovation, in order to deliver on its constitutional responsibilities regarding trade, requires an administrative project to enable in-bound and out-bound trade related delegations necessary to secure and maintain market access. This Trade Facilitation project will provide Hort Innovation with a suitable administrative vehicle to facilitate these activities. These activities will fulfil Hort Innovation's three constitutional objects regarding trade, namely: market access (including new access, improvement and maintenance), market development and in-market promotion/consumer demand. This project acts as a fundamental vehicle to facilitate activities in support of these objectives.

Horticultural Trade Data and Intelligence Reporting (MT16010 & MT16011)

Service Provider	Euromonitor International Ltd
Project Leader	Tim Foulds
Start Date	10/03/2017
End Date	03/02/2020
Funding Type	Levy

Summary

Hort Innovation is looking to provide Australia's horticultural industry with a strategic program of trade performance information to support increasing productivity, farm gate value and global competitiveness. Access to smart, digested and easy to act upon trade performance information is crucial to ensure participating horticultural industries remain informed on the issues and considerations that affect current and future trade and market performance. Timely reporting will enable the industry to remain informed and improve its capacity to make sound strategic planning and marketing decisions.

Euromonitor considers the following as success criteria of the program:

- updated data and analysis of trade performance for key horticultural industries
- increased knowledge of factors driving trade performance over the short to medium term (e.g. macroeconomic conditions and supply/demand factors)
- improved global competitiveness of participating industries through the provision of trade intelligence
- information that enables improved strategic trade and marketing decisions.

Based on this Euromonitor has devised a three-year research programme that envisions a strong impact on the horticultural business environment in Australia, providing:

- quarterly global trade performance reports on 10 key horticulture industries including avocado
- quarterly strategic webinars to inspire strategies on how to increase competitiveness in specific regions
- a strong partnership plan for general services and consulting services as requested.

Avocado Strategic R&D Levy Investment - Program Overview continued

Objective 4: By 2021, productivity (marketable yield per hectare) has improved by 15 per cent on average without increased production costs per kilogram

Pest Status and Management of Six-Spotted Mite (AV15012)

Service Provider Western Australian Agricultural Authority (Department of Agriculture and Food Western Australia)

Project Leader Stewart Learmonth

Start Date 01/07/2016

End Date 01/07/2018

Funding Type Levy

Summary

Six-spotted mite occurs in avocado orchards across the lower south west of Western Australia and is usually present in balance with natural enemies.

Avocado trees will shed leaves when infested with six-spotted mite at relatively low densities of mites, with the potential to cause leaf loss predisposing fruit to sunburn and may adversely affect tree vigour and subsequent fruit production.

Severe defoliation in some orchards in the 2014/15 season occurred after an unexpected increase in mite numbers resulting in a disruption to the harvest program across the lower south-west of Western Australia.

This project seeks to clarify the pest status of six-spotted mite in avocado orchards, and the management of the pest. The management aspect will involve a primary focus of monitoring for the pest and beneficials, the role of predatory mites with in-season releases of two exotic species, and whether these predators are self-sustaining. If required, the role of the miticide *fenbutatin oxide* will also be considered. Guidelines will be extended to growers on basic orchard practices to resist mite attack, monitoring for the pest and predatory mites, and using the predatory mites. This study will provide growers with the confidence to be proactive in protecting crops from infestations of six-spotted mite.

RNA Silencing Based Phytophthora Root Rot Resistant Avocado Rootstocks – Phase 2 (AV13000)

Service Provider The University of Queensland

Project Leader Neena Mitter

Start Date 15/09/2013

End Date 31/07/2016

Funding Type Levy

Summary

Phytophthora root rot (PRR) is considered the most important and most widely distributed disease of avocados. Avocados are cultivated in the tropical and subtropical regions of more than 50 countries and from a production point of view, PRR caused by *Phytophthora cinnamomi* is the single most important disease of avocado.

The project aimed to deliver Phytophthora root rot tolerant avocado rootstocks by:

- undertaking a field trial evaluation of PRR tolerance of transgenic rootstocks developed in the previous project AV08002
- satisfying Office of the Gene Technology Regulator (OGTR) requirements and confirm the absence of the transgene in the scion
- evaluating non-target effects of the technology on plant growth characteristics
- clonally propagating identified PRR tolerant transgenic line(s)
- continuing to generate more independent transgenic lines/constructs and including other rootstocks as recommended by the industry.

Outputs/Recommendations

While the outcomes of this project remain commercial in confidence, the project did show proof of concept for the development of PRR resistant avocado root stocks. Interestingly while even researchers were not able to prove the presence of genetic modification in repeat experiments, the transformed lines performed better as compared to non-transformed lines in resistance screening experiments in the glasshouse. Recommendations are:

- To screen these plants in Phytophthora infested field plots to confirm resistant status. However, this will require exemption from OGTR. Though, all our results to date indicate that the genetic modification may not be present, there are uncertainties if OGTR will give an exemption as the plants have gone through a transformation event and may require more in depth investigation. It is envisaged that acceptance of such a technology will need to go through a rigorous regulatory and acceptance pathway.

- To try innovative topical application of RNA silencing targeting *P.cinnamomi* as opposed to generating transgenic plants. We have developed a patent protected 'BioClay' technology to deliver RiboNucleic Acids (RNA)silencing molecules loaded on clay nanoparticles. This has been shown to be effective against protection form viruses. It will be interesting to investigate this technology for fungal diseases such as PRR or anthracnose.

Australian Avocado Benchmarking Program Development Rounds II and III (AV13003)

Service Provider Pinnacle Agribusiness

Project Leader Howard Hall

Start Date 15/07/2014

End Date 29/07/2016

Funding Type Levy

Summary

The value of enterprise benchmarking increases exponentially, as data from multiple years is collected and analysed. An industry benchmarking database compiled from just one financial or data year/period will capture inherent differences between management practices, regions, seasonal conditions and many more aspects of any broadly distributed business activity.

This project developed an industry database and benchmarking process that enabled growers to identify and strive for Australian best practice in production, packing and marketing of avocados. Those that participated in this project learnt of and adopted findings from this process, to improve farm productivity, produce quality and sustainability.

Insights assisted growers to understand relationships between key farm and business practices and improved productivity, cost efficiency, quality and consistency of produce.

The outputs enabled comparisons between growers based on a combination of location, business size (turnover, volume or tree numbers) and principal varietal type, over multiple years. Motivated growers then identified those areas which impacted on their productive and financial performance.

Recommendations

- The results of the Top 10 analysis and regional comparisons suggested that drainage, mulching, phytophthora treatment and related activities are areas where Western Australian and Tristate participants, and other Southern Zone participants, may benefit from further research, experimentation and adoption.
- Irrigation management is an area where North Queensland participants and other Northern Zone participants may benefit from further research, experimentation and adoption.
- The inter-relationship between irrigation practices and the benefits of higher use of mulch to protect root zones from the impact of moisture and temperature variations has not really been examined in this program and may also be worthy of further research.

Achieving More Consistent Yields of Quality Fruit in the Australian Avocado Industry (AV14000)

Service Provider Department of Agriculture and Fisheries Queensland

Project Leader Simon Newett

Start Date 01/11/2014

End Date 31/12/2017

Funding Type Levy

Summary

The aim of the project is to provide Australian avocado growers with the knowledge required to implement practices that will lead to more consistent high yields of good quality fruit. Grower adoption of best practices will result in a more consistent supply of Australian avocados to the market. This extension project is encouraging greater grower adoption of best practices, to address issues of inconsistent supply of Australian avocados.

There is a perception that irregular bearing is primarily an issue in the southern (cooler) states of Australia (for example, Victoria, South Australia and Western Australia) but it affects all producing states including Queensland where some of the worst cases have been recorded (South Queensland, West Moreton region) and it is a regular issue in the temperature-sensitive Shepard variety, which is grown in Central and Northern Queensland.

The project focuses on educating growers about practices and conditions that can lead to irregular bearing, and how to reduce its severity. Other on-farm topics important to the sustainable and competitive supply of Australian avocados will also be accommodated in the project. You can see more about the extension work from this project on Page 12.

Avocado Strategic R&D Levy Investment - Program Overview continued

Investigating Tree Mortality During Early Field Establishment (AV14012)

Service Provider The University of Queensland
Project Leader Elizabeth Dann
Start Date 01/08/2014
End Date 31/05/2018
Funding Type Levy

Summary

The aim of this project is to increase our understanding of disease causing tree deaths after planting out, and provide practical management procedures for nurserymen and growers.

Plant diseases are rarely static and in the future the number and types of disease affecting avocado will change. We have become aware of two disease issues within recent years affecting the success of our plantings. One is a species of fungus, *Calonectria* (also known as *Cylindrocladium*), which infects roots of plants in the nursery (possibly during the high humidity phases of clonal propagation) and causes severe destruction of roots of nursery trees. The other problem encountered by some growers is the decline and death of young trees from a dieback and canker disease, most likely caused by species of *Botrysphaeria genera* of fungi.

Improved health benefits in avocado orchards will include:

- the supply of healthy trees which are free of pathogens to growers
- high establishment and growth rates of trees after planting out. This will save replanting, and lead to vigorous growth and rapid onset of fruit production
- recommendations on management of the diseases in the nurseries and also on-farm, which includes nursery hygiene, targeted use of fungicides, and disinfestations.

Outputs to date with peer reviewed publication in *Phytopathology*

- Indication that amendment of potting mix with Caliente provided some protection to avocado seedlings against *Phytophthora cinnamomi*.
- A scientific paper ("Novel species of *Gliocladiopsis* (*Nectriaceae, Hypocreales, Ascomycota*) from avocado roots (*Persea americana*) in Australia") describing three new species (*Gliocladiopis peggii, G. whileyi* and *G. forsbergii*) has been published in *Mycoscience*
- Methodology for clonal propagation of avocado has been established at Ecosciences Precinct.

Recent work in the project has included the establishment of trials to assess the pathogenicity of soilborne root-rot fungi on a range of commercially-important rootstocks for avocado. This work is ongoing. Biofumigants also continue to be evaluated for soilborne disease management. A biofumigation approach traditionally involves the use of specialised cover crops that are grown, mulched and incorporated into the soil prior to cropping. In this project, initial glasshouse trials demonstrated that incorporating commercially-available, dried mustard biofumigant Caliente (*Brassica juncea*) into potting media reduced root necrosis by nearly 40 percent in seedlings inoculated with the mould *Phytophthora cinnamomi,* compared to inoculated plants that had no biofumigant amendments in their potting mix. According to the research, further experimentation is now needed.

SPLAT Cue-Lure based management of Queensland fruit fly (MT12001)

Service Provider	South Australian Research and Development Institute (SARDI)
Project Leader	Peter Crisp
Start Date	1/05/2013
End Date	31/07/2016
Funding Type	Levy

Summary

This project aimed to assess the efficacy of SPLAT Cue-Lure (Isca Technologies USA) as a management option for control of Queensland fruit fly (*B. tryoni)* in a range of susceptible crops such as summer fruit, citrus, mangoes, banana, cherry and avocado.

The pest control methods developed as part of this research are likely to be able to be transferred to other susceptible crops including apples, pears and tomatoes.

The SPLAT Cue-Lure uses cue-Lure to attract male *B. tryoni* and *spinosad* as a toxicant. This use of SPLAT with Cue-Lure is a form of male annihilation technique (MAT) which has been successfully used for fruit fly management in a number of countries but has usually involved less benign toxicants such as *maldison*. SPLAT is also significantly easier to apply than most MAT systems, therefore reducing labour costs.

Traditional MAT blocks are *canite* blocks which must be soaked in a lure/toxicant mix allowed to dry and then attached to trees individually, whereas SPLAT can be applied from a tractor or by air if required.

The research will include a series of field efficacy trials in four states to provide data from a wide range of crops and environmental conditions. Laboratory trials associated with the research will investigate the weathering rates to assist with developing and optimising the timing of applications in field base management programs.

Recommendations

It has been established that SPLAT is an effective alternative to current industry MATs. The following recommendations are necessary before commercial adoption of this technology.

- Evaluate combined data sets collected as part of this research for compilation of a registration application to the APVMA for use of SPLAT Cue-Lure as a control option for Queensland fruit fly in susceptible commercial crops and urban eradication programs. Some data from the field trails in Queensland may benefit from further analysis.
- Identify any gaps in the data and develop a strategy to gather any information required to achieve registration. This may include equivalence trials if an alternative source of *spinosad* is sourced or if *spinosad* is replaced with other toxicants.
- Assess field efficacy under a wider range of conditions and crops, if required to meet registration requirements for SPLAT.
- Evaluate the rates at which the toxicant and the lure are breaking down/becoming less toxic/attractive in SPLAT, to allow improvements to the lure.
- Conduct *oviposition* studies to understand the ability of females to oviposit after feeding on SPLAT five percent Cue-Lure + *spinosad* (and other toxicants).
- Conduct studies to determine the effectiveness of SPLAT incorporating a female attractant; this is strongly desired by growers. There is currently significant investment in improving male lures and developing a reliable female lure. As these are developed the opportunity to improve the efficacy of SPLAT MAT need to be investigated

Further work in this area will be funded through the Hort Frontier Fruit Fly Fund. For more information on this area of investment, visit *http://horticulture.com.au/co-investment-fund/fruit-fly-fund/*

Avocado Strategic R&D Levy Investment - Program Overview continued

Enhanced National Bee Surveillance Program 2016–2021 (MT16005)

Service Provider Plant Health Australia
Project Leader Alison Saunders
Start Date 12/12/2016
End Date 12/12/2021
Funding Type Levy

Summary

The objectives of this project are: to deliver a nationally coordinated bee pest surveillance program that enables early detection and therefore best opportunity for successful eradication of 14 high priority pest incursions; to ensure the Australian Honey Bee and Pollinator reliant industries (including avocado) are safeguarded from the impact of an exotic pest and incursion of honeybees. The aim is to continue to deliver the significant biosecurity outcomes of the previous National Bee Pest Surveillance Program (NBPSP) through a strong industry government partnership and enhance the program through inclusion of the initiatives as recommended from the Review and Redesign of the National Bee Pest Surveillance Program.

A Varroa mite feeding on a European honey bee. The mites cause death and disease in bee colonies. Photo by Scott Bauer, USDA - ARS, Bugwood.org.

Underpinning projects

National Avocado Industry Communications Program (AV15002)

Service Provider Avocados Australia Limited
Project Leader John Tyas
Start Date 02/11/2015
End Date 02/11/2018
Funding Type Levy

Summary

The **National Avocado Industry Communications Program** strives to inform and engage all stakeholders ranging from growers, suppliers, exporters and importers, wholesalers, retailers, decision-makers from government and non-government organisations, the media and the general public.

This project is responsible for producing and implementing numerous communications vehicles to ensure stakeholders receive the latest news and research updates, including:

- the quarterly Talking Avocados magazine
- the fortnightly Guacamole newsletter, as well as various grower and industry notices
- industry-facing social media activities
- the provision of up-to-date relevant industry news from around Australia and the world at *www.avocado.org.au/news-publications/latest-news/*
- media relations
- crisis management.

Through effective communication, avocado growers (levy payers) and other industry stakeholders, receive up-to date information regarding challenges confronting the industry, available opportunities, along with research and development outcomes which will benefit the profitability and sustainability of the Australian avocado industry.

Industry Advice and Grower Consultation (AV16910)

Service Provider Hort Innovation

Project Leader Astrid Hughes

Start Date 01/07/2016

End Date 30/06/2017

Funding Type Levy

Summary

This project funds the advisory mechanism under Hort Innovation. This includes the strategic investment advisory panel (SIAP) and attendance by growers at meetings to provide advice on strategic R&D investment and marketing investment through individual project committees, such as evaluation panels and other meetings. It includes the strategic investment advisory panel flights, accommodation and attendance and also evaluation panel time and attendance and input into various project steering committees by growers and industry stakeholders as needed. During the past year, the development of the new strategic investment plan was completed which included two workshops and an industry survey disseminated through Avocados Australia Limited and Hort Innovation.

Driving Collaboration in Australian Horticultural Research (MT14055)

Service Provider Flourish Communications

Project Leader Victoria Taylor

Start Date 27/03/2015

End Date 31/05/2017

Funding Type Levy

Summary

The National Horticultural Research Network (NHRN) was formed in March 2001 and comprises the Horticultural R&D managers from the State agricultural agencies, CSIRO, the Tasmanian Institute of Agricultural Research (TIAR), the Australian Council of Deans of Agriculture and Hort Innovation. Before Hort Innovation investment, these organisations provide nearly $90 million annually for horticultural research and development.

NHRN provides a senior national forum for horticultural RD&E coordination and inter-agency communication to drive integrated national programs and activities. The NHRN is committed to a vision of focused and cohesive research, development and extension that underpins a vibrant and growing horticultural sector.

Under MT08042, and amongst other programs, the NHRN developed the National RD&E Framework for Horticulture. Under this project, a major role of NHRN will be to implement the framework according to the summary of the NHRN Strategic Plan.

Strategic Investment Plan, Economic Analysis and Monitoring and Evaluation, Hi Link Model (MT15032 & MT15033 & MT16006)

Service Provider Clear Horizon, Avocados Australia Limited, Centre for International Economics

Project Leader Lee-Ann Maloney, John Tyas, Derek Quirke

Start Date 09/06/2016

End Date 30/06/2017

Funding Type Levy

Summary

The economic modelling and analysis across this suite of projects involved working with industry representatives and alongside the strategic investment plan (SIP) teams. Monitoring and evaluation frameworks for each SIP were developed. The process clarified the links and alignment between industry-specific SIPs and the broader Hort Innovation vision of profitability, productivity and industry sustainability. This suite of projects addressed the level of service and engagement with growers that Avocados Australia Limited (AAL) undertook, utilised the network of growers to deliver a comprehensive engagement process throughout the SIP planning process and ensured strong communications to enable feedback and consultation. The economic analysis for the SIPs provided the capability to quantify economic benefits and impacts of the SIPs, and included an update of the Hi Link database with the latest available data (including supplementary data provided by AAL). The Avocado SIP has an expected economic benefit of $212 million.

Avocado Strategic R&D Levy Investment - Program Overview continued

Multi-scale monitoring tools for managing Australian Tree Crops: Industry meets innovation (ST15016)

Service Provider	Hort Innovation
Project Leader	Anthony Kachenko
Start Date	20/08/2015
End Date	16/05/2018
Funding Type	Rural R&D for Profit Grants Programme

Summary

The Multi-scale monitoring tools for managing Australian Tree Crops: Industry meets innovation is an overarching project, funded via a grant awarded to Hort Innovation in May 2015 as part of the Rural R&D for Profit programme from the Australian Government. The purpose of this grant is to fund a collaborative research and development (R&D) project to support continued innovation in Australia's primary industries. Collaborators in this project include the following co-contributors and research providers: University of New England, University of Queensland/JRSRP, Central Queensland University, The University of Sydney and Queensland Government Department of Agriculture and Fisheries.

Agtrix Pty Ltd is engaged in this project as a provider of web technology and data storage and Simpson Farms is engaged in this project as a provider of field support. Avocados Australia, Australian Mango Industry Association and Australian Macadamia Society are engaged in this project as providers of extension of project outputs. Project ST15016 aims to apply more innovative information technologies to help growers improve their production and profitability. This project will combine the latest high resolution satellite imaging systems, cloud-based computing, data discovery and analytics together with on-ground robotics and an increasingly 'connected' producer base, to support Australia's tree crop producers' decision making. This project has two components:

- A national audit capability framework identifying the location, area and tree population of every commercial avocado, mango, macadamia orchard and banana plantation across Australia. The audit will integrate novel satellite image analysis with existing industry and government crop databases, regional surveys and on-ground evaluations. A Geographic Information System (GIS) database integrating a web delivery and data discovery platform will support grower auditing, seasonal and longer-term production forecasts, product traceability and facilitate productivity gains through improved understanding of the spatial and temporal distribution of cultivars, geographical regions, climate trends and production bases. The database will also support biosecurity and post disaster monitoring at state and federal level and complement existing systems and programmes.
- A farm-level decision support tool using satellite image data and novel on-ground sensors and robotics for mapping fruit yield and quality, tree health and inflorescence counts. Data will assist grower yield forecasting and optimisation, harvest segregation based on quality and fruit size, tree health monitoring including early detection of pest and disease outbreaks, pollination efficacy, support product traceability (tree-to-plate), and reduce input costs through judicious management of water, fertiliser and pesticides, and genotype evaluation.

For more from this project, go to Page 45 of this edition.

Transforming subtropical/tropical tree crop productivity (AI13004)

Service Provider	The Department of Agriculture and Fisheries Queensland (DAF)
Project Leader	John Wilkie
Start Date	20/11/2013
End Date	01/12/2018
Funding Type	Horticulture Transformational Industry Fund

Summary

This program has the potential to transform the commercial productivity of subtropical and tropical tree crops. There are aspects of the methodology that offer the application of cutting edge science to Australian horticultural tree crop industries, in particular research into areas of molecular genetic regulation of floral initiation and tree architecture. Other aspects of the methodology, such as portions of the applied physiological and horticultural experimentation and germplasm evaluation offer the potential for significant improvements in understanding and productivity when applied to avocados, mangoes and macadamias. The integration of the program components into a unified and ordered approach is this program's greatest strength and is probably unique for subtropical and tropical tree crops

The principles included as Key Research Components (KRCs) are:

- Vigour management: control by rootstock induced growth reduction and enhanced reproductive development, and/or by canopy manipulation; rootstock breeding and evaluation; and growth regulator application.
- Architecture: understanding natural development patterns and fruiting; manipulation by pruning and/or training and associated responses of flowering and fruiting.
- Canopy light relations: quantifying the role of light in canopy functions like flowering and fruiting; optimisation by pruning and/or training and associated responses of carbon partitioning.
- Crop load: understanding and managing crop load and associated effects on floral initiation, fruit set, irregular bearing and tree growth; and practical methods for load management.

Ultimately, knowledge from these diverse research components will be systematically integrated using planting systems trials (assessing the effect of rootstock, planting density, pruning and training, and crop load on performance), genetic and physiological analysis, and functional-structural modelling. Aspects of each of the research components will be focussed on understanding the underlying physiological, genetic and molecular principles involved, leading to project components that focus on applying this understanding to develop modern, highly productive planting systems that can be adopted by industry. The initiative will primarily focus research on avocado, macadamia and mango. For example, any work undertaken on the molecular regulation of flowering and branching in our focus tree crops would have a much broader relevance due to the highly conserved nature of flowering genes across species. This ambitious research initiative is inherently a long-term proposition, due to the plant breeding/germplasm selection component, the long-term nature of any tree crop research, and the requirement to integrate multi-disciplinary research findings.

For more from the *Small Tree - High Productivity Initiative*, go to Page 11 of this edition.

Avocado Strategic R&D Levy Investment - Program Overview continued

Across Industry

The Across Industry R&D program is funded through matched R&D levies and is a continuation of investment under the previous Horticulture Australia Limited (HAL) system. These legacy projects are funded through a contribution of all legacy R&D programs and allocated to the Across Industry program.

Below is a project list of the investment with expenditure that occurred in the 2016/17 Across Industry program.

More information

For further details on the specific projects, we encourage you to contact Astrid Hughes on *astrid.hughes@horticulture.com.au* on 0405 306 334.

Project No	Title	Project Start	Project Completion	Organisation
AH11011	Horticulture funding of the CRC for Plant Biosecurity	30/06/2012	30/05/2018	CRC For National Plant Biosecurity
AH13027	Plant protection: Regulatory support and co-ordination - Continuation of AH09003	31/05/2014	1/07/2018	AKC Consulting Pty Ltd
AH13033	Investing in Youth Successful Scholarship Applicant	27/06/2014	30/06/2017	Rural Industries R&D Corporation (RIRDC)
AH15001	Horticulture Statistics Handbook 2015-2018	7/12/2015	22/12/2017	Freshlogic Pty Ltd
AH15002	National Fruit Fly Strategy Council – Phase 2	03/11/2015	01/10/2018	Plant Health Australia Limited

Latest Hortlink provides levy R&D update

For an update on all levy-funded activity in the avocado industry, check out the latest edition of Hortlink from Hort Innovation: *www.horticulture.com.au/hortlink-2017-edition-2/avocado.*

Hortlink includes easy-to-read project updates, results and resources you can use in your business, plus case studies from across horticulture, industry contacts and more. So what are you waiting for? Check it out now!

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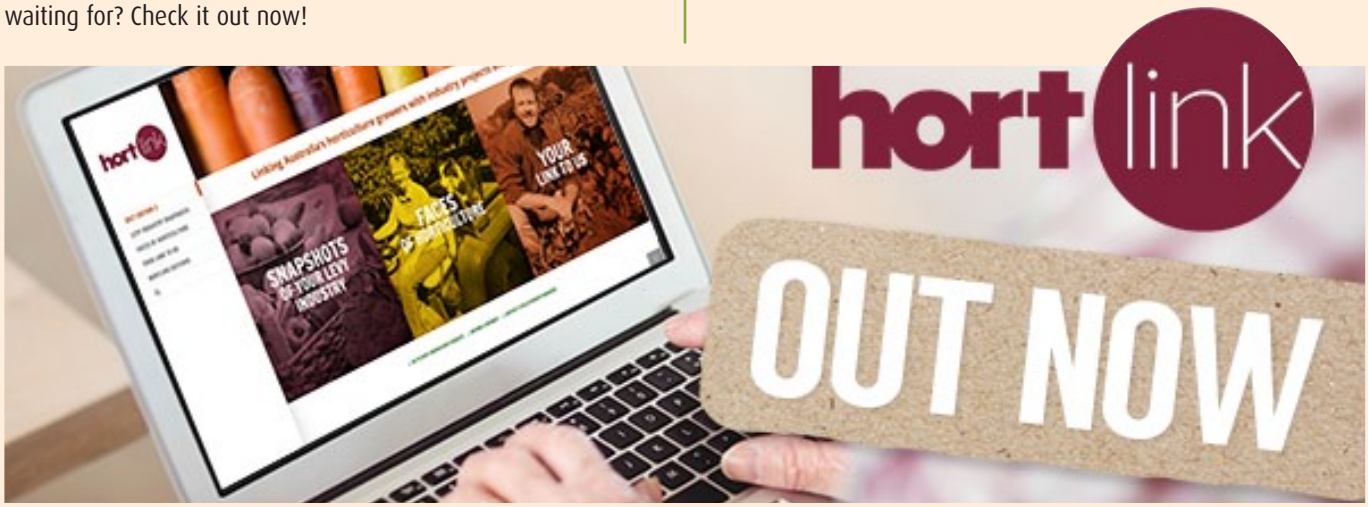

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Snapshots - International Avocado Research Update

This series of research snaphots is compiled from abstracts of published scientific papers accessed through CAB Direct, PubMed (US National Library of Medicine), AGRIS (FAO, UN) USDA and OECD databases, as well as research presentations delivered at the 2015 World Avocado Conference (Peru). Dates provided reflect the date research was published or presented.

Production

Study of yeast to control anthracnose

Mexico (2016): The antifungal activity of *Wickerhamomyces anomalus*, a yeast isolated from contaminated avocados with anthracnose (*Colletotrichum gloeosporioides*) was evaluated as a potential biocontrol agent. It was shown that the yeast could reduce the growth of anthracnose in plate and by volatile compounds and the conclusion was drawn that there is potential to develop a biocontrol product for this disease.

Evaluation of tolerance to Phytophthora cinnamomi in avocado germplasm

Columbia (2017): The aim of this research was to identify avocado accessions, which could be used as rootstocks in a cultural control strategy for preventing root rot disease. In total, 21 accessions from the Avocado Germplasm Bank of CORPOICA were evaluated. Two accessions were identified as promising for their tolerance to *Phytophthora cinnamomi*. Susceptible accessions used as control, e.g. Hass variety and rootstock 'Topa-Topa' were highly susceptible to the disease.

Mapping the water foot print of horticultural crops

Israel (2017): Addressing the global challenges to water security requires a better understanding of use of water in agricultural cropping. This study combined high resolution-data with a GIS system to analyse the impact of agricultural practices, crop type, and spatial factors such as drainage basins, climate, and soil type on the Water Footprint (WF) of agricultural crops. The area of the study, the northern Lower Jordan Valley, includes three main plantation crops: banana (cultivated in open-fields or net-houses), avocado and palm-dates. The study compared the WF of the different crops, showing that net-house bananas have the lowest WF based on a range of criteria. Modelling showed that the adoption of net-house cultivation throughout the area of study could result in a significant reduction of irrigation water use each year. Integrating the WF methodology and local high-resolution data using GIS can therefore promote and help quantify the benefits of adopting site-appropriate crops and agricultural practices that lower the WF by increasing yield, reducing water consumption, and minimising negative environmental impacts.

Providing aids to train dogs to detect laurel wilt in avocados in the USA

USA (2017): Laurel wilt (*Raffaelea lauricola*) is a major fungal disease of avocados in the south east of the United States. Trained detection dogs are currently one of the few successful methods for early detection of pre-symptomatic diseased trees. In order to have appropriately trained dogs, there is a need to create accessible and safe training aids. However, identifying and accessing volatile organic compounds (VOCs) associated with laurel wilt in avocado trees for training the dogs is challenging. This research provides new approaches and methods to develop reliable and cost effective training aids based on VOCs.

Postharvest

Biodegradable antifungal films for controlling postharvest anthracnose pathogens.

Thailand (2017): Research has shown that antifungal packaging films can potentially be used to control postharvest pathogens of fresh produce. Biodegradable antifungal films were developed to be used for controlling postharvest anthracnose (***Colletotrichum gloeosporioides***) pathogens. Two antifungal compounds, thymol and R-carvone, were incorporated into poly(lactic acid) (PLA)-based polymer films at different concentrations and the antifungal activity against anthracnose isolated from avocado and citrus was measured. Both showed promise in suppression of the disease under different conditions.

Maintaining postharvest quality of cold stored Hass avocados with the use of natural volatile compounds

UK/South Africa (2017): Low temperatures are often used to extend the storage life of fruit; however, in the case of avocado, a temperature below 3°C will often result in the development of physiological disorders associated with chilling injury. The objective of this study was to investigate the ability of methyl jasmonate (MeJA) and methyl salicylate (MeSA) vapours to alleviate chilling injury in Hass avocado fruit kept at 2°C for 21 days followed by 6-7 days of shelf-life at 20°C, simulating supply chain conditions. The incidence and severity of chilling injury were significantly reduced in MeJA- and MeSA-exposed fruit, especially at 100 µmol L. The mechanism involved improved membrane integrity via alteration of the fatty acid content and composition. MeJA and MeSA have the potential for being used with Hass avocado fruit shipped at low temperature to reduce its susceptibility to chilling injury.

Use of by-products

Potential use of avocado seed compounds to control Listeria in food products

Mexico (2017): High standards of *Listeria* monocytogene control and consumer demand for food products without synthetic additives represents a challenge to the food industry. Fatty acid derivatives in avocado seeds, called acetogenins, were tested to determine their impact on *Listeria* monocytogenes. The anti-listerial properties of an enriched acetogenin extract (EAE) from avocado seed was compared to two commercial antimicrobials (one enriched in avocado acetogenins). The EAE was shown to provide suitable inhibitory effectiveness. The research documents the properties of avocado seed acetogenins as natural anti-listerial food additives.

Trade

The national economic benefits of U.S. imports of Hass avocados from Mexico.

USA (2017): Imports of food products are often seen primarily as a threat to domestic producers while the broader economic impacts are ignored. Research on rapidly growing US avocado imports has focused on the consequences for the US avocado industry. This study conducts an economic impact analysis to measure the level and industry distribution of any benefits of US imports of avocados from Mexico that may accrue to the US national economy. It was found that the US$1.5 billion in US imports of Mexican avocados in 2015 had a positive and statistically significant effect on the US economy in that year. Every dollar of avocado imports from Mexico in 2015 generated US$2.31 in US output, US$1.41 in US GDP, and US$0.79 in US labour income. About 12.3 jobs were generated per US$1 million of imports. A separate econometric analysis corroborates the result. We conclude that imports of Mexican avocados are pro-growth for the US economy.

Health

Compounds in avocado seed shown to have effect on breast and liver cancer

Indonesia (2017): A compound, triterpenoid, isolated from avocado seeds was tested for its cytotoxic effect on breast and liver cancer cell lines. The results show that triterpenoid from avocado seeds, at tested concentrations, was cytotoxic to the cancer cells and safe to normal cells, concluding there is potential for further development of this compound as anticancer agents.

More information

If you would like more details on any of the snapshots, please contact Jenny Margetts, P2P Business Solutions, at *jmargetts@bigpond.com* or 0418 215 276.

Factors affecting avocado flesh bruising susceptibility

By Melinda Perkins, Muhammad Mazhar, Daryl Joyce, Noel Ainsworth, Lindy Coates and Peter Hofman

Avocados are prone to flesh bruising, especially once they reach retail shelves (*Figure 1*). This issue is a major concern to the Australian avocado industry, with flesh bruising being responsible for around half of all avocado internal defects detected at the retail level[1]. A problem for shoppers is that they can't tell if a fruit is bruised internally until they cut it open at home. The end result in many cases is consumer disappointment and a reluctance to purchase avocados in the future[2].

What is it that makes avocados susceptible to bruising and can anything be done to make them more resilient? Mechanisms involved in avocado flesh bruising and factors that govern them are discussed here with a view to reducing bruising.

What is bruising?

Physical injury of avocado fruit tissues occurs in response to applied mechanical force. Damage that leads to bruise expression is caused by impact (e.g. dropping), compression (e.g. squeezing) and/or vibration (e.g. transport) injuries. The walls of cells comprising fruit tissue are elastic to a limited degree. As such, they can absorb some of the physical shock without permanent injury being caused. However, when cells experience stress beyond their elastic limit, the cell walls fail and permanent damage occurs. In this circumstance, cell contents previously separated within compartments in the cell will mix together as the cells rupture. This brings phenolic compounds into contact with the enzyme polyphenoloxidase (PPO), which triggers enzymatic browning resulting in polymerised phenolics. These are brown in colour and are responsible for the typical dark discoloration recognised visually as a bruise.

How is bruising measured?

Flesh bruising in fruit has been described and measured in various ways[3]. Bruise incidence can be defined as the number of bruised fruit in a given sample (e.g. tray) of fruit. It can be expressed as a percentage of the total number of fruit affected within the sample. Alternatively, it can be measured and expressed as the number of bruises on any individual fruit. Bruise incidence data do not indicate the degree to which fruit are bruised. Bruise severity, on the other hand, indicates the size of a bruise. It is generally quantified as either the area or the volume of the affected flesh in individual fruit. The value may also be converted to a percentage of the total fruit flesh area or volume. The avocado industry recognises the importance of both bruise incidence and severity, and tracks the percentage of fruit at retail with more than 10 percent affected flesh area[1] (the level generally considered to be unacceptable to consumers[2]). Bruise intensity is a measure of the relative darkness of a bruise. It can be scored visually (e.g. light brown to black) or measured with a colour meter. The latter involves recording three colour coordinate values (e.g. L, a, b) that pinpoint a particular colour in a three-dimensional colour space of all possible colours[4]. Bruise susceptibility is the relative degree to which a fruit bruises when given a specific damaging pressure. It is expressed as the amount of flesh showing damage per unit of absorbed impact or compression energy.

What affects bruise susceptibility?

Anecdotal and experimental evidence suggest that the susceptibility of avocados to bruising is related to fruit firmness, dry matter content, flesh temperature, and time in the supply chain.

Firmness is an indicator of cell wall strength in fruit tissue and a way to determine the ripeness of avocado fruit. Firmness decreases during ripening and has been characterised into the stages of hard, rubbery, sprung, softening, firm-ripe, soft-ripe, overripe, and very overripe[5]. Bruise susceptibility increases as firmness decreases. For example, injury due to a "very slight" thumb compression of 5 Newtons produced twice as much bruising (in terms of bruise area) in soft-ripe than firm-ripe Hass avocados (unpublished data; *Figure 2*). For impact injury, the drop height at which Hass avocados began exhibiting bruising was 5cm for sprung fruit and 2.5cm for firm-ripe fruit[6]. Mathematical modelling for Collison avocados suggested that

Figure 1. *Flesh bruising in Hass avocado fruit at the retail level is a major quality issue.*

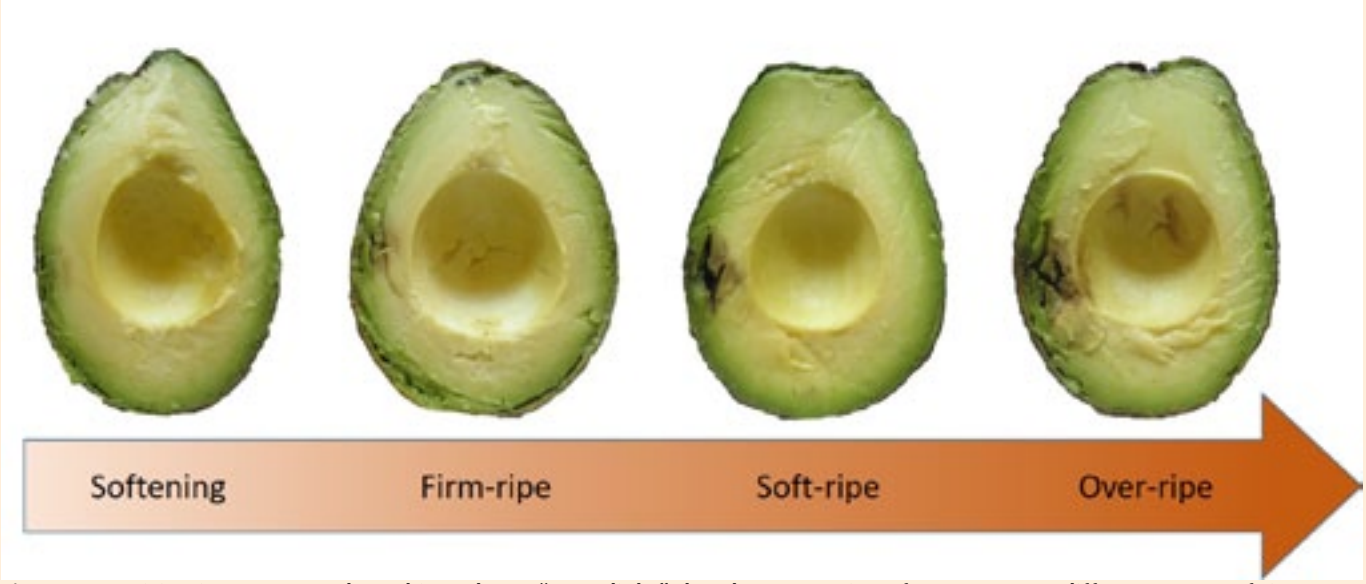


Figure 2. *Bruising in Hass avocados subjected to a "very slight" thumb compression of 5 Newtons at different stages of ripeness.*

the critical drop height for bruising was approximately 3cm in fruit that the authors referred to as "ripe"[7]. In contrast, hard fruit are resistant to bruising. No permanent bruising was recorded for hard green mature Hass avocados after impact from a drop height of 100cm. Initially damaged tissue in green mature fruit was apparently able to recover over time[8].

Dry matter content tends to increase over the harvest season and is a reliable measure of avocado maturity. Fruit with higher dry matter were less susceptible to bruising in a study that subjected firm-ripe Hass avocados to a 50cm drop height[8]. Bruise volume progressively decreased as dry matter increased from 22 to 33 percent.

Relatively high fruit dry matter can offer consumers a better eating experience[2]. On the other hand, waiting to harvest unusually high dry matter avocados might lead to a less desirable eating experience. For example, a slight decline in consumers' intentions to purchase avocados was observed when dry matter exceeded 40 percent[2]. Furthermore, a very late harvest may deplete carbohydrate reserves in the tree and increase the risk of biennial bearing[9]. Delaying harvest to 'meet and beat' the minimum recommended dry matter level for harvest (i.e. 23 percent+ for Hass) is likely to be a good compromise towards reduced bruise susceptibility.

The temperature of the fruit following an impact is a potentially important factor in lessening avocado flesh bruising. Hass avocados held at 5°C for 48 hours after being impacted did not show bruising[8]. In contrast, holding impacted fruit at 15 or 25°C for the same period resulted in 90 and 95 percent bruise incidence, respectively. Moreover, bruise intensity was higher (i.e. darker) in fruit held at 25°C than at 15°C. The data suggested that flesh temperature during the first eight hours after impact is critical in determining visible bruising. Relatively greater PPO activity was considered to be the likely cause for greater bruise incidence observed at higher temperatures. Note, however, that chilling injury may occur in Hass avocados at 3°C or lower. Also, refrigeration of fruit at retail level may have cost and other marketing considerations.

Prolonged **time in the system** has been shown to increase the susceptibility of Hass avocados to bruising. When subjected to impact at the firm ripe stage, fruit stored at 5°C for one to five weeks prior to ripening tend to exhibit greater bruise volumes than un-stored control fruit[8]. A trend of increasing bruise volume was observed with increasing cold storage duration.

Any other factors?

Although not specifically researched to date, other factors are likely to affect bruising susceptibility by influencing the physical properties of cell walls and/or enzymatic browning processes.

Pre-harvest water stress has, for example, been found to promote PPO activity in avocado fruit[10]. Therefore, it might be reasonable to expect bruise expression to be greater in water deficit stress affected fruit. However, investigation is required to establish if this is the case.

Cultivar (i.e. genotype) is known to dictate the enzymatic browning potential of avocado fruit. For instance, the rate of cut flesh browning, as well as flesh total phenolic content and PPO activity, are greater in Fuerte than in Lerman[11,12]. For cultivars common in Australia, the peel of Hass avocados contains greater concentrations and diversity of phenolic compounds than does Shepard avocado peel[13]. The concentration of epicatechin, a known PPO substrate, exhibited a dramatic decrease in Hass avocados during a harvest season[14]. This trend may at least partly explain the decreasing bruise volumes observed with increasing dry matter over time as noted above.

Choice of **rootstock** cultivar has been shown to affect calcium

Factors affecting avocado flesh bruising susceptibility continued

(Ca) accumulation in avocado fruit. Ca is important for cell wall strength and membrane stability. Compared to fruit containing low Ca concentrations, Hass avocados with relatively high flesh concentrations at harvest show delayed ripening[15,16], greater firmness after storage[17], lower incidence and severity of body rots[15,18], decreased mesocarp discolouration[15,19], and reduced incidence and severity of vascular browning[19,20]. Grafting of Hass onto Velvick or A10 rootstocks produced fruit with high Ca concentrations[21]. However, variation in rootstock effects on postharvest fruit quality has been reported across different locations and seasons. Therefore, it is difficult to predict and remains to be proved which rootstock, if any, may reduce fruit susceptibility to flesh bruising.

High turgor pressure in flesh tissue has been linked to greater bruise susceptibility in fruits such as apple and pear[22]. However, no such studies have investigated the relationship between turgidity and bruising for avocado. Nonetheless, greater lenticel damage has been reported in avocado fruit with high cell turgidity[23]. It can be reasoned that, as turgor pressure rises, cell wall elasticity decreases and fruit tissues could become more 'brittle' and, therefore, susceptible to physical damage. Fruit that are wet from rainfall or dew are likely to have high turgor pressure. Harvesting fruit in wet conditions promotes vascular browning and lenticel damage in Hass avocados[24,25].

Precautions to reduce bruise susceptibility

Based on the above, recommendations for improved practices to reduce bruise susceptibility in avocado fruit have been summarised in *Table 1*. For some recommendations, a confirmed link with bruising susceptibility was established in the recent Hort Innovation project, ***Reducing flesh bruising and skin spotting in Hass avocado*** *(AV10019)*. On the other hand, some recommendations are based on anecdotal or indirect evidence. These, in particular, need to be further investigated for adoption or not into commercial practice.

Future work

Producing more resilient fruit is one approach to addressing the flesh bruising problem. Another is to minimise exposure of the fruit to damage events that cause bruising, such as dropping or squeezing. The ongoing Hort Innovation project ***Supply chain quality improvement – Technologies and practices to reduce bruising*** *(AV15009)* will also identify tools, practices and other measures for reducing damage events in the supply chain. All project AV15009 findings are being incorporated into the Avocados Australia online Best Practice Resource (www.avocado.org.au/best-practice-resource/) and shared with two concurrent avocado supply chain quality improvement projects, ***Cool chain best practice adoption*** *(AV15010)* and ***Retailer point of purchase improvements*** *(AV15011)*.

Table 1. *Practices known or likely to reduce susceptibility to flesh bruising in avocado.*

Recommendation	Link to bruise susceptibility	Relevant stage(s) in supply chain
Select cultivars that produce fruit with low browning potential	Likely	Orchard establishment
Select rootstock cultivars that promote Ca accumulation in fruit	Likely	Orchard establishment
Ensure that trees receive adequate water	Likely	Fruit growth and development
Avoid harvesting fruit when wet	Likely	Harvest
Harvest when dry matter is above 23 percent	Confirmed	Harvest
Pass fruit through the supply chain as quickly as possible	Confirmed	Harvest, pack house, ripener, distribution centre, retailer, consumer
Hold ripened fruit at 5°C	Confirmed	Distribution centre, retailer, consumer

Acknowledgement

The strategic levy investment ***Supply chain quality improvement – Technologies and practices to reduce bruising*** (AV15009) is a project under the Hort Innovation Avocado Fund, funded by Hort Innovation using the avocado research and development levy and contributions from the Australian Government. It is delivered by the Queensland Department of Agriculture and Fisheries in collaboration with The University of Queensland and Avocados Australia Ltd.

References

A full list of the referenced works in this review article can be found online at www.avocado.org.au/news-publications/talking-avocados/.

Better understanding of avocado flowering can improve your pollination

By David Pattemore and Brad Howlett, The New Zealand Institute for Plant & Food Research Ltd, and Lisa Evans and Brian Cutting, Plant & Food Research Australia

Avocado has low fruit set rates, usually only three fruit from 1,000 flowers, and yields can be highly variable. Optimised pollination may help to reduce variability in yields between years and ensure that fruit set is not limited by pollination.

Unlike many traditionally cultivated fruit crops in Australia, avocado is a subtropical rather than a temperate species, and originated in Central America. It exhibits some unusual flowering traits; considering its origin in diverse subtropical forests helps us to understand the tree and how best to optimise avocado pollination.

Understanding avocado floral biology: from the forest to the farm

Cross-pollination – pollination between two genetically distinct individuals – is almost always the better long-term strategy for plants in the wild, as it maintains genetic diversity within populations, thereby lowering the risk of extinction from impacts such as rapidly evolving diseases and changing environments. Avocado flowers show many adaptations to maximise the chance of cross-, rather than self-pollination (pollination within the same tree or the same cultivar).

All flowers on a single tree, and within a cultivar, are in phase with each other; female-phase flowers open for several hours before closing, to later re-open in the male phase (*Figure 1*).

Figure 1. *It is important to be able to distinguish female-phase avocado flowers, which have a single upright style (a) from male-phase flowers, with multiple upright anthers (b), so that you can assess when in the day your flowers are receptive and ready for pollination.*

This reduces the chance of self-pollination, although there can be some overlap in the changeover between phases. Cross-pollination occurs because cultivars vary in the timing of their male- and female-phases, so one cultivar in male-phase provides the pollen that is transported to a female-phase flower on a second cultivar. Based on these flowering phases, cultivars are grouped into two flowering types. Flowers of Type A cultivars like Hass typically open in the female-phase in the morning and in male-phase in the afternoon. Type B cultivars like Bacon or Fuerte typically have male-phase flowers in the morning and female-phase flowers in the afternoon.

This system makes sense when you consider the historical scenario of single isolated avocado trees in a diverse forest of many different species: what we see now as differences between clonal cultivars would have been differences between individual avocado trees. The two flowering types would have maximised the chance for cross-pollination between neighbouring trees which may have been hundreds of metres apart in a dense forest.

The capacity for self-pollination is then best seen as a back-up strategy for the trees in case they received insufficient cross-pollination. Self-pollination can occur during a very short period, usually in the middle of the day, when male-phase flowers open and release pollen before the female-phase flowers are fully closed. However, cross-pollinated fruit are more likely to be retained during periods of stress, so the final make-up of fruit at harvest is biased towards cross-pollinated fruit.

Understanding the reasons behind this flowering system can help to guide orchard design. Whole orchards of a single cultivar

Figure 2. *Flies, like this green blow fly (a), and beetles, like this ladybird (b), can be important pollinators of avocado. Getting into the habit of identifying and counting insects visiting your female flowers will allow you to make the right decisions about how to maintain or improve pollination in your orchard.*

Better understanding of avocado flowering continued

can still be a viable strategy, because self-pollination can occur. However, in a sense, you will be fighting the biology of the plant which is entirely geared towards maximising cross-pollination. You are likely to obtain more consistent and higher fruit set if you interplant your main cultivar with a cultivar of the opposite flowering type which flowers at the same time of year.

Climate a big factor in avocado pollination

The climate in your region is also an important factor to consider, as warmer nights of 13°C and higher are likely to lead to greater overlap between the timing of male and female phases of Hass in the middle of the day. In these conditions, the male flowers often open and release pollen before the female flowers are fully closed. It is possible that orchards in warmer regions are able to achieve acceptable yields with single-cultivar blocks through this process. However, for most orchards, inter-planting Type A and Type B cultivars is still recommended as the best way to ensure consistently high yields.

Temperature has another important effect on flowering: colder overnight temperatures delay the timing of female flower opening. While it is generally stated that female-phase Hass flowers open in the morning, cold overnight temperatures can delay this female-phase into the afternoon, early evening, or even result in female-phase flowers being open all night long. If your orchard is in a region where night-time temperatures during flowering regularly drop below 10°C, it is important to consider how this afternoon or evening flowering of Hass could affect your pollination. Different species of pollinator may be important if your orchard regularly has late afternoon or evening female flowering, as honey bees peak in activity towards the middle of the day.

Avocado pollinators – bees, flies and beetles

Even when conditions are optimal for honey bee pollination (warm, sunny days after warm nights, with female Hass flowers opening mid-morning), honey bees may not be your most important pollinators. In our pollinator surveys in avocado orchards in the Tristate region we found that flies and beetles were the dominant pollinators (*Figure 2*), with many orchards almost completely lacking in honey bee activity even when hives were introduced. This was a surprising result to us, as we assumed that we would find that feral honey bees were important pollinators in these orchards, but the honey bees that we saw were focusing on the flowering citrus orchards nearby. Flies can be excellent pollinators of avocado, as they tend to be better at cross-pollination and they deposit similar amounts of pollen per visit to a honey bee, so when they occur in high densities they can be very effective.

The risk here is that most of the growers in the Tristate region were not aware that these flies and other wild pollinators were doing most of the work. Simple changes in orchard management (including earthworks, irrigation regimes and use of pesticides), could unintentionally harm pollinator populations and have a significant effect on the pollination of these orchards.

The importance of these diverse wild pollinators is not surprising when we consider the tropical origins of avocado. Naturally they would not have been pollinated by honey bees, which were found only in Europe and Asia, but instead would have probably been pollinated by a diverse range of small native bees, flies and beetles.

Understanding pollination system is key

From our two-year Hort Innovation funded study of avocado pollination, our strongest recommendation to cover all growers in all regions is that it is important to understand your own orchard. If you form the habit of recording fruit set rates, monitoring the female and male flowering phases of your trees, and identifying and counting pollinators on your trees, you will be able to make informed decisions about how to optimise pollination for your own orchards. You may find that you have enough honey bees visiting, and your female flowers are open at the right time for honey bees to do the job. Or you may find that your orchard is dominated by flies, and so you need to think about how either to protect those fly populations or to increase your stocking rate of honey bee hives, to ensure optimal pollination if you plan to control the fly population.

Acknowledgements

The now-completed project **Optimising pollination of macadamia and avocado in Australia** (MT13060) was funded by Hort Innovation using contributions from The New Zealand Institute for Plant and Food Research and the Australian Macadamia Society, with funds from the Australian Government.

More information

We have produced a brochure explaining some basic ways to improve pollination in your avocado orchard. It is available to download from:

http://beeaware.org.au/pollination/pollinator-reliant-crops/avocados/

Can we increase avocado production via pollination?

By Bryony Willcox, University of New England

In Australia, crops that benefit from insect pollinators have an estimated value of $4.3 billion.

The pollinators that visit avocado flowers include managed honey bees, other wild bees, flies, wasps, beetles and butterflies. As pollination services delivered by insect pollinators are a key driver of yield and quality variability within these horticultural systems, increased knowledge about how we might go about reducing this variability through pollination is an important step forward.

The potential use of remote sensing to better understand this yield variability is being evaluated in a current national research project **Multi-scale monitoring tools for managing Australian Tree Crops – Industry meets innovation** (ST15016), funded by the Federal Government Rural Research and Development for Profit Scheme, and supported by Hort Innovation. One goal of this project is to map yield parameters and tree vigour across avocado orchards, and to better understand the extent to which these two aspects relate to pollination services.

The first interesting finding is that pollinator communities can differ from orchard to orchard within a region. For example, in the last flowering season (2016), honey bees were the most abundant flower visitor across seven Hass orchard blocks surrounding Bundaberg. Apart from honeybees, it was found that wild bees, beetles and flies also visit flowers and that individual avocado blocks differed in the identity of the most abundant pollinator group present (*Figure 1*).

We then looked at how tree vigour (combination of tree size and health), interacts with pollination services provided by insects. In this project, tree vigour is determined by an NDVI (normalised difference vegetation index) image derived from Worldview-3 satellite images (*Figure 2*). Looking at these interactions a hand pollination trial, replicated across five Hass orchard blocks in the Bundaberg area, began last year. The trial involves hand pollinating trees that represent a range of tree vigour classes with outcross pollen (Shepard variety) in addition to the open pollination services they already receive. A second group of trees across the vigour range did not receive the additional hand pollination, representing open pollination, and were retained as controls. At harvest, fruit number and weight of fruit were measured for each of the experimental trees.

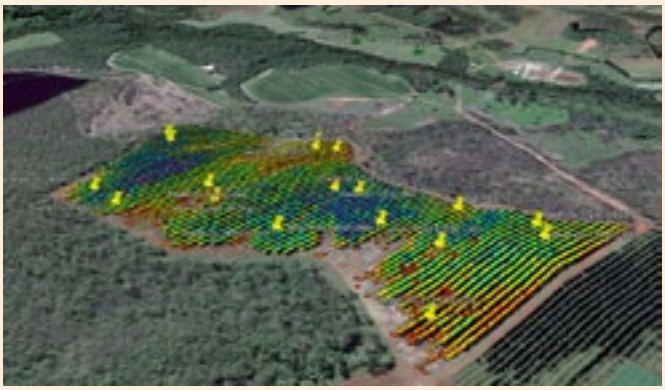
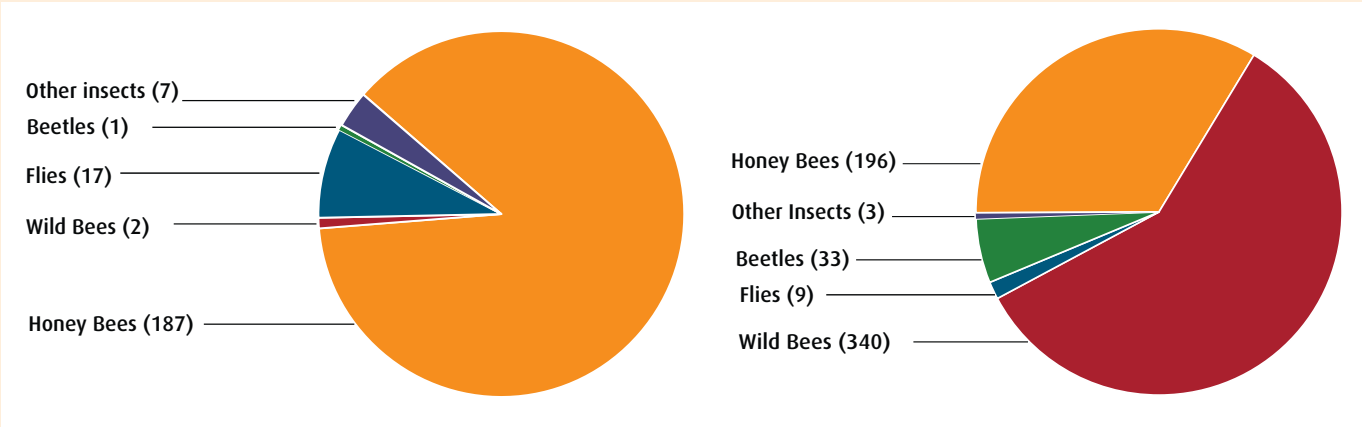


Figure 2. *An example of a satellite-derived NDVI image being used to determine high, medium and low vigour canopy growth across an orchard block. The yellow pins indicate the location of individual trees. These either received hand pollination treatment or were left as open controls, across varying tree vigour regions. The image has been overlayed onto Google Earth.*

The second interesting finding is that trees with a low and medium vigour rating can produce increased yields (both fruit number per tree and total weight of fruit per tree) after receiving additional hand pollination (*Figures 3* and *4*). This suggests the medium to low vigour trees might be pollen limited. Interestingly, high vigour trees suffered reduced yields following hand pollination. We will also be comparing fruit quality measures between hand-pollinated and open control trees to better understand these results.

These experiments will be repeated in the upcoming 2018 harvest year to determine if the same trend is repeated, or potentially to identify if the smaller trees suffer a yield decline as a result of the higher yields they achieved during the 2017 harvest season. The findings may allow growers to quickly evaluate their orchards to make predictions of pollinator distribution and yields in their specific orchards.

Figure 1. *Abundance of insect pollinator groups observed at two different orchard blocks in the Bundaberg region, 2016.*



Can we increase avocado production via pollination? continued

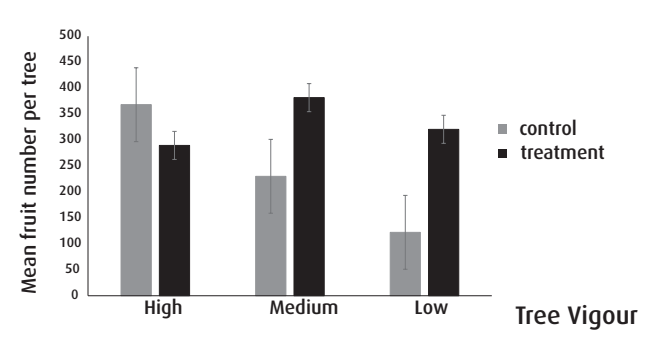


Figure 3. *Mean fruit number per tree across five Hass experimental blocks in Bundaberg, Queensland. Bars represent standard error of means. *represents significant difference between means of treatment and control groups*

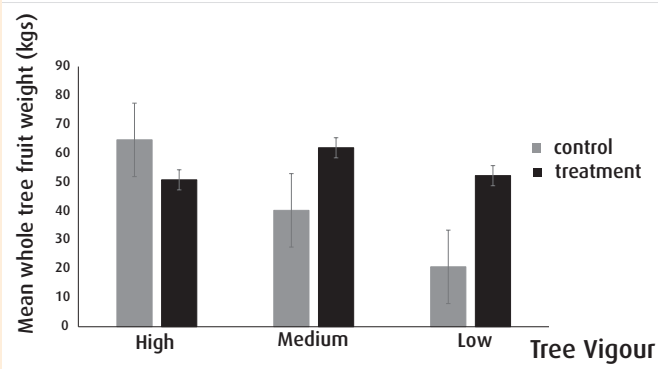


Figure 4. *Mean total fruit weight per tree across five Hass experimental blocks in Bundaberg, Queensland. Bars represent standard error of means.*

Acknowledgement

Bryony Willcox is a PhD student at the University of New England, Armidale, collaborating with Associate Professor Andrew Robson, Dr Romina Rader and Dr Brad Howlett. The PhD project is being conducted as part of the Federal Government Rural Research and Development for Profit Scheme, supported by Hort Innovation. We would like to thank the growers in Bundaberg who allowed us access to their orchards including Simpson Farms, Chad Simpson, Tom Redfern (Donovan Family Investments) and AustChilli Farms.

More information

More on the **Multi-scale monitoring tools for managing Australian tree crops — industry meets innovation** project can be found at: *www.une.edu.au/research/une-research-priorities/agricultural-sciences/parg/research-areas-and-current-projects/national-tree-project.*

New Zealand research into resistance

New Zealand research is underway to determine whether the pathogen causing root rot disease is building up resistance to the fungicide currently used to protect avocado trees.

This year's New Zealand Agricultural Fieldays scholarship winner, Shannon Hunter, a University of Waikato Masters student, has been awarded a $22,000 New Zealand Agricultural Fieldays Sir Don Llewellyn Scholarship to assist her research.

The species that causes the root rot disease is *Phytophthora cinnamomi* and the fungicide used to manage it, phosphite, is widely used across all agricultural sectors for disease management.

"Shannon's results will not only be important for the vibrant and expanding avocado industry. They will be useful for understanding the threat of loss of control of several other Phytophthora pathogens affecting the agricultural sector," Associate Professor of Biological Sciences Mike Clearwater said.

Ms Hunter is gathering samples from six avocado orchards in the Bay of Plenty region to support her research.

She said as New Zealand had used phosphite to manage avocado root rot for more than 25 years, it provided an excellent model system to study fungicide resistance.

The project involves collaboration with the NZ Avocado Industry Research Council and Phytophthora experts' Dr Peter Scott and Dr Rebecca McDougal at Scion. The scholarship will fund a research trip to USA later in the year where Ms Hunter will work with researchers from the University of California, Riverside to test their cultures from avocado orchards and the University of California, Berkeley, to test other important species for phosphite resistance.

Shannon Hunter 2017 Fieldays Scholarship recipient

The NZ Agricultural Fieldays Sir Don Llewellyn Scholarship was established in 2012 by the NZ National Fieldays Society Inc. and is awarded to graduate students at the University of Waikato whose research is seen to have a meaningful outcome for the agricultural industry.

New Zealand small tree research could be relevant to some Australian regions

By Edouard Perie, Andrew Barnett and Grant Thorp, The New Zealand Institute for Plant & Food Research Limited

A New Zealand project that may have relevance to some Australian growing regions is exploring the use of small trees in high density plantings to increase early fruit yields.

The concept of small trees – high density plantings – is primarily based on intercepting the maximum amount of sunlight over the total planted area, as soon as possible after planting, to achieve high yields early in the life of the orchard.

Indeed, trees in high density plantings are planted much closer than traditional plantings, with some extreme cases in South America where trees are planted as close as 1.25 metres apart.

The closer the planting distance the faster the total ground area is covered by leaf canopy and the more incoming light is intercepted allowing potential for greater productivity per hectare. However, the fertile and free draining soils of avocado producing regions in New Zealand, combined with a warm temperate climate, can result in very vigorous tree growth which presents challenges of how to prevent the closely planted trees from overcrowding too soon without requiring major pruning efforts which, in turn, can invigorate the tree even more.

In 2014, Plant & Food Research, in partnership with NZ Avocado and funded by the New Zealand Ministry for Business Innovation and Employment (MBIE), established a trial on a grower's property in Oropi, near Tauranga. The objective of this trial is to understand the practicalities of managing high density plantings in New Zealand.

Tree spacing & height	3m between trees, 5m between rows, max tree height: 2.5m
Irrigation	One sprinkler per tree – when tensiometers reach 30-35 centibars, each tree receives 10-15L of water.
Fertiliser plan	"A little and often": 10-11 times per year based on leaf and soil tests.
Spray programme	"Avogreen" monitoring, spray as necessary, similar to that used on large trees. Spraying done from a quad bike with a high-pressure hand gun.

Table 1: Orchard management

The trees were planted in spring 2012 at a spacing of five metres between rows and three metres between trees on a north facing slope that is too steep for machinery. The target is to have a maximum tree height of 2.5 metres so that all fruit can be picked from the ground with a short picking pole. *Table 1* gives details about tree management.

The first pruning was carried out in spring 2014 when the trees were two-years-old. The plan was to reshape these young trees by moderate pruning over two to three years, removing a third or less of the canopy at any pruning time to maintain leaf area. The trees might be pruned once or twice a year, if needed. In spring, the main pruning event would take place after harvest when it is time to decide on the structure of the trees, while in autumn, a light prune might be carried out, working around the current crop.

In the first year (April 2015), branches were tied down to spread the trees as much as possible, to encourage the leaf canopies to capture more light by covering more ground area. A blue pallet strap was tied around the branch and attached to a steel peg forced into the ground. This was done in autumn, keeping the angle of each branch above the horizontal to limit the vertical regrowth of the terminal shoots and to encourage flowering and fruiting.

Since this initial pruning and tying down of branches, two pruning methods have been compared:

Single leader, pyramidal shape	Multi leader, vase/bowl shape
One vertical branch is selected as the main trunk, keeping the top tier of the tree smaller than the middle tier, which is smaller than the bottom tier.	Four to six branches are selected as major limbs, often cutting out the centre of the tree. The branches are kept well-spaced.

The multi-leader, vase /bowl shape is the "industry standard", being similar to most avocado trees in New Zealand, and pruning is performed by commercial pruning contractors. The single-leader pyramidal shape is inspired from the management of other fruit trees such as apple, and is carried out by the researchers. Researchers and pruning contractors collaborate and discuss to learn from each other.

In addition, we are testing the plant growth regulator uniconazole-P (marketed as SUNNY®) on half the trees in each pruning system, as well as on a group of unpruned trees. There are mixed reports about the effect of uniconazole-P. Some trials suggest an increase in flowering and fruit set, higher yield, bigger fruit, less ridging and reduced shoot growth, while other trials suggest very little or no effect at all. The rates and volumes sprayed so far are detailed in *Table 2*. The goal of the November application (during flowering) is to increase fruit set, while the December and January applications are aimed primarily at reducing shoot growth.

Rate: 1L uniconazole-P per 100L of water.			
Season	**November (during flowering)**	**December**	**January**
2014-15	Not applied	12L (eq. 148L/ha)	12L (eq. 148L/ha)
2015-16	Not applied	15L (eq. 185L/ha)	16.5L (eq. 204L/ha)
2016-17	18 L (eq. 222 L/ha)	23L (eq. 284L/ha)	25L (eq. 309L/ha)

Table 2: Quantities of uniconazole-P (SUNNY®) sprayed on a total of 54 trees.

This grower trial is in its early stages of establishment, and it will take several years to understand the practicalities of high density plantings. However, the first lessons learnt include:

- In year three (December 2015), the trees had covered approximately one-third of the ground area, therefore capturing only one third of available sunlight in the orchard.
- More pruning cuts were required in the 2014-15 season to reshape the single leader- pyramidal trees than needed on the multi-leader–vase/bowl shaped trees.
- However, in the 2015-16 season, more pruning cuts were required to maintain the multi-leader trees than the single-leader trees.
- It is too early to conclude anything about the effect of uniconazole-P.
- In spring 2016, these trees produced between 14.6kg and 19.2kg of fruit per tree on average, with no significant differences between pruning methods. These yields are equivalent to 7,500kg and 9,800kg of fruit per hectare for these four-year-old trees.

These encouraging yields are a good result if they can be increased over time, which should in theory be the case, as the canopy covers more ground area and intercepts more sunlight. We'll keep an eye on it!

Acknowledgement

The authors would like to acknowledge the growers involved in small tree high-density trials, Dave & Julie Flett and John & Cindy Cotterell. Pruning contractors Michael Dillon and Chris Turner are thanked for their work and help. The authors are also thankful to the small tree workgroup for constructive discussions when setting up the trial, as well as NZ Avocado for their support, and MBIE for their investment in the research (contract 30253).

Biosecurity boost to bear fruit for farmers

The Federal Government is investing $2.2 million in three new plant biosecurity projects.

The projects include a trial of automated fruit fly traps and a strengthening of the fruit fly surveillance programme and a grants program for work to prove areas are free of pests.

Deputy Prime Minister and Minister for Agriculture and Water Resources Barnaby Joyce said many of Australia's trading partners required evidence of our strong biosecurity and freedom from pests and diseases to allow produce imports.

"To boost exports to these countries the government is providing funding to Plant Health Australia to support state governments and export industries to develop further evidence of pest free areas, to support new market access requests and maintenance of existing markets," Mr Joyce said.

"This work will give trading partners more evidence to be confident of claims of pest absence and area freedom. This makes things easier for exporters through minimising delays and allowing producers to get a better price for their quality produce overseas."

Mr Joyce said the other grants would be directed towards the management of fruit fly, the world's most damaging horticultural pests, and a major threat to Australia's $10.5 billion horticultural industries.

"We are funding a pilot of automated traps to help detect fruit flies early, which will also help prove areas are free from this pest and save growers, who currently monitor traps manually, valuable time and money," he said.

"We are also strengthening the National Exotic Fruit Fly Surveillance Program, which operates at many entry points into Australia to stop exotic species entering and becoming established.

"This represents a further investment in our biosecurity system which underpins agriculture's significant contribution to our nation's economy and safeguards us all from damaging pests and diseases."

$21 million plant biosecurity push

Australia is on track to adopt some of the most sophisticated plant pest surveillance technologies in the world after Hort Innovation secured a Federal Government grant and co-investor funding to deliver a $21 million plant biosecurity push.

Announced by the Australian Government in May, the $6.8 million Rural R&D for Profit grant will complement more than $14 million in investment across the seven plant Research and Development Corporations (RDCs) and partners such as the CSIRO, universities and state government agencies. Vegetable industry body AUSVEG and Plant Health Australia are also key collaborators.

Hort Innovation chief executive John Lloyd said the new project, which began in July, would further safeguard Australian agriculture from pathogen and pest incursions.

"The early detection and identification of any new pathogen or pest is critical, and a pre-emptive approach is vital to control," he said. "Pests and diseases can devastate growers, affect the supply of timber, food and fibre products and hinder trade opportunities."

"This new initiative will utilise next-generation technologies to build on Australia's reputation for offering clean, green plant products."

As part of the five-year project, eight state-of-the-art mobile pest monitoring hubs will be constructed, including a suite of smart surveillance traps that capture airborne fungal spores and insects and reference them against GPS, temperature, humidity, wind speed and direction data.

That data will then be fed real-time into cloud-based system AUSPestCheck – a national database already being used by State and Territory governments. It will then be distributed to producers, governments and industry groups in the form of immediate alerts, pest forecasts and general reports to support fast, informed and collaborative decision making.

Mr Lloyd said these pilot monitoring hubs would be positioned on the edges of incursion areas to prevent the spread of threats, and also in new pest and disease zones to determine the breadth of any problems. They will also be employed for spot checks in pest-free regions, with the data gathered used to support market access.

"This new initiative will utilise next-generation technologies to allow producers to receive timely and accurate information about pests and pathogens in their region, help them with management decisions, reduce resistance and demonstrate pest-free status to export markets."

Throughout the life of the project, producers will be trained to access the data system, and shown how to use it to improve farm productivity and reduce farm input costs.

This announcement comes off the back of the nation's plant RDCs' commitment to unite efforts to strengthen Australian plant biosecurity, made in March. It also complements the Federal Government's announcement of three separate biosecurity projects on May 13.

Renowned scientist heads plant biosecurity initiative

A renowned Australian scientist with more than 25 years' experience in plant disease, biosecurity and microbiology has been appointed the director of the national Plant Biosecurity Research Initiative (PBRI).

Dr Jo Luck will lead the development and delivery of plant biosecurity research for PBRI – a new partnership between seven plant Research and Development Corporations (RDCs).

Hort Innovation chief executive John Lloyd said Dr Luck is the ideal candidate for the PBRI director role.

"Dr Luck has a strong track record of delivering results throughout her 30-odd year career in plant sciences," he said.

Dr Luck will be charged with helping unite biosecurity research efforts across the plant RDCs, stamping out any repetition in funding and making recommendations for new investment in consultation with producers and other stakeholders.

She will also work with key biosecurity stakeholders to identify research area priorities, engage funding partners and keep government and other stakeholders informed of activities.

Dr Luck is the former research director at Plant Biosecurity Co-operative Research Centre. Before that, she was the principal research scientist of microbiology at the Victorian Department of Primary Industries, and performed roles at NSW Agriculture, NSW Fisheries and La Trobe University.

Dr Jo Luck will lead the development and delivery of plant biosecurity research for PBRI.

Greg Fraser, PBRI chair and Plant Health Australia chief executive, said Dr Luck had a detailed understanding of funding and research in biosecurity, and "is well known and well regarded by many of the key stakeholders that will be involved in the new research partnership".

PBRI – comprising the wine, wood, cotton, grain, rural industry, sugar and horticulture research and development corporations – currently invests $55 million per year in research to manage pests and diseases that affect Australian plant crops.

Agriculture remains one of Australia's most dangerous industries

July included National Farm Safety Week, and according to Safe Work Australia statistics, there's still a lot of work to be done to make agriculture safer.

As at 13 July this year, 20 people in the agriculture, forestry and fishing industries had lost their lives at work, and 41 in total died during 2016. The latest Safe Work Australia data is based on initial media reports and is a preliminary estimate.

As Farm Safety Week got underway, Assistant Minister to the Deputy Prime Minister, Luke Hartsuyker, noted agriculture was the biggest employer in rural and regional communities, making farm safety should be a priority for everyone in the sector.

"One of 2017 National Farm Safety Week's main focuses was quad and vehicle safety, given tractors, other machinery and quad bikes are the leading causes of deaths on farms."

According to Safe Work Australia's Work-related traumatic injury fatalities, Australia 2015, between 2003 and 2015, there were 744 agricultural fatalities in total, or 23 percent of all worker fatalities. Of those, 247 died in a vehicle collision or rollover. In 2015 alone, there were 52 fatalities.

The latest statistics here: *www.safeworkaustralia.gov.au/statistics-and-research/statistics/fatalities/fatality-statistics-industry.*

PHA levy now in place

The 0.1 cents per kilogram Plant Health Australia (PHA) levy was confirmed in the May 2017 Federal Government Budget, and implemented from 1 April 2017.

The government introduced a PHA levy on fresh avocados, as proposed by Avocados Australia, to support biosecurity management for the industry. There is a corresponding reduction of 0.1 cents in the existing avocado R&D levy rate from 3c/kg to 2.9c/kg.

This levy will help the avocado industry manage biosecurity and meet its obligations with government.

As with the R&D and Marketing levy, this will be collected by the Australian Government, but remitted to PHA.

You can find out more on lodging returns and paying levies here: *www.agriculture.gov.au/ag-farm-food/levies/lodging_returns_and_paying_levies.*

'Ripe & Ready to Eat' in Singapore

By Jenny Margetts, P2P Business Solutions

In recent week Australian exporters, Avocados Australia and the Department of Agriculture and Fisheries Queensland have been working together to support 'ripe & ready to eat' export trials in the Singapore market.

"We have a great advantage in Singapore in that our fruit is the freshest and we want Singaporeans to be able to access 'ripe & ready to eat' Australian avocados," Avocados Australia CEO John Tyas said.

"We know from research here in Australia and in other countries that offering a 'ripe' selection of fruit will increase overall sales in the category."

Antony Allen, CEO of The Avolution, who was supporting the trials in Singapore, said one of the challenges was to have consistently 'ripe' product in the best possible condition for the consumer.

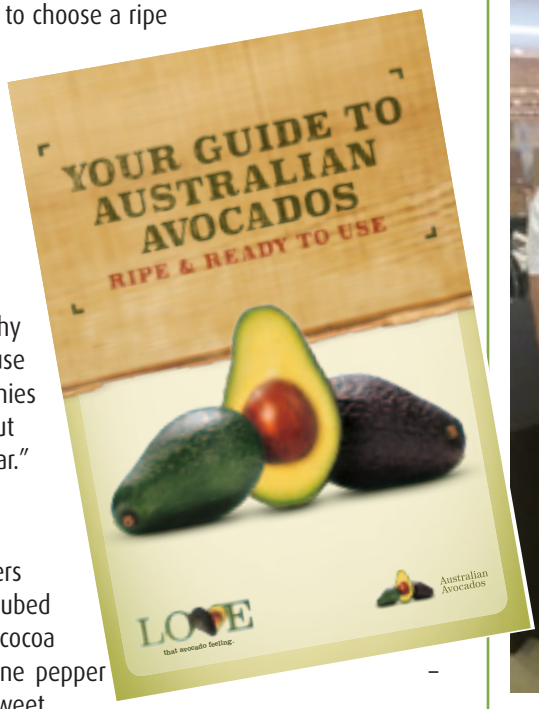
"This means it's important that everyone along the supply chain plays their role. In recent weeks we have been working with our importer to deliver a 'ripe & ready to eat' program through one of the supermarket chains in Singapore," Mr Allen said.

The project team is delivering training to staff members tailored to meet the needs of the supply chain businesses and at the same time helping educate consumers in Singapore.

"Primarily, Singaporean consumers seem interested to know about how they can use avocados and how to tell if an avocado is ripe, so we are using point-of-sale leaflets to educate consumers on how to choose a ripe avocado, ways they can use them and why they should be buying Australian avocados," Mr Tyas said.

"They know that avocados are healthy for you and often use avocados in smoothies with milk or coconut milk and palm sugar."

In recent store demonstrations in Singapore, customers were offered ripe cubed avocado dipped in cocoa powder and cayenne pepper – a combination of sweet and savoury, which most customers seemed to enjoy. Changing culinary trends in Singapore are also resulting in avocados being used in other ways, such as in salads and guacamole.



Consumer education material being distributed to Prime Supermarket customers to educate them on purchasing ripe avocados.

"It is also often said that Singaporeans prefer to buy their avocados unripened and wait for them to ripen at home," Mr Allen said.

"Our anecdotal evidence, from the work that has been undertaken in recent weeks, is that consumers may be more interested in purchasing 'ripe' fruit than the market expects. As part of the process, sales data and feedback from the supply chain partners in Singapore is being analysed to see how the figures stack up."

The range of training materials Avocados Australia and DAF Queensland have developed for supply chain parties is being tested and modified to suit the market. It builds on previous industry work and aims to improve ripening and handling skills along the supply chain to retail store. Although the focus is on retail, the training being undertaken will also benefit food service supply chains that Australia services in Singapore.

On the Australian side, Avocados Australia is looking to support growers and exporters in the adoption of improved handling practices so that the fruit being offered in export markets is of the highest quality.

"We know that with the increasing supply of avocados in the coming years that the development of premium export markets will be very important for our industry," Mr Tyas said.

The Mahota chef and product demonstrator for Australian avocados at the Prime Supermarkets' flagship Mahota Commune store.

"We are heartened to see that growers are actively asking for information about how they can support and participate in export supply chains. During the next year we plan to work with our exporters and growers to help the whole industry gain a better understanding of export requirements and have fruit that is export-ready."

Acknowledgement

These market development activities are being undertaken as part of a project being funded by the Australian Government's Package Assisting Small Exporters Program, the Avocado Export Company, Sunfresh and The Avolution.

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Maximising fertigation results

By Shane Singh, AgriHort Solutions

Fertigation is a broad term that means delivery of dissolved fertiliser through irrigation water. It is a great technology that provides growers with the flexibility to deliver nutrients to the crop when required; rather than according to work schedule.

Fertigation combined with a good nutrition plan targeting the nutrients needed for set, sizing and fruit quality produce apparent results at harvest that extend through the postharvest supply chain.

Whether you are considering fertigation or already have a system in place your irrigation infrastructure is the most important thing to ensuring uniform delivery of fertiliser to your crop. Uniform delivery is the key to successful fertigation, without it you may find production variability within blocks and not all irrigation systems are designed to operate fertigation systems.

So, if you are considering fertigation as an innovative technology for your enterprise or you already have a system in place here are some points for your attention.

New technology?

In many areas, this is not new technology, however, in areas that have traditionally relied on high rainfall, irrigation and fertigation are now being investigated as a way to increase yield and reduce biannual bearing.

a. **Irrigation type** – Drip irrigation effectively delivers water and nutrients directly to the root zone however if substantial volumes of fertiliser are applied, root damage can occur. Low level sprinklers are suitable for fertigation; they deliver water and nutrients to a larger area outside the rootzone which is largely uncontrollable. Sprinklers have shown benefits with orchard cooling and should not be dismissed based solely on fertigation requirements.

b. **Fertigation type** – There are many fertigation systems in the market place, most systems can be classified into three fertigation types:

   i. Bulk dosing – As it implies, you fertigate a large amount in a brief period, this can be daily, weekly, or monthly depending on how involved you want to get.

   ii. Continuous fertigation – This method is more involved and requires a better understanding of fertigation and plant nutrition. It applies small amounts of fertiliser constantly whenever irrigation is applied.

   iii. Open Hydroponics – Like continuous fertigation with a couple of differences. Fertigation Electrical conductivity (EC) and pH are adjusted to suit the crop physiology requirements.

c. **Filtration** – A separate filtration system will be required for fertigation tanks and injection points to avoid undissolved or incompatible fertilisers entering the irrigation system that can clog up lines, drippers or sprinkler heads.

d. **Property size** – The size of the farm will influence the distance the fertiliser needs to travel before it reaches the desired block to be fertigated, it could be minutes or hours.

Fertigation mixing and holding tanks.

It may be more practical to have multiple injection points on larger farms.

e. **Construction materials** – Fertilisers can vary in their acidic/alkaline properties and can cause damage to older systems with fibro-cement mainlines and some types of fittings in newer irrigation systems.

Irrigation system maintenance

This should be on the top of your list! Without a well-maintained system, you are throwing your money away. Problems created through lack of maintenance include:

a. under or over watering

b. increased power costs

c. uneven watering due to blocked emitters or lack of pressure

d. loss of production and profitability.

To maintain your irrigation system, you should check your operating pressures and implement a regular maintenance program to:

a. flush the mainline, submains & irrigation lines

b. remove Algae growth using either Chlorine or Hydrogen peroxide

c. remove deposits caused by irrigation water and fertilisers using acids.

Caution must be taken when using chlorine, hydrogen peroxide and acids. Incorrect handling of these products can cause damage to your health or your infrastructure. It is always best to seek specialist advice when using these products.

Water source

This is generally not a major problem in Australia but in some areas irrigation water can cause problems. Water quality aspects that should be considered are: pH, alkalinity, water hardness, Electrical conductivity (EC), Sodium Absorption Ratio (SAR), Chloride and contaminants.

Having these water quality parameters tested can give you an indication of any issues and the suitability of the water source for your crop. You should consider getting your water tested and regularly testing the pH and EC; both are good indicators for any changes in water quality.

Fertilisers

The choice of fertilisers are endless, there always seems to be a new one on the market. So, consider the following when selecting fertiliser for fertigation:

a. Liquid fertiliser vs dry soluble fertilisers

Maximising fertigation results continued

i. Generally liquid fertilisers are the same as dry soluble fertilisers, the difference is someone has premixed the fertilisers into a fertigation solution for you and for this privilege you pay a premium over dry soluble fertilisers.

ii. Many liquid fertilisers claim to be more available to plants than dry soluble fertilisers, this is generally not the case.

iii. When choosing the fertiliser type, one must consider cost, ease of use and/or occupational health and safety. Either dry or liquid fertilises are suitable for fertigation.

b. Tank mixing

i. Fertiliser solubility is a major consideration when mixing fertilisers, if the solubility limit is exceeded the fertiliser will stop dissolving. The main consideration in fertiliser solubility is the type of fertiliser and water temperature, for example Potassium Nitrate has a solubility of 21kg/100L @ 10oC and 32kg/100L @ 20oC.

ii. Nitrate based fertilisers create an endothermic reaction when mixed in water which means that the water temperature drops and you might find that a water temperature of 20oC has become 15oC, affecting solubility and tank mixing.

iii. Not all fertiliser are compatible and major problems arise around Calcium based fertilisers. Care must be taken when mixing up fertilisers at all times; I have seen compatibility reactions occur between fertilisers just because the fertigation tank was not cleaned between tank mixes.

Crop nutrient requirements

It is important to meet the nutrient requirements of the crop and this starts with a good nutrition plan. Do your homework and look at your soil organic matter levels, soil structure, cation exchange capacity (CEC), soil water holding capacity, crop load and previous fertiliser applications.

A good nutrition plan needs to be monitored and adjusted throughout the season based on soil and leaf analysis, tree health, crop load, climate and tree physiology.

Your irrigation infrastructure is essential to maximising fertigation results. Now is a good time to implement your irrigation system maintenance plan.

Avocado grower reinforces irrigation practices

By Growcom

The Lockyer Valley is renowned as a key food bowl in Australia, with a range of produce being grown in the southern Queensland region each year. However, that doesn't mean farming in the area is without challenges.

Robyn Lubach, Redbank Plantation, Queensland has been using overhead sprinklers and mulch as a way to beat the heat.

Robyn Lubach owns Redbank Plantation near Gatton, where she works with farm manager Brad Wilson to produce Hass avocados from 4,700 trees across 24 hectares. Avocados require plenty of water and free draining soils, both of which are present at Redbank Plantation. However, managing heat has been a big challenge in recent years.

"In the first three months of this year, 15 out of 30 days of each month have been over 35°C, and avocados like to be below that temperature," Ms Lubach said.

"We've installed overhead sprinklers and that has helped by bringing the temperature down by five degrees in the orchard when they're running. The other thing is root health, because if we don't have good roots we don't have fruit. We use hay or avocado chip for mulching, and this helps to improve moisture-retaining capacity of the soil and also the health of the soil."

Redbank Plantation was originally chosen for its sandy loam soil, as avocados don't like to be waterlogged. While Robyn Lubach says they have a good handle on their soil types, EM mapping done through Growcom's Hort360 program has uncovered some critical information.

"We have a few wet spots, some we were unfamiliar with, but because of the EM mapping, we are going to look at doing a double mulch throughout the year on the super sandy areas to help improve and retain that moisture and hopefully improve the texture of the soil as well. The flow-on impact of better mulching should result in better retention of fruit, mainly because of increased roots taking foundation in the soil. The trees are in a happier place and so therefore not only will they set fruit, but they will hold that fruit when we get into a heat stress situation."

Through the Rural Water Use Efficiency Program, Growcom staff also recently tested the fertigation system on Redbank Plantation, to test how long fertiliser was taking to travel from the pump to various sections of the orchard.

Ms Lubach said they had been previously incorrectly advised that it took four minutes from one end of the line to the other.

"We weren't actually taking that advice, which was just as well because Growcom put the dye through the water and found it took 16 minutes to reach the end of the line," she said.

"Thanks to Growcom, with this new information, we can now be guaranteed that the fertiliser is being delivered to where we want it delivered, not sitting in the line."

Acknowledgement

Growcom's RWUE-IF program for horticulture is part of the Rural Water use Efficiency Initiative funded by the Queensland Department of Natural Resources and Mines.

More information

View the video here: *www.youtube.com/watch?v=ZATsma_1WH8*.

Contact Growcom's Kathleen Heuvel, 0427 138 118 or kheuvel@growcom.com.au.

News in brief

Avocados Australia AGM update

Avocados Australia members are invited to the Avocados Australia limited Annual General Meeting in November in Brisbane, Queensland.

Full details will be sent to all Avocados Australia Limited members and provided on our website closer to the time: *www.avocado.org.au/events/*.

Quarter 1 trade report released

In the latest Hort Innovation *Horticulture trade intelligence* report for avocados, it has been reported export volumes increased 10 percent year-on-year, due to an increase in exports to Hong Kong.

Compiled by market researchers Euromonitor International, the Horticulture Trade Intelligence reports capture insights for key fruit, nut and vegetable products in Australia from January to March 2017.

"This trade performance data will give Australian growers the tools they need to gauge what is happening in markets around the world to identify potential market opportunities and, where necessary, adjust their farm operations and marketing accordingly," Hort Innovation Chief Executive John Lloyd said.

The report notes the significant growth in exports to Hong Kong (a 1,150 percent year-on-year growth, representing a 12 percent volume share of that market) can be attributed to its role as a re-export hub, from where avocado supplies are sent to China to meet the country's growing demand.

Australia's avocado industry continues to focus on developing a core market in South East Asian nations.

Despite this, the report also notes Chile, Mexico and the US continue to dominate exports to key Australian destinations such as Singapore and Hong Kong.

The avocado trade report is available in the BPR Library in the Market Data section. You can log in (or request access!) via *www.avocado.org.au/best-practice-resource/*.

Hort Innovation releases 2015/16 statistics handbook

Covering the year ending 30 June 2016, the latest *Australian Horticulture Statistics Handbook* combines all available data on production, international trade, processing volumes and fresh market distribution in order to produce statistics on 75 horticultural categories, including avocados.

According to the report, the domestic market remains dominated by the competitive intensity in the retail channel with the growth generated being attributed to products in smaller portions and meal ready forms. The food service channel is generating growth as consumers are drawn into using more technology-enabled ordering tools and are spending more of their food dollars on eating out.

Domestically, the report says 56 percent of Australian households purchased avocados, buying an average of 508g per shopping trip. The consumption per capita was 3.1kg in 2015/16, based on the volume supplied.

The statistics handbook is available here: *http://horticulture.com.au/australian-horticulture-statistics-handbook-downloads/*.

Alvin Avocado at the Blackbutt Avocado Festival

Join Alvin Avocado at the 2017 Blackbutt Avocado Festival, on 9 September, at Blackbutt in Queensland.

Among the event's many features is Avo Central, where there will be sales, demonstrations, cooking, recipes, competitions and more. And for gardeners keen to have their own avo tree, over in the Avo Grow Tent you'll find information on growing, grafting, fertilising and more.

You can find out more on their Facebook page: *www.facebook.com/bbbfestival/*.

New Hort Code helps protect growers

A new mandatory Horticulture Code of Conduct was introduced on 1 April 2017.

Avocados Australia CEO John Tyas said the new mandatory Code addressed many of the difficulties with the previous code and aimed to protect growers by ensuring transparency around how they worked with their agent or merchant.

"It's really important that growers are aware that they must have a written contract – a Horticultural Produce Agreement (HPA) – with their agent or merchant," Mr Tyas said.

"The Australian Competition and Consumer Commission (ACCC) website has developed some useful example HPAs that you can uses a template to develop your own agreements."

Much of the Code remains the same as before. As before traders must publish their terms of trade, enter into horticulture produce agreements (HPAs) before trading with growers, and ensure growers are paid within the agreed timeframe.

The Code:

- requires growers and traders to have a HPA and applies to all HPAs
- obliges all parties to deal in good faith
- obliges merchants to explain how price will be calculated
- includes penalties for breaching certain sections of the Code
- requires growers, agents and merchants to keep certain records.

Growers with an existing written HPA signed before 1 April 2017 have until 1 April 2018 to make sure it includes the things listed in the new Code. This includes all HPAs entered into prior to 15 December 2006 when the original Code was introduced. If a HPA is changed before 1 April 2018, the whole Code will apply from the date it is changed.

Some parts of the Code will apply to all HPAs from 1 April 2017, including the obligation to deal in good faith and the dispute resolution procedure.

However, there are also exceptions.

"The Code doesn't apply to direct transactions between growers and retailers, growers and exporters or growers and processors," Mr Tyas said.

However, according to the Fresh Markets Australia (FMA), the Code does apply to "transactions between all parties who meet the definition of being a Trader or a Grower".

According to FMA, this means the Code applies to growers who source another grower's produce to consolidate loads for on-sale, and to "off-Market" wholesaling businesses operating outside the Central Markets but that often on-sell produce to Central Market Wholesalers.

More information

www.accc.gov.au/business/industry-codes/horticulture-code-of-conduct#protecting-growers

Hort Innovation Marketing Update

By Claire Tindale-Penning, Marketing Manager, Hort Innovation

Welcome to the *Talking Avocados* Winter 2017 marketing update, where we give you a snapshot of the latest marketing activity that's helping Aussie consumers connect with (and eat!) Australian avocados. This activity is managed by Hort Innovation on behalf of the industry, and is funded by the avocado marketing levy. Hort Innovation develops consumer-focused promotions using a variety of channels, including social media platforms such as Facebook and Instagram, as well as targeted partnerships with consumer-related publications and platforms.

Avocado Brand Health Report from Nielsen

So what has marketing activity meant for avocado sales? Looking at the year period to 17 May, 2017, the great news is that avocados have seen an increase across all their Nielsen KPI* Metrics. These metrics are Penetration (percentage of households who have purchased avocados), AWOP Volume (the total average weight of avocados (kilogram) purchased per household) and AWOP $ (the average spend on avocados per household). Compared to the same period in 2015/16, the percentage of households buying avocados has gone from 69.2 percent to 71.4 percent.

Not only are more people buying avocados, they are also buying more avocados annually, and as a result are spending more, with the average annual household spend increasing from $36.77 to $38.40 each per year. This was driven by people purchasing the same amount of avocados each shopping trip as they had the previous year, but shopping for them more often.

Digital activity

The 13-week digital video campaign wrapped up on 10 June. As part of this activity, the industry's 30-second TV commercials were deployed across various websites, such as news.com.au, as well as catch-up TV services including tenplay.com.au, to bring the Australian Avocados message to consumers watching their favourite programs online instead of on traditional television. During the total campaign, Australian Avocados reached over 1.117 million people – a fantastic result.

The digital activity also beat benchmarks for key performance metrics, including the number of people who viewed the 30-second spots in their entirety (just under 90 percent of viewers did this, with the benchmark at 70 percent).

Digital activity also included a partnership with popular online media site Buzzfeed, which ran for two months and also finished in June. This activity was targeted to female grocery buyers aged 25 to 54, and involved two avocado-themed articles posted to educate and inspire readers:

- **The ultimate how-to guide for avocado lovers**, providing a fun, illustrated guide to choosing, using and storing the fruit
- **18 delicious ways to use avocado... that don't involve smashing it on toast**, which featured a range of innovative and delicious sweet and savoury recipes, such as avocado brownies with avocado ice-cream, and warm Moroccan avocado and vegetable salad.

Combined, these articles received a total of 90,874 views. Proving just how engaging and the content was, more than 5,500 of these views were essentially free, thanks to people being inspired to share the content on their own social media accounts.

In addition, there was an animated reel based on the ultimate how-to guide article that was shared on the Buzzfeed Australia Facebook Page. This video was viewed by nearly 100,000 people, and resulted in 14,623 clicks to the Australian Avocados consumer website. In total, the industry partnership with Buzzfeed resulted in more than 168,000 views to Australian Avocado content.

Social media

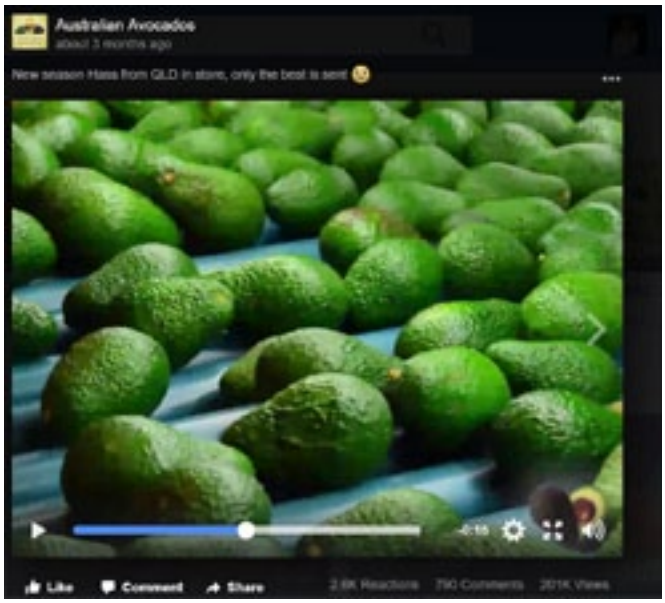
The 'always on' approach to Australian Avocados social media has continued across both the consumer-facing Facebook page (www.facebook.com/AustralianAvocados) and Instagram account (@AustralianAvocados) with fans continuing to be engaged with and inspired by avocado content. In fact, the Facebook page achieved its second-highest results in the social media campaign to date in April, reaching some 1.24 million consumers, with close to 790,000 people directly engaging with the brand across the month. Video content in particular resonated with the industry's target audience, with the top-performing post for the month being a video featuring vibrant new Hass avocados from Queensland getting ready to reach consumers – perfect

**DISCLAIMER Hort Innovation makes no representations and expressly disclaims all warranties (to the extent permitted by law) as to the accuracy, completeness, or currency of information provided by Nielsen, contained within this report. Recipients or users of the information contained herein should take independent action before relying on its accuracy in any way.*

Hort Innovation Marketing Update continued

for drumming up excitement for the variety's season and lifting spirits with the Shepard season coming to an end!

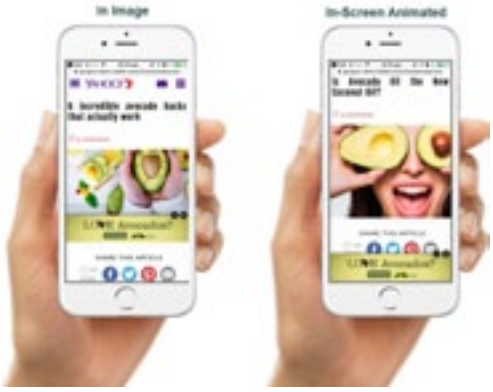
In recent months there have also been many fans taking to the kitchen and then sharing their avocado recipes on the Facebook page, showing their passion for avocados. In short, the sentiment from avocado followers is overwhelmingly positive, and the posts have also been very effective in driving people to the Australian Avocados consumer website. In April alone, there was a 48 percent increase in people visiting the website, with social media posts driving 38 percent of the total traffic.



Hass avocado Facebook video.

Mobile

From mid-March to mid-June, mobile phone ads proved a successful component of the industry's marketing activity. This involved the placement of 'Love Avocado' ads on mobile devices, targeted to people who were viewing or searching for avocado-specific and avocado-related content online (for example, 'healthy lunch ideas') who were also in the industry's target market – main grocery buyers, aged between 25 and 49 – with a proven interest in food, health, lifestyle and similar topics.



The visually striking ads, pictured, had a strong call to action, prompting people to click through to the Australian Avocados website to get avocado recipes and more. More than one million people were reached with this activity over the campaign.

The Sydney Royal Easter Show

The Australian Avocados partnership with the Sydney Royal Easter Show this year was a fantastic opportunity. Running from 6 to 19 April, the Royal Easter Show was attended by more than 922,000 people – a huge audience for the industries advertising at the event. The Australian Avocados TV commercial and 'Love Avocados' static ads were shown in various locations around the showground, including on the big screen in the main stadium, on banner boards in the stadium, and on 52 plasma screens around the event. Overall, the TV commercial was shown 110 times, and the static ads 714 times over the two-week period.

MyFoodBook

Avocado fans are loving the avocado content on MyFoodBook (*www.myfoodbook.com.au*), a recipe and cookbook community that includes more than 200,000 subscribers, and promotes

The Sydney Royal Easter Show avocado marketing activities.

The full video and audio of the industry's TV commercial was played to stadium crowds.

High-frequency static ads appeared on the big screen for added exposure.

The full TV commercial video was played on 52 plasma screens around the event.

Banner signage added another high-frequency format to display Australian Avocados messaging.

recipes to more than 2.8 million people each month. Australian Avocados activity has involved a number of recipes being included on the website, with the Avocado, Garlic and Cheese Pull-Apart Bread recipe at *www.bit.ly/2txtk6S* performing particularly well. As of 1 June, it had been viewed more than 18,200 times. This recipe has also proved popular on the Australian Avocados' website, being the second most visited page after the homepage in April.

Acknowledgement

Marketing activity is managed by Hort Innovation on behalf of the industry. Under the Hort Innovation Avocado Fund, it is funded by the avocado marketing levy.

More information

http://australianavocados.com.au/

Facebook: *www.facebook.com/AustralianAvocados/*

Instagram: @AustralianAvocados

News from Around the World

News from Around the World contains reproduced articles that have been published by various international news sources.

Redbay ambrosia beetle threat to US avocado

26 June 2017

It may have taken only one beetle and the fungus it carried to kill one-third of the nation's redbay trees, according to scientists at Mississippi State University (MSU) and the University of Florida.

Laurel wilt is a devastating disease of any tree or shrub species in the laurel family. The redbay ambrosia beetle, introduced from Asia into Georgia in 2002, carries the deadly fungus.

Neither the insect nor the fungus are native species. However, they pose a serious threat to an entire family of related trees and shrubs, including avocado, sassafras, swamp bay, northern spicebush and others, including some species that are threatened or endangered.

John Riggins, an MSU forest entomologist with the Mississippi Agricultural and Forestry Experiment Station, said 300 million redbay trees have succumbed to the disease, and related shrubs and trees were susceptible.

"The first time the redbay ambrosia beetle was encountered in the US was in a trapping survey in Georgia in 2002," Riggins said. "It was sort of written off at the time as an oddity. No one knew much about it, and often when you catch an insect like that around a port city, it's not given much attention."

But in 2004, large numbers of redbay trees around Jekyll Island, Georgia, began to die, and researchers began looking for a cause.

The redbay ambrosia beetle arrived in Mississippi and was first detected in Jackson County in 2009. That was a 300-mile jump from the next nearest infestations in Georgia and Florida. The insect then jumped to central Louisiana, south Arkansas and now southeast Texas.

"We don't know why it makes these big jumps. It likely happens in the movement of firewood or wood that people may be using for specialty projects. Redbay is not a commercial tree species, so it is not harvested for lumber, but some people like to use it for bowl turning or cabinet making."

Finding the cause of the plant deaths was just the beginning. Researchers then began looking very closely at the non-native, invasive insect.

"The vector and the pathogen entered North America as a single introduction," Riggins said.

Jason Smith, a forest pathologist at the University of Florida School of Forest Resources and Conservation, examined the fungus at a genetic level.

"It was a pretty significant surprise for us to discover there was no genetic variation and a single-strain pathogen vector system has caused such diverse and severe damage across the landscape," Smith said.

The laurel species of trees and shrubs is very diverse, but the single-strain pathogen being carried by the redbay ambrosia beetle is proving fatal to all hosts.

"It's been a real tricky problem to figure out how to solve," Riggins said. "After the insect and disease got here, the fungus was laterally transferred to other ambrosia beetles, making it extra difficult to control. The fact that only one female beetle has to survive adds to the difficulty."

In Florida, the beetle and the fungus it transmits have caused catastrophic damage in some avocado groves. Riggins said there are measures commercial growers can take to minimise the damage in these managed situations.

Source: *http://mafes.msstate.edu/news_item.asp?id=386*

Growth continues in international avocado market

30 June 2017

The international avocado market continues to grow. Importers in Europe are looking for enough volumes to meet the rising demand, and growers and exporters are striving to reach those same volumes and are investing in expanding the production. Not only in Europe is the demand rising, but also in Asia, where consumers are discovering avocados. Latin American countries are eager to supply these markets, but the Chinese, among others, are not willing to let the opportunity escape. The first Chinese avocados should be harvested in September.

Mexico is looking at Asia and the US

With an area of 120,000 hectares, the Michoacan region is considered to be the market leader. So far, exports stand at 945,000 tonnes, with the US, Europe, Asia and Canada as the main destinations. However, the US is, by far, the most important market, accounting for 90% of the volume.

A growers association from Jalisco is working on the export to the US, which is a very important market. Official figures point to a production area totalling 17,000 hectares, but according to

Grower Member Application Form

Avocados Australia Limited

ACN 105 853 807

The Australian avocado industry is a growing, successful and progressive industry. As the Australian avocado industry's peak industry body we work closely with all of the stakeholders that can have a direct impact on the marketplace. If you are looking to gain the maximum benefit from being a part of the Australian avocado industry we recommend that you become a member of Avocados Australia.

Avocados Australia provides online and offline information, programs, materials and events to advance the industry. On top of this there are other services we can provide that are only made possible through the support of our members. Join today. All membership enquiries can be directed to admin@avocado.org.au or call toll free 1300 303 971.

For Associate and Affiliate membership application forms please go to: ***www.avocado.org.au*** or call **07 3846 6566**

Member Details

Business name and/or trading name: _____

ABN: _____

Key contacts: _____

_____

Preferred address (postal): _____

_____

Address of property (if different): _____

_____

Contact Details

Business phone: _____

Home phone: _____

Fax: _____

Mobile: _____

Email: _____

Grower Member Application Form continued

Corporate Structure

How would you describe the nature of your operations (please tick)?

☐ Individual ☐ Partnership ☐ Company
☐ Trust ☐ Lessee ☐ Cooperative
☐ Other (please specify)_____

Please indicate the area of property that you crop for avocados (please tick)

☐ 0.5 - 5 ha ☐ 6-19 ha ☐ 20-49 ha
☐ 50-99 ha ☐ 100-149 ha ☐ 150-199 ha
☐ 200-499 ha ☐ 500 ha+

Payment Options

Grower Membership of Avocados Australia is **$250 pa** (+ GST).

You can pay your membership by cheque or credit card. To pay your membership fee, please choose one of the following options:

☐ **Cheque**
Please find enclosed a cheque for $275.00 made payable to Avocados Australia Ltd.

☐ **Credit Card**
Please charge $250 (+GST) to my credit card.
Details are listed below.

Credit card type (please circle): Mastercard Visa

Credit card number: _____

Name on credit card: _____

Expiry date: _____

Signature: _____

Once you have completed this form please place it in an envelope addressed to:

Avocados Australia
Reply Paid 8005
Woolloongabba Qld 4102

(no stamp required within Australia)

Or email ***admin@avocado.org.au***

For more information or assistance please go to ***www.avocado.org.au*** or call on **07 3846 6566**

News from Around the World continued

growers, the actual figure is closer to 22,000 hectares, or even higher. The difference is due to the fact that new plantings are not always taken into account.

However, the Chinese market appears to be very promising.

Peru expects 20 percent growth

The weather conditions at the beginning of the season will have an impact on the development of the campaign, but the new plantings should compensate for part of the losses. The country expects 20-25 percent growth this year. The main cultivation regions are La Libertad Department of Lima and Lambayeque. The export season kicks off in February and lasts until September. The peak is in June and July.

Europe is the most important destination market. Around 60 percent of exports go to Europe, another 30 percent is shipped to the US and Asia receives five percent. Latin America and Canada account for the other 5 percent. The domestic market is still small, but the sector wants to use the experience gained with promotions in the international market to boost the demand domestically.

Asia is a new market, but already accounts for 5,000 tonnes of exports. This will grow to 10,000 tonnes. Performance differs within the continent. The Japanese market is familiar with avocados and the ripening techniques, but pays a lower price than the Chinese; however, as explained by an exporter, in China, knowledge about the product is limited. As for new markets, Peru sees opportunities in New Zealand, Korea, Australia and Colombia.

Chile is entering Asia

Exporters of Hass avocados will focus more on the Asian market, especially China, in the medium and long term. The Association of Producers and Exporters of Hass Avocados sees this market as the future. Over the past two years, a lot of promotions have been carried out in Asia. For now, Europe is still the most important market for the avocados, and the exporters do not want to lose this market, according to the organization. The focus on Asia is primarily a matter of market diversification.

Chile has 24,491 hectares devoted to the commercial cultivation of avocados. After a long period of drought, production has recovered and the acreage has expanded. However, the figures are not yet at the same level as a few years ago, when the country had around 40,000 hectares of avocados. Last year, the main export markets were the Netherlands (which acts as distributor for Europe), the United States, the United Kingdom, Argentina and China. The sector is focusing more on exports. Due to the impact of prices, demand has fallen on the domestic market.

US: Demand higher than the supply

For some growers, the harvest in California started in January and is not over yet. According to the figures available, 75 percent of the harvest has been completed (as at original publication of 30 June). How long the season will last is difficult to say. In the south, the campaign will likely finish in early July, while growers in the north will probably continue until August. The prospect is for 90 million kilograms to be harvested this year, which is less than last year. Due to this decline, the demand is higher than the supply.

Chinese plantations come into production

The supply is rising slowly. Prices amount to around 160-180 yuan (20-23 Euro) per 4 kilograms for the top class. Lower classes generate up to 150-160 yuan. In September, the first large domestic plantation of Hass avocados will start with the harvest for the domestic market. The plantation is in the Yunnan province. The season lasts from September to February. In the coming years, the area in this province will rise to 13,000 hectares. Transport to the major cities on the east coast takes 48 hours.

Dominican Republic: limited exports

Last year, the value of avocado exports increased by 91%, from 16.6 million dollars in 2015 to 31.7 million dollars in 2016. The impact of the Mediterranean fruit fly reduced exports to the US, which was the main destination for the fruit. A significant part had to be sold on the domestic market or other export destinations. Total production oscillates between 200,000 and 300,000 tonnes per year, of which about 10% (30,000 tonnes) are exported. The rest of the production is for the domestic market.

Israel: lucrative avocados motivate investment

Over the past ten years, production has increased to 100,000 tonnes a year. About 60% of that production is exported, with 80% of shipments going to Europe. Russia is another important market. With over 50,000 tonnes of exports, Israel accounts for 6% of the world's avocado exports. In the winter months, Israel is the leading supplier in the European market. European demand grows slower during the export season (October to February) than in other months. Israeli exporters therefore believe that there is still a lot of potential.

Source: *www.freshplaza.com/article/178128/OVERVIEW-GLOBAL-AVOCADO-MARKET*