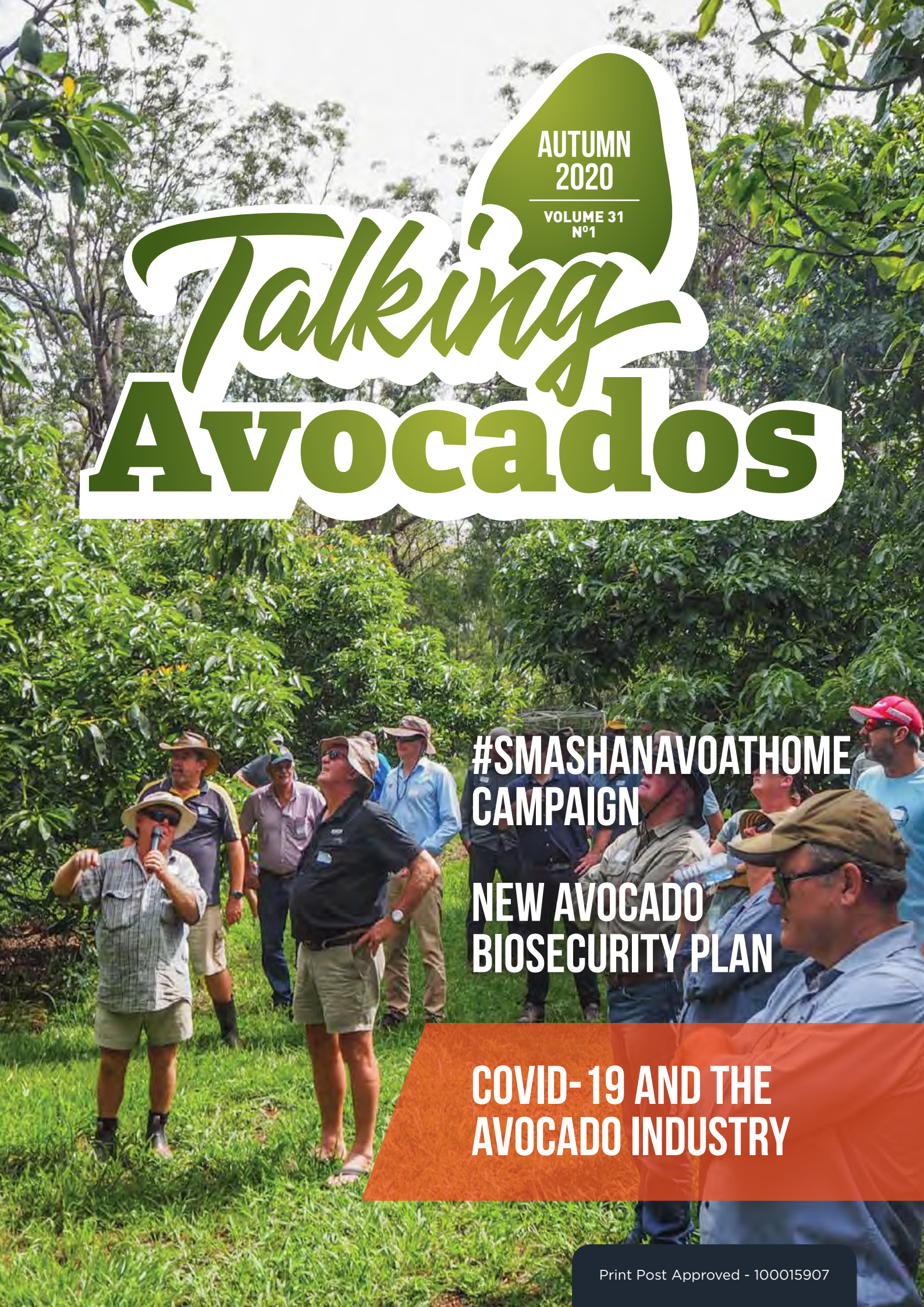

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2020
VOLUME 31
Nº1

Talking Avocados

#SMASHANAVOATHOME CAMPAIGN

NEW AVOCADO BIOSECURITY PLAN

COVID-19 AND THE AVOCADO INDUSTRY

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Hort Innovation
Strategic levy investment

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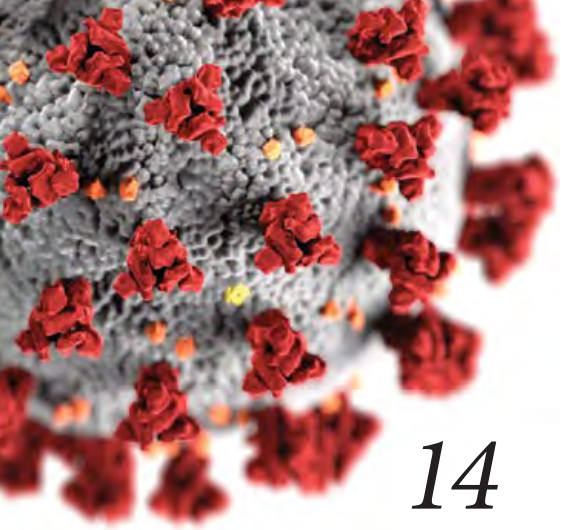
Avocados Australia



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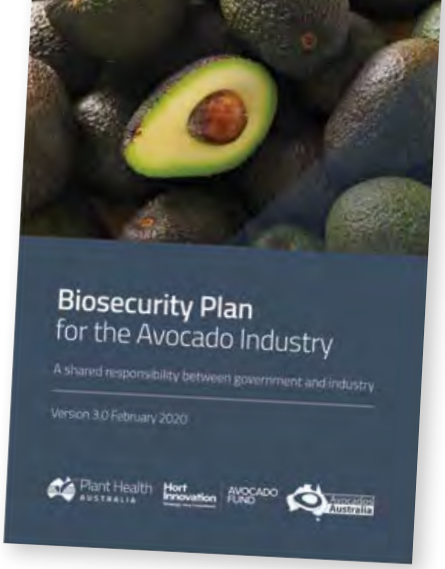

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COVER IMAGE: Andy Veal talks avocado production in his family orchard at the South Queensland Regional Avocado Forum at Blackbutt.

CHAIR'S PERSPECTIVE

Jim Kochi, Avocados Australia Limited

Safe to say, this is not the start to 2020 that any of us expected!

Last edition I mentioned frost, hail, droughts, fires and floods. Now we have a global pandemic. It feels like the sand is shifting under our feet all the time.

There are, however, some pillars of stability that we all need to focus on: the quality of our product, and encouraging Australians to smash their avo at home (more on page 43) on that.

These two pillars of our industry will see us through this crisis, and reinforce the very foundations of our industry.

Australians are already the highest consumers of avocado per capita in the English-speaking world, whether that's a brunch out with friends or eating at home. This fact has definitely served our industry well in the last few months, as we lost 10-20% of the market when food service was shut down, and access to our small but important export markets was severely curtailed by COVID-19.

As we enter the New Normal, I want to say again, there are two things we need to focus on and it starts with providing the best quality we can so that every time one of our consumers takes an avocado home, it's a good experience. This in turn leads to the second thing: increasing the at-home consumption of avocado.

You will read more about how the industry's levy-funded marketing has been heavily focussed on that in this edition of *Talking Avocados*, and also how growers have stepped up to spread the word with #smashanavoathome. I don't care if they smash it, mash it, slice it or dice it, I just don't want our consumers to ever go without their avocado.

You will also find items of interest in the R&D section outlining the industry's current work on fruit quality, including monitoring at retail level. We can't let this focus slide because of a little thing like a global pandemic.

An example of the new databar, incorporating the Kangaroo Label branding.

We have a product people love, and even better, it's good for them. We want to see more avocados in shopping baskets (alongside lots of fresh fruit, vegetables and nuts).

And let's not forget, there is an easy way we can help our customers pick up an Australian avocado, by making sure it carries the easily identifiable Kangaroo Label. This is always critical but right now, we know there is a focus across the world of consumers actively seeking out local produce. Here in Australia, let's make it easy for them.

CEO'S REPORT

John Tyas, Avocados Australia Limited

Well, last edition I said 2020 was shaping up to be another very busy year. How very true that was, just not in the way I thought.

We are now operating in a very different world, one where a global pandemic has caused massive changes and disruptions.

Everyone has had to make changes to the way they operate their businesses. At Avocados Australia, we have been working hard to keep industry informed of new developments and sharing resources to help industry manage through this difficult period. We have also been working closely with Hort Innovation to adapt the marketing program to the changed market conditions (more on page 43). We are all now looking forward to a time when the 'new normal' becomes the 'old normal'.

Season outlook

The April 2020 *Quarterly Infocado Report* has recently been published and released to contributors. It shows that avocado supplies should be fairly steady for the remainder of 2020. While market options for Class 1 fruit are currently limited due to the restrictions on the food service market, we expect this to ease as restrictions are hopefully eased in the coming months. The southern areas of Western Australia and the Tristate region are forecasting much lower production this season as a result of unfavourable weather conditions during fruit set. As a result, supplies of Australian avocados are expected to be much lower in January, February and March 2020.

Chile import conditions released

In any other year, this would be much bigger news and it still does have the potential to impact on the Australian industry. The Australian Government has released the import conditions for fresh avocados from Chile. This means that it is now possible for Chilean avocados to enter the Australian market, but the likelihood of this happening is hard to judge in the current circumstances. However, the light supply of Australian avocados expected in early 2021, presents an unexpected opportunity for Chile. You can find the import conditions via: *https://bicon.agriculture.gov.au/BiconWeb4.0/*.

Hort Connections

As with so many events this year, Hort Connections will not go ahead in 2020. Instead, Avocados Australia will be an industry partner for the June 2021 event in Brisbane. We are still planning to host an avocado-specific event, focussing on supply chain aspects. We will know more in the new year.

Updating the crop cycle calendars

Growers who are interested in learning more about how their trees grow through the season are invited to contact Simon Newett to discuss what is involved and how in the process they can also help to update the industry's crop cycle calendars. (The current calendars can be found in the Growing section of the Best Practice Resources.)

Growers (and advisors) who would like to participate will receive a recording sheet and instructions to collect the observations necessary to create growth cycle(s) for their farm and varieties.

Simon and the team at AV17005 hope to add calendars for additional varieties and new growing areas, and update those already existing. Please contact *simon.newett@daf.qld.gov.au* if you are interested.

Do you know a new grower?

Do you know a new grower who isn't receiving industry communication? We encourage you to recommend they subscribe (for free) to the fortnightly *Guacamole* newsletter, for the monthly *Avo Alerts*, and for this magazine.

As we all know, new growers have joined the industry in every region in the last few years. It is important that new growers stay well informed about industry matters and we are very keen to engage with them.

Encourage new members of our industry to make contact via *admin2@avocado.org.au* or by calling 07 3846 6566 for more information about our various publications and activities.

Avocados Australia CEO John Tyas talks all things industry at the packed Sunshine Coast Regional Forum in Bellthorpe, Queensland.

AROUND AUSTRALIA

TRISTATE

By Kym Thiel

The next 12 months promises to be as challenging as ever for the Tristate region with a number of issues facing growers, let alone the impact of the COVID-19 pandemic. Water allocations, light crops and now market conditions promise to dent what might have otherwise been a reasonable year.

All of this highlights the importance of growers being as informed as possible and supplying as much information as possible into the system. Avocados Australia has done a huge amount of work, working with other industry and government sectors trying to limit the impact of the virus and as growers in this region we can count ourselves lucky that we are not in the middle of harvest at the moment. However, it will still impact on us and who knows when restrictions will be lifted.

I would predict a later start to harvest at this stage and with a lightish crop there should be no rush. Industry is fully aware of the importance of changing shoppers' habits and encouraging them to use more avocados in home as opposed to eating out. Less blemish and better fruit quality should help improve packouts and make more fruit available for the major market at this time which is the supermarkets.

Although the crop is lighter than the previous year it is not as light as expected for many. Many growers have commented to me how well the fruit set considering the extremely light flowering. A very mild and much cooler February and March than 2019 helped this fruit stick and in many cases give growers at least average an crop.

South Australia will announce its next water allocations for 2020/2021 in mid-June. The water market changed dramatically since the millennium drought and growers need to be informed about all aspects of this market including carryover.

With public meetings impossible at the moment, it is imperative that growers sign up and attend webinars where possible or get the information sent to them. If you missed our Tristate Regional Forum webinar, I encourage you to watch the recording, available in the BPR Library, under Event Proceedings. International speaker Dr Inaki Hormaza provided us with an insight into understanding flowering and maximising fruitset, based on his research in Spain.

CENTRAL NEW SOUTH WALES

By Ian Tolson

Well what an interesting six months it's been. Firstly drought, compounded by horrendous fires, then some flooding and now another challenge… COVID-19.

The issues of the drought and fires were soon pushed aside once the rains arrived. Orchards with irrigation had been in survival mode, with enough water to stay alive and hold as much of the crop as possible. Those without irrigation were looking very sad and growers were wondering whether they would have any crop to harvest. What a difference good soaking rain makes. Orchards are flourishing and crops are looking good.

However, the world as we knew it no longer exists; for how long this life changing event will continue is anyone's guess. So far, with agriculture considered an essential service, the effects for this region will not be felt until harvesting begins. The challenges will be many, but as usual they will just need to be worked through. Staffing, especially backpackers who have not been in contact with sufferers will be hard to find. Policing, for the want of a better word, the extra hygiene and sanitising routines will require patience and persistence and possibly more use of the translator app on our phones.

The push, over the past few years, for growers to strive for Premium grade fruit will be realised this coming season. Any grade other than Premium, at this stage, will struggle to find a home. The closure of restaurants, cafes and growers' markets where this fruit was either used or sold has left a massive whole in available outlets. Processing doesn't have the capacity or demand to accommodate the added volume of lower grade fruit. On the bright side of things though, fruit shops are still operating and may be able to cover some of that excess volume.

As an industry it will take a unified approach and co-operation across states and growers to manage the predicted volumes, to provide the best financial outcome for all.

The other challenge for the industry is to keep the demand for avocados. Reminding consumers that avocados can be used in many dishes, are affordable, all fresh produce is good for your immune system and that your brekkie treat of smashed avocado on toast can be made quickly and easily at home.

For growers the message remains the same, provide the consumer with the best possible avocado. This virus will be the biggest learning curve our industry has come across. Who knows when the next life altering virus will be upon us and if consumers have faith and confidence in avocados then maybe the demand for avocados will be up there with toilet paper and hand sanitiser.

SUNSHINE COAST

By Robert Price

Well, we certainly live in interesting times. While we have now adjusted somewhat to the "new normal" of living with a global pandemic, I am sure it's been a tough time for some in the industry. Thankfully, food service has started to re-open, providing for a steady (we hope) rebuilding of demand for fruit into that sector.

At the time of writing, the COVID-19 curve in Queensland had well and truly bent the way we need it to, with intrastate easing of restrictions ahead of schedule. We cannot, however, afford to be complacent in our health and safety practices on our orchards or packsheds. Economic recovery requires that we keep our COVID-19 cases to as close to zero as we can, and that remains a whole-of-community endeavour.

Weather-wise, it's been interesting too. Rain in the lead up to April was certainly welcome and the trees are healthier because of it, but there had already been some fruit loss due to the lack of water. I also know from the experience in our orchard that the rain has not been enough to recharge the water table, although the situation does vary across the Sunshine Coast region, depending on geography.

How the year eventually ends up, I think it's important that we plan for a dry year. If it's not as dry as you plan for, it's not a problem. But if you haven't planned for it to be dry and it is, that can be tough.

TAMBORINE AND NORTHERN RIVERS

By Tom Silver

Harvest in the Northern Rivers Tamborine growing area is just about to start. Maturity seems to be ahead of schedule with quality quite good, but size due to the prolonged dry has been limited to some degree, however, there is still plenty of time for it to improve.

The COVID-19 pandemic has affected our industry in a way that we probably didn't predict. Industry concerns over the years have been more about cheap imports, domestic over supply, climatic factors and 'on farm' biosecurity. So a global pandemic that despite having a relatively small direct effect on Australians through infection in comparison to other countries, has had a massive effect on the way we live our lives. The closure of food service which uses an estimated 10-20 (possibly up to 25%) of our domestic supply combined with the temporary closure of export markets had an instantaneous negative effect on our domestic market. This came on top of the usual difficult changeover period of Hass to Shepard and back to Hass. Avocados Australia's response through CEO John Tyas and his team was swift and exemplary, getting a handle on the issues and numbers weighing on the market, communicating these issues to all levels of the supply chain and lobbying the Hort Innovation marketing staff to immediately respond to a change in avocado buying patterns and promotions through social media.

The response highlights the need for a strong industry peak body that best represents the needs of avocado growers and no one else, I applaud John and his team for their excellent work.

WESTERN AUSTRALIA

By Dudley Mitchell

In Western Australia, another record season has come to an end with an approximate six million trays being recorded in the *Infocado* system. For 12 consecutive weeks of the season from the end of September to Christmas, an average of almost 400,000 trays were dispatched weekly. Flow of fruit was uninterrupted with all players in the supply chain working well together, resulting in surprisingly solid returns to farmgate with a welcome kick up post-Christmas – everyone should be commended for their discipline and timing for the year just passed.

However, as is the norm in agriculture, no two years are the same and the vagaries of climate has dealt a blow for the Southern producers in Western Australia. The Northern and

Coastal regions of our sate seemed to have set relatively well, but in the South, inclement weather over fruit set, followed by severe heat in December has caused a mixed bag of results with only a few pockets of well-set orchards. The outcome is expected to be a lower volume year which, in light of the country's current crisis may not turn out to be such a bad thing.

We are watching the current market dynamics with concern as our fellow growers in Queensland grapple with an uncertain premium market and a vastly diminished first grade market, knowing that we have dodged a bullet, finishing just prior to the COVID-19 lockdowns. Now is the time for industry to pull together and throw its full weight behind a marketing drive bringing avocados to the forefront of every consumer's mind.

All channels should be supported along the supply chain in order to keep all grades moving. It's in times like these that innovation comes to the fore and we should take the opportunity to explore new messaging, new logistics, new delivery methods, new product offerings. The only certainty that we have right now is that on the other side of this crisis the consumer landscape, and therefore our marketing and product offering, will be totally different.

With that in mind I would like to extend our best wishes to the regions that are facing this head on – good luck!

SOUTH QUEENSLAND

By Daryl Boardman

We have two major issues for the avocado industry in South Queensland at the moment, and one emerging: COVID-19, the ongoing drought and a potential future labour shortage.

Packing sheds and orchards have all instituted extra steps to protect worker and community safety since the global pandemic was declared earlier this year. We have all instituted a lot more cleaning protocols, and taking additional steps such as reducing visitor access to our sites.

COVID-19 is also the cause of what could be an emerging issue for all of horticulture: at our farm and packshed, we are being inundated with calls from international visitors desperate for a job, but there's a limited number of positions available. Our concern is, if they leave Australia because they can't find work, it's going to hurt horticulture as a whole as picking progresses across the country.

And while everyone is focussed on COVID-19, we should not forget about drought. In South Queensland, lack of water is our biggest issue. The crop from South Queensland will be lighter this year, due to the drought conditions, with smaller fruit and some growers also experienced fruit drop, because of a lack of irrigation capacity.

The only saving grace is this smaller fruit is moving well with pre-packs and multi-bags, as well as into the export markets we can still access.

The extent of the ongoing drought is illustrated by the success of the Australian Government On-Farm Emergency Water Infrastructure Rebate, designed to help those with permanent horticulture tree crops to install new bores and desilt existing dams. This funding was meant to be available until June 2021 but it's already run out. On one hand, it's great that people were proactively taking it up, but obviously the need has been much greater than the government anticipated.

In Queensland, we still have 41 councils drought declared. Here in my own Toowoomba Regional Council area, we have been drought declared since 2014. Six years is a long time to be in drought, and it's going to be a pretty tough summer if we don't see rain, and enough rain to refill our aquifers.

CENTRAL QUEENSLAND

By John Walsh

In the Central Queensland region, we are dealing with both the immediate effects of the COVID-19 pandemic (more on safely operating during these times can be found from page 12) and also the threat of reduced capacity in Paradise Dam.

Growers and areas of the wider community, including the Bundaberg Regional Council, are still scratching their heads at the decision of Sunwater. They also cannot give a reasonable explanation besides hiding behind safety as to why these works are to be done.

The Bundaberg Fruit & Vegetable Growers (BFVG) and supporting growers have proactively engaged external consultants with international experience regarding this type of dam. Dr Paul Rizzo told us earlier in the year that not one dam of hundreds built in the same way around the world had ever been known to fail. He also advised that no dam built the same way with any structural issues had been unable to be repaired and restored to full capacity.

Naturally, community safety has to be the first concern addressed, but given the importance of the Paradise Dam to the horticultural industry of Central Queensland, any change to the capacity of the dam needs to be based on accurate data. If I was to apply the same safety factor to driving down the highway, then I would not do so.

More than 60,000 avocado trees fall within the Paradise Dam catchment; a majority of those are more than five years old. The security of water supply will be critical for those trees as they come into their peak production years. I would encourage growers to continue to support the efforts of the BFVG and the actions of Tom Marland. There must be continued pressure on the government to ensure water storage and security is available to all growers and associated business who have invested their own hard-earned money, time and effort into the region. We must also continue to ask and challenge the process that has led to this decision.

On the seasonal front, picking as started and is going well. The crop in Central Queensland does look like it will be down on estimate, due to a smaller than average fruit size and reduced tonnage in total. This is the impact of the hot and dry Spring and Summer that the region went through. If we have too many of these years back-to-back then we will be wishing that Paradise is full.

We are now coming out of the COVID-19 induced slump on return prices. While the retail prices were impacted, the pricing for market sales saw significant and immediate deflation in returns. This was due mainly due to the closure of the food service sector. This demonstrates how many avocados are eaten away from home. On the flip side it also shows the avocado industry is resilient in the face of an event like COVID-19, when compared to other crops and industries. This is the result of the years of investment that growers have put back into the avocado industry, and this investment must continue.

NORTH QUEENSLAND

By Jim Kochi

As I wrote in my Chair's report, "the sand is shifting under our feet" and for a brief moment I thought the North Queensland crop was going to slide into a big sink hole. My estimates for the North Queensland crop made in November were for around two million tray equivalents, that being almost half of the 2019 crop. As we moved into the new year the Hass crop looked a bit more promising and I lifted my estimates to the three million tray mark, and I think that was close to what the final result will be. This result , in my mind, is the result of a better fruit set on the recent plantings of younger trees which may have set fruit before the onset of the late frost events in September which fried the flowers in full bloom.

And then came COVID-19 and the sudden shutdown of the foodservice sector, the toilet paper panic and the loss of jobs, income and confidence in how our lives will cope. The week, no the day, the food service shutdown caused the wholesale price dropped 30% and class 1 fruit was instantly without a market. It took a few weeks for the market to ease back and I will thank the ABC radio and other media for their interest and support of our industry. Avocado was the fresh produce commodity that dominated the media at that critical time. I would also thank those growers who made media comment, including Daryl Boardman, Lachlan Donovan, our CEO John Tyas and Lisa Yorkston our Communications Manager, and finally Philip Bujea at Preferred Fruits in the Sydney markets for his frank assessment of the situation. These media reports and COVID-19 resources can all be found at avocado.org.au, and we have included some information in this edition of your magazine.

Our industry is now in a better place because of this situation. Consumers have proven to be loyal to our avocados at home and in food service and we need to keep them satisfied with quality and regular supply. The weather, as always, controls our fate and it looks like an early flowering of Shepard this year and the Hass are showing emerging buds. My last comment here is – this was probably the best year to have a light crop.

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NEWS

General News

Coronavirus a new business challenge

Lisa Yorkston, Avocados Australia

The spread of a novel (new) coronavirus (COVID-19) continues in Australia, and the world.

According to SafeWork Australia, coronaviruses are a large family of viruses that can cause illnesses from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV).

The World Health Organization (WHO) has declared the outbreak of COVID-19 as a pandemic, with cases, and deaths, across the globe.

Managing the risks from COVID-19

The model Work Health and Safety (WHS) laws require a person conducting a business or undertaking (PCBU) to ensure, so far as is reasonably practicable, the health and safety of their workers and others at the workplace. This includes providing and maintaining a work environment that is without risk to health and safety.

To comply with the model WHS laws, PCBUs must identify hazards at the workplace and the associated risks, and do what is reasonably practicable to eliminate those risks, or where this is not reasonably practicable, to minimise those risks.

Whether a control measure is reasonably practicable to implement involves consideration of what is able to be done to manage a risk and whether it is reasonable in the circumstances to do so. The likelihood of the risk occurring, the degree of harm that might result and the availability and suitability of a control measure are key considerations in determining what measures are reasonable.

Exposure to COVID-19 is a potential hazard for workers and other people at workplaces. PCBUs must have measures in place to protect worker health and safety and manage these risks.

PCBUs need to keep up to date with the latest COVID-19 information and advice to ensure that any action taken is measured and appropriate. This includes closely monitoring the Australian Government Department of Health, the Smartraveller website and any advice from state or territory government agencies.

Depending on the workplace, an appropriate range of actions may include:

- providing clear advice to workers about actions staff members should take if they become unwell or think they may have the symptoms of coronavirus, in accordance with advice from the Australian Government Department of Health and state or territory health department
- providing regular updates to workers about the situation and any changes to organisational policies or procedures
- contingency planning to manage staff absences.

Workers also have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of others. Workers should be reminded to always practice good hygiene and other measures to protect themselves and others against infection. This includes:

- washing their hands often, with soap and water, or carrying hand sanitiser and using it as needed
- covering their mouth when coughing or sneezing, but not using their hands to do so
- seeing a health care professional if they start to feel unwell
- if unwell, avoiding contact with others (including shaking hands or other touching, such as hugging).

More information

Avocados Australia has collated information specifically for avocado orchards and packsheds. You can read that on page 14, or visit *bit.ly/TA311covid* for a link to the online article.

NO EVIDENCE FOOD A TRANSMISSION SOURCE

The European Food Safety Authority (EFSA) is closely monitoring the situation regarding the outbreak of coronavirus disease (COVID-19) that is affecting a large number of countries across the globe. There is currently no evidence that food is a likely source or route of transmission of the virus.

EFSA's chief scientist, Marta Hugas, said experiences from previous outbreaks of related coronaviruses, such as severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV), showed that transmission through food consumption did not occur.

"At the moment, there is no evidence to suggest that coronavirus is any different in this respect," Dr Hugas said.

The European Centre for Disease Prevention and Control (ECDC) has said that while animals in China were the likely source of the initial infection, the virus is spreading from person to person – mainly via respiratory droplets that people sneeze, cough, or exhale.

The advice circulated by Hort Innovation is to wash fresh produce in running water, not soap. This is because soap residue may remain, and that is not intended for human consumption.

Regarding food safety, the World Health Organization (WHO) has issued precautionary recommendations including advice on following good hygiene practices during food handling and preparation, such as washing hands, cooking meat thoroughly and avoiding potential cross-contamination between cooked and uncooked foods.
EFSA is a European agency funded by the European Union that operates independently of the European legislative and executive institutions (Commission, Council, Parliament) and EU Member States.

Operating in the time of COVID-19

Lisa Yorkston, Avocados Australia

There is a lot of information and resources available to help the horticulture industry and associated industries operate in this pandemic.

Avocados Australia has collated a list of resources online here: *bit.ly/TA311covid*. This online list covers links to health information, export updates, food safety resources, financial assistance information, labour updates, and workplace information. It is updated continuously, so please check for the latest information.

General tips

All businesses must follow advice from the Department of Health and the relevant state and territory governments. They must:

- maintain a minimum distance of 1.5m between people
- provide hand hygiene products and suitable rubbish bins
- wash hands regularly for at least 20 seconds
- frequently clean and dispose of waste
- limit the amount of people for essential indoor or outdoor gatherings .

Additional steps you may want to implement include:

- temperature checking staff before the start of each shift
- request staff get a flu shot (it won't protect from COVID-19 but may reduce the combined impact of seasonal influenza and COVID-19 on staffing).

Read more on general practices in the National Farmers Federation's COVID-19 workplace guide, *https://farmhub.org.au/covid-19/*.

The food safety advice in the Best Practice Resource (*avocado.org.au/bpr/*) is easily transferrable to dealing with the current situation:

- properly cleaning and sanitising all surfaces and equipment (check the references list for a link to an environmental cleaning and disinfection factsheet from the Australian Government Department of Health)
- maintaining a high level of personal hygiene, especially hand-washing
- identify and assess the risk of hazards that may occur during land preparation, growing, harvesting and packing of fresh produce
- prevent or minimise the risk of hazards occurring
- prepare produce to customer specifications
- manage staff and documentation
- review compliance .

In the packhouse

Also in the Best Practice Resource WHS section, you can find Avocado Growing and Packing – A Practical Safety Guide. For packsheds, it is suggested that you review the risk controls (pages 14-16) but from a COVID-19 perspective:

- review the design and layout of the various sections and work stations
  - are they 1.5m apart?
  - if they cannot be appropriately spaced can you mitigate the risk with PPE (masks and gloves) or additional infrastructure (eg perspex screens between stations)?
  - can you break the process into zones, and/or organise teams to minimise any chance of cross-contamination?
- consult with workers to identify potential hazards
- visitor safety
  - can you stop visitors from entering the packshed and other common areas?
- safety inductions
  - do these need to happen more frequently?
  - can these happen in smaller groups or outside to allow for appropriate physical distancing?

You may want to review the entire guide with an eye to COVID-19, and update your planning as needed.

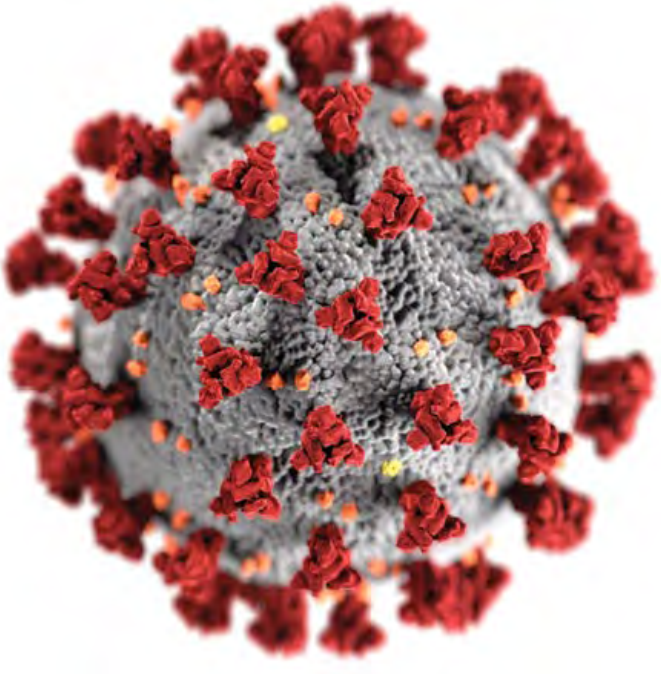

Photo by CDC on Unsplash

Picking

For picking activities, PMA-ANZ has released a factsheet with a checklist for field crews. The list includes:

- isolate different harvest crews from one another from the time they enter the site in the morning until they leave in the evening
- organise separate portable toilets for the respective harvest crews (and clean frequently)
- consider providing pickers with their own tools where possible
- consider reducing the size of harvest crews in order to enable more space between pickers.

Check the references section for a link to the full list .

Freight

With regard to freight, Safe Work Australia has a factsheet for freight workers. Specifically, freight workers are advised to:

- limit physical interactions with customers
- use electronic paperwork where possible
- ask customers about what COVID-19 measures they have in place
- stay in their vehicles whenever possible .

You may need to adjust some of your transport activities to accommodate these measures.

Various states have border restrictions (and some states have restrictions between zones within their borders as well). You can find a summary from the National Farmers Federation's Farmhub: *https://farmhub.org.au/covid-19/*.

Assess the market before you pick

The impacts of COVID-19 on the food service sector will impact the overall consumption of avocados. The food service sector has been an important market for Class 1 fruit and bulks and this market has disappeared overnight. In addition to this, exports have effectively stopped (although some opportunities are re-emerging), and this has been an important market for smaller sizes, in particular.

It is essential that everyone who is harvesting or about to start harvesting carefully considers the current market dynamics and the options available to respond to changes.

- Maintain regular open communication with your supply chain partners before, during and after picking. Packing fruit without a market is extremely risky.
- Avocado growers have a lot of flexibility around harvest times. The best place to store fruit when markets are full is on the tree.
- Consider size picking (based on the advice of your wholesaler and supply chain partners).
- We need to have the most accurate information about supply, particularly at times like this. We have a great

advantage in having *Infocado* to help with planning, but everyone needs to put greater effort into their forecasting so we can plan confidently.

Additional staff management & sourcing

As per the advice from Safe Work Australia, the health of your workers should be checked for key symptoms of COVID-19, such as fever. Direct all workers (whether they are at the workplace or not) to report to you if:

- they are experiencing any symptoms
- they have been, or have potentially been, exposed to a person who has been diagnosed with COVID-19 or is suspected to have COVID-19 (even if the person who is suspected to have COVID-19 has not yet been tested), or
- they have undertaken, or are planning to undertake, any travel.

Safe Work also says to encourage workers to report if they observe another worker is displaying any symptoms, stop workers from working if they are displaying symptoms or have contracted COVID-19 and a range of other measures . A full URL is in the references list for this article.

Policies and plans

As recommended in the Safe Food Queensland workforce checklist , review or develop and implement personnel policies and procedures, including a fit for work policy, a proactive sick leave policy, and a confidential reporting process. You can find the link in the references.

Health plan

Another generally useful document may be the Queensland Government's health plan template. This template is intended for use by employers bringing necessary staff across the state border, but the plan provides detailed health screening steps, and management for preventing transmission of COVID-19.

This template may be generally useful in your Workplace Health and Safety record keeping, no matter what state you are in. Visit *bit.ly/TA311plan* where you can find the template in the resources on the righthand side. If this link does not work, search for Queensland border health plan template into your favourite search engine. If your state has developed its own Health Plan or similar, please use that instead.

Employment documentation

With travel restrictions in several states and territories, it may be prudent to provide new employees/contractors with documentation to prove they a) are an essential ag worker and b) are travelling for work. These templates may be useful to you, to provide to new staff/contractors travelling to your orchard/packhouse:

- adjust the Queensland Government health plan to fit your

operation (link above)
- travel letter – outlining reason for travel
- confirmation of employment – confirming new staff are travelling for work with you
- health declaration.

Please note, these are not official documents, and you and your employee/contractor will still need to fill out the relevant application form for border crossings (*https://farmhub.org.au/covid-19/*), and where necessary lodge a health plan.

Sourcing staff

If you're a producer, COVID-19 may impact your ability to source harvesting and production workers. Many businesses have relied on a regular pattern of seasonal workers and a stable, permanent workforce for many seasons, but there are other ways to recruit. One option is to use the Harvest Trail online facility at *https://jobsearch.gov.au/harvest*. Several states also have their own jobs hubs.

WHS & industrial relations

Please consult your relevant state department as well as Safe Work Australia (*safeworkaustralia.gov.au/*) for the latest workplace health and safety information, as well as your state body.

For industrial relations matters (including Award updates) please consult the relevant national bodies:
- Fair Work Commission – *https://www.fwc.gov.au*
- Fair Work Ombudsman – *coronavirus.fairwork.gov.au*.

Audits

We understand growers are concerned around upcoming audits during the COVID-19 pandemic. At this stage, Freshcare and HARPS do not expect there to be any significant disruption to the services they provide.

Freshcare has communicated a Management of Extraordinary Circumstances Policy in relation to COVID-19 directly with all approved certification bodies, providing measures to minimise the potential impact to certified businesses. This policy provides guidance for certification bodies on audit rescheduling, temporary exemption and extension criteria. However, it is up to the certification bodies to decide how to implement the policy.

Businesses due for audit in the coming weeks should:
- review the Freshcare resources provided below and consider the additional measures required to be adopted by your business
- only contact your Certification Body if you have restrictions in place that impact access to your sites
- consider options provided by your Certification Body, and what will work best for maintaining your certification
- provide any supporting documentation requested by the Certification Body.

Find more at Freshcare (*freshcare.com.au*) and HARPS (*harpsonline.com.au*).

Resources

Visit our *bit.ly/TA311covid* for links to other sources of information and assistance. You can also find a link to this article on that page, for easier navigation.

Keep up to date

www.avocado.org.au

Avocados Australia is keeping the Australian News and the International News sections on our website updated as items come to hand. For the wider industry, we will also email important information directly, as needed, and we have compiled a (growing) list of national resources and information (*bit.ly/TA311covid*). This page provides links to health resources (including workplace posters, and workplace advice from the Department of Health, coronavirus and workplace laws, details of available financial and other assistance at a national level and more.

For members, we have a daily blog in the Member Area (log-in needed) and links to state-based resources and information (New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria, Western Australia).

Avocados Australia will be updating these pages as information comes to hand. Please check the currency of the information and consider your state-based requirements as well.

References

https://www.agriculture.gov.au/coronavirus/food-agriculture

https://www.health.gov.au/resources/publications/coronavirus-covid-19-environmental-cleaning-and-disinfection-principles-for-health-and-residential-care-facilities

https://www.avocado.org.au/best-practice-resource/packhouse/food-safety/

https://www.avocado.org.au/best-practice-resource/whs/ - Avocado Growing and Packing – A Practical Safety Guide

https://www.pma.com/-/media/anz/files/covid19--workforce-protection-v1-final.pdf?la=en

https://www.safeworkaustralia.gov.au/covid-19-information-workplaces/industry-information-covid-19

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COVID-19 changing eating habits in Asia

Consumers across Asia have signalled their eating habits may change permanently once the world moves beyond the impact of the novel coronavirus (COVID-19). In an exclusive Nielsen study of 11 Asian markets, only Japanese consumers say they are less likely to change their eating habits as a result of the global pandemic.

Eating at home to stay

The study, the first in a wave of Nielsen explorations underway across 74 markets, indicates that consumers in Chinese mainland, Hong Kong, South Korea, Malaysia and Vietnam will rethink and re-prioritise the place eating at home has in their lives.

In the Chinese mainland market, 86% said they would eat at home more often than before the outbreak. In other markets, a similar trend was observed with 77% of consumers in Hong Kong planning to eat at home more often than before the event, and in South Korea, Malaysia and Vietnam, that number was 62%, respectively.

Further, the study found a high demand for more takeaway food and home deliveries of food, particularly in Hong Kong, South Korea and Thailand. These markets epitomise "on-the-go" lifestyles and value the convenience on-the-go food offerings bring.

Lasting trend?

Nielsen South East Asia Managing Director Vaughan Ryan said the desire to spend time at home seemed a likely side effect of COVID-19 that would extend over time.

Mr Ryan also noted the trend appeared to be playing out differently across the region, but that these behaviours were quickly becoming the new norm.

"The initial assumption was that consumers were panic buying, but we have seen this behaviour now in markets for more than two months," he said.

"If we think about Singapore as a country that already embraces home delivery of meals and Japan as one that has been less inclined, we're seeing many more countries move closer to Singaporean habits than before."

The food landscape in Asia has been an incubator of innovation and change over the last five years, and the rise of food delivery and on-the-go consumption has dramatically changed traditional food consumption and eating experiences. But as the coronavirus situation has evolved, where and how consumers are eating has changed, with more choosing to purchase goods to eat at home.

"Consumers have been back to the same store multiple times, so this behaviour is beyond panic buying. There is no doubt consumers have moved away from an 'on-the-go lifestyle' to more of a 'safe in-home consumption' trend," he said.

The shifts away from out-of-home dining to at-home food delivery, takeaways and cooking during the COVID-19 period are locally nuanced by traditional consumption habits but also by the different quarantine and shutdown measures by market.

For example, the Japanese have hardly increased ordering food delivery while Thailand has leaned heavily on this channel.

But while consumer behaviour across markets in the immediate terms has definitely changed, the subsequent question is "when will it return to normal?" The answer may well be never.

Given the unique circumstances of this experience for consumers, there are a number of indicators in the data that suggest a more permanent transformation.

"For many, old habits like eating out may forever be replaced by new habits, more apt to new, altered environments. Not only will consumers reassess where they're eating, but they will also be far more cognizant of what they're eating," Mr Ryan said.

For many consumers used to eating on-the-go, home cooking may be a new concept or habit, and they will need help to adjust to this new world.

Health and food safety

As Chinese mainland returns from quarantine conditions, another Nielsen research study from Chinese mainland, Nielsen Social Intelligence Survey on Coronavirus, shows they are emerging with more of a "homebody" mindset, where health and technology are factors that will influence consumer spending and shopping habits in the short and longer term. If Chinese mainland is viewed as an example of how consumer response plays out as the pandemic progresses, it is possible that many other markets may face the need to pivot short-term observations into longer-term strategies.

"The COVID-19 epidemic is quickly revolutionising how consumers from Chinese mainland think about their health, as well as changing their purchase behaviour and the channels they are using to shop," Justin Sargent, President of Nielsen China said.

This showcases that even after life returns to normal post COVID-19, healthy eating may register higher on consumers' radars than in the past. In-home eating experiences have been reset.

"This represents a key opportunity for manufacturers, retailers, restaurants and food delivery to rethink their health offerings and raise the bar even higher, ensuring their assortment satisfies expanding demand for health and convenience attributes—but with high quality and hygiene standards."

Read more

bit.ly/TA311niel

Avocados Australia's new *Infocado* data system

By Daniel Martins, Avocados Australia Data Analyst

Since its conception about 15 years ago, *Infocado* has served the Australian avocado industry providing the industry with data to underpin effective supply chain management.

However, the way Australian supply chains are set up and operate have undergone significant changes during this time. Because of this, it has been one of our priorities to conceive and build a new reporting system, that captures and presents the data in a way that better represents the way fruit is being traded, with the aim of increasing the value of the data presented to the industry.

We are now pleased to announce that we are taking the final steps to introduce this new tool that will continue to assist the industry, by delivering high quality data and information to support decision making.

What changes to expect

The motivation behind the revamp originates with the way consolidator activity is currently accounted for in the weekly *Infocado* system. The original software was never designed to accommodate the role of consolidators, a role that has become more prominent in supply chains over the past 10 years. The way that data is currently captured doesn't provide a clear separation between the volumes dispatched and the volumes sold.

In the new system, the weekly report will enable visibility of the total volume of fruit that has been dispatched each week from a packhouse as 'hard' unripe fruit, and the total volume of 'conditioned' ripe fruit that has been sold each week into retail, ignoring the exchange that happens among traders in between these two points.

There will be two forms for the weekly *Infocado* system, one to capture Packers' dispatch volumes to 'Traders', 'Major Retail', 'Others', and 'Exports'; and another one to capture Traders' sales volumes to 'Major Retail', 'Others', and 'Exports'. Businesses that operate as both a Packer and a Trader, selling directly into retail, would complete both forms.

In this way we hope to ensure that there is better visibility of the volumes of fruit entering the supply chain directly from packers each week.

Proposed charts for consideration

We will be presenting the data captured in these forms in graphs with distinct purposes, but that are complementary to each other. Mainly, the new premise described above will be made clear in two charts: The Packer's Dispatch chart and the Trader Sales chart.

The data presented in these two charts will allow the reader to have an overview about the different flows into and out of the market, and how they relate to one another. Their main aim is to represent what has been agreed by industry members as an accurate depiction of the movement of avocados through the Australian market.

In addition to these two, there will be other graphs and tables aimed to portray different aspects of the data captured in these forms, such as packers dispatch by region, trader sales by destination state, dispatch and sales by variety, among others.

Note that there may be changes to the appearance of the charts here presented, but this is essentially the information that will be conveyed.

Packers dispatch

The *Packers dispatch by destination* chart (Figure 1) allows the reader to have insight into the volumes of hard unripe fruit that are entering the market every week (green bars), broken down according to where the fruit is sent, namely 'Traders', 'Major Retail', 'Other' and 'Export'.

- Traders: wholesale agents/merchants, consolidators, marketers, exporters.
- Major Retail: Woolworths, Coles, and Aldi.
- Other: food service businesses, smaller supermarkets, local markets, and other grocers.
- Export: export markets.

In this chart the reader is also able to see volumes sold by traders in the same week (blue dots). When the data is collated and reported in this way, it indicates both the rate at which fruit is entering the supply chain compared with the rate at which fruit is exiting the supply chain. If the number of Traders contributing data remains low, these data sets wont mirror each other, but the trends are useful to see.

Also deriving from the same packers' data, we are producing a *Packers dispatch by region of origin and variety* charts (Figure 2). These two charts aim to add an extra level of detail to complete the picture by indicating where avocados are coming from, and what variety they are.

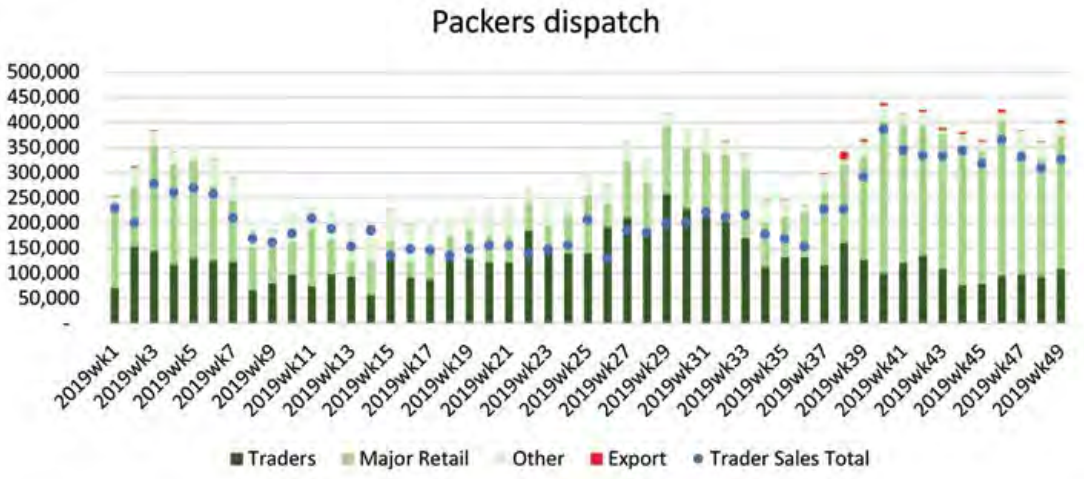

Figure 1. Packers dispatch by destination

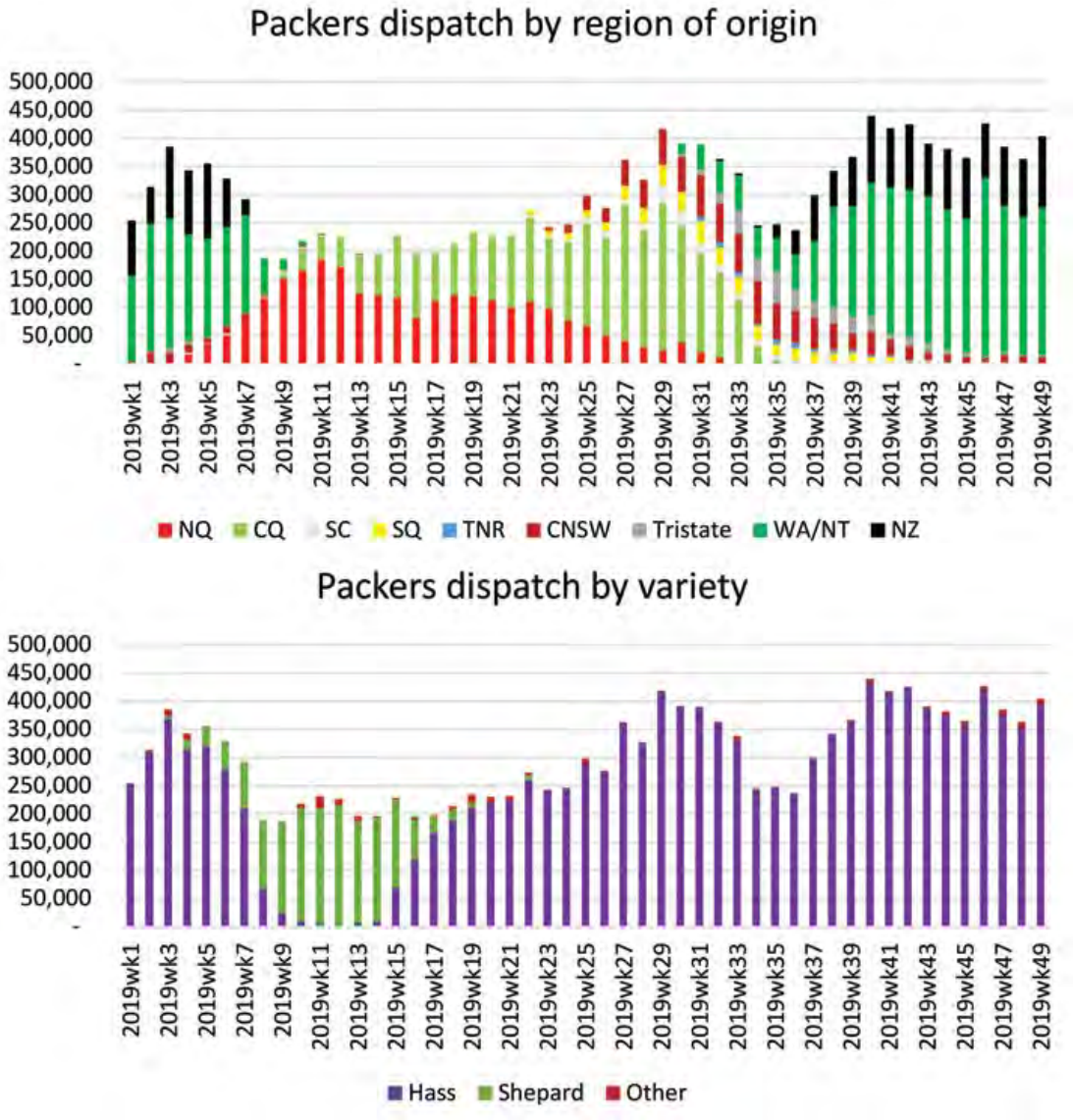

Figure 2. Packers dispatch by region of origin and variety

Figure 3. Trader sales

Trader sales

The *Trader sales by destination* chart (Figure 3) on the other hand, can be seen as an opposite view of the *Packers dispatch by destination* chart, in that its primary representation depicts how much ripened fruit is being sold by traders every week. Just like in the *Packers dispatch by destination* chart, here the reader is also able to see an aggregated view of volumes dispatched by packers (green dots), allowing them to have an indication of the rate at which the fruit is dispatched, relatively to sales per week.

The categories in which trader sales are broken down are 'Major Retail', 'Others', and 'Exports'.

- Major Retail: Woolworths, Coles, and Aldi
- Other: food service businesses, smaller supermarkets, local markets, and other grocers
- Export: export markets

In the same way as for the packers' data, to give a more complete picture of the trader's sales, we are producing a *Traders' sales by destination state* and *Traders' sales by variety* charts (Figure 4). In this way we have an idea of what's exiting the supply chain in terms of variety and where it's going.

Dispatch/sales balance

The dispatch/sales balance allows us to further evaluate the relationship between the packers' unripe fruit dispatched and traders' ripe fruit sold. This chart in Figure 5 could be understood as focusing on the relationship between the previous two charts 'packers dispatch' and 'trader sales'. In short, it shows the balance between what's entering the market and what's exiting into retail. In ideal circumstances, we would see equal amounts dispatched and sold, which in this chart would net to zero. A red 'surplus' bar would indicate that avocados are selling at a slower rate than they are being dispatched out of packhouses. Conversely, if a green 'shortage' is shown, this would indicate that sales have been higher than dispatches for any week in particular. As mentioned above, while the number of Traders contributing data remains low, this data should be treated with caution and used for assessing trends only.

Weekly Dispatch vs Forecast by Region

Complementing the *Dispatch vs weekly forecast* chart (Figure 6), the purpose of this chart is to provide an additional level of detail. In it we can see the balance between what's forecasted and dispatched broken down by region. This will enable the reader to identify whether a misalignment between forecast and dispatch is due to circumstances specific to any region in particular.

Additional features

We are also going to introduce new features that will increase the ease of participation, improve the completeness (and therefore accuracy) of the data, provide better insight, and enhance the overall *Infocado* experience.

Without revealing too much ahead of time, there are a range of features in consideration.

- Additional grids and charts: in addition to the charts presented here, we will include other charts that will provide better insight about the volumes of fruit forecasted, dispatched, and sold.
- Online reports: aside from the static reports that we will keep sending out via email, there will be dynamic reports accessible online, to which the user can apply filters and select date ranges as required.
- Mobile device application: geared towards users who prefer to use a mobile device to input their week's figures, we are working on a mobile device application to access the forecast, dispatch, and sales forms that will further facilitate data contributions.

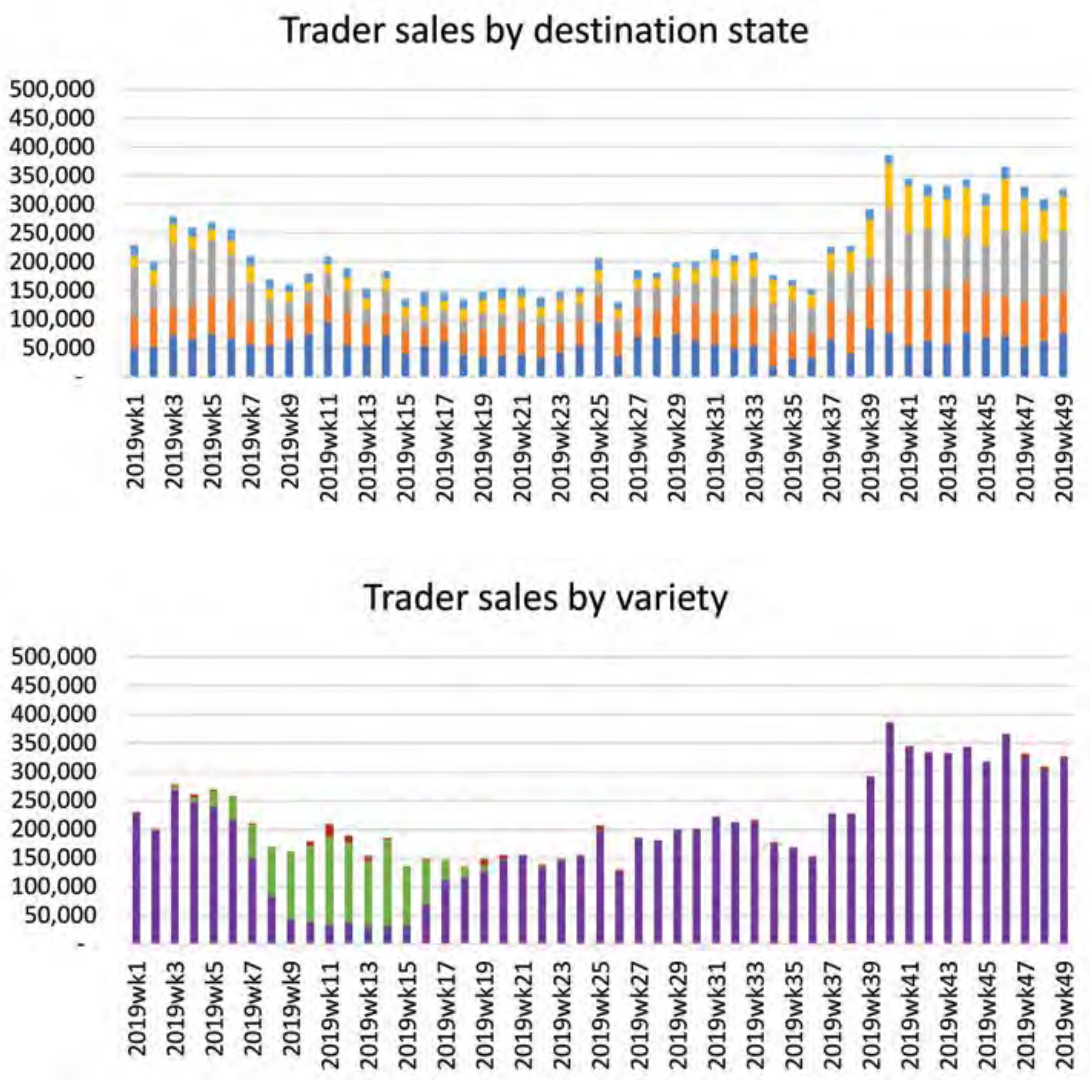

Figure 4. Trader sales by destination state & variety

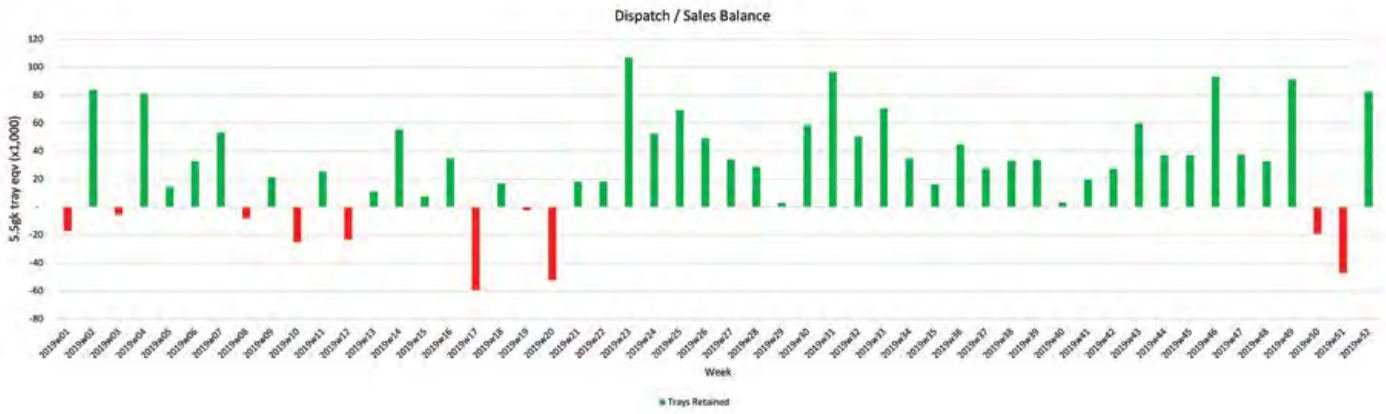

Figure 5. Dispatch/Sales balance

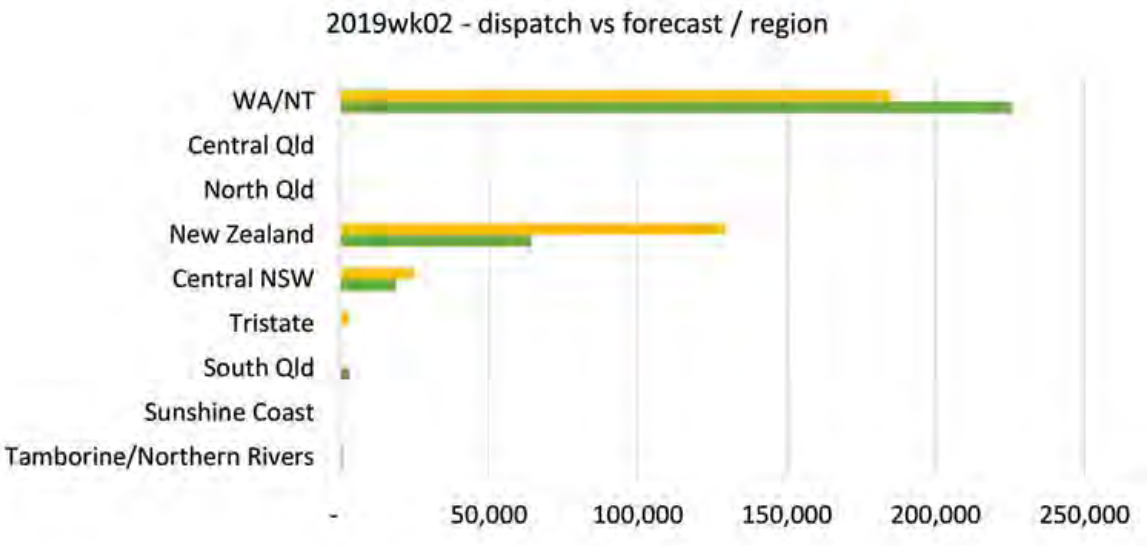

Figure 6. Weekly Dispatch vs Forecast by Region

- Simplified forms: for smaller packers unable to complete the full dispatch form due to resource constraints, a simplified version of the weekly dispatch form will be made available on both the browser platform and the mobile device application. This will simplify the data contribution process for these smaller businesses, enabling them to become active participants in the program.
- Packhouse management software link-up: for packers equipped with more sophisticated packhouse management software, we will include a new feature that will enable the user to contribute data directly from their system without ever having to fill out a dispatch form.

Rollout

The rollout of the new system has been planned to be carried out in stages. In order to migrate all of the existing data from the old to the new system, the first release will be comprised of the Customer Relationship Management (CRM) and Admin components. This will allow not only to incorporate the industry's organisational details, but also to have the data input forms ready, so we can commence to prepare the 'beta' version of the new reports. During this time, and as usual, we will be very receptive to feedback around the data and format of the new reports.

This stage will be followed by subsequent releases of different components related to the reports that we prepare. By the time these following stages roll out, we expect to have incorporated the industry's feedback to cement a refined, more definite version of the reports. The order that these releases will follow are:

1. Admin and CRM
2. Weekly reports
3. Quarterly reports
4. *OrchardInfo* & remaining components
5. stable release
6. project closure.

It is our aim to deliver the system to industry and initiate the phase of training and promotion as soon as it is possible. We plan to present this system at regional forums when they are re scheduled, and during these subsequent releases as more of the system is revealed, we will be holding training sessions for existing and new users. As we approach the end of the development stages, and there is some clarity around the expected duration of the COVID-19 emergency, we will advise the details of this rollout plan.

Acknowledgement

The *Avocado industry market data capture and analysis* project (AV16006) has been funded by Hort Innovation, using the avocado industry research and development levy and contributions from the Australian Government.

Hort Innovation Strategic levy investment | AVOCADO FUND

Australian avocado 2019 export and import report

Joy Tang, Avocados Australia Export Coordinator

The Australian Avocado Export Import Report for 2019 calendar year has been completed and is now available in the Best Practice Resource, on the Avocados Australia website.

Exports

Australian avocado exports for January to December 2019 were 4,272 tonnes, which was 71% higher compared to same period last year and valued at AU$24.55 million. Unit prices were 6.3% lower at AU$5.75/kg for the calendar year.

Singapore was the leading destination taking 1,674 tonnes or 39% followed by Malaysia with 1,651 tonnes. Hong Kong lifted 160% to 659 tonnes. Middle East markets combined lifted 8-fold to 113 tonnes from a low base.

Average returns per kg increased 72% over the decade in 2019 compared to 2010 aided by the exchange rate depreciation shown by the $USD comparison.

Asian markets imported 135,000 tonnes of avocados in 2019, which was 8% less than the previous year although showing a growth trend of 18% per year over five years. Japan, the largest importer with 57% share of the region's avocado imports increased 4% (to 77,000t) while China retreated 25%.

Australia has a significant share of Malaysia and Singapore markets, which combined have a 5% share of all avocado imports by Asian region.

A majority of Australian avocado exports are from Queensland and Western Australia. Queensland trade was higher in the early 2019 season compared to 2018, however, Western Australia's stronger results in 2019/20 summer has influenced the annual result the most. Prices averaged A$5.75 for the 2019 calendar year.

Imports

Imports of avocados from July to December 2019 were 11,626 tonnes, all imported from New Zealand, and worth AU$55.97 million, which was 4.3% above the previous season. From January to December 2019 there were 15,042 tonnes of avocados imported to Australia from New Zealand worth AU$72.99 million, which was 35% above the previous season. Unit values were 3.8% lower at AU4.85/kg. Avocado imports from New Zealand are influenced by a bi-annual bearing pattern of "on" and "off" years in New Zealand.

Australia accounts for over 80% of New Zealand's avocado exports. Avocados were Australia's largest fresh fruit import by value in 2019.

Please find the detailed report in export section in the BPR Library at *avocado.org.au/bpr/*.

Acknowledgement

The *Avocado export readiness and market access* project (AV17000) has been funded by Hort Innovation, using the avocado industry research and development levy and contributions from the Australian Government.

Hort Innovation
Strategic levy investment

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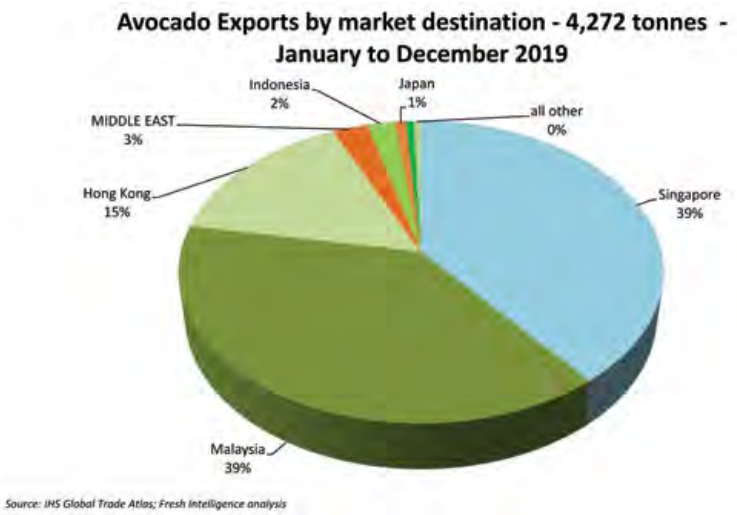
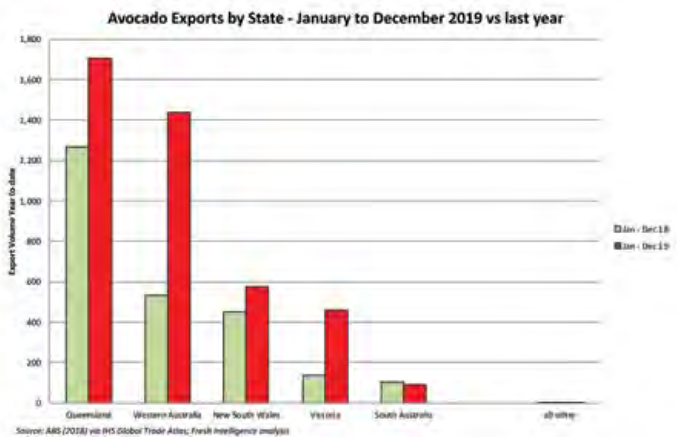




Export market analysis

Wayne Prowse, Fresh Intelligence Consulting

Australian avocado exports reached 4,272 tonnes in 2019, an increase of 71% over the previous calendar year.

The export destinations were highly concentrated to Singapore and Malaysia accounting for almost 80% of the exports and a further 10% to Hong Kong. Japan is by far the largest importer of avocados in Asia where Australia has recently gained market access and hopes to gain a foothold in this market.

In this section we will take a brief look at these 4 markets to understand more of the market dynamics and import demand through this last year, and Australia's position.

Singapore

With a small affluent population of 5.6 million, Singapore is Australia's leading destination for avocados and also Australia is the leading supplier accounting for 34% of all avocados imported. Being a market with unrestricted access there are many suppliers, and some will be trying to challenge Australia's market share, not the least being Mexico and Kenya. In 2019 Singapore imported 5,469 tonnes of avocados. Australia's advantage is being the closest supplier and having a strong quality reputation.

Figure 1 shows the price movements through 2019, highlighting Australia's CIF (cost, insurance and freight) price (average A$5.89) and that of Mexico (average A$5.25), our closest competitor against the background of total volumes and Australia's market share by month. Mexico's highest volumes are from October to April correlating with their lower price points and is counter seasonal to Australia's peak supply period from April to October. During this period Australia's CIF price is below Mexico. Kenya is in the market year-round with prices below A$4/kg, while New Zealand is in the market from July to December at A$5/kg.

Imports of avocados by Singapore in 2019

	Tonnes	share	A$ per kg CIF
Australia	1,868	34.2%	$5.89
Mexico	1,667	30.5%	$5.25
New Zealand	624	11.4%	$5.00
Kenya	512	9.4%	$3.34
South Africa	443	8.1%	$3.75
United States	209	3.8%	$5.54
Other	146	2.7%	
Total	**5,469**	**100%**	**$5.13**

Source: ITC Trademap; Fresh Intelligence analysis

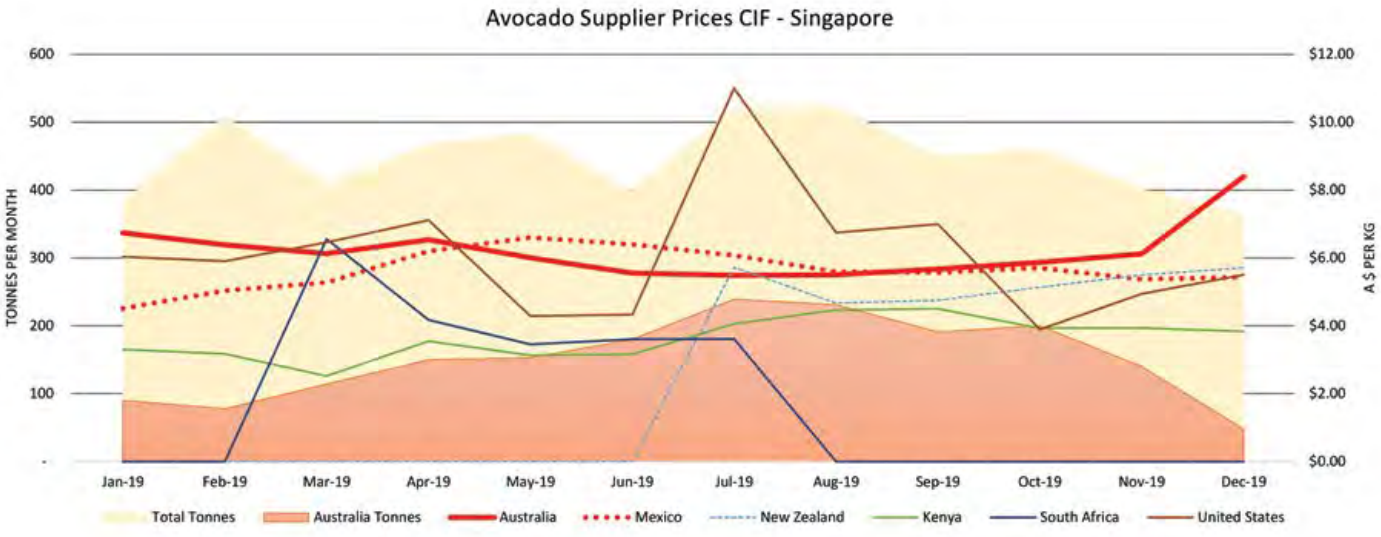


Figure 1. Source: ITC Trademap; Fresh Intelligence analysis

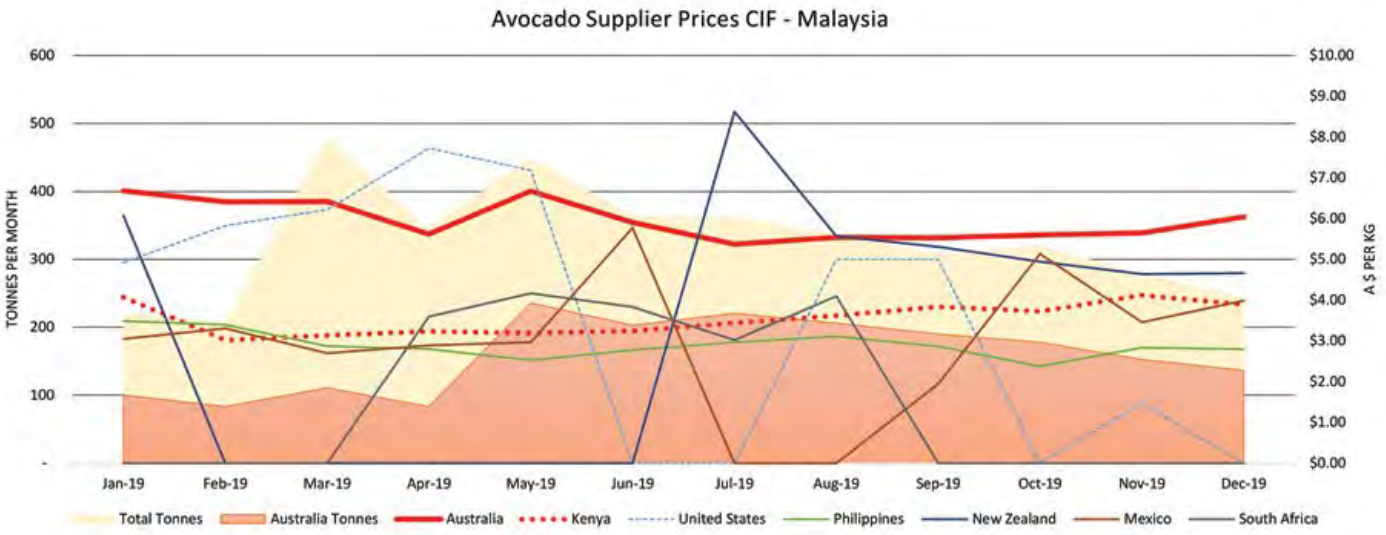


Figure 2. Source: ITC Trademap; Fresh Intelligence analysis

Malaysia

With a population of 32 million, Malaysia is Australia's second leading destination after Singapore for avocados and again Australia is the leading supplier accounting for almost 49% of all avocados imported. Like Singapore Malaysia has unrestricted access with many suppliers although despite a much larger population the imports were under 4,000 tonnes in 2019. Australia's advantage is being the closest supplier and having a strong quality reputation.

Figure 2 shows the price movements through 2019, highlighting Australia's CIF price (average A$5.89) and that of Kenya (average A$3.39), our closest competitor against the background of total volumes and Australia's market share by month. Kenya's highest volumes are from March to May correlating with their lower price points and seems to influence a delay in starting the Australian peak supply period. Australia's CIF price is well above Kenya year-round and more so in February to May. United States, New Zealand, Mexico and Philippines are in the market periodically through the year with lower volumes.

Imports of avocados by Malaysia in 2019

	Tonnes	share	A$ per kg CIF
Australia	1,901	48.6%	$5.89
Kenya	589	15.0%	$3.39
United States	306	7.8%	$6.51
Philippines	495	12.6%	$2.78
New Zealand	132	3.4%	$5.05
Mexico	202	5.2%	$3.28
Other	289	7.4%	
Total	**3,914**	**100%**	**$4.73**

Source: ITC Trademap; Fresh Intelligence analysis

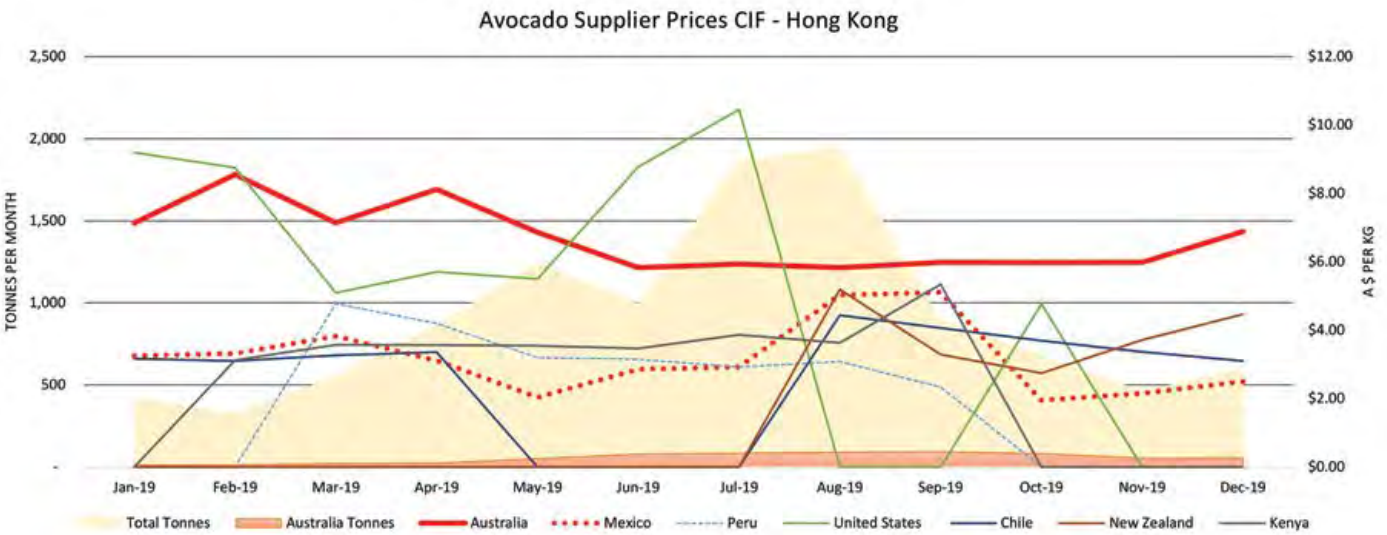


Figure 3. Source: ITC Trademap; Fresh Intelligence analysis

Hong Kong

Hong Kong trade is strongly influenced by China. With a population of 7.4 million, Hong Kong has developed a strong demand for avocados for local consumption, particularly since Mexico, United States, Chile and Peru export direct to China. Australia's market share is 7.0% of 10,800 tonnes imported and was the third largest supplier in 2019. Hong Kong has unrestricted access and some suppliers use Hong Kong as a pathway to China. Mexico and Peru are the main suppliers to Hong Kong. Considering the monthly trade pattern, it is more likely that some of the Peruvian avocados are redirected to China rather than Mexican avocados which enter directly.

Figure 3 shows the price movements through 2019, highlighting Australia's CIF price (average A$5.39) and that of Mexico (average A$4.04), our closest competitor against the background of total volumes and Australia's small market share by month. Mexico maintains a steady supply around 400 tonnes per month while Peru supplies a high level of more than 1,200 tonnes per month in July and August, and likely some of this is redirected to China. Australia's CIF price is above other suppliers throughout the year though the gap with Mexico is closer during Mexico's off season from July to October.

Imports of avocados by Hong Kong in 2019

	Tonnes	share	A$ per kg CIF
Australia	761	7.0%	$5.39
Mexico	4,996	46.3%	$4.04
Peru	3,570	33.1%	$3.36
Chile	372	3.4%	$2.74
United States	304	2.8%	$2.94
South Africa	335	3.1%	$2.50
Other	462	4.3%	
Total	**10,800**	**100%**	**$4.06**

Source: ITC Trademap; Fresh Intelligence analysis

Japan

Japan is the largest importer of avocados in Asia with a population of 125 million. In 2019 the country imported 77,000 tonnes of avocados and has increased by an average 8% per year over five years. Mexico has long been Japan's dominant supplier though access from several markets notably Peru, Chile, New Zealand and now Australia is challenging Mexico's dominance even though its market share is still above 90%.

Australia gained access to the Japanese market in 2018, though only from Western Australia (and other areas free of Medfly), which means that our supply correlates with Mexico's peak season for all destinations and lowest price period. Less than one tonne was supplied by Australia in the first year of access though has lifted to 37 tonnes in 2019.

Figure 4 shows the price movements through 2019, highlighting Australia's CIF price (average A$6.68) and that of Mexico (average A$4.41), against the background of total volumes and Australia's market share by month, albeit negligible in this scale. Mexico's highest volumes are in March and April with over 8,000 tonnes per month correlating with their lower price points while Peru peaks in July with over 2,000 tonnes even though Mexico barely falls below 4,000 tonnes in any given month in their off season. Australian avocados have been in the market from September to March mostly with volumes of less than 10 tonnes per month. Our share is very small with room to develop over time.

Imports of avocados by Japan in 2019

	Tonnes	share	A$ per kg CIF
Australia	37	0.0%	$6.68
Mexico	70,775	91.6%	$4.41
Peru	4,480	5.8%	$4.58
United States	849	1.1%	$7.12
Chile	593	0.8%	$4.94
New Zealand	536	0.7%	$5.19
Other	17	0.0%	
Total	**77,287**	**100%**	**$4.46**

Source: ITC Trademap; Fresh Intelligence analysis

Acknowledgement

The *Avocado export readiness and market access project* (AV17000) has been funded by Hort Innovation, using the avocado industry research and development levy and contributions from the Australian Government.

Hort Innovation Strategic levy investment | AVOCADO FUND

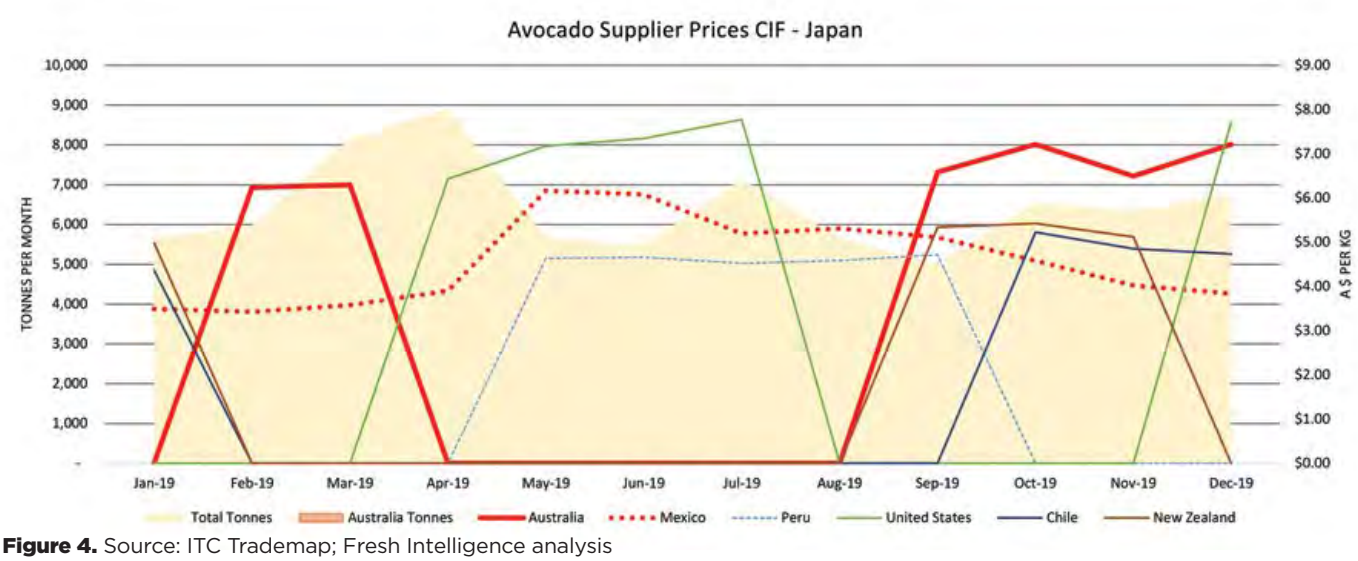


Figure 4. Source: ITC Trademap; Fresh Intelligence analysis

Round 1 success for Avocado Regional Forums

Liz Singh, Avocados Australia Industry Development Manager

COVID-19 is having a big impact but the *Avocado industry development and extension* (AV17005) project is adapting and going digital to continue the success of the Avocado Regional Forums. Keep an eye on the *Guacamole* for more information.

In the meantime, the *Avocado industry development and extension* (AV17005) project team have been visiting avocado growing regions and targeting topics you want more information about in the Avocado Regional Forums. The project team have finished the first round of Regional Forum meetings around the country and are getting geared up for the digital age in Round 2. This activity has successfully shown that the industry is looking for opportunities to learn, come together to interact and get an update on the industry position.

Region	Date	Location	Participants
South Queensland	11/2/2020	Blackbutt	93
Sunshine Coast	26/2/2020	Bellthorpe	82
Western Australia	12/3/2020	Manjimup	95

Industry

John Tyas (AAL CEO) told Regional Forum participants that the Australian Avocado industry continues to grow with many young plantings yet to come into production. New challenges are ahead with supply increasing much faster than demand, increasing competition and the opening of the Australian market to imports of fresh avocados from Chile. The forecasted lower yields next summer could create an unexpected 'foot in the door' for Chile to start exporting fruit to the Australian market now phytosanitary protocols have been finalised. Despite this, there are new initiatives being developed to accelerate domestic consumption growth and to build new international markets for Australian fruit. However, industry needs to become more globally competitive through increased productivity and exceptional quality.

Grower experiences

South Queensland – Growing in dry times – Tony Dugdell, Anthony Beutel and Russell Page shared their experiences growing avocados in dry times and advised Regional Forum participants that skirting trees was a big mistake that led to increased evaporation of precious water. The majority of irrigation is conducted during the night to reduce evaporation and mulch is used to improve water retention though there is concerns that the irrigation water might not be making it through the mulching material and the participants were cautioned to select course material when mulching. Russell indicated that we need to review avocado irrigation methods and the reliance on a shallow root system.

Sunshine Coast – Growing in dry times and fruit quality to consumers – Henry Kwaczynski supported the views of South Queensland growers indicating the importance of mulching and creating a stable microclimate for tree roots. Anton Fick, who suffered the loss of a crop ready to harvest due to a storm, has seen a different side of the industry. As he took his crop from the ground to the market he has gained valuable insight into consumer requirements and a gap still in consumer education for storage, ripening and ready to eat qualities of an avocado.

Western Australia – Flowering, pollination and Fruit set – Travis Luzny, Stewart Ipsen and Doug Pow indicated that there had been quite cold weather conditions over flowering and that elevation and distance from the coast had contributed to how each grower had gone during set. Travis indicated that he had received 20 hours of fruit chill in the middle of flowering which were true winter conditions. Stewart indicated that they had lost a lot of fruit early at olive and matchhead size and Doug said the set had been very random with some trees setting well and others not at all.

Field walks

A big "thank you" is given to growers sharing their experiences and field walk hosts. Your willingness to open your orchards and share information about your management practices, what has or hasn't worked and what you hope to do better in the future is greatly appreciated and progresses the learning experience of the Australian avocado industry.

Growers and industry members enjoyed visits to orchards in South Queensland (Andy and Judy Veal), Sunshine Coast (Mary and Peter Annand) and Western Australia (Vic Grozotis). For more information on these orchards or any of the information presented in these Regional Forums visit the BPR library and look under "Event Proceedings".

Queensland drought assistance

While the rain was welcomed by all as a chance to refill the dams in South Queensland, growers are concerned about what lies ahead of them growing avocados in this region, with many growers forced to reassess their position in the industry.

Stephanie Denman (Queensland DAF) said she was a link to Queensland growers getting the right drought advice and assistance - *stephanie.Denman@daf.qld.gov.au* or 07 4182 1825.

Supply Chain – AV18000

Noel Ainsworth (Queensland DAF) and Declan McCauley (DPIRD Western Australia) have been delivering results from the avocado supply chain project (AV18000). The project aimed to identify and promote improvements to practices in supply chains between the farm and the retail distribution centres. Changes in temperature while in transit, which can result in higher fruit body rots, was seen in 20% of the consignments surveyed in 2019. The aim for the industry supply chain is to keep below 10% of fruit with >5% rot.

Nutrition

David Hall from David Hall Consulting suggested that a better understanding of the changes in the source/sink relationship throughout the season will assist growers to better target nutrition in the orchard. He indicated that not all fertilisers are the same quality and it is important to know the forms of nutrients you are applying as well as extra unwanted biproducts such as salts. David spoke with forum participants about the need to link orchard nutrition to soil health and to get an understanding about how the physical, chemical and biological components of your soils contribute to orchard health and production.

Chris Searle from MacAvo Consulting spoke to participants about how nutrition is generally the first management practice that growers review and think they have a problem with, but management of soil carbon health should be more important. The use of the right mulch placed in the right position will build more resilience in the orchard than targeting nutrition alone. Chris spoke about how Phytophthora will reduce the nutrients trees can access and that placement of fertilisers should be altered by the root rot presence. Nitrogen, calcium, boron and zinc have important roles in sustaining orchard health and promoting production and quality.

Dry times

Simon Newett (Queensland DAF) shared research results that indicate that avocados have a 'drought memory', blocking xylem tubing during times of reduced water and not necessarily recovering from this. Simon suggested that reducing the size of the tree meant that it used less water and could potentially reduce negative impacts on future production.

California and World Avocado Congress – AV17005

A report on the California Avocado tour and the IX World Avocado Congress in Colombia was presented by Liz Singh and Doug Pow. Doug indicated that he had visited the California avocado industry in the 1970s and noticed a huge change from a booming industry to one that is now struggling. A full report of the tour can be found in the BPR Library.

Fruit set and abscission – AV16005

The Western Australian Regional Forum all wanted to hear about flowering, pollination and fruit set following a confusing fruit set period. Participants heard from Harley Smith and Amnon Haberman from CSIRO about the potential causes of the poor fruit set event and the need to know more about the way avocados use carbohydrates to understand irregular bearing cycles.

Harley indicated that the fertilisation process required to set fruit takes approximately 48 hours and changes in climatic conditions, hormone signalling, carbohydrate status and water and nutrition over this time can impact whether the process is successful.

Amnon presented local data on fruit growth, retention and abscission from Jasper Farms. Interactions driving fruit production in the following season included harvest time (early/mid/late/drought) and flowering intensity (high/low/drought). Amnon outlined the hypothetical model for regulating fruit abscission and the trials they have been conducting using defoliation, drought and shading to test the model.

Phosphonate and flower blight – AV16007

Liz Dann presented results from phosphonate fruit residue survey indicating that all fruit tested was below the 500mg/kg (ppm) Maximum Residue Limit (MRL) for Australia, which is different in export markets. However, Liz cautioned participants about the systemic nature of phosphonate and that it should not be the sole solution to Phytophthora root rot issue but should be used in conjunction with the Pegg Wheel.

Liz also presented some information about panicle and shoot blight which has affected production areas in Queensland and Western Australia in 2019. This is a new issue for the industry and one with no obvious answer.

What's coming up

Avocado Regional Forums will be held in a digital format until further notice. Check the fortnightly *Guacamole* newsletter and the events calendar at *avocado.org.au* for future dates. Look in the BPR library under "Event Proceedings" for presentations and notes from previous events.

More information

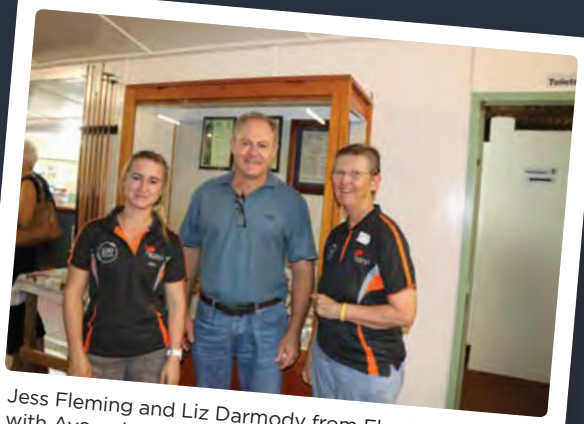
If you would like more information on the project, contact Avocados Australia Industry Development Manager Liz Singh, 0499 854 111 or *idm@avocado.org.au* (Mon-Thurs 9am-3pm), or at DAF, contact Simon Newett, *simon.newett@daf.qld.gov.au* or 07 5381 1326, or Bridie Carr, *bridie.carr@daf.qld.gov.au* or 07 5381 1327.

Acknowledgement

The Avocado industry development and extension (AV17005) project has been funded by Hort Innovation, using the avocado research and development levy, co-investment from the Queensland Department of Agriculture and Fisheries, and contributions from the Australian Government.

Andrew McKillop, The Avolution, Mark Bamess, and Tony Fontanini (West Aussie Avos) at the Western Australian Regional Forum in March.

Anton Hornbuckle and Peter McGregor from Label Press, with Joss Donovan and Avocados Australia Sunshine Coast Director Rob Price at the Bellthorpe Regional Forum on 26 February 2020.

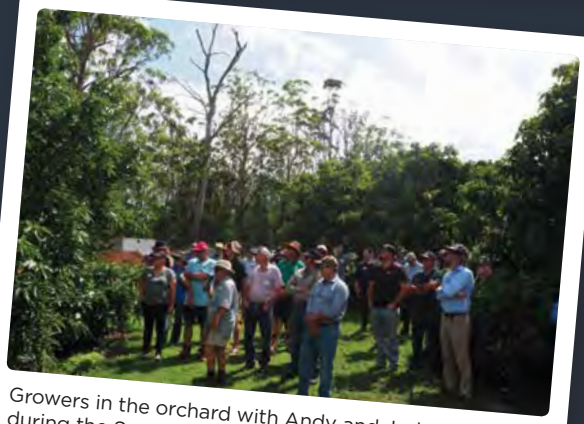


Jess Fleming and Liz Darmody from Fleming's Nursery with Avocados Australia CEO John Tyas at the Sunshine Coast Regional Forum on 26 February.

Yui-Ping Liang and Akila Prabhakaran from Queensland Agriculture with Jenny Donovan and Jocelyn Kwaczynski at the Sunshine Coast Regional Forum on 26 February 2020.

Graham Sanders and Kerri Seccombe from Perseverance Farming at the Sunshine Coast Regional Forum.

Avocados Australia CEO John Tyas and Sunshine Coast Regional Forum field walk host Peter Annand.



Growers in the orchard with Andy and Judy Veal, during the South Queensland Regional Forum at Blackbutt in February.

Denis Dugdell (Minmore Fruits) and John Tannock at the South Queensland Regional Forum.

Orchardwalk host Judy Veal from Touchwood Farming with Avocados Australia's Liz Singh during the South Queensland event.

Avocados Australia Director Daryl Boardman, Bill Mair (Balmoral Orchard) and Andrew Fyffe (The Avotree) at the South Queensland Regional Forum.

Mitch Ipsen (Manjimup Avocados) with Joel and Rahela Winfield (Appadene Park) at the Western Australian Regional Forum on 12 March in Manjimup.

Greg Tapscott (Agrichem) and Zac Starkie (Farmlink) at the Western Australia Regional Forum in Manjimup.

Richie Wilson (Curley Creek) and Dawn Warrington (Advance Packing & Marketing Services) at the Western Australia Regional Forum.

At the orchard walk at Vic Grozotis' Applewood Orchard at the Western Australia Regional Forum in March.

Shayne Forth (Golden Grove), Doug Pow (Pow Brook) and Dr Mike Christensen from the South West Catchment Council at the Western Australian Regional Forum in Manjimup.

David Morcombe (Ambrosia Orchard), Craig Duncan (The Avocado Grove) and Alan Blight (Avowest) in Manjimup for the Avocado Regional Forum.

CSIRO researcher Dr Harley Smith talks avocado fruit set at the Manjimup forum.

Avocado growers buzzing about native bees

Hannah Rice-Hayes, Richmond Landcare

In early March avocado growers, Landcarers and native bee specialists came together for a free field day, exploring the role of native bees in avocado pollination.

As part of the *Stingless bees as effective managed pollinators for Australian horticulture* project, the event got growers up-close and personal with the insects in the orchard, with nets, jars and the inside of a native stingless bee hive.

The field day was held at Miloudamat Farm near Alstonville, NSW, and included information sharing presentations, Q &A opportunities, a farm walk, insect hunts and demonstration of native stingless bee management.

Event hosts, Richmond Landcare Inc and Western Sydney University Hawkesbury Institute for the Environment, limited capacity to a 40 people to ensure good learning outcomes.

Presenters included local grower and stingless bee keeper, Mike Hogan of Miloudamat Avocados, who performed a live split of a stingless bee hive and explained how native bees have enhanced their organic enterprise.

Tom Silver (Avocados Australia Tamborine and Northern Rivers Director) discussed the industry's approach to pollination. Dr Megan Halcroft of Bees Business detailed the importance of pollination for crop quality, yield and biodiversity, concerns about a potential over-reliance on honey bees and the potential problems associated with a Varroa mite incursion. A hive of researchers from the Western Sydney University's Hawkesbury Institute for the Environment detailed the research completed to date on this ongoing project, with Dr Mark Hall, Claire Allison and Sunayana Sajith sharing their project findings.

"Honey bees are excellent pollinators of many crops, but the burden placed on their health by pests and diseases is heavy," Dr Halcroft said.

"Added to that, the looming threat of a Varroa mite incursion makes our reliance on honey bees for pollination decidedly risky."

In this context, the Hawkesbury Institute for the Environment at Western Sydney University is heading up the Hort Innovation project *Stingless bees as effective managed pollinators for Australian horticulture*. The project's overall objective is to investigate and develop potential alternative, native insect pollinators for use in horticultural crops. The leading candidates are stingless bees, because they can be managed in hives, just as honey bees are, and moved into crops as required. Native stingless bees live in colonies and visit a variety of plants. They are currently used in macadamia crops, where their pollination services outperform honey bees.

Post event feedback showed that all attendees had substantially increased their level of knowledge of native bees, and most strongly agreed that they planned to change their property management strategies due to attending the workshop.

Acknowledgement

This event was organised by Richmond Landcare Inc and Western Sydney University Hawkesbury Institute for the Environment and is sponsored by Hort Innovation. The *Stingless bees as effective managed pollinators for Australian horticulture* (PH16000) project is funded by the Hort Frontiers Pollination Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation with contributions from the Australian Government.

Dr Megan Halcroft talks all things pollination at Alstonville

Growers in the Alstonville NSW area learning about the use of native pollinators in avocados.

More than 50 local growers attended the native pollination workshop near Alstonville, NSW.

Various native pollinators.

Mike Hogan, Miloudamat Farm, talking native bees.

Avocados Australia Director and local avocado grower Tom Silver at the native pollinator workshop in March.

Sunayana Sajith, PhD student at Hawkesbury Institute for the Environment at Western Sydney University.

Claire Allison, PhD student at the Hawkesbury Institute for the Environment at Western Sydney University.

Dr Mark Hall, postdoctoral research fellow at Western Sydney University at the Richmond Landcare workshop at Alstonville.

Mike Hogan, Miloudamat Farm, demonstrates splitting a native beehive during the workshop.

Images: Megan Lewis Images

Updated biosecurity plan for avocado industry

Mechanisms to minimise the risk to Australia's $483 million avocado industry from exotic plant pests have been strengthened with an update to the *Biosecurity Plan for the Avocado Industry*, released earlier this year.

Avocados Australia CEO John Tyas said while a human virus had captured the world's attention, the Australian industry continued its work on other potential threats.

"While avocado does not seem to be a host, the incursion of fall armyworm into Australia is a timely reminder that exotic pests can reach us just as easily as a virus," Mr Tyas said.

Fall armyworm is reported to feed on more than 350 plant species, including maize, cotton, rice, sorghum, sugarcane, wheat, and vegetable and fruit crops, and have caused significant economic losses overseas. At the time of printing, fall armyworm had reached Central Queensland and been found in the north of Western Australia.

"Biosecurity is essential for our global long-term competitiveness," Mr Tyas said.

"Keeping new exotic pests and diseases out of Australia means better access to export markets and more efficient production systems, it's as simple as that."

The industry biosecurity plan, first released in 2011, is a framework to coordinate biosecurity activities and investments. It provides a mechanism for industry, governments and stakeholders to better prepare for, and respond to, incursions of pests that could have significant impacts on the industry.

It identifies and prioritises exotic plant pests not currently present in Australia, and established pests of biosecurity concern and focuses on future biosecurity challenges.

In Version 3, the Threat Summary Tables provide a list of more than 170 exotic plant pests, outlining their potential biosecurity threat to the Australian industry. In this plan, established pests of biosecurity significance were also identified, as good biosecurity practice is beneficial for ongoing management and surveillance.

Importantly, the plan also details current mitigation and surveillance activities, and identifies contingency plans, fact sheets and diagnostic protocols.

Mr Tyas said the plan also provided the pathway to improvement. "All of the work that went into this plan helped to identify gaps and allowed the working group to prioritise specific actions which help us increase the industry's preparedness and response capability," he said.

"Just as with the first plan back in 2011, this document isn't the end point: it's a work in progress and a part of securing the future of our industry."

More information

You can read the plan at: *avocado.org.au/best-practice-resource/library/*. It is available in the Education Materials section of the Library.

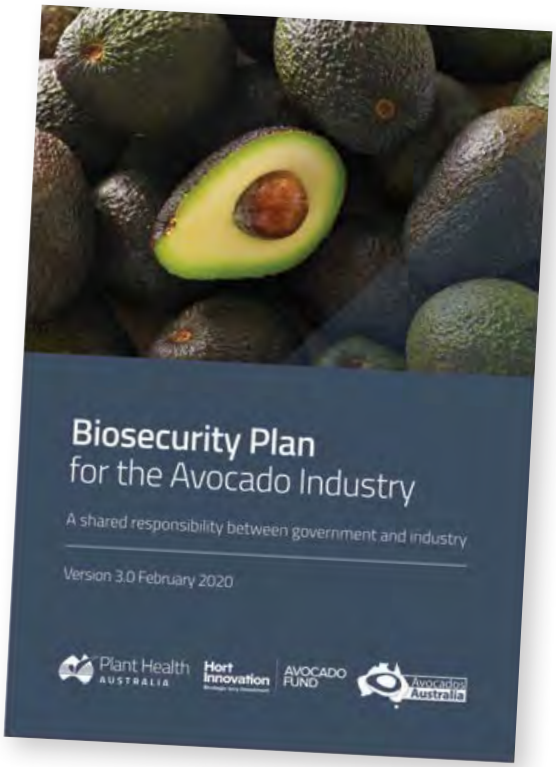
Acknowledgement

The *Biosecurity Plan for the Avocado Industry* project (part of *Review of national biosecurity* plans – AV17003) was coordinated by Plant Health Australia and developed through a partnership approach with government and industry.

In 2019, Avocados Australia has also signed a Memorandum of Understanding with Plant Health Australia, to establish a mechanism for the consultation, management and implementation of services and activities to improve biosecurity for the industry.

Hort Innovation

IF YOU SEE ANYTHING UNUSUAL, CALL THE EXOTIC PLANT PEST HOTLINE
1800 084 881



Keeping out exotic fruit flies

By Plant Health Australia

The Exotic Fruit Fly in the Torres Strait Eradication Program has been running successfully since the mid-1990s, and is paramount to protecting the mainland from exotic fruit fly incursions.

During the National Fruit Fly Council's most recent meeting in Brisbane on 5 March 2020, the Council invited Queensland-based industry representatives to a meet and greet. The industry attendees participated in a range of discussions with the Council including one led by the Queensland Chief Plant Health Manager about the Exotic Fruit Fly in the Torres Strait Eradication Program.

Eradicating exotic fruit fly incursions in Torres Strait prevents their establishment on the Australian mainland saving industries and governments a significant amount of money and resources. For example, the last time oriental fruit fly *(Bactrocera dorsalis)*, then known as Asian papaya fruit fly, was detected on mainland Australia it took four years and cost $34 million to eradicate, with an estimated cost to industry of $100 million.

The *Exotic Fruit Fly in the Torres Strait Response Plan 2018-2021* outlines the strategy for eradicating exotic fruit flies from the region and builds on the approach implemented since 1996 under the *Long-term Containment Strategy for Exotic Fruit Flies in Torres Strait*. It aims to stop the annual incursion of three fruit fly species (*Zeugodacus cucurbitae, Bactrocera dorsalis* and *Bacrocera trivialis*) using a program of bait spraying, trapping and male-annihilation blocking.

The program is on track to achieve eradication again this year. As of 11 March 2020, 94 *Bactrocera dorsalis*, 12 *B. trivialis* and zero *Zeugodacus cucurbitae* have been intercepted during the current monsoon season (November 2019 to May 2020). These interceptions have initiated response activity on five islands in Torres Strait which is a fairly typical pattern of detection and response for this time of the year.

Currently, a cost shared budget of $1.642 million for the program is agreed until 30 June 2021. Contributions come from the Australian Government, the Northern Territory, all state governments, Plant Health Australia and affected industry parties including Avocados Australia.

The Queensland Department of Agriculture and Fisheries (QDAF) works with staff from the Department of Agriculture, Water and the Environment's Northern Australian Quarantine Strategy (NAQS) program to deliver the response plan. NAQS assists QDAF to deliver key program elements, and ensure the availability of specific technical expertise and continuity of program knowledge.

More information

More information: *preventfruitfly.com.au* and *fruitflyidentification.org.au*

A female oriental fruit fly (*Bactrocera dorsalis*).
Image: Scott Bauer, Wikimedia Commons

Avocados Australia CEO John Tyas said this was an important program for the industry, because if these exotic fruit fly species became endemic in mainland Australia, the industry would have these new pests to manage.

"They may not be a major production constraint for avocado growers, but they would certainly disrupt interstate and export trade of avocados," Mr Tyas said

"As we expand our export markets into countries like Japan that have phytosanitary requirements, maintaining our pest status in Australia is critical. If we were to have an incursion of an exotic fruit fly, then our current market access protocols come into question.

"As an example, our current protocol for Australian avocados to Japan stipulates phytosanitary conditions for Mediterranean fruit fly. If Western Australia suddenly had a new fruit fly of quarantine concern for Japan, our current protocol would immediately be ineffective as it only deals with Mediterranean fruit fly. Trade would stop immediately until protocol amendments could be negotiated or the pest was eradicated."

The latest in your BPR

A host of new resources have been added to the Best Practice Resource in the last few months, from highlights of the various regional forums, to extensive reports on the world's major avocado suppliers.

COVID-19 resources

Along with collating a list of the nationally available resources and information, Avocados Australia has a specially collated list of resources and information for managing avocado orchards and packsheds during this pandemic. The resource page provides links to everything from health updates to financial assistance packages. Specifically for avocado orchards and packsheds, we have collated a step by step guide of general tips, WHS considerations, staff management, tips on assessing the market, and more. These have been specifically collated with avocado orchards in mind. You can access these resources directly from the homepage of the public website, without needing to log into the BPR. Visit *avocado.org.au*.

New phytophthora video

A new video, produced via the industry extension project (AV17005), has been added to the BPR Library, under the video heading.

The *Protecting your avocado trees from Phytophthora root* rot video demonstrates the steps needed for the effective use of phosphorous acid, as part of an integrated management approach. Phytophthora root rot is a major issue for the avocado industry. The application of phosphorous acid forms an essential part of the integrated management of this disease, however, it must be done correctly. This video demonstrates the steps that must be followed to achieve the effective use of this valuable fungicide.

New industry biosecurity plan

You can find Version 3 of the industry's biosecurity plan in the BPR Library, in the Education Materials section. Read more about this plan on page 38.

World Congress presentation summary

The team from the industry's current extension project have uploaded summary of presentations from the World Avocado Congress. This handy summary can be found in the Event Proceedings section of the BPR Library. You will also find a report on the conference pre-tour to California, and two reports on the Colombian field tours to Rio Negro and Sonson, including details of visits to avocado orchards and research sites.

Regional forum materials

Event proceedings have been added for all of the 2019 and 2020 Avocado Regional Forums. This includes notes on the key messages, as well as copies of the various presentations. Check the Event Proceedings section of the BPR Library.

Avo Alerts

Growers can find the two latest editions of the *Avo Alerts* – lists of useful orchard tasks checklists organised by growing region – in the Australian Agronomy section of the BPR Library. The latest editions include links to various video content, and COVID-19 resources.

Workplace health and safety

Now more than ever, workplace health and safety are front and centre for not just the avocado industry but the whole world. But while we are all putting in place additional safety and hygiene measures to combat the global pandemic (more on pages 14-17), it's important to also continue normal safety practices.

The Best Practice Resource (*avocado.org.au/bpr/*) WHS module contains a range of avocado-specific resources, including guides, plans, registers and checklists to help you plan and

implement a WHS program for your business.

There are also a range of links to external information sources in the BPR Library's WHS resources section, by state.

Registering for the BPR

Avocados Australia welcomes new applications for the Best Practice Resource from all businesses that are part of the Australian avocado industry. This includes, growers, packers, wholesalers, ripeners, transporters, retailers, exporters, researchers, consultants, input suppliers and other relevant stakeholders.

Information has been sourced from the latest research, development and industry investment, checked by industry experts and carefully structured to allow quick and easy access to information including a search function. Information and resources are updated as new content becomes available.

Can you apply for registration via *avocado.org.au/bpr/*. It's free!

Managing bullying, harassment and discrimination

Thomas Hertel, Fair Farms Program Manager

The horticulture industry is lucky enough to welcome workers with diverse backgrounds and experiences that make the industry an interesting and exciting place to work.

However, these workers may be vulnerable to bullying, harassment and discrimination. This not only forms a health and safety risks for workers but can also prevent them from performing their job well.

We all deserve a safe place to live and work, therefore Fair Farms encourages growers to have policies and procedures in place to understand, prevent and manage any instances of bullying, harassment and discrimination.

Bullying and harassment

Bullying happens when people repeatedly act unreasonably towards someone in a way that can affect that person's physical or psychological wellbeing. Bullying can either be direct or indirect.

Direct bullying is negative behaviour that is very clear and explicit, usually conducted to belittle or demean a person. Examples of direct bullying include:

- abusive or offensive language
- regular teasing
- making someone the butt of pranks.

Indirect bullying involves more subtle or indirect behaviours that over an extended period have a negative impact. Examples of indirect bullying include:

- deliberately excluding someone from normal work or social activities
- spreading rumours about someone
- deliberately making someone's job harder to perform by hiding equipment or giving false information.

Warning signs that bullying might be occurring in your workplace can include high rates of workers calling in sick, an excessive 'tough guy' workplace culture and uneven distribution of work.

Like bullying, harassment is unwanted or uninvited behaviour that is offensive, intimidating or humiliating. However, unlike bullying, harassment can be a single incident that offends or humiliates someone. *Sexual harassment* occurs when the behaviour directed at a person is of a sexual nature, is unwelcome and would cause a person to be offended, humiliated or intimidated. Sexual harassment is unlawful under both State and Federal legislation.

Discrimination

Discrimination occurs when someone is treated less favourably because of a characteristic such as ethnicity, religion, gender or sexual orientation. Like bullying, discrimination can be direct or indirect. While direct discrimination is very easy to see (eg only hiring white, Asian or female workers), indirect discrimination can be harder to see. For example, a dress code that requires no facial hair when working on a grading line might unknowingly discriminate against workers who have facial hair for religious reasons.

Managing these risks

The first step in managing the risks of bullying, harassment and discrimination is having a clear policy and procedure in place. Your policy should outline:

- your commitment to a safe workplace and intolerance of bullying, harassment and discrimination
- the types of issues that are handled under this policy
- how your business will handle, investigate and resolve instances of bullying, harassment and discrimination
- how workers can seek help, including contact information for counselling and support services.

Once you have a clear policy and procedure in place, it is important to communicate it to all workers and include it in any induction material, so workers feel comfortable and safe to raise an issue. You should also train supervisors or managers in the policy so they are confident in handling arising issues in accordance with the procedures.

These and other important topics are covered in the Fair Farms Standard, which outline the accepted principles of fair and ethical employment in horticulture. Employers who wish to demonstrate compliance with the Fair Farms Standard can get third-party certified. For more information, visit: *fairfarms.com.au* or email *fairfarms@growcom.com.au*.

Next generation Horticulture Statistics Handbook is here

The latest edition of the much-anticipated *Australian Horticulture Statistics Handbook* is now live and includes an exciting new interactive dashboard with improved search functionality and user preferences.

The Handbook features data on more than 70 horticultural products including avocados and other fruit, nuts, vegetables, nursery, turf and cut flowers.

The data shows that in 2018/19, the horticulture sector recorded its highest production value to date. After seven years of consecutive growth, the sector now has a total value of $14.4 billion.

Results by category show that in the fruit sector, the value of berries and citrus accounted for nearly one-third (32%) of the total value of fruit in 2018/19.

Avocado production in 2018/19 was valued at $444 million at the farmgate. As reported in the Statistics Handbook, the wholesale value of the fresh supply was $512 million, with $389 million distributed into retail and $124 million into food service.

Avocados Australia CEO John Tyas said while the handbook reported more than half of Australian households purchased avocados during the year, that percentage had increased in the second half of 2019 and into 2020.

"We are waiting to see the final impact the global COVID-19 pandemic has on household purchasing, but avocado is clearly a regular part of Australians grocery shopping and we are working to maintain that," he said.

Mr Tyas said the industry's small but growing export activities would be hit by COVID-19, as Australian avocados were mostly transported via airfreight, on passenger jets.

"As the Handbook notes, our exports were valued at $19.7 million in 2018/19," he said.

The value of the vegetable category increased by nearly 9% to reach a value of $4.7 billion in 2018/19.

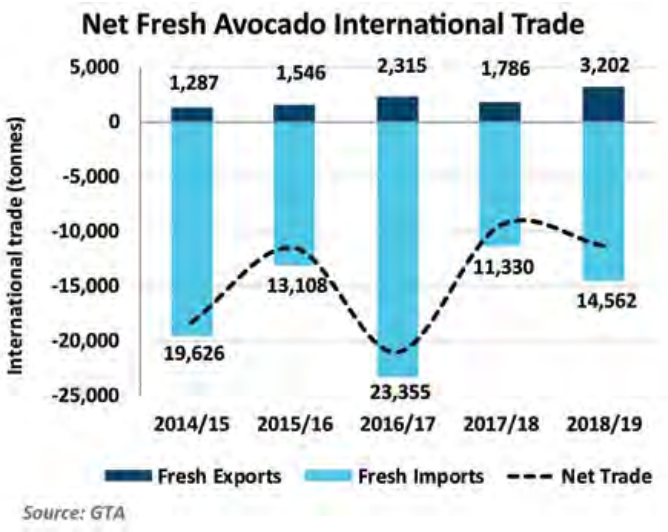
Meanwhile, the nursery sector accounted for 17% of the total production value of horticulture in 2018/19.

And in trade and export, the 2018/19 value of table grapes exported increased by 44.5% annually to reach a record value exceeding $500 million, now larger than the value of all citrus combined.

Almonds were the highest-valued horticulture export overall, achieving a record export value of $675 million. Almonds and macadamias also accounted for 89% of the total value of nut production in 2018/19, up from 85% in the previous year.

Hort Innovation Head of Data and Insights Adam Briggs said the Handbook provided important data for industry, researchers and decision makers; supported policy formation; and contributed to further research to benefit all horticulture industries.

He said the ongoing investment in the development and improvement of the Handbook meant new metrics which reported information about retail and foodservice distribution for fruit and vegetable products is now available. Further, the accessibility of the Handbook has also been improved.



Australia has traditionally imported more avocados than it has exported, typically importing between 15,000-25,000t from New Zealand over summer. In this graph from the *Australian Horticulture Statistics Handbook*, imports are counted as negative tonners.

More information

To access Hort Innovation's Australian Horticulture Statistics Handbook, visit www.horticulture.com.au/hortstats. The Handbook's interactive dashboard is suitable for viewing on desktop computers, while PDF information can also be viewed on mobile.

Acknowledgement

The *Australian Horticulture Statistics Handbook 2018-19 to 2020-21* (HA18002) has been funded by Hort Innovation using the across industry levy and contributions from the Australian Government.

Hort Innovation

MARKETING UPDATE

Promoting the benefits of avocados

By Australian Avocados

Driving demand remains the top priority for the levy-funded marketing program during these uncertain times through encouraging consumers to #smashanavoathome.

The COVID-19 pandemic has caused changes in both the consumption trends in fresh produce and our marketing efforts as our consumers show an increasing interest in home cooking and health during this period.

Australian Avocados will continue to be a supportive, positive influence for all home cooks through all communication channels. The key messaging from the current campaign, including 'avocados making meals better' and 'avocado's health credentials', position the industry well.

The current situation with COVID-19 has presented two immediate needs for Australian Avocados to drive in-home consumption:

- ensuring consumers understand how and why avocados can positively benefit them and their health during this time, and
- educate how to use avocados at home, on Shepard avocados and the differences from Hass and the versatility of the product across a range of meals/occasions.

Avocados Australia and Hort Innovation are working together to ensure the avocado marketing program continues to drive consumer demand.

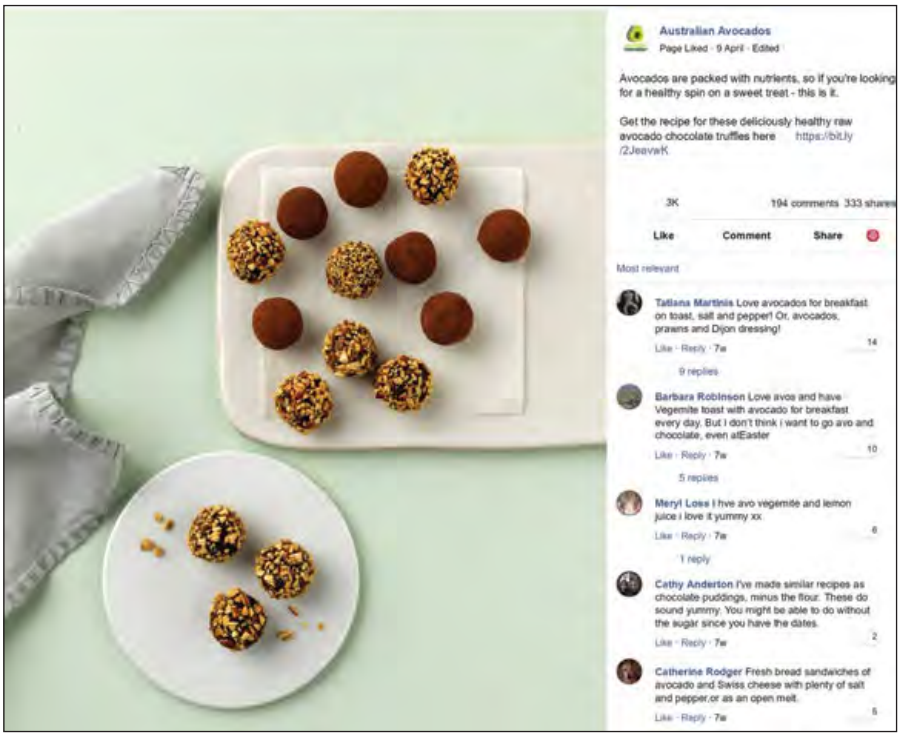
In response to the shifting location for our audiences (ie, to their homes instead of out and about), the avocado marketing program increased its focus towards digital media, including social media. (As a side note, globally, the use of Facebook messaging jumped 50% because of COVID-19, and a user survey found most expected to increase their time on Facebook, Instagram and YouTube significantly, among other channels.)

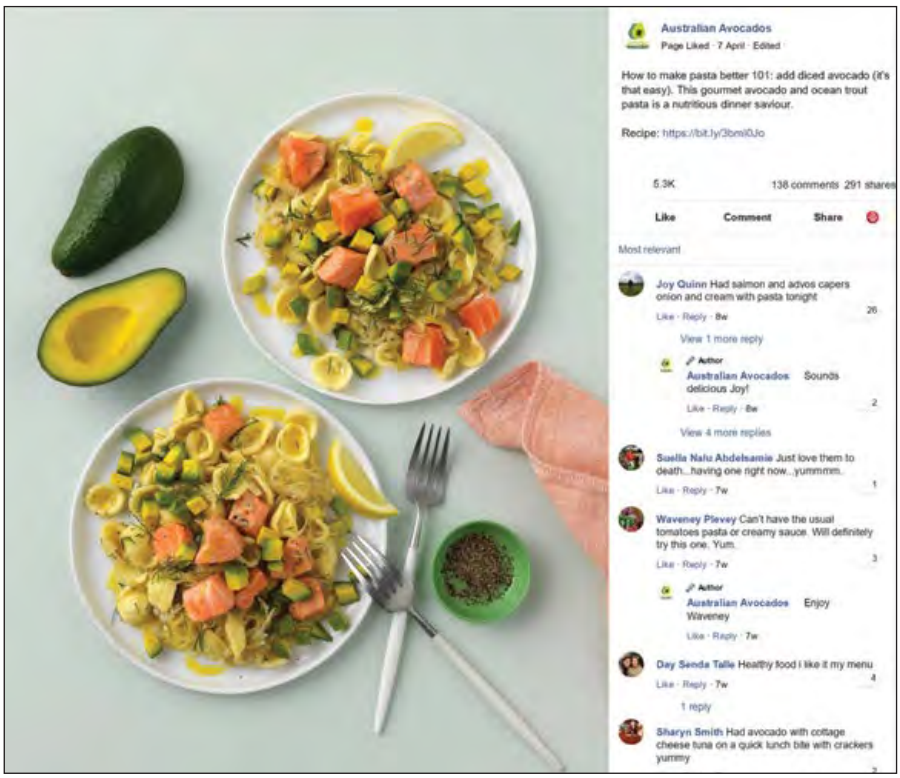
Social media

Content was reviewed during the first part of the year, to better connect with consumers and drive demand with a key focus on useful recipes, education and health as the underlying key message. There will be a focus on encouraging consumers to #smashanavoathome.

Social media remains a key platform for driving the demand of Australian Avocados at present. Content has been reviewed to be more reflective of the current circumstances, and Australian Avocados shared information helpful to consumers during COVID-19. This included providing recipe inspiration for at home consumption such as Avocado & Ocean Trout Pasta, Broadband Brunch Ideas and nutritious Raw Avocado Chocolate Truffles.

The sentiment on both the Facebook and Instagram page remains overwhelmingly positive, with many loving the recipes and activities (such as the downloadable colouring in graphic, on the website here).





Retail integration

Additionally, retail integration with select Woolworths stores started on 8 April, including storefront digital screens, bollard panels, basket liners, recipe cards, and rewards integration to promote and inspire consumers to add more Australian avocados into their shopping baskets.

Radio

In an attempt to maximise impact of the push for at-home consumption, the current campaign shifted into Breakfast and Afternoon programs, as well as moving advertising investment into streaming from April.

Out of Home

Out of home marketing will continue as planned as these are currently live and unable to be cancelled. This includes street furniture, train-station platforms and retail precincts.

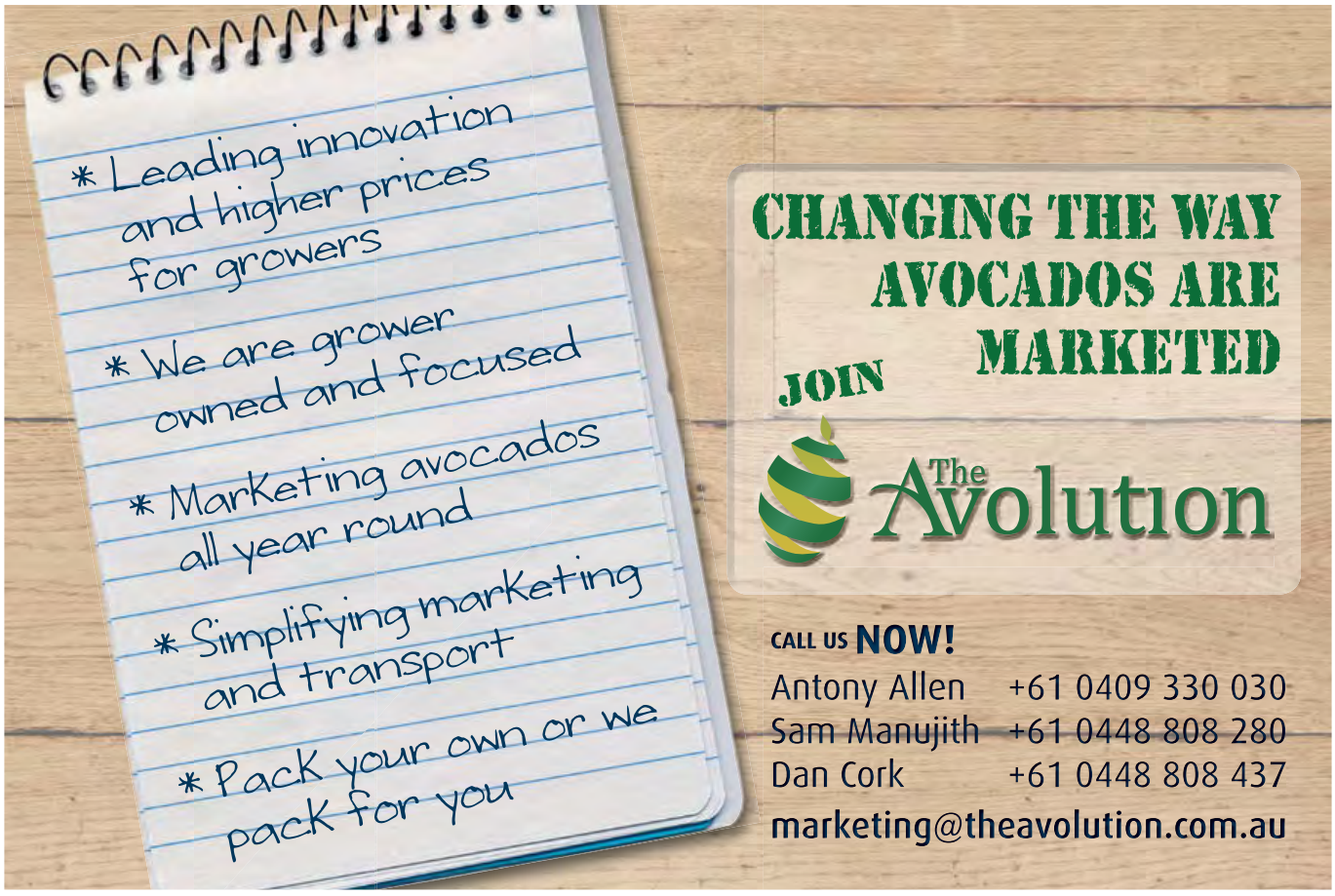
Partnerships

Sonoma Bakeries

Australian Avocados secured a partnership with the famous Sonoma Bakery in Sydney to deliver fresh sourdough bread and avocados straight to consumers' homes. The initial push during the Easter long weekend created some excitement across media.

taste.com.au

A partnership with *taste.com.au* ran for four weeks in April/May. This campaign included a mix of advertising, bespoke recipes and Taste TV Videos to encourage everyone to use avocados at home.



Influencer outreach

Supporting the work of growers with their #smashanavoathome messaging via videos and images shared on social media, Australian Avocados distributed #smashanavoathome packs to key influencers and friends of Australian Avocados including: healthy chef and cookbook author Luke Hines, chef and author Alice Zaslavsky, chef Tom Walton, chef Hayden Quinn and Model Turned Cook blogger Jax Raynor, dietitian and nutritionist Lyndi Cohen (The Nude Nutritionist), and fitness influencer Sam Wood to continue to drive at home-consumption.

Read more about how growers supported #smashanavoathome on page 48.

Public relations

Luke Hines, a chef and Instagram influencer was part of the Shepard season campaign, demonstrating the versatility of Shepard avocados to his 91,000 followers, and beyond with recipes created to encourage people to make avocado the hero of their meals at home. *Better Homes & Gardens*, *Interiors Addict*, and *Kiddipedia* shared three Shepard avocado recipes, Avocado Chimichurri, Avocado Popsicles and Avocado Salad. Shepard avocados also featured in a number of articles in the 2020 season, with articles in *Body and Soul*, *Women's Day*, *Canberra Weekly*, *Queensland Country Life* and *The Land* in coming weeks.

Hass is back

And while the COVID-19 pivot occurred, Australian Avocados also worked to ensure a smooth transition between marketing for Shepard and Hass, as the season changed. This was based on indicative flows captured through the *Infocado* system.

Australian Avocados Group Marketing Manager Matthew Dwyer told *Life Begins At* magazine the return of Hass to stores is expected to be welcome news for many avocado lovers.

"New research by YouGov Galaxy found that more than half (53%) of Australians buy Hass avocados regularly or consider them their preferred avocado variety," Mr Dwyer said. You can read the full article at *lifebeginsat.com.au/hass-is-back-so-it-is-time-to-get-smashing/*.

Between February and April, Australian Avocados has secured 106 pieces of media and social coverage, which had the potential to be seen more than 14 million times. This outreach has only increased since, with the seasonal transition PR work.

Acknowledgement

This activity is managed by Hort Innovation, on behalf of the industry, and is funded by the avocado marketing levy.

Hort Innovation
Strategic levy investment
AVOCADO FUND

#smashanavoathome

Driving demand remains the top priority for the levy-funded marketing program, through encouraging consumers to #smashanavoathome.

To keep driving demand for in-home consumption of avocados during this time, Australian avocado growers were encouraged to submit a short video, showcasing how they used avocado at home.

There were some great submissions from across the country, and you can watch them via the news food on the Avocados Australia Facebook page (*facebook.com/AvocadosAustralia/*) or search #smashanavoathome.

Contributions came from across the country, including Karri Brook Estate in Western Australia, Parkes Lane Produce and Golden Hill Packing in South Australia, Avocado Tom from New South Wales, and Sunnyspot, Rock Ridge Fresh, Groves Grown Tropical Fruit and Hinterland Avocados in Queensland. There was even a special guest appearance by Alvin the Avocado.

#smashanavoathome

australian avocados
#smashanavoathome

The youngest members of the Hinterland Avocado team from North Queensland showed off their skills, putting together a smashed avo you'd be happy to see at your favourite café!

Thanks to everyone who sent in their videos and photographs, helping us show our consumers some easy and delicious ways to whip up meals with avocados.

According to Nielsen, living the COVID-19 life includes the rise of a "homebody economy", driven by consumers' choice to increasingly live, eat and entertain at home, even as restrictions ease.

So, if you find yourself inspired, be sure to use the #smashanavoathome hashtag on your favourite social media and let us know so we can share across the industry channels.

Sarah from Parkes Lane Produce in the Tristate pulled out all the stops and set up a prep bench at the packhouse to share her favourite avocado salad as part of the #smashanavoathome mini campaign.

Kym Thiel from the Tristate didn't even have to put down his coffee as he shared his fave #smashavo (hint: featuring bacon)!

Brad from Western Australia came up with a double feature for his #smashanavoathome challenge. He started off with an avocado, tomato, chickpea and four bean mix salad. And should you have any of this tasty creation left from your Saturday night barbecue, well, Brad says it's excellent for Sunday brunch #smashedavo with some toast and a few poached eggs.

It was all hands on deck for the Rock Ridge Fresh family as they showed off their favourite way to eat an avo! While Paul and Marcello put together their favourite smashed avo, little Lucia proved that really, you just need a spoon!

Even Alvin the Avocado got in on the act, heading into the kitchen for #smashanavoathome!

Mark and Dawn from Wakerie in the Tristate talked all things avo from their orchard, and chatted about their favourite recipes.

Daryl Boardman from Sunnyspot Packhouse in South Queensland shows his quick packhouse lunch – avocado and tuna.

Tom from the Tamborine Northern Rivers has the easiest (but super tasty) avo treat: avocado plus your fave thousand island dressing.

Domestic campaign to support growers

In Australia, the horticultural industries have faced numerous challenges including drought, floods and bushfires. COVID-19 has thrown challenges to the nation impacting mental wellbeing and mood through isolation. It has affected Australian growers with immediate changes to the export market and food service closures, as well as consumer behaviour in consumption and purchasing.

To support horticultural growers, Hort Innovation has launched a campaign called The Good Mood Food Campaign. The aim is to motivate Australian consumers to eat more fruit, vegetables and nuts. Launching the major components of the campaign in May, the campaign includes a new new TV ad supported by advertising, public relations, increased social media and a range of partnerships that will see the campaign reach up to 98% of Australians.

Consumer behavioural data available through the Hort Innovation levy funded Harvest to Home initiative highlighted that overall fresh produce volumes were up 5% compared to March last year. However, performance at the category level has been mixed with consumers responding to competing influences concerning price, perishability, and discretion. Growth in fresh produce sales have been widely outpaced by frozen and canned products of which a greater share is imported.

Only 5.4% of the Australian adult population are meeting their fruit and vegetable requirements.

Australians will be educated and inspired on how Aussie produce can promote good mood alongside overall health and wellbeing. Importantly, they will also be driven to purchase and re-purchase a variety of produce.

The campaign is encouraging people to look after themselves mentally to boost their mood as well as promote good physical health.

Hort Innovation CEO Matt Brand said the campaign grew out of the need to support growers across Australia and stimulate demand for fruit, vegetables, and nuts.

"It's extremely important that we promote the importance of eating fresh Australian produce to all Australians which in turn supports growers," he said.

"The campaign is developed so it can be extended and focus on seasonality or moments where Australians will be looking for increased health and wellbeing or eating options.

"We want to support growers with what they are facing now, and with whatever happens next. This campaign provides the flexible platform to do that.

The design of this campaign provides opportunities for other, individual industries to benefit from using its content to amplify their own unique consumer positioning."

The campaign is being funded through risk management reserves that the Hort Innovation Board has released in response to the challenging times being faced by the horticulture sector following drought, bushfires, COVID-19 and what lies next.

Find out more: *thegoodmoodfood.com.au*.

New Market Development Manager

In a move to proactively increase domestic demand, Avocados Australia has created a new position for a Market Development Manager.

Avocados Australia CEO John Tyas said as production increased, the industry needed to do more to make the most of the opportunity.

"We have employed our first Market Development Manager, Hayleigh Dawson, to focus on quality, supply dynamics and promotion," Mr Tyas said.

"The key here, is this role will focus on leveraging existing activities for greater benefits across the value chain. "We're not looking to reinvent the wheel because there is already excellent marketing, research and development work taking place. We want that work to be as effective as possible, well integrated and communicated across the value chain to ramp up consumption of Australian avocados in our domestic market."

Ms Dawson has worked in fresh produce supply management since graduating with a Bachelor of Agribusiness & Bachelor of Applied Science from the University of Queensland in 2016.

"I understand the importance of the task ahead in continuing to drive consumption of Australian avocados for the industry and am excited for the challenges ahead."

The priority areas for this new Avocados Australia role are:

- Quality – Improve the quality of avocados available to Australian consumers at retail point of sale
- Supply dynamics – The role will help to leverage maximum value from the industry's highly regarded crop forecasting and dispatch monitoring system
- Promotion – Ms Dawson will seek opportunities to leverage the industry and retailer investments to drive growth in the avocado category.

"While domestic consumption levels are quite high, we definitely have room to grow and this role will help to increase consumption of Australian avocados higher and faster," Mr Tyas said.

"Hayleigh has really hit the ground running, starting around the same time as COVID-19 impacted the market, and just before the Shepard to Hass transition. The need for this new role has already been vindicated in its first few weeks."

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RESEARCH AND DEVELOPMENT

Monitoring avocado quality in retail

Adam Goldwater, Applied Horticultural Research

Australian avocado production and consumption continues to climb year on year, but what does this mean for stakeholders? For a fresh produce category to grow, consumers need confidence and positive experiences of fruit purchases that meet their expectations.

Fruit quality is one of the biggest issues currently facing the avocado industry. Domestic consumption of avocados needs to increase significantly during the next four to five years. Why? To meet increasing supply based on current plantings.

At the same time, imports of avocados have been increasing (from New Zealand), and Chile now has access to the Australian market. Customer satisfaction with Australian avocados is therefore critical to increase sales.

Surveys of avocado quality undertaken by Avocados Australia from 2011 to 2015 found 20-25% of fruit in stores had unacceptable levels of bruising, internal rots, or other disorders. Poor fruit quality reduces consumer satisfaction and sales. The avocado industry continues investing to improve fruit quality, and this project will help measure the effectiveness of those investments.

During the next three years, Applied Horticultural Research (AHR) will be funded via the Hort Innovation Avocado Fund to measure avocado fruit quality nationally at supermarkets, independent fruit stores and speciality retailers.

What to expect from the project

Regular assessments are planned for retailers in Sydney, Melbourne, Brisbane, Perth and Adelaide (at the same stores each time to reduce variability). The timing of sample collections will be staggered so that the industry receives feedback from at least one location nearly every week throughout the year, capturing change of supply regions.

Hass and Shepard avocados will be purchased from retail displays, as presented to consumers. The quality of store displays will be assessed, and fruit supplier details, including pack-date will be recorded. Fruit samples will then be returned to the laboratory for assessment of firmness, dry matter, bruising, rots and other internal defects.

Wherever possible, sampling will include as many different packhouses as can be sourced from the targeted retailers on each sampling event.

Stakeholder benefits

Rapid feedback to growers, packers, retailers and marketing groups will provide real-time reports on fruit quality at retail. This continuous feedback mechanism will enable problems to be addressed to help improve the quality of avocados.

Reports will be tailored to specific stakeholder groups, and where possible, results will be confidentially benchmarked against other suppliers, growers and retailers, providing a ranking for the season.

The project will provide an objective measure of how well the industry is tracking on their mission to improve the consumer eating experience of avocados.

Where to find results

Sampling will commence once COVID-19 related restrictions are lifted, and non-essential work activities can resume.

Regular communication and updates with de-identified results will appear via the Avocados Australia website. Keep an eye out for ongoing findings from the project in *Talking Avocados* magazine, as well as *Guacamole* newsletter.

Confidential reports will be emailed to specific stakeholder groups.

AHR will participate in extension field days and industry events, presenting findings with a strong focus on specific regional issues.

More information

Adam Goldwater, Applied Horticultural Research (AHR), 0466 080 693 or adam.goldwater@ahr.com.au.

Acknowledgement

The *Monitoring avocado quality in retail* (AV19003) project has been funded by Hort Innovation, using the avocado research and development levy, and contributions from the Australian Government.

Hort Innovation
Strategic levy investment

AVOCADO FUND

What was your fruit quality like in 2019?

Noel Ainsworth, DAF Supply Chain Horticulturist

Repeat consumer purchases are critical for Australian avocado consumption and this relies on 90% or more of the fruit meeting their expectations.

Consumer expectation is that fruit have 10% or less of fruit damage. Damage is usually made up of mainly bruises and rots.

During 2019, the avocado supply chain feedback project (AV18000) monitored 40 supply chains across the country throughout the year. We collected fruit as it left the ripener and then waited for them to reach a soft ripe stage, before undertaking fruit quality assessment.

Given that it had been four years since regular retail quality information had been collected in the Avocado industry quality benchmarking project (AV11015), it was interesting to see if any progress had been made on improving fruit quality.

The 2019 result was that 92.6% of fruit (915 fruit sampled) met that expectation of <10% damage (see Figure 1). This good result may be simply due to 2019 being a year that was typically dry with good quality and short supply chains due to no large amounts of pre-ripening storage. However, our sampling was only to the point of ripening, not to the point of retail display.

It will be interesting to see if the 2019 results suggest an improving trend or just an exceptional result. Either way, it will be checked using the 2020 data as well as the monthly data that will be collected under the new retail quality monitoring project (AV19003). (More on the new retail project on page 54.)

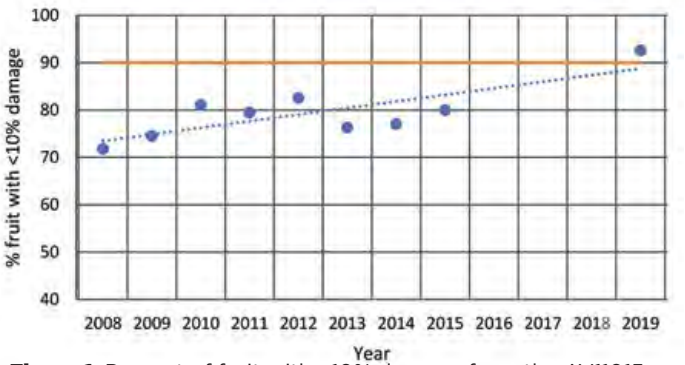

Figure 1. Percent of fruit with <10% damage from the AV11015 (2008-2015) and AV18000 (2019) data collection with the minimum limit for consumer repeat purchase (as the orange line). The trend line is the blue dotted line.

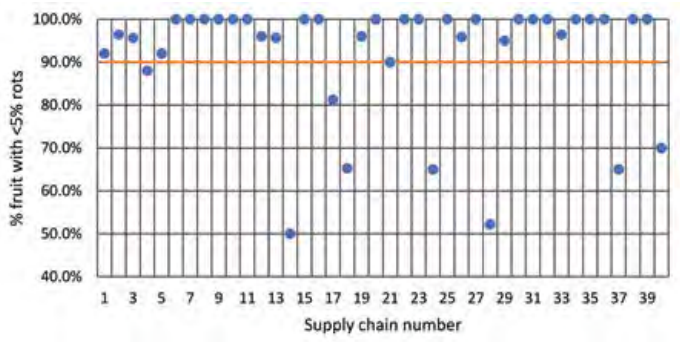

Figure 2. Percent of fruit in 2019 supply chain samples with <5% rots (equivalent to >10% damage). While it wasn't possible to point the finger at any one cause with just the first year of data, these supply chains have been informed of the results and will be monitored again as we collect data in 2020.

Even though fruit quality was good, the recent benchmarking identified some opportunities for improvement. Figure 2 shows the comparative performance of the 40 supply chains monitored.

It not only shows the variability between supply chains, but it also identifies eight of them as not reaching the 90% of fruit level expected to meet consumer expectations. This offers the project some direction to examine that 20% of supply chains to further improve the average fruit quality reaching consumers.

Acknowledgement

The *Implementing best practice of avocado fruit management and handling practices from farm to ripening* (AV18000) project has been funded by Hort Innovation, using the avocado research and development levy, co-investment from the Queensland Department of Agriculture and Fisheries, Western Australian Department of Primary Industries and Regional Development, and contributions from the Australian Government. Key project delivery partners also include Avocados Australia and Rudge Produce Systems.

Hort Innovation
Strategic levy investment
AVOCADO FUND

Figure 3. Avocado fruit with <10% damage, at the limit of acceptability for repeat purchase.

Improving avocado fruit quality: evaluation of post-harvest treatments

Elizabeth Dann[a], Shaun Hood[b], Akila Prabhakaran[a], Kamrul Hassan[a,c]

[a] University of Queensland, St Lucia, QLD 4072, Australia
[b] Syngenta Australia Pty. Ltd., North Ryde, NSW 2113, Australia
[c] Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

KEY MESSAGES

- Premium fruit quality is the responsibility of everyone along the supply chain, and begins with good orchard management to limit infections from fungi causing anthracnose and stem-end rot during fruit development.
- Post-harvest treatments should not be used as a "Band-Aid" to cure infected fruit coming into the supply chain.
- Graduate A+ is an effective post-harvest treatment, particularly for stem-end rot
- Further trials are required to test electrolysed oxidising (EO) water under commercial conditions, but initial work is promising.
- Combinations of EO water and Graduate A+, or other products as they are available, may enhance robustness of fruit through extended storage and transport chains, resulting in premium quality fruit at point-of-sale and a pleasurable experience for the consumer

Introduction

There are several diseases and other physiological disorders of avocado fruit impacting the quality of product and eating experience for the consumer. Trees and fruit are pushed to their limits in terms of yields, productivity, biotic stress (diseases and insect pressure) and abiotic stress (floods, drought, low soil fertility etc). On top of this, as production volumes increase and export markets expand, fruit are stored and transported for lengthy periods after harvest and frequently subjected to undesirable spikes in temperature. No wonder fruit doesn't always arrive in the best condition! It is the responsibility of all stakeholders in the chain to supply avocado fruit of high quality with minimal post-harvest wastage.

In Australia, the primary diseases (rots) affecting avocado fruit *after* harvest are anthracnose and stem-end rot. Anthracnose (Figure 1) is primarily caused by fungal *Colletotrichum* species, and while fruit may be infected at any time during their development, the fungus remains dormant for many months after penetrating the fruit cuticle without causing obvious symptoms.

After harvest, during the ripening process, the fungus resumes growth causing disease symptoms. Several fungal species are associated with stem-end rot (Figure 2), including *Colletotrichum* spp., *Diaporthe (Phomopsis)* spp., *Pestalotiopsis* and species in the Botryosphaeriaceae family (*Lasiodiplodia* spp., *Fusicoccum* spp., and *Neofusicoccum* spp.). These fungi are frequently present as endophytes internally infecting living plant tissues without causing any visible disease for at least part of their life cycle. They may colonise the fruit peduncle and be present in the stem end of harvested fruit. During ripening the fungi recommence growth and become pathogens, causing disease emanating from the stem end, frequently tracking along the vascular strands within the pulp (Figure 2). Stem-end rot is frequently worse in fruit from stressed trees, such as those in decline from Phytophthora root rot.

Growers should not rely solely on post-harvest fungicide treatments to manage fruit diseases such as anthracnose and stem-end rot. Management of these diseases must commence on-farm with a combination of tools for high-health orchards. These include orchard hygiene and canopy management to reduce fungal spore load and infection events, strategic applications of registered fungicides, optimal irrigation and nutrition for healthy trees and robust fruit, and careful harvest and post-harvest practices (find out more from avocado.org.au/bpr).

Research undertaken in AV16007 evaluated post-harvest treatments including Graduate A+, a fungicide comprised of two active ingredients, azoxystrobin and fludioxonil, as well as electrolysed oxidising (EO) water, a chlorine-based sanitiser, for their effect on anthracnose and stem-end rot compared with the industry standard prochloraz, and some results are presented here.

Figure 1a and 1b. Anthracnose, caused by *Colletotrichum* spp. fungi. Note the hemispherical lesions arising from initial infection of the peel, and rotting into the pulp.

Figure 2 a b and c. Stem end rot, arising from infection at the stem or "button" and progressing along the vascular strands.

Results

PART 1 Evaluation of Graduate A+ in commercial packing sheds in Queensland – demonstration trials

Three demonstration trials were undertaken in commercial packing sheds in Queensland, utilising different post-harvest fungicide application methods. Samples of fruit were collected from the line after the initial rinse (as untreated control), and after fungicide spray with label rates of prochloraz or Graduate A+ (azoxystrobin + fludioxonil). Fruit were dried, packed into trays and transported to the laboratory facilities at Ecosciences Precinct, Brisbane. Fruit were maintained in a controlled environment room 23°C and 65% relative humidity to encourage expression of disease. Fruit were checked each day and removed from the ripening room when deemed "eating soft" and assessed for severity of symptoms caused by anthracnose and stem-end rot.

Trial 1 Non-recirculating spray, North Queensland

Graduate A+ (250mL/100L) was applied via a non-recirculating spray system for 30 seconds (Figure 3). Both anthracnose and stem-end rot were reduced by Graduate A+ treatment (Figure 4), with the severity of stem-end rot 8-fold lower than in rinsed control fruit.

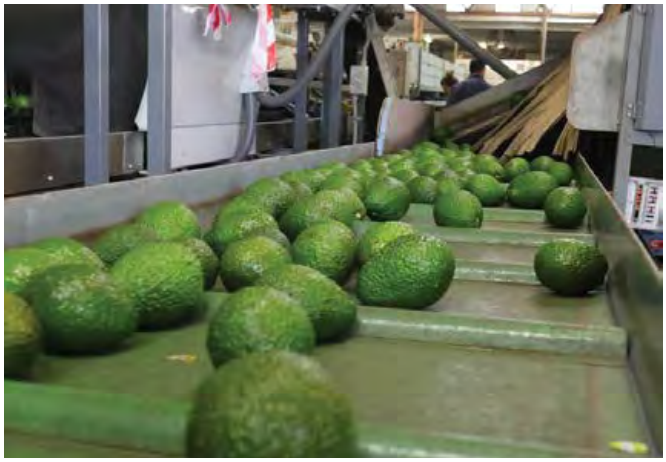

Figure 3a and 3b. Hass fruit progressing through the line. The fruit covered with tape indicated when to collect fruit after the rinse and prior to fungicide treatment (for the "untreated" control).

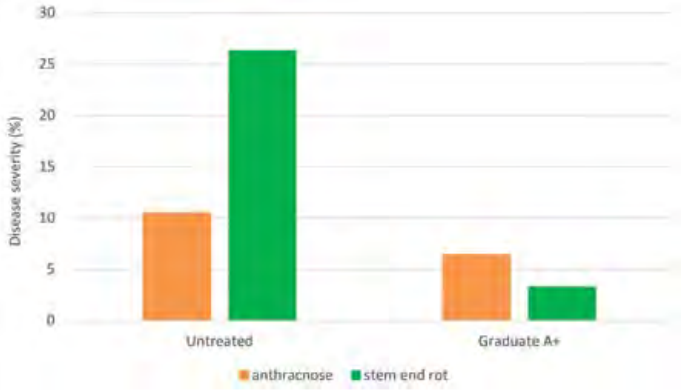

Figure 4. Effect of Graduate A+ on anthracnose and stem end rot disease in Hass avocado. Graduate A+ (250mL/100L) was applied via a non-recirculating spray system for 30 sec, Trial 1.

Trial 2 Recirculating spray, Central Queensland

Graduate A+ (250mL/100L) was applied via a recirculating spray system for 30 seconds. One tank (about 650 L) of Graduate A+ was prepared in the morning of Day 1. From the first bin of the day to the last, 48 tonnes of fruit passed through the line and spray solution volume dropped to approximately 375L. In the morning of Day 2, prochloraz (Sportak, 55mL/100L) was prepared and applied for the day. Fruit from the same orchard was treated with both Graduate A+ and prochloraz.

Fruit treated with Graduate A+ in the morning or afternoon of Day 1 had less severe anthracnose and stem-end rot compared with respective fruit that went through the rinse only (Figure 5). Stem-end rot was reduced up to 10-fold compared with control fruit. On the second day, anthracnose and stem-end rot were reduced by prochloraz treatment, although reduction in stem-end rot (about twofold) was less than that achieved by Graduate A+ the previous day.

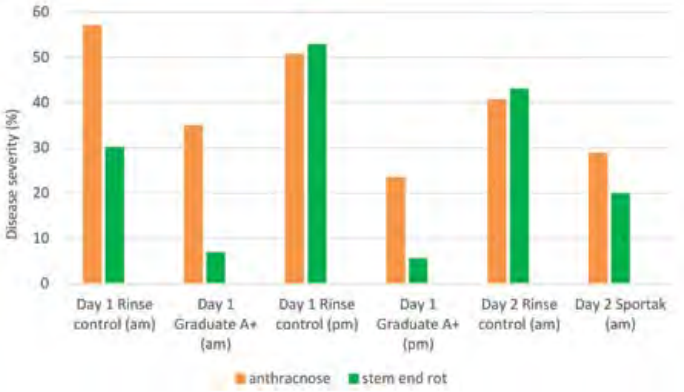

Figure 5. Effect of Graduate A+ and Sportak (prochloraz) fungicide on anthracnose and stem-end rot disease in Hass avocado. Fungicides were applied via a recirculating spray system for 30 sec, Trial 2.

Trial 3 Non-recirculating spray, Central Queensland

The trial with Wurtz incorporated a combination of field sprays of Amistar (azoxystrobin) or copper prior to harvest. The post-harvest treatments were applied through a non-recirculating spray tunnel for 30 seconds. The results show two field sprays with azoxystrobin (one early season and one close to harvest) followed by Graduate A+ post-harvest provided similar levels of anthracnose control as that when three field sprays of azoxystrobin (one early season and two close to harvest) then Graduate A+ were applied (Figure 6). Stem-end rot was least severe when fruit were treated after harvest with Graduate A+.

PART 2: Effects of treatment with electrolysed oxidising water on postharvest diseases of avocado

Electrolysed oxidising (EO) water is generated by electrolysis of a dilute salt solution, and its microbiocidal effect is attributed to its high oxidation reduction potential and available chlorine (predominantly as hypochlorous acid). There are several benefits of EO water over other chlorine-based sanitisers, including its low corrosion potential, low toxicity and irritant levels (thus safe for operators), production on-site, and negligible residue and waste issue as the active chlorine decomposes back into dilute saline solution.

Furthermore, it is an approved input in organic production systems. EO water-generating systems are now commonplace in many hospitals and facilities processing and packing fresh meat, fish, herbs, fruit and vegetables.

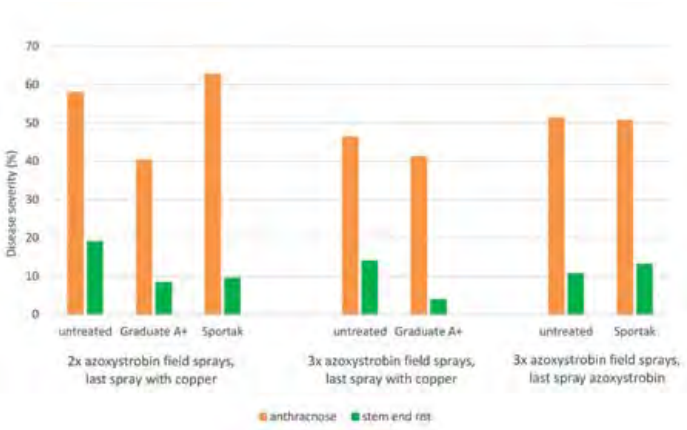

Figure 6. Effect of Graduate A+ and Sportak (prochloraz) fungicide on anthracnose and stem-end rot disease in Wurtz. Fungicides were applied via a non-recirculating spray tunnel for 30 sec, Trial 3.

Figure 7. Hass fruit rolling over brushes under treatment sprays in the experimental-scale packingline. The equipment is ideal for treatment of whole tray (approximately 20 pieces) replicates of fruit, allowing for robust statistical analyses of data. Volumes of 80L can be used, and the tank and line is easily flushed between treatments so that multiple separate treatments can be applied in a few hours.

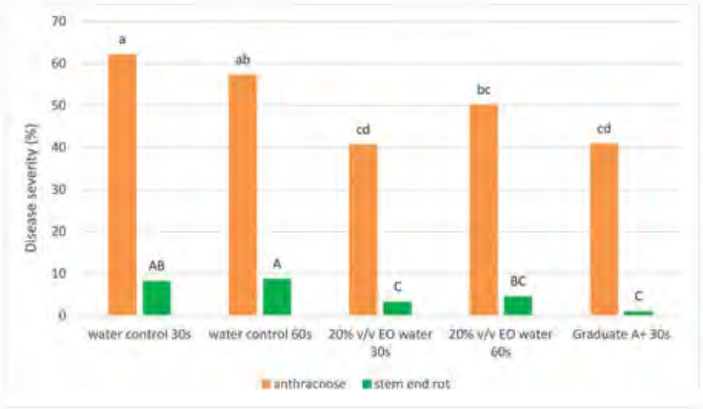

Figure 8. Effects of treatment with electrolysed oxidising water or Graduate A+ on post-harvest diseases of avocado, cv. Hass, applied via recirculating spray in an experimental packingline for 30 or 60 seconds.

Five separate trials were conducted with fruit harvested at commercial maturity (24-34% dry matter) from orchards with known high anthracnose and stem-end rot disease pressure. In the first 4 trials fruit were dipped for 30 seconds in 20% v/v EO water, and stem-end rot (but not anthracnose), was significantly reduced compared with water control (results not shown). However, treatments in the final trial were applied as overhead recirculating sprays in an experimental-scale packing line to simulate commercial conditions (Figure 7). Anthracnose was reduced similarly by both EO water and Graduate A+ compared with water control treatment (Figure 8). The full article and results can be downloaded here *https://www.mdpi.com/2077-0472/9/11/241*.

Discussion

Graduate A+ was registered in Australia for post-harvest use in 2018, and has been adopted by many packing sheds. It has been shown to be particularly effective against stem-end rot disease. One of the limitations to adoption more widely has been the somewhat conflicting label statements. The azoxystrobin label currently states that the final field spray with azoxystrobin should be seven days prior to harvest. Thus, azoxystrobin is typically the very last fungicide to be applied in field. However, the Graduate A+ label states that under the Crop Life Fungicide Resistance Management strategy, Graduate A+ must not be applied to avocado if Amistar (azoxystrobin, or similar Group 11 fungicide) was the final field spray. This has prompted Syngenta to apply for a label amendment to clarify that azoxystrobin does not have to be the final field spray. Further testing is required, however, our preliminary data suggests that two field sprays with azoxystrobin (with the second close to harvest) followed by Graduate A+ in the packingline, may be sufficient for very high-quality fruit with minimal postharvest disease breakdown.

The research also demonstrates the potential for electrolysed oxidising water to be incorporated into integrated management programs for avocado, and possibly other fresh produce. As an approved input for organic production, it may be a strategy worth investigating for stakeholders in the organic food industry. Further trials in commercial packing sheds are required to confirm these preliminary results. As well as reducing fungal rots in fruit, it is likely to reduce foodborne (human) bacterial pathogens such as *Salmonella* spp., *Listeria monocytogenes* and *Escherichia coli*, on fruit surfaces and in processed pulp products. EO water-generating systems are now commonplace in many hospitals and facilities processing and packing fresh meat, fish, herbs, fruit and vegetables. Conceivably, an initial wash with EO water followed by fungicide treatment could be easily integrated into fresh fruit packing facilities.

Acknowledgment

Improving avocado orchard productivity through disease management (AV16007) is funded by Hort Innovation, using the avocado research and development levy and contributions from the Australian Government. The project is jointly supported by the Department of Agriculture and Fisheries and the University of Queensland.

M. K. Hassan received an Endeavour Research Fellowship from the Department of Education and Training Australia via to allow his six-month placement to undertake the study with EO water. The authors also acknowledge useful interactions and support received from Professor Roger Stanley (University of Tasmania), Keith Mason (EnviroLyte Asia Pacific), Mark Parkinson (Lockyer Agronomics Pty Ltd), Anderson Horticulture Pty Ltd. We gratefully acknowledge the owners and staff of three packing sheds in Queensland for their cooperation in conducting the post-harvest trials.

References

Hassan, M. K. and Dann, E. K. (2019) Effects of treatment with electrolyzed oxidizing water on postharvest diseases of avocado, *Agriculture*, 9 (11): 241 *https://doi.org/10.3390/agriculture9110241* (published in the special issue *Postharvest Physiology and Technology of Fruits and Vegetables*)

Demonstrating pest-freedom from avocado sunblotch viroid with a smartphone app and improved detection methods

Dr Louisa Parkinson and Dr Lara-Simone Pretorius, Queensland Alliance for Agriculture and Food Innovation (QAAFI), and A/Prof Andrew Geering, The University of Queensland

Avocado sunblotch viroid (ASBVd) has the potential to disrupt trade in fresh fruit, particularly to pest-free countries such as New Zealand. As such, a new biosecurity surveillance project (AV18007) for demonstrating pest-freedom from ASBVd is underway in Australia.

This project aims to map all avocado orchards and nurseries in the country, testing thousands of trees and conducting statistical analyses to demonstrate pest-freedom at farm or regional-level, so that growers can meet export conditions and nurseries can obtain ANVAS accreditation.

We are collaborating with experts in epidemic modelling from Cambridge University in the UK and in disease management from South Africa.

In collaboration with CSIRO, we are also trialing a novel surveillance strategy using honeybees, which do the leg work by collecting pollen samples from dozens of trees. If the viroid is present, it should be detectable in the pollen samples using our highly sensitive molecular diagnostic tools. Outcomes of the project will be that the Australian avocado industry can enter new export markets and will be better equipped to respond to all types of biosecurity threat.

Symptoms and mode of spread of ASBVd

Symptoms of ASBVd include abnormally shaped fruit with deep scarring beginning at the petiole; variegation, bleaching and deformation of the leaves; a stunted and decumbent growth habit; and in some cases, bark cracking or 'crocodile skin' on the trunk and branches (Figure 1). There are also asymptomatic strains of the viroid that nevertheless, still result in yield losses. Root grafting is thought to be the principal mode of transmission in the field, although there is likely inefficient transmission of the viroid on sap-contaminated pruning blades. The major point of infection is in the nursery, as the viroid is transmitted at a very high rate through seed, and can also be introduced through use of infected budwood. Growers are recommended to use plants produced by an ANVAS accredited nursery as these nurseries are required to ensure plants are free from ASBVd.

Figure 1. Symptoms of ASBVd infection. Malformed fruit and yellow sunblotch streaking at the stem (left); yellow streaking and curving of leaves (right).

How is surveillance conducted with AgKonect?

We identified that data management would present some challenges in the project: in capturing field data, tracking diagnostic samples, reconciling results with tree observations, analysing and presenting the data, and reporting back to growers. Thus our surveys are conducted in collaboration with Brisbane company AgKonect Pty Ltd, which provides custom software for agriculture, with the QLUMP national avocado farm layer (a map of all avocado orchards in Australia) already added to their software platform.

AgKonect is a software program that simplifies field work using custom forms in a map-driven smartphone app. The software enables users to create customisable survey forms on a computer (Figure 2) and subsequently capture all data, photos, precise GPS locations and sample details in the field using a smartphone or tablet (Figure 3).

AgKonect is used in our project for precisely tracking the GPS location of every single tree that is tested so we have an auditable record of the tree location and label, observations made, samples taken, photographs of symptoms and diagnostic test results. The software also enables growers to collect samples for testing and directly input the data, and for the diagnostic team to link results as they are obtained. Industry-wide use of the app can enable our research team to collect detailed and accurate data for demonstrating freedom from ASBVd.

Implementing improved diagnostic methods

The highly sensitive and specific molecular test for ASBVd, a reverse transcription quantitative PCR assay (RT-qPCR), was developed by A/Prof Andrew Geering and has become a global industry standard. Dr Lara Pretorius, a new member of our research team, has developed an improved nucleic acid extraction method (the first step in the molecular diagnostic test), utilising filter paper. The viroid nucleic acids have high binding affinity to the cellulose fibres in the filter paper under high salt conditions, but are reversibly eluted under low salt conditions (Figure 4). This extraction technique improves the sensitivity of the molecular test and enables fast, inexpensive, high-throughput processing of a large number of plant samples, making testing of thousands of trees feasible by a small research team.

Another diagnostic component of our project is to trial the use of honeybees for monitoring the incidence of ASBVd in avocado-growing regions. When managed honeybee hives are used for horticultural crops to deliver pollination, the bees can also provide valuable pathogen surveillance services by effectively 'sampling' entire crops as they collect pollen and nectar. Research by Dr John Roberts (CSIRO) has demonstrated that a wide diversity of viruses can be detected in pollen samples, and exotic viruses can be discovered before they are recognised using traditional methods of surveillance. We will be trialling the usefulness of this surveillance method in South Africa where ASBVd is widespread, and as well as

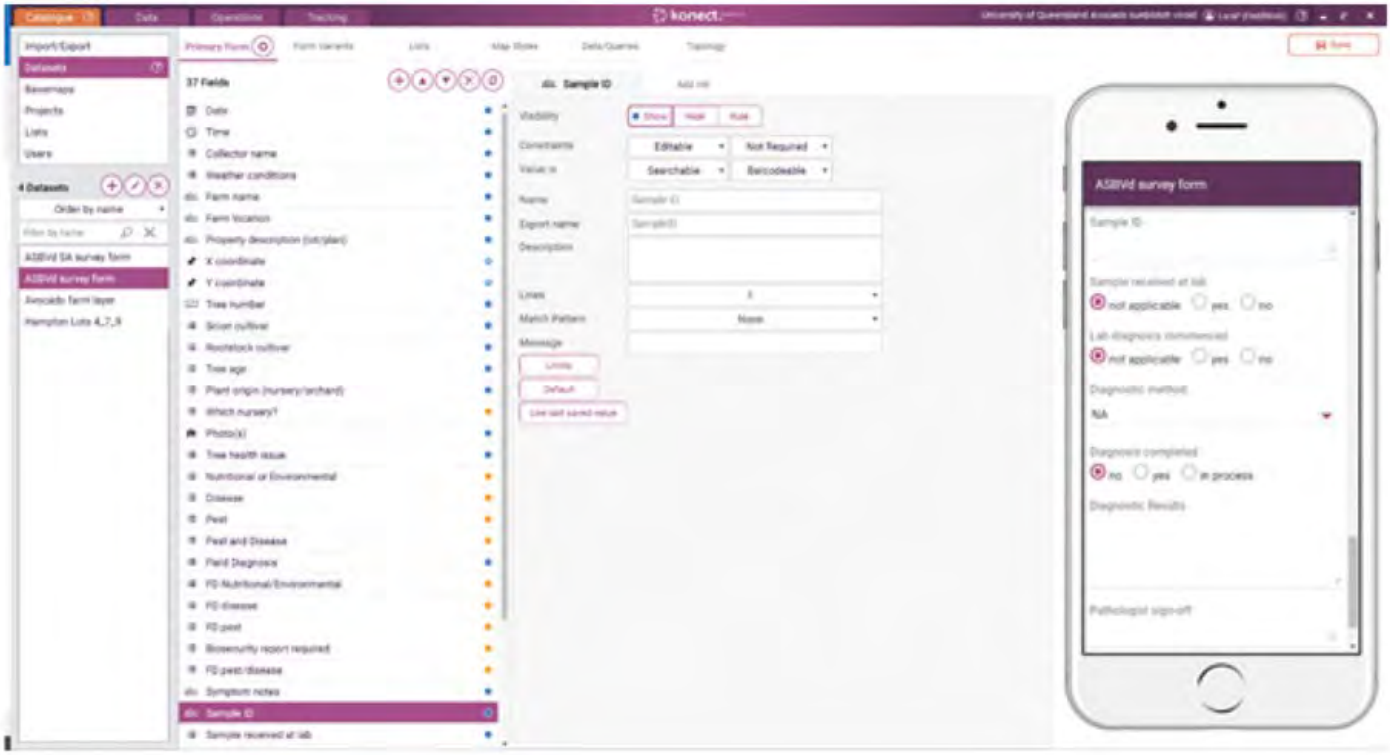

Figure 2. Screenshot of computer software interface where the survey form can be created and edited. The smartphone image (right) displays the survey form interface on the app.

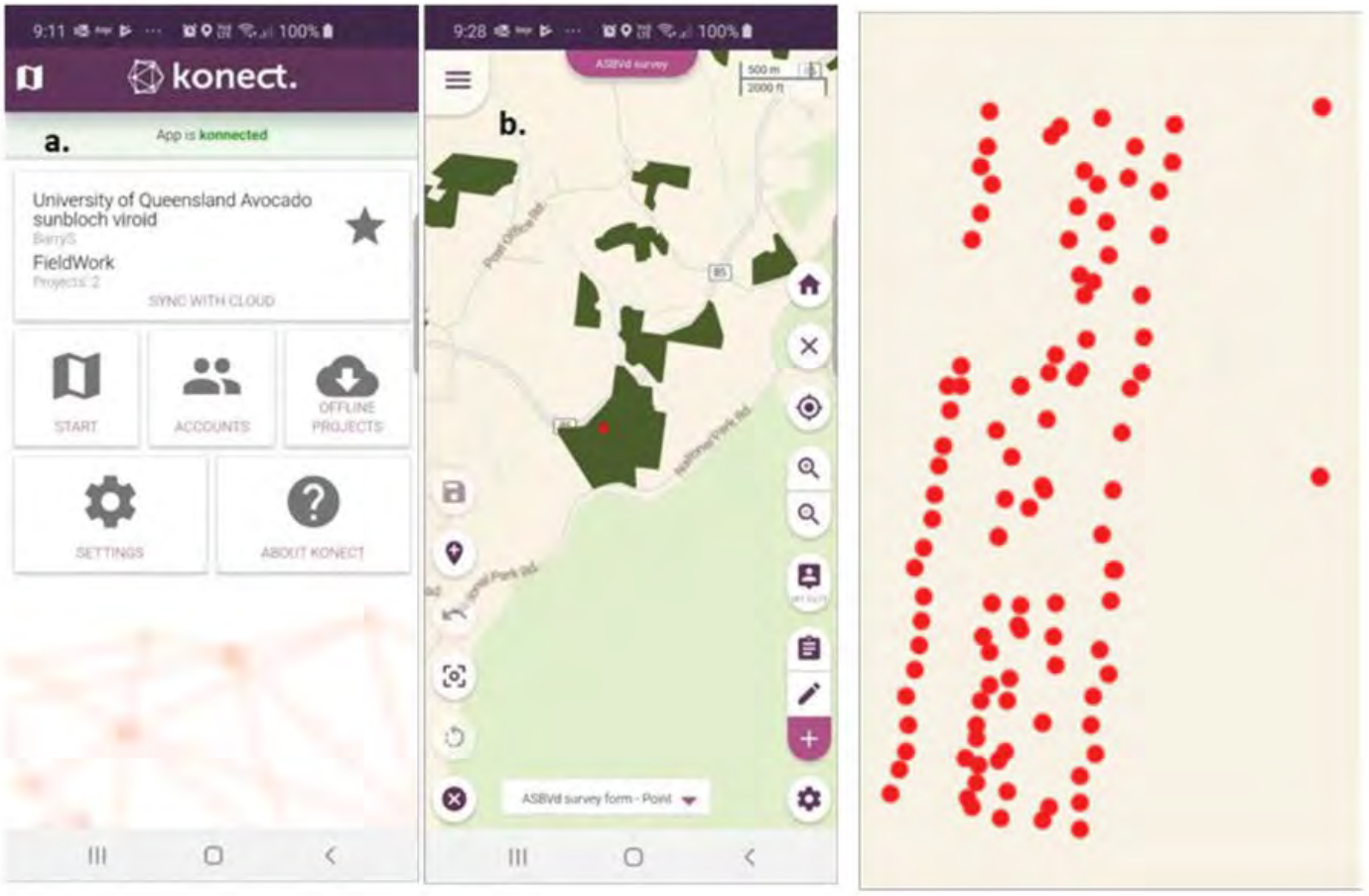

Figure 3. Smartphone screenshots of the app interface with a GPS point recorded for an individual tree (red dot).

in the Tristate area of Australia, which historically has had the most records of ASBVd in the country. We are also collaborating with citrus pathologists in New South Wales to validate the method using citrus viroids.

Sampling starts in North Queensland

Avocado sunblotch viroid is currently in very low prevalence in Australia and could potentially be eradicated.

As part of AV18007, work is already underway to conduct a national ASBVd survey of orchards, starting with North Queensland in 2020. Researchers need to test a large number of orchards, so we encourage you to submit samples for testing, particularly from older orchards. The cost of the testing is covered by the project.

Interested in having your orchard or nursery tested for ASBVd?

Please contact our research team (Dr Louisa Parkinson, *l.parkinson@uq.edu.au*) for your orchard or nursery to be tested for ASBVd. For further information about using AgKonect in your orchard or nursery, please contact Dr Peter Whittle (*office@agkonect.com*).

Acknowledgements

This project has been funded by Hort Innovation, using the avocado research and development levy and contributions from the Australian Government.

Hort Innovation
Strategic levy investment
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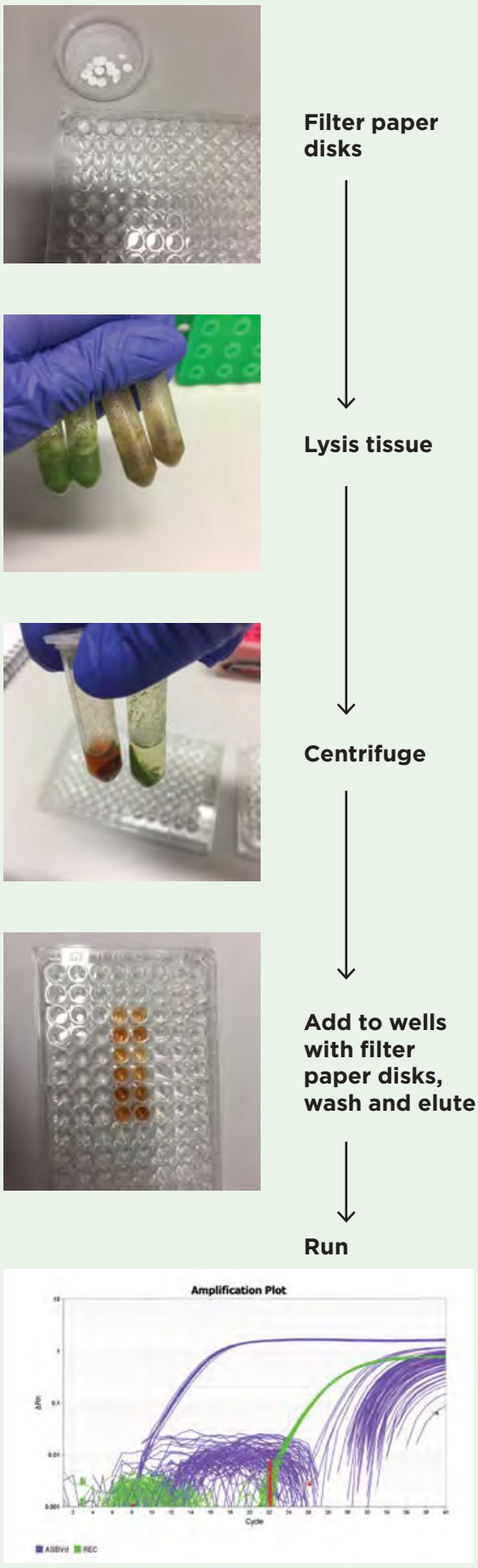


Figure 4. Extraction procedure with avocado leaf tissue and filter paper disks for use in the ASBVd molecular diagnostic test.

National mapping program in progress

Craig Shephard, UNE Applied Agricultural Remote Sensing Centre

To better understand the annual growth of the avocado industry and to be better prepared for biosecurity outbreaks and natural disaster response, Avocados Australia and Hort Innovation are supporting the continued development of the Australian Tree Crop Rapid Response Map.

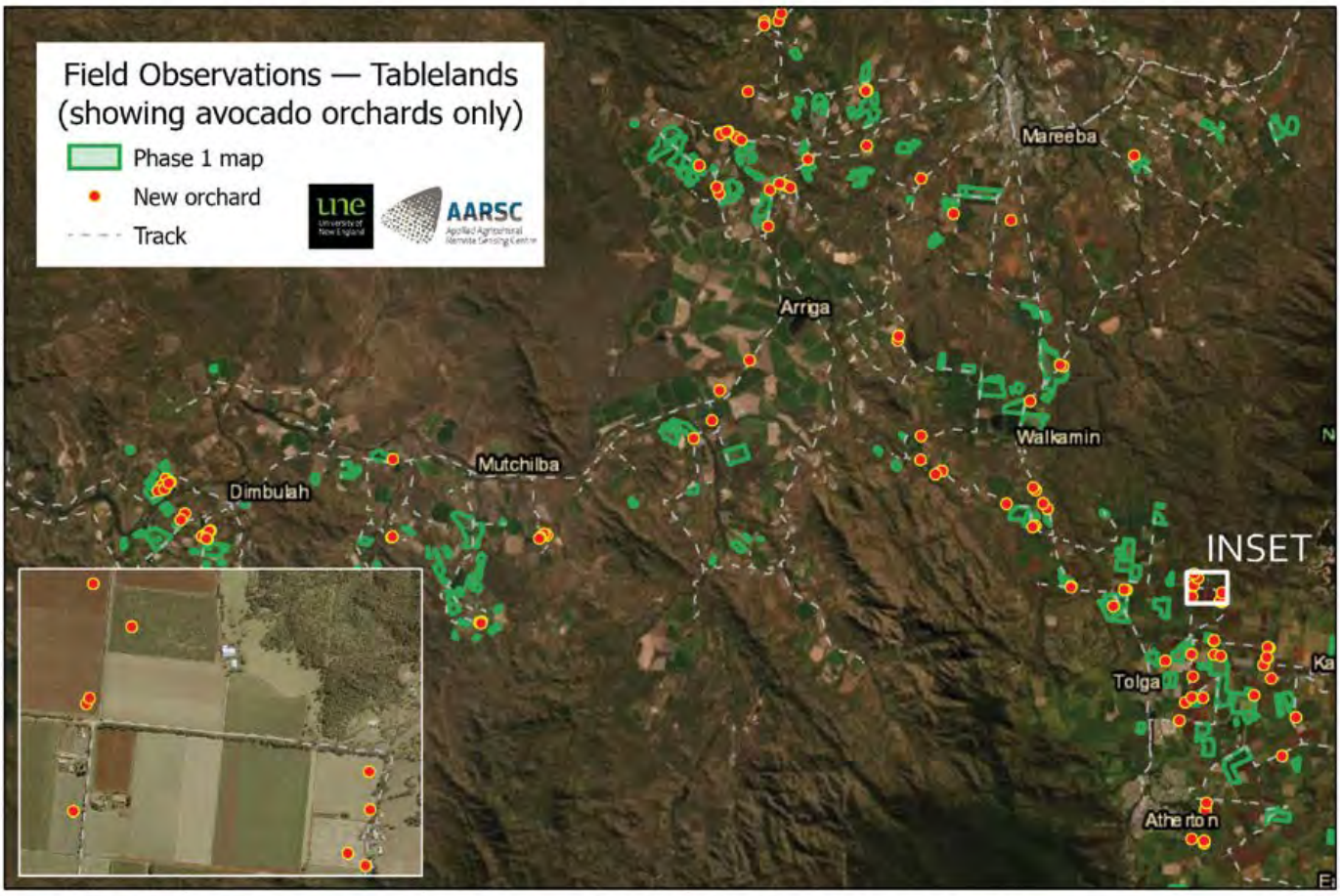
The new map will see the area and distribution of production updated at higher detail (1 hectare) and will include new orchards planted since the original map was published in 2017.

The mapping program targets 14 growing regions across Australia, with updates to follow by each one. The Wet Tropics, Tablelands and Bundaberg regions are currently 'under construction' (Figure 1).

Mapping tree crops relies primarily on the interpretation of imagery. Correctly classifying tree crops with imagery alone is challenging — different crops can appear alike while variations in land management practice are known to further challenge our interpretation, as the same commodity can appear very different.

To aid our interpretation we undertake fieldwork to collect 'ground-truth' information as ancillary data; it is especially useful in correctly classifying tree crops from one-another. Fieldwork has recently been completed for the regions under construction, and Figure 2 shows the ground-truth observations collected in the Tablelands region, and highlights the many new orchards to update.

Figure 1. The mapping program targets growing regions across Australia.



Sources:Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Inset imagery: © State of Queensland (Department of Natural Resources and Mines), 2018

Figure 2.

Mapping the new orchards raises an additional challenge because the high-resolution imagery we typically use is often several years old (see the inset in the map as an example). This is not a significant limitation in mapping the established crops, however, when mapping new crops they are not yet visible in the imagery so we can't map them with high-resolution imagery alone.

To overcome this challenge, we will use coarser resolution (but more recent) imagery, but only where we have other ancillary data (eg field observations or land use surveys) to inform us.

You can help! Get the app, improve the map!

Using the Land Use Survey App (*une.edu.au/landusesurvey*) anyone can submit a land use survey observation (from any web browser on mobile or desktop device). This is especially helpful for mapping the new orchards.

Importantly the mapping adheres to national standards for commodity-level land use mapping, supported by the Australian Collaborative Land Use and Management Program (ACLUMP). ACLUMP promotes nationally consistent land use information. Privacy concerns are acknowledged and respected as the information sources used to compile land use include remotely sensed data (imagery), state and national ancillary datasets, field observation and expert opinion.

No personal or confidential information is collected as part of the land use mapping process nor contained within the land use datasets. The map simply presents a polygon feature for land use, without commercial or personal information (ownership, variety, yield, etc).

More information

Craig Shephard via *cshepha2@une.edu.au* or visit *une.edu.au/aarsc*, and you can view the map via *bit.ly/ATCRRmap*.

Acknowledgement

The Multi-scale monitoring tools for managing Australian tree crops initiative is led by the University of New England, and supported by Hort Innovation under the Australian Government's Rural R&D for Profit program.

Hort Innovation

Understanding pest management in avocados

Jessica Page, IPM Technologies

Review and extension of avocado pests and their management (AV19001) is a new project funded by Hort Innovation.

The aim of this project is to review where the industry is at in regard to pest management and Integrated Pest Management (IPM) adoption. In many industries uptake of research and IPM practices is often slow. Common reasons for this are that pesticides work, and are an easier option compared to IPM which is often more difficult and confusing.

The project is led by the Biological Research Company in collaboration with the Queensland Department of Agriculture and Fisheries, NSW Department of Primary Industries, Western Australia's Department of Primary Industries Research and Development, and E.E. Muir & Sons.

The main drivers for adoption of IPM practices in many industries are the withdrawal of pesticides and limited maximum residue limits (MRLs) for growers wanting to export to overseas markets. It is likely that these issues will also apply to the avocado industry at some stage. To assist growers in being prepared for changes in pesticide requirements this project is seeking information on current pest management practices and issues. This information will then be used to identify areas in need of further research and extension investment and areas which don't.

Baseline survey

A very important part of this project is a survey of growers, advisors and resellers that is currently available. We understand that no one likes doing surveys, so we have tried to make it as short and painless as possible. Take the survey online: *https://www.surveymonkey.com/r/Ipmtechnologies*. Thank you in advance for filling the survey in, your responses will contribute to the direction of future research and extension in the avocado industry.

Extension activities

The second part of this project involves running of IPM workshops and spray application workshops, potentially toward the end of this year. These workshops will allow growers, advisors and resellers the opportunity to learn about practical IPM options and improve spray applications.

Acknowledgement

The *Review and extension of avocado pests and their management* (AV19001) project has been funded by Hort Innovation, using the avocado research and development levy, and contributions from the Australian Government.

Hort Innovation Strategic levy investment | AVOCADO FUND

Snapshots – International Avocado Research Update

This series of research snapshots is compiled from abstracts of published scientific papers accessed through CAB Direct as well as Google Scholar searches. Dates provided reflect the date research was published.

HUMAN HEALTH

An evaluation of pathogens carried by avocados to the market and consumer

Mexico (2020): Hass avocados may become contaminated with *Salmonella* and *Listeria monocytogenes* at the farm and the packing facility or later during transportation and at retail. In Mexico, avocados are frequently sold in bulk at retail markets, where they are stored at room temperature for several hours or days and exposed to potential sources of microorganisms. These conditions may favour the entry, adhesion, survival, and biofilm formation of Salmonella and *L. monocytogenes*. The aim of this study was to determine the occurrence of *Salmonella*, *L. monocytogenes*, and other listeria species and the levels of indicator microorganisms on the surface of avocados sold at retail markets. A total of 450 samples (Hass) were acquired from retail markets located in Guadalajara, Mexico. Both *Salmonella* and *L. onocytogenes* were isolated from the samples indicating that avocados may carry countable levels of microorganisms and could be a vehicle for transmission of *Salmonella* and *L. monocytogenes*. You can read the full abstract here: *bit.ly/TA311sal*.

PATHOGENS

Susceptibility of avocado varieties to the attack of mistletoe

Mexico (2018): Mistletoe is starting to become a problem in cultivated perennial trees, but will it be for avocados? The objective was to study the susceptibility of different avocado materials to attack by mistletoe species and identify the genera and species of mistletoe plants that grow on the diversity of avocado trees in the Michoacán avocado region. A fraction of this region was sampled and botanical material from parasitic plants that were affecting avocado trees was collected. In the nursery in Hass, Fuerte and Creole avocado plants were used and infestations were induced with seeds of the different mistletoe species collected in avocado trees in situ. The response was observed during one year, in terms of the rate of germination and development on the infested plants. Results indicated a highly significant statistical difference (Pr> F=0.0024) for the development of the parasitic plant on the different avocado materials used. The highest incidence was in Creole avocado with 83.3% and in Fuerte avocado it was 66.7% of infested plants; Hass in none of the plants developed the infection. You can download the journal here: *bit.ly/TA311mis*.

Bacterial extracts and bioformulates as a promising control of fruit body rot and root rot in avocado Hass

Netherlands (2020): At least 20-40% of annual losses of avocado crops are caused by pathogenic fungi. The chemical treatments of these diseases are inefficient, cause environmental pollution and are increasingly restricted by international laws. This work aimed to assess the biocontrol capacity of a bacterial extract to protect avocado fruits and plants from pathogen infections. Extracts from the bacterial isolate *Serratia* sp. ARP5.1 were obtained. A body rot post-harvest infection model with *Colletotrichum gloeosporioides* on fruits was developed. Moreover, packaging conditions were simulated using the bacterial extract and the commercial fungicide prochloraz as a positive control. Additionally, seedlings infections with *Phytophthora cinnamomi* were performed on two types of avocado (West Indian race and cv. Hass). The extract and the emulsion formulate showed promising results for the control of avocado pathogens. New bioproducts based on this type of active principles could be developed for the benefit of avocado industry. The extract from *Serratia* sp. ARP5.1 showed a high potential for the control of both root rot infections caused by *P. cinnamomi* and post-harvest and body rot infections caused by *C. gloeosporioides*. However, the concentration of the extract must be adjusted to avoid toxicity effects on plants. The preliminary approach to a commercial formulation showed that an emulsion could be an appropriate vehicle for the extract to keep its biological stability over time. You can download the full text here: *bit.ly/TA311bac*.

POST-HARVEST

Chitosan-propolis combination inhibits anthracnose in Hass

Brazil (2018): Natural products have been shown as efficient alternatives for use in the control of fungal diseases. Chitosan is a natural biopolymer obtained from the shells of crustacean and has been shown previously to control fruit postharvest

diseases and improve fruit shelf-life. Propolis is a resin like material made by bees. The effect of chitosan-propolis combination on the control of in *vitro* and *in vivo* growth of *Colletotrichum gloeosporioides*, a causal agent of anthracnose, as well as on the quality of avocado of Hass cultivar has been evaluated. Chitosan and propolis were added to the culture medium separately and in combinations to verify the efficacy of inhibition of *C. gloeosporioides* mycelium *in vitro*. Avocados were immersed for one minute in the treatments that best inhibited the mycelium growth (*in vitro*) with the aim of testing the fungus control *in vivo*. The use of 1.5% chitosan in combination with 2.0% propolis controlled the mycelial growth of *Colletotrichum gloeosporioides in vitro*. In addition, coating with only 1.5% chitosan provided the best results in avocados, reducing the severity and incidence of anthracnose and maintaining the fruit quality. You can download the full paper here: *bit.ly/TA311chi*.

ALTERNATE BEARING

Evaluating the competition for resources between mature fruit and open flowers in Hass

New Zealand (2020): Alternate bearing of Hass trees is a phenomenon across avocado-growing regions around the world. In New Zealand, the cycle can be more complex as the fruit often remains on the trees for over 12 months, potentially resulting in competition for resources between fruit from the previous year and the flowers. This work looks at the impact of the presence of a 12-month-old heavy crop on the accumulation of boron and carbohydrates to flowers. By sequencing and measuring the expression of the avocado Trehalose Phosphate Synthesis (TPS1) gene, researchers reported on the effects of cropping cycle on the delivery of carbohydrates to the flower. Differences in sugar delivery rate to the flower reflected by differences in TPS1 expression were not reflected in the carbohydrate and boron contents of open flowers, and it is suggested that flowers require a certain amount of sugars to accumulate to enable their development and to reach a stage where they are able to open as a female flower. You can read the abstract here: *bit.ly/TA311alt*.

HARVEST

Using near infrared spectroscopy (NIR) technology to optimise harvest at the correct dry matter content

Australia (2020): Avocado flesh dry matter content (DMC) is an index of eating quality of ripened fruit, and DMC is also related to fruit maturity, with a (cultivar dependant) minimum DMC recommended for harvest. Based on DMC variation within the fruit, the outer equatorial region of the fruit was chosen for optical and physical sampling. Three handheld near infrared spectrophotometers were compared for in-field non-invasive assessment of DMC, with the best results for prediction of independent sample sets obtained using an instrument employing an interactance optical geometry and the wavelength range 720-975 nm. The trial conducted over three seasons demonstrated, in-field use, tracking DMC of fruit on tree from between 14 and 27 % over several months to inform a harvest timing decision. Use on ripening fruit was also demonstrated. Tracking of known (tagged) fruit was recommended over assessment of randomly chosen fruit. You can find the full abstract here: *bit.ly/TA311dmc*.

Canopy position of avocado fruit during growth and development and relationship with maturity

South Africa (2020): In the current study, biochemical changes of Carmen and Hass were evaluated during growth, development and maturation. The aim was to determine if exposure of fruit to sunlight could vary the biochemical compounds associated with maturity, and hence be among the causes of uneven maturity, and ripening. The current study also seeks to evaluate if the mesocarp C7 sugars, oil and DM content have a relationship with fruit maturity. The significantly ($p < 0.001$) higher DM and oil content in fruit that were sampled from the outside canopy in both cultivars suggested an early maturity, and vice versa inside canopy. The higher D-mannoheptulose and perseitol in fruit sampled inside canopy as a storage reserve was associated with the rate of respiration, which is slower inside canopy due to cooler temperatures. This results in accumulation of higher overall C7 sugars that are slowly used up as a substrates of respiration for synthesis of overall DM, oils, proteins, C6 sugars and other biochemical constituents associated with ripening. In terms of maturity, higher D-mannoheptulose and perseitol implies that fruit from the inside canopy will take longer to mature and to reach edible ripeness when harvested. This then causes uneven maturity of fruit. You can read the full abstract here: *bit.ly/TA311can*.

More information

If you would like more details on any of the snapshots, please contact Avocados Australia on 07 3846 6566.

Acknowledgement

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INTERNATIONAL NEWS

China still expects import increase in avocados

Mr. Avocado doesn't expect COVID-19 to dampen demand for the fruit in China this year, despite lower demand in the first quarter.

Speaking to *FreshPlaza*, Mr. Avocado Vice-President of Operations Shi Chunyu said market supply was "insufficient" in February, with avocados sourced from Chile (at the end of its production season), and a small volume from Mexico.

"Apart from this, the market also suffered from a shortage of workers and problems with transportation as a result of the outbreak of COVID-19," Shi told *FreshPlaza*.

"All of these factors combined to create a decline in avocado sales."

With the exception of Wuhan, the initial site of the COVID-19 outbreak, all of the Mr. Avocado warehouses were back in business by the middle of March.

Shi said the peak sales for 2020 were expected at the end of May, primarily supplied by Peru.

Promotional activities around the peak are expected to display ready to eat avocados, with a goal of making avocado a daily cuisine for Chinese consumers.

The company is not expecting a repeat of last year's 30% decline in overall sales of fresh fruit, driven in part by breakdowns in the refrigerated supply chain.

"The price of avocados was quite high this season because the supply volume was limited," Shi told *FreshPlaza*.

"The sales volume was therefore small as well. However, the supply of avocados from Peru began to grow in early April and this slowly restored the price to regular levels."

Shi also reported an increase in online avocado sales during the COVID-19 outbreak.

"The production volume was especially large this year in Peru and so the Chinese import volume of Peruvian avocados is expected to grow significantly," she said.

Read more in *FreshPlaza*, *bit.ly/TA311china*.

Westfalia's first Thailand shipment arrives

Westfalia Fruit Peru celebrated the arrival of its first avocado shipment in Thailand during May, in what is only the country's second year of access to the Thai market.

Despite logistical challenges around the world because of COVID-19, the container carrying seven tons of avocados arrived at Laem Chabang port in Chonburi Province.

The shipment was welcomed by Peruvian ambassador to Thailand, Fernando Quiros.

According to the Peruvian Embassy in Thailand, this was the first shipment to arrive by sea, with other imports in 2019 and 2020 arriving by air.

Peru's National Agricultural Health Service has audited 2,626 growers and 98 packers in Peru, for access to the Thai market.

Westfalia celebrates its first shipment of avocados from Peru to Thailand.

Chile researching better drought management

Given Chile's vulnerability with regard to water scarcity, INIA La Cruz has evaluated and quantified the use of some strategies to reduce irrigation water requirements for avocado orchards in the Province of Petorca.

The Instituto de Investigaciones Agropecuarias (INIA) is a private, non-profit corporation, linked to the Chilean Ministry of Agriculture.

For three years, they evaluated: plastic cover (installed in a similar manner to hail netting in Australia), underground or subsurface drip, and plastic mulch (a groundcover) over the row of orchard.

The aim was to minimise losses due to evaporation of water from the soil. Project manager Alejandro Antúnez said the project results showed potential benefits from focussing on reducing evapotranspiration via the plastic groundcover.

Evaluation

Regarding the results of the plastic covers, Antúnez said they now advised against the use of plastic covers in hill conditions.

"Yes, it is feasible to evaluate it in flat areas, which are more susceptible to frost because the plastic protects and reduces the time when the tree meets sub-zero temperatures. Therefore, it is an alternative that could be valid in those conditions."

However, the plastic covering technique is expensive. "We are talking about 30 million pesos per hectare, with a structure that has an average duration of between eight and 10 years based on eight-metre long rollers, plastic, wire and other supplies, which makes it an expensive technique," Antúnez said.

"The only different effect we found was in relation to avocados that are outdoors and avocados under plastic, where wind damage under plastic is decreased in the order of 30% to 17% when we put plastic. This could be of interest to producers who are very affected by this."

In the case of underground or subsurface drip irrigation, the reduction of evapotranspiration was evaluated, which occurs due to the decrease in wet surface, also monitoring the depth wetting of the soil and the water potential of the plant.

Commercial yield and phenology were evaluated, in addition to the development of diseases and post-harvest condition of the fruit.

Again, Antúnez said they would not recommend the technique as it did not achieve significant savings in evapotranspiration in the field in Chile.

The use of mulch consisted of covering the orchard row with plastic, protecting the area watered directly by the dripper, preventing the direct evaporation of the applied water.

This was one of the innovations that was implemented and that obtained the best result, reducing water consumption by up to 15%.

"There are several branches that can be derived from this technique and definitely the evaluation of the use of mulch on the ridges will continue," Antúnez said.

The mulch technique is economic with average cost between 4 and 5 million pesos with a duration between six and eight years, since it requires replacement and maintenance due to the degradation of the mulch by ultraviolet light.

One of the additional advantages of using this technique is the control of weeds in the orchard row, which would favour the development of superficial roots that find an optimal humidity environment in the first centimetres of soil.

Antúnez said there was no detrimental impact to the quality of the fruit, nor to fruit set, flowering, phenology, nor in the post-harvest life of the fruit.

Antúnez said there would be a need for further studies, to determine the effectiveness of using the groundcover when growers undertake "drastic pruning" during drought.

About INIA

The Agricultural Research Institute (INIA) is the main agricultural research institution in Chile, dependent on the Ministry of Agriculture.

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