



MANGO MATTERS

APRIL 2020 / VOLUME THIRTY-NINE

AUTUMN ISSUE

DEVELOPING EXPORT MARKETS

The Australian mango industry looks at growing export volume as part of the Mango Strategic Investment Plan. *(page 16)*

PLUS

Exporting Australia's taste of summer *(page 10)*

Opening the cold chain black box *(page 20)*

New varieties hit the shelves *(page 24)*

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Aussie mangoes making waves!

As the 2019/20 season draws to an end, we reflect on a very successful year with a huge buzz from consumers, influencers and the media.

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WANT TO CONTRIBUTE?

If you would like to submit pictures and story ideas to AMIA, or provide feedback, please contact the AMIA team via the details listed on this page.

CEO'S REPORT



Robert Gray
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“We had frosts, fires and other weather conditions to contend with and unrest in some overseas export markets, but overall the season has finished on a high note...”

- Robert Gray

Editorial Note: This edition was compiled before the COVID-19 (Coronavirus) became a pandemic in Australia. For regular communication about COVID-19, please refer to our weekly e-newsletter *My Mango*.

As another season draws to a close everyone should congratulate themselves for their hard work and perseverance, in what at times was a challenging season for some growers. We had frosts, fires and other weather conditions to contend with and unrest in some overseas export markets, but overall the season has finished on a high note—with great feedback from retailers and consumers alike. Darwin also had a record season in terms of volume, which was great to see.

In February we presented the most recent export statistics at the Mango Export Performance—End of Season Review. Growing our export markets is and will continue to be a key focus for the Australian

Mango Industry. You can read more about the work being done in our export markets throughout this edition of Mango Matters.

Another key project that Australian Mangoes are working on (with project partners) is the Hort Innovation-led Rural R&D for Profit research project: *Multiscale monitoring tools for managing Australian tree crops – Phase II*. You can read more about this project on page 22.

There are a few announcements to make regarding our board and executive team.

Firstly, I would like to thank Joe Perry for his time on the AMIA Board as the Katherine representative as he steps down from this role.

As for our executive team, Industry Development Manager, Bryony Hackett, has decided to resign and we are currently recruiting for her role. The team wishes Bryony all the best with her future endeavours.

On a final note, Communication Manager, Jessica Mitchell will be commencing maternity leave for baby number two in July 2020. She is expected to return in the first half of 2021. We are also recruiting for her maternity leave cover.



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CHAIRMAN'S REPORT



Ben Martin
Chairman, AMIA

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The 2019/20 mango season is drawing to a close with only some late varieties and southern areas remaining in the harvest phase. In contrast to the previous season, returns to growers in some regions have been excellent but there are others where grower returns have been mediocre which indicates that significant work remains in order to achieve satisfactory returns for all.

The current strategic marketing plan will finish this year and a review will be undertaken on all marketing activities to evaluate the success of the plan and identify if all marketing activities collectively achieve the industry goals and expectations for all growers.

At the time of writing we are working with the Federal Department of Agriculture to ensure that mangoes are at the forefront of discussions with industry representatives from Japan in order to maximise export opportunities for the industry.

In December, I spent time with Professor Kerry Walsh and his team from Central Queensland University on the trial of the automated mango harvester. This work will ultimately redefine the harvest operations and I look forward to following the development of this equipment.

February 2020 saw the reappointment of David Littleproud MP to the position of Minister for Agriculture, Drought and Emergency Management and I will renew ties with the Minister to ensure he is well briefed on all relevant industry matters.

I also acknowledge the excellent relationship and support our industry enjoyed with the previous minister, Senator Bridget McKenzie. Senator McKenzie was an enthusiastic supporter of the mango industry and I would like to thank her for what she did for the mango industry.

“At the time of writing we are working with the Federal Department of Agriculture to ensure that mangoes are at the forefront of discussions with industry representatives from Japan in order to maximise export opportunities for the industry.”

- Ben Martin

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DIRECTOR REPORTS



FAR NORTH QUEENSLAND & NORTH QUEENSLAND



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At the time of writing most growers will have completed or will be coming close to completing harvest of their late season varieties and conducting post-harvest preparations for next season.

As expected, there was a late start to the season (in the Mareeba/Dimbulah region), with the region starting at the same time as South East Queensland, which presented some challenges. There was also larger average fruit sizing in the Keitt variety this season as well. At the time of writing, pricing for Keitt is a little disappointing compared to previous seasons, but let us hope that changes soon and there is some price recovery before the end of the season.

Growers no doubt will be looking forward to a well-deserved break before busily planning for the next season. Growers hope the 2020/2021 growing season is not as challenging and the weather conditions are a little kinder to us; in regard to the extended cold and random hail events that the region experienced.

I would also like to urge growers to keep updating their crop forecast volumes to assist in better sales planning. I know all too well this can be difficult to manage during such a busy harvest time, but it is an important tool for the industry.



John Nucifora
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The mango season in Mareeba/Dimbulah is on the wind down and I have had mixed reports on how the season went for different growers.

If a grower had large volumes of fruit, prices were okay, but probably could have been stronger due to the lower volumes in the marketplace overall, when compared to last season. For some growers who had low volumes it was a season to forget.

At the moment there are late varieties from this region in the market place and prices seem to be quite low and in a lot of cases well below the cost of production.

I am concerned about the forecast, particularly when it comes to the late season varieties. We need to improve the forecast for the sustainability of Keitt and other late season varieties.

We are now preparing our trees for the following year. After a harder season, there are many growers who are hoping the 2020/2021 season will be a better one.

SOUTHERN QUEENSLAND & NEW SOUTH WALES



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With only late season varieties left to pick, many growers are now reflecting on what has been a challenging season.

Flowering and growing conditions, for many, were extremely hot and dry with fires an ever-present danger. These conditions have recently been replaced with some much welcome rain. Unfortunately, with the heavy rain, some areas have flooded and our thoughts are with those that are experiencing these conditions.

This season also saw many growers facing low prices in the marketplace. I would like to take this opportunity to assure growers that the AMIA Board is committed to overcoming this challenge—grower sustainability is always our number one focus. At the time of writing board members are due to convene in Brisbane for a two day meeting. We will review the season and propose recommendations to ensure growers achieve higher returns in the future.

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“I would also like to urge growers to keep updating their crop forecast volumes to assist in better sales planning. I know all too well this can be difficult to manage during such a busy harvest time, but it is an important tool for the industry.”

- John Nardi

There were a few issues with getting fruit into supermarkets which did not have the PLU label incorporating DataBars. This resulted in lower returns for affected growers. Now that the supermarkets are requiring this form of labelling growers need to be sure they update their labels.

NORTHERN TERRITORY & NORTHERN WESTERN AUSTRALIA

Continued from page 6

SOUTHERN WESTERN AUSTRALIA



David Morcombe
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At the start of this season we were optimistic about having a good crop in the Gingin area. Unfortunately, the early onset of a hot dry summer appears to have been the cause of poor fruit retention and has led to very low production in our region. At the time of writing, in late February, harvest is still in progress. We'll be hoping for a better harvest next season.

Carnarvon has just finished their late varieties with a lighter crop than the previous season. The good news is that the Gascoyne River is flowing well after cyclone activity in its' catchment (the cyclone itself did not adversely affect Carnarvon). This means there should be a plentiful water supply for the coming season.



Han Shiong Siah
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It has been a quiet couple of months in the Northern Territory (NT), with many growers returning from their Christmas holiday and getting ready to start their pre flowering preparation for the 2020/2021 season. There is not much to report from up here in the NT besides that it has been very hot and humid!

As of mid-February, we have not had much of a wet season so far. Without a solid monsoon season, there are concerns about the refilling of the underground aquifer and water availability for the coming season. However, the forecast for rain over the next couple of weeks is looking promising. It is too early to determine if this will be enough to refill the aquifer.

I would like to thank Camilla Philip for her work, in her role as Mango Business Industry Development Officer for the NT Farmers. In her time in this role she provided valued assistance to AMIA. Camilla is moving on to a new role and I wish her the best for her future endeavours.



Geoff Warnock
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KUNUNURRA: The 2019 season is well and truly over. Most growers have completed pruning and fertilizing and are anxiously waiting for some serious rain.

Production was down for the region this season which was believed to be caused by rainfall being only about half of the average annual figure. As a result of this there seemed to be a lot of dead wood develop in the orchards especially in the older trees.

Most growers were able to get reasonable returns for their fruit, although there was not that much of it.

This wet season has been very late to start and is shaping up much the same as what was experienced last year, however we will have to wait and see what will happen in April.

Some growers may be feeling the pressure, but other areas of Australia are having a lot more to contend with such as drought and floods, so we should be feeling sympathetic to them and trust the rain will come and the 2020/2021 season will be a good one.

Continued page 8



DIRECTOR REPORTS

(cont'd)



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Thank goodness for the rain! The region has finally experienced a wet season with 200-250mm of rain falling so far, though it is uncertain whether the remainder of the wet season will meet the average rainfall of around 1000mm.

All farms have been busy hedging and pruning their orchards with some reports of dieback in the region. Agronomists are uncertain as to why this is occurring, but some think that it could be related to the long periods of warmer temperatures experienced in November 2019, which has caused some heat stress.

2020 will see new plantings ready for production, so it is anticipated we will see similar volumes in the 2020/2021 season as the season just gone.

This is my last column for *Mango Matters* as I am leaving my post on the board as the Katherine representative. I would like to thank Ben and my fellow board directors for their support and also Robert and the executive team at AMIA.

I wish you all the best of luck for the 2020/2021 season.

AMIA & INDUSTRY NEWS

Mango technology research continues

CQUniversity's Dr Zhenglin Wang has received a \$180,000 Industry Research Fellowship Queensland Government grant. As part of his work he will continue to explore machine vision to optimise mango harvesting.

The project is being conducted alongside grower-marketer Perfection Fresh Australia and mango growers in the Burdekin, Mareeba and Childers regions.

Minister for Innovation and Tourism Industry Development Kate Jones said the Research Fellowship funding for Dr Wang would contribute to a cloud-based system for planning the mango harvest.

"Horticulture is Queensland's second largest primary industry, employing more than 25,000 people," Ms Jones said.

"Farmers and marketers have the challenge of knowing how much crop is on tree and when it will be ready for harvest.

"China, Korea, Japan, Hong Kong and Singapore love Queensland mangoes and this project will support export marketing," she said.

Dr Wang is using his expertise in electrical engineering to collect data about fruit maturity and crop load on farm, using LiDAR (Light Detection and Ranging), machine vision and time-of-flight cameras.

He said current farm estimates of fruit load are based on a manual count of sample trees, but new technologies that allow assessment of the whole orchard have become robust and cheaper.

"We plan to automate how mango growers estimate the spread of flowering as well as estimation of fruit number, weight and maturity, Dr Wang said.



Dr Zhenglin Wang. Photo credit: CQUniversity.

"Machine vision rigs on farm vehicles will move through the orchards mapping fruit attributes and, when the images and data are processed, growers will view results via a mobile phone app.

"This Fellowship will allow exploration of LiDAR and Time of Flight technologies in such a system."

The Fellowship activity is undertaken within a CQUni team supported by a complementary research project (Multiscale Monitoring of Australian Tree Crops, funded by the Australian Government Department of Agriculture, as part of its Rural R&D for Profit program, through Hort Innovation) that aims to implement these technologies into an automated mango harvester.

For further information visit:
<https://www.cqu.edu.au/cquninews>.

Freshcare appoints interim CEO

Australia's leading industry-owned assurance standard for horticulture, Freshcare, has recently announced the appointment of Interim CEO, Yvonne Diab, following the departure of recently appointed CEO Benjamin Wash who left the business in December 2019.

Michael Simonetta elected AFPA chair

Michael Simonetta, CEO of Perfection Fresh, has been elected chair of the Australian Fresh Produce Alliance (AFPA). Simonetta succeeds Costa Group's Harry Debney, who has served in the role since the alliance formed in early 2019.

Dale joins Mareeba DAF team

Department of Agriculture and Fisheries at Mareeba would like to introduce Ms Dale Bennett, Development Horticulturist, to the mango industry.

Dale is working with fellow DAF horticulturists Geoff Dickinson and Ebony Faichney on a range of mango industry projects. These include the Hort Innovation project 'Building best management practice capacity for the Australian Mango Industry', CRCNA project 'Transforming mango futures' and the Rural R&D for Profit project 'Multi-scale monitoring tools for Australian tree crops—phase 2'.

Dale has previously worked as an Extension Officer with the Australian Banana Growers Council (ABGC) at South Johnstone, primarily in reef water quality projects. We welcome Dale to her new role working with the mango industry!



Dale Bennett. Photo credit: DAF.

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PR & MARKETING

Exporting Australia's taste of summer



During the 2019-2020 season promotional programs were created in collaboration with exporters, importers, and retailers in Singapore, Hong Kong, South Korea, New Zealand, and the USA.

Our objective was to continue to position Australian Mangoes as a premium experience for which consumers in our target markets will happily pay a premium price.

In line with the Mango Strategic Investment Plan, markets and retail partners were chosen using the following criteria:

- A mix of protocol and non-protocol markets
- A mix of established and emerging markets
- A robust supply chain capability delivering a consistent quality experience
- Alignment with retail partners that target affluent consumers who are prepared to pay a premium price for a great quality mango.

The consumer campaigns varied by market and included a mix of point of sale material (POS), in store sampling, advertising, public relations, social media, and an Australian Mangoes Sales Challenge—that encouraged, recognised and rewarded excellence in store execution.

Target markets and partners were supported with an engagement program including pre-season planning meetings, regular in season work in progress meetings, in-market visits and end of season reviews.

While campaign outcomes are still being completed at the time of writing, our target partners were all excited by the significant growth they have experienced in the Australian mango category this season and they are hungry for more.

On behalf of Australian Mangoes, I express our sincere appreciation to the growers and exporters who continue to invest in developing these important export markets, and the importers and retail partners who have committed to strongly supporting the growth of Australian Mangoes within their businesses. We look forward to working with you in 2020. Thank you!

For further details contact Treena Welch, Australian Mangoes Marketing Manager: P: 0417 001 253 E: marketing@mangoes.net.au

**Hort
Innovation**

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USA



Images from Gelson's supermarkets California

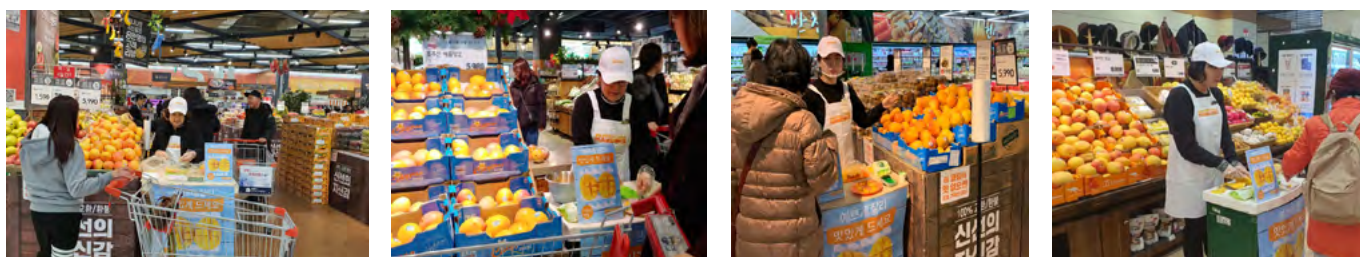
1. Creating customer excitement and anticipation with signage outside store entrances.
2. Going loud and proud with **fresh cut** Australian Mangoes.
3. Staff wear Australian Mangoes 'ambassador buttons' to engage customers in conversation.
4. The produce teams were constantly sampling Australian Mangoes.
5. In-store demonstrations were variety specific with separate campaigns for Kensington Pride, R2E2, Calypso and Keitt.



Continued from page 10

The Australian Mangoes stand at Asia Fruit Logistica was the hub for pre-season collaboration with our Asian market partners.

SOUTH KOREA



Homeplus and Lottemart conducted in store demonstrations supported by POS material in South Korea, which were key to driving awareness and purchase of Australian Mangoes.

HONG KONG



Driving awareness and trial of Australian Mangoes with POS material and in store demonstrations in Wellcome stores in Hong Kong.

NEW ZEALAND



1. Treena Welch engaged Produce Managers at their Countdown Supermarkets National Produce Conference to launch Australian Mangoes.
2. Countdown Produce Managers get behind Australian Mangoes with daily sampling.
3. Awarding the Australian Mangoes Sales Challenge winner at the Countdown Conference Gala Dinner.
4. Mohammed Fayiz was crowned the King of Mangoes for 2019.



Aussie mangoes making waves with consumers, influencers and media alike

PR

As the 2019/20 season draws to an end, we reflect on a very successful year with a huge buzz from the media. We've received a total of 257 hits with media. In December alone, the combined reach of coverage was 119 million.

This season's broadcast wins include *Studio 10* showcasing the mango Budgy Smugglers in the lead up to Mess-tival and 9 News reporting on some monster mangoes found in the Darwin.

In print, mangoes had page long features in the lead up to Christmas across *Delicious* and *Woman's Day*, inspiring readers to slice, dice and demolish all summer long. Regional publications like *Canberra Weekly* and *The Herald Sun* ran recipes created by Aussie Mangoes. Top tips for how to use different mango varieties and why it's important to buy Aussie were included in 44 publications two days before Christmas.

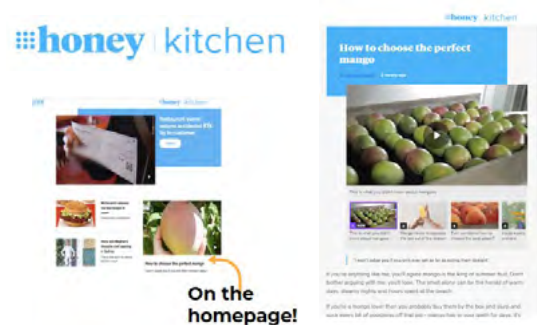
Perhaps the most important channel, digital, also saw great results in terms of news generation—with recipe and season coverage from *lifestylefood.com.au*, *Best Recipes*, *body + soul*, and *delicious.com.au* to name a few!



PRESS FARM FAMIL

During the season, we worked with 9Honey to produce content for their channels. John and Cassie Warren kindly hosted Jane, the journalist, on their farm in Gin Gin.

The resulting article titled 'How to choose the perfect mango' included details on the growing season and the different variety of mangoes available and at what time of year. The harvesting process is clearly explained within the feature and the video to accompany the piece. 9Honey reaches 3.5 million readers making it the biggest farm famil we've done. Once again, thank you John and Cassie for being fantastic hosts.



INFLUENCERS

From season start to finish, we sent lucky influencers fresh trays of mangoes, who collectively posted about Aussie Mangoes over 374 times. *Thriving on Plants* was the most prominent influencer, who shared her passionate love for the king of fruit with her 369,000 followers. After comedian Nazeem Hussain chose mangoes as his specialist subject on Celebrity Mastermind, we rewarded his fanatic dedication with a tray of late season varieties. *Tess Begg* also shared her love for mangoes to her 264,000 followers, as well as *Healthy Eating Jo* creating Mango and Toasted Coconut Cheesecake for her 188,000 fans. Collectively, the influencers used this season had a huge following of over 2.94 million—a 63% increase from last year.

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DIGITAL

This year was all about giving consumers reasons and reminders to buy through our digital campaign. We focused on making sure the king of fruit was on as many screens as possible and introduced Instagram stories as a new format for the page. Up until January on Facebook, we had reached almost 3 million of our target audience through the Aussie Mangoes page. On Instagram, we reached 14.2 million! We post educating, inspiring and informative mango content on [Facebook.com/aussiemangoes](https://www.facebook.com/aussiemangoes) and Instagram at [@aussiemangoes](https://www.instagram.com/aussiemangoes). Join in!



EVENTS

A new royal was crowned *Brisbane Produce Market Annual Charity Mango Auction*. Alexandra Catalano took home the season's 'first tray of mangoes' and the coveted title of 2019 Mango Monarch thanks to a generous \$25,000 winning bid. The event generated a huge 22 pieces of TV and radio coverage for Australian Mangoes. As the bidding began, *The TODAY Show* crossed live from the event on the day as well as covering the news the following Friday morning. The auction was also covered by the *National Nine Morning News*, *7 News Brisbane*, *Cairns*, *Townsville and Mackay* and *ABC radio Brisbane*, *Darwin and Southern Queensland*.

The 8th annual Mess-tival took place on the first day of summer and crowds were drawn to celebrate the making of Mango Beach! The event was heavily pre promoted by the likes of *Time Out*, *Mouth of Mums*, *Broadsheet* and *Wentworth Courier*. *Studio 10* went live on air ahead of the big day, also giving away the exclusive mango Budgie Smugglers! Mess-tival generated 30 pieces of news reaching 5.8 million consumers.



BUDGIE SMUGGLER COLLABORATION

Beaches in Australia got extra fruity this season with limited edition Budgie Smugglers. As well as the *Studio 10* giveaway, we also ran an exclusive competition with *Mouth of Mums*, offering readers a chance to win their very own pair. On social media, our fans had their own chance to win the summers hottest swimwear—the competition was one of the most engaged with posts this season.

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**Hort
Innovation**



BIOSECURITY, RESEARCH & POLICY

Biosecurity—check your fruit for mango pulp weevil

As part of our commitment to represent the biosecurity interests of the Australian mango industry, Australian Mangoes (AMIA) will bring you more regular information about pests and diseases to look out for on farm. We will now provide you with an article in each edition of *Mango Matters*.

This edition, we look at the mango pulp weevil. Information has been prepared by the Department of Agriculture and Fisheries.

Mango pulp weevil (*Sternochetus frigidus*) is an exotic insect pest that tunnels into the flesh of mango fruit, making them unfit to eat. This pest has been reported to have a high economic impact on Asian mango industries because it causes premature fruit drop and loss of marketable fruit.

The lifecycle of mango pulp weevil is closely linked to the development of mango fruit. Eggs are laid on the fruit surface. After hatching, larvae tunnel through the flesh leaving brown granular faeces behind as they feed. The larva creates a chamber where it develops into a pupa and then changes into an adult weevil. The adult weevil bores through the skin and emerges from the fruit. Adult weevils can survive between fruiting seasons inside fallen mango fruit, under loose bark, in crevices in the tree trunk, or in leaf litter and other fallen plant material.

HOW DO I LOOK FOR MANGO PULP WEEVIL?

The best time to look for mango pulp weevil is during the fruiting season.

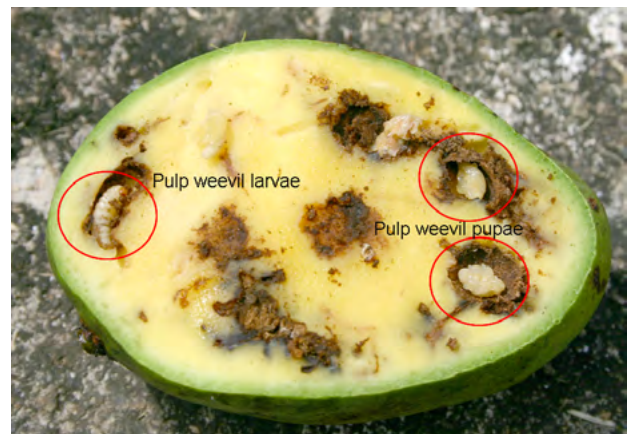
Be suspicious if there is more fruit drop than usual. Infested fruit show no external signs until the adult weevil tunnels its way out, so it is important to cut fruit open to detect the pest.

To check for mango pulp weevil, examine both fallen fruit and fruit from the tree. Cut the fruit to expose the internal flesh and seed. Look for burrowing damage, insect faeces, larvae, pupae and adult weevils in the fruit flesh.

Mango pulp weevil larvae are plump, white, legless grubs with a well-defined brown to black head. The pupae are white to pale red and up to 10 mm in length. The adult weevils have long snouts, are mottled brown and about 6 to 9 mm in length.

WHAT COULD MANGO PULP WEEVIL BE CONFUSED WITH?

Mango pulp weevil could easily be confused with its close relative, the mango seed weevil, which is present in parts of Queensland, the Northern Territory and New South Wales. The difference between mango pulp weevil and mango seed weevil is that mango pulp weevil will be found in mango fruit flesh (the pulp), but not the seed. While mango seed weevil tunnels through the flesh into the seed, where it causes most damage. An entomologist is needed to distinguish adult weevils, so if you aren't sure, report it.



Mango pulp weevil larvae and pupae inside mango fruit flesh.
© Department of Agriculture and Fisheries.



Mango pulp weevil can cause significant fruit damage, particularly to mango fruit flesh. © Department of Agriculture and Fisheries.

Continued page 15

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WHERE IS MANGO PULP WEEVIL CURRENTLY FOUND?

Mango pulp weevil is found in mango growing areas of South and South East Asia. It is present in Indonesia and Papua New Guinea, but has not been found in Australia.

The greatest risk of mango pulp weevil being introduced into Australia is by people illegally moving infested mango fruit and mango plant material. The Australian Government has strict entry requirements for goods being imported into Australia, and manages biosecurity zones in the Torres Strait that prevent the introduction of exotic pests and diseases.

HOW CAN I PROTECT MY ORCHARD?

Growers can protect their farms by practising good farm biosecurity, including the early detection and immediate reporting of an exotic pest or disease.

The [*Orchard Biosecurity Manual for the Mango Industry*](#) (produced in partnership with Plant Health Australia, the Queensland Government and AMIA) provides excellent advice to growers on practical ways to implement effective biosecurity measures on farms. The [Farm Biosecurity](#) website (<https://www.farmbiosecurity.com.au>) also contains many useful resources to assist commercial growers to protect their orchards.

ABIDE BY THE LAW

Be aware of and comply with biosecurity laws relevant to the state you are in. Movement of mango fruit, plant material and associated soil may be restricted. For information about interstate requirements go to the [Australian Interstate Quarantine](#) website (<https://www.interstatequarantine.org.au>).

Mango pulp weevil is a categorised pest in the Emergency Plant Pest Response Deed. If you suspect mango pulp weevil, you must report it. Contact the Exotic Plant Pest Hotline on 1800 084 881.

Early detection and reporting increases the chance of effective and efficient eradication, and minimises the risk to your orchard and to the broader industry.



Close-up view of an adult mango pulp weevil. © Department of Agriculture and Fisheries.



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Developing export markets

Australian growers and exporters export about 12% of fresh Australian mangoes to over 25 countries throughout the world. The Australian mango industry is looking to grow this volume as part of the Mango Strategic Investment Plan.

CURRENT STATISTICS

Australian Mangoes, CEO, Robert Gray, recently presented the most current statistics (source: Australian Bureau of Statistics) in February 2020 at the Mango Export Performance—End of Season Review. These statistics indicate that while overall there has been a growth in export over the past few seasons, the 2019/2020 mango season saw a slight downturn in the amount of mango exported. This can mainly be attributed to less volume in the marketplace overall than previous seasons and also unrest in some overseas markets, such as Hong Kong.

DEVELOPMENT OF EXPORT MARKETS IN RECENT SEASONS

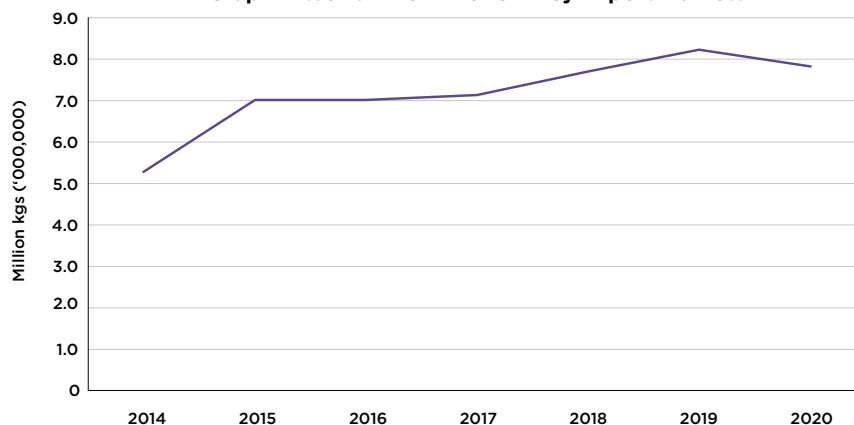
To meet the goal of increasing exports, Australian Mangoes (in conjunction with the wider Australian mango industry (Industry) and the Department of Agriculture, Water and Environment (DAWE)) have focused on streamlining the export process, so that more growers are able to export their product and also send more volume.

We have focused on:

- Access to new markets, such as the United States of America (USA), which has seen a steady increase in volume exported over the past few seasons.
- Negotiating with existing markets to create less stringent policies, which in turn costs exporters less. For example, South Korea used to require a permanent inspector in Australia for the entire mango season. This is no longer necessary.
- Advocating for research into additional treatment options and more varieties into markets.
- Streamlining the export process by bringing it online this season and having Industry Development Officers (IDOs) on farm to assist exporters with navigating this process.
- Participating in trade visits and the Trade Assessment Panel (TAP) and Industry Trade Advisory Panel (ITAP); including attending meetings and creating submissions.

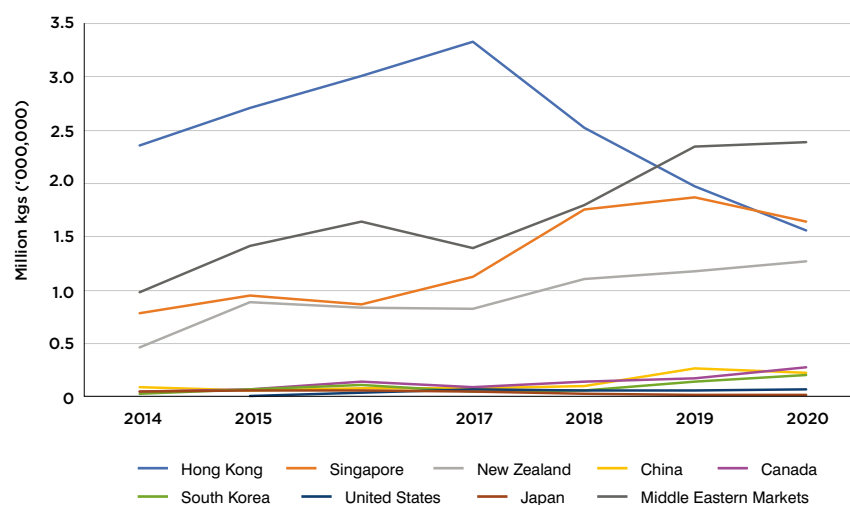
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Graph 1. World - 2014-2020 - Key Export Markets

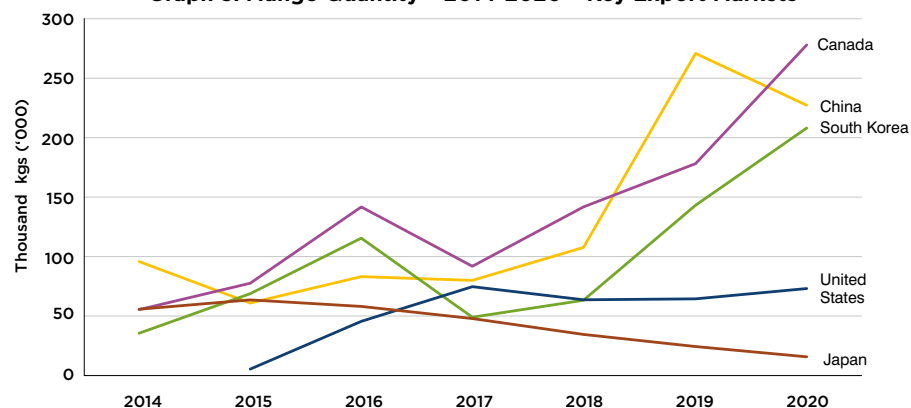


Note: Graph 1 was not presented at the meeting, but displays an overview on the total volume exported. Source: Australian Bureau of Statistics. Data collated mid-February 2020.

Graph 2. Mango Quantity - 2014-2020 - Key Export Markets



Graph 3. Mango Quantity - 2014-2020 - Key Export Markets



Note: Graphs 1 and 2 show volumes exported to key export markets. Graph 3 displays a close-up of the markets displayed at the bottom of Graph 2. Source: Australian Bureau of Statistics. Data collated mid-February 2020.

- In conjunction with Industry and DAWE facilitating and coordinating visits with Korean and Japanese Inspectors, who are responsible for certifying the Australian VHT treatment facilities registered to export mangoes into these markets.

The section 'protocol market requirements' delves into more detail about some of the key export markets and what Industry is working on in these markets where applicable.

PROTOCOL VERSUS NON-PROTOCOL MARKETS

Key export markets include both protocol and non-protocol markets. The non-protocol markets include countries whereby there is no agreement with Australia prescribing the export requirements for a particular commodity. They are usually easier to export to than protocol markets and include for example Singapore, Hong Kong and Canada. These markets might still have phytosanitary requirements.

The protocol markets are countries that have an agreement with Australia prescribing the export requirements for a particular commodity. For mangoes, these are China, Japan, Korea, New Zealand and USA. These countries have specific requirements which are described in country-specific workplans and protocols.

PROTOCOL MARKET REQUIREMENTS

The below outlines the detailed requirements of the key protocol markets.

Country	Orchard approval by DAWE (annually)	Packhouse approval by DAWE (annually)	Approved crop monitoring program (approved annually)	Vapour Heat Treatment (Fruit Fly)	Irradiation (Fruit Fly and other arthropods pests)	Mango Seed Weevil (Freedom)
People's Republic of China	✓	✓	✓	✓		✓
Japan		✓		✓		
Republic of Korea	✓	✓	✓	✓		✓
New Zealand					✓	
United States of America	✓	✓	✓		✓	

CHINA

China is a growing market with 227,082 kilograms exported in 2019/2020. Orchards and packing sheds need to be registered and growers must monitor orchards to ensure that freedom from mango seed weevil, orange fruit borer and bacterial black spot is maintained at all times. Where orange fruit borer and bacterial black spot are detected, the orchard or block will be suspended. Growers can verify orchard freedom from mango seed weevil by one of two methods:

- Fruit cutting survey to demonstrate orchard/block freedom (monitoring every two weeks)
- Systems approach to ensure product freedom (weekly monitoring).

Fruit flies are also a major concern for China and all Australian mangoes must undergo vapour heat treatment (VHT). VHT treatments and the loading of the chambers must be supervised by a Departmental Authorised Officer or a person authorised by the Department of Agriculture, Water and the Environment (DAWE). Being able to use authorised officers rather than relying solely on departmental staff allows for greater flexibility and cost savings for industry.

INTERESTED IN EXPORT?

To access relevant workplans and protocols for any of the above countries, please register for DAWE's MCoR website via this [link](#).

Australian Mangoes in conjunction with DAWE is currently reviewing the online export process that was implemented last season. If you are interested in exporting for the 2020/2021 season, we will keep you informed via our newsletter regarding export updates.

We would like to thank Manbulloo Ltd., Diamond Star and the Australian Department of Agriculture for allowing us to attend their treatment facility pre-clearance inspections.

As of February 2020, there are three operating and approved (approved by DAWE) VHT facilities and three irradiation facilities in Australia.

Vapour Heat Treatment facility operators

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M: +61 (0)487 934 448

<http://diamondstaraus.com.au>

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P: +61 (0)7 3860 6990

E: export@mangoroad.com.au

Perfection Fresh

P: +61 (0)7 3310 3900

E: export@perfection.com.au

Irradiation facility operator

Steritech

T: +61 (0)7 3385 8400

M: +61 (0)417 122 230

E: breilly@steritech.com.au

JAPAN

Japan is quite a small market with 15,437 kilograms exported during the 2019/2020 season. Japan has varietal restrictions and only Australian KP, R2E2, Keitt, Kent and Palmer can be exported into Japan. Packing sheds need to be registered for export but not the orchards. The presence of Queensland fruit fly (*Bactrocera tryoni*) and Mediterranean fruit fly (*Ceratitis capitata*) is a major concern to the Japanese authorities and all Australian mangoes for export to Japan must undergo VHT to mitigate the risk of fruit flies. The VHT facilities registered to export into Japan must undergo pre-clearance inspections undertaken by a Japanese Ministry of Agriculture, Forestry and Fisheries (MAFF) officer.

Industry is working closely with DAWE to negotiate the removal of pre-clearance inspections and varietal restrictions.

At the end of last year, the MAFF officer went to Manbulloo Ltd. and Diamond Star to oversee the first VHT treatment of the season and Australian Mangoes were able to attend. The inspection process includes the calibration of the sensors in water using a NATA certified reference thermometer and the actual treatment schedule where temperature probes are placed in fruit pulp in each of the lower, middle and upper parts of the chamber.

SOUTH KOREA

This is a growing market with a significant increase in volume exported—208,298 kilograms in 2019/20. Orchards and packhouses need to be registered and crop monitoring needs to be undertaken every two weeks from flowering by an accredited person, for mango seed weevil, stem end rot, red-banded mango caterpillar and bacterial black spot. Fruit flies are also a major concern for Korea and all Australian mangoes must undergo VHT. A Departmental Authorised Officer must be present for all VHT treatments and supervise the loading of the treatment chambers. The Republic of Korea's Animal and Plant Quarantine Agency (QIA) may, at their discretion, send an officer to inspect orchards, packhouses and treatment facilities and observe the export procedures for mango exports to determine compliance with the protocol and to observe practices relating to pests of quarantine concern.

NEW ZEALAND

New Zealand is the third biggest market in terms of volume exported after Singapore and Hong Kong with 1,275,127 kilograms exported during the 2019/20 season. Orchards and packhouses don't need to be registered for the New Zealand export program. The treatment pathway for mangoes into New Zealand is irradiation. The minimum treatment rate, specified by the NZ Ministry for Primary Industries (MPI),

At the end of last year, the MAFF officer went to Manbulloo Ltd. and Diamond Star to oversee the first VHT treatment of the season and Australian Mangoes were able to attend.



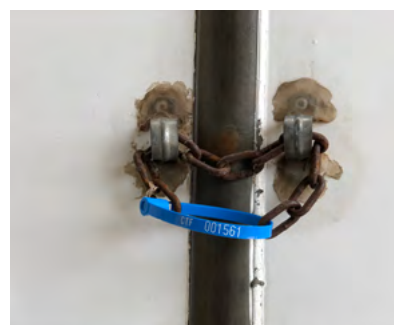
- The calibration is performed by placing all temperature sensors in a hot water vat. Each sensor must sit separately within the vat and they must read within $\pm 0.2^{\circ}\text{C}$ of 47°C .
- Each sensor must be calibrated three times to show repeatability of readings, this involves removing the sensors from the vat and allowing their readings to move away from 47°C before returning them to the vat and re-stabilising to 47°C .
- The temperature of water in the vat must be stabilised to 47°C against a reference thermometer before commencing the calibration test.
- The reference thermometer must be NATA certified every 3 years.



- The temperature probes must be placed in fruit pulp in each of the lower, middle and upper parts of the chamber.
- The treatment must be undertaken in a chamber heated using saturated vapour with an air temperature exceeding 48°C .
- The innermost fruit pulp temperature must be maintained or above 47°C for 15 consecutive minutes.



- Chambers being loaded at the Diamond Star VHT facility under the supervision of MAFF and departmental officers.



- The VHT chamber has a uniquely numbered seal which is required as part of the process.

for mangoes exported from Australia is 250 Gy. This minimum irradiation rate is deemed to be effective for the fruit flies and regulated arthropods of concern for New Zealand. The Department of Agriculture, Water and Environment audits treatment facilities to ensure compliance with Australia-New Zealand Bilateral Quarantine Arrangement requirements.

USA

The importation of Australian mangoes into the USA using irradiation as a quarantine treatment was approved in September 2013. The USA is still a small market with 73,055 kilograms exported last season.

Orchards and packhouses need to be registered and crop monitoring needs to be undertaken for fruit flies, mango seed weevil, bacterial black spot and stem end rots. The minimum treatment rate for mangoes exported from Australia is 300 Gy. This minimum irradiation rate is deemed to be effective for fruit flies and mango seed weevil. In addition to irradiation treatment, each consignment must be inspected and accompanied by a phytosanitary certificate issued by the Department of Agriculture, Water and Environment.

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HORTICULTURE

Opening the cold chain black box

Mango exporters and interested supply chain partners recently attended a *Mango Export Performance—End of Season Review* organised by the Department of Agriculture and Fisheries (DAF).

The focus of DAF's presentations were on real-time cold chain temperature monitoring as a tool to help us consistently deliver quality fruit to customers. A survey carried out by DAF in 2017 indicated that 80% of exporters use USB style loggers to some degree, but most never see the data unless there is a claim.

While transport and storage of mangoes should ideally be around 12°C, just what happens in export chains is a bit of a black box.

WORKING WITH EXPORTERS

Over the 19/20 season DAF worked with ten mango exporters air-freighting out of Brisbane, Sydney and Melbourne. The main destinations were Singapore and Hong Kong. The aim was to provide the exporters with experience using real time temperature loggers. Most had previously only used USB loggers. The exporters were shown how to activate and deploy the loggers as well as access real time temperature and location data using a phone app. The easy to read temperature graphs produced were examined, temperature problems identified, and potential actions discussed.



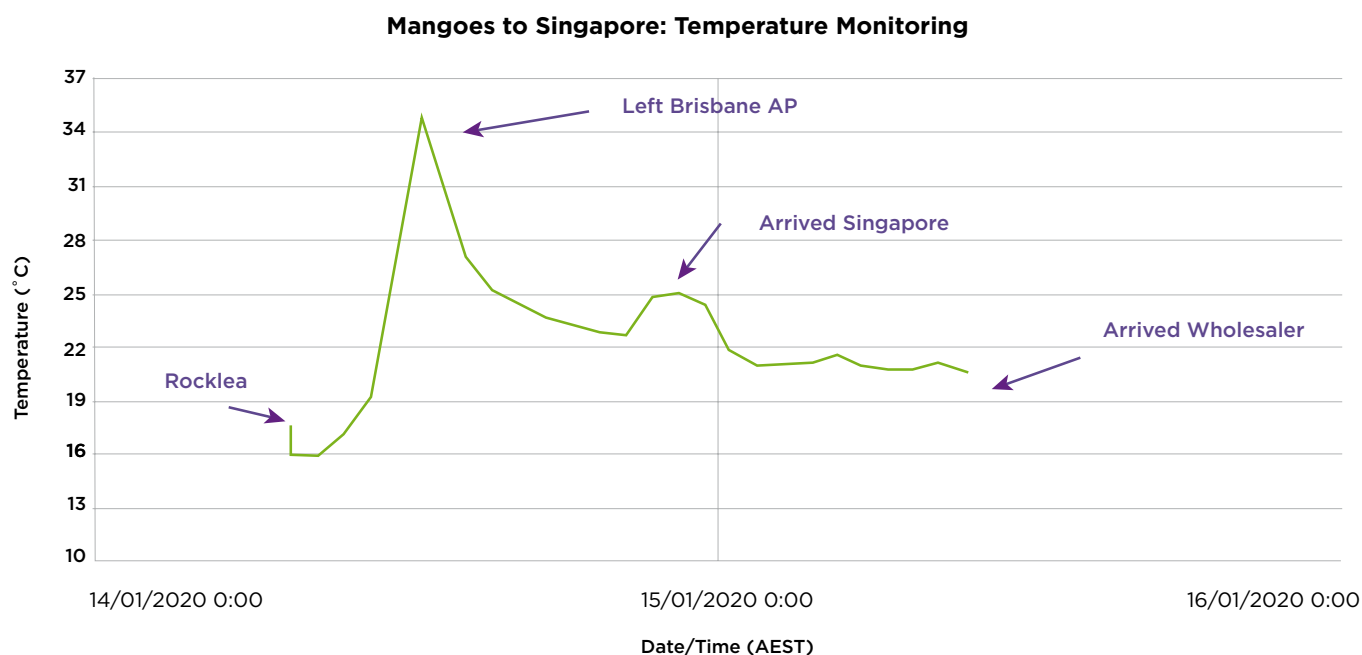
Tray of R2E2 with an Emerson Go Real-Time Temperature Tracker.



The exporters, using real-time temperature loggers, sometimes found temperature problems during the period between leaving storage and the freight forwarder at the airport. For example, the temperature graph below shows that these mangoes left the markets too warm and then continued to heat up (to 35°C) waiting at the airport. The temperature cooled during air freight, but the fruit still arrived in Singapore too warm.

The exporter's findings have parallels to work conducted by Australian Mangoes tracking domestic supply chains during the past season. In this project to date findings have indicated approximately two thirds of consignments were not following temperature best practice, with insufficient pre-cooling at the packhouse being the main problem.

Continued page 21



Graph showing air temperature over time in a container of mangoes air-freighted to Singapore.

TEMPERATURE RESEARCH

Andrew Macnish (DAF) talked about the “Serviced Supply Chains” research project experience with Manbulloo mango exports. Using real-time temperature monitoring they identified three critical control points along the supply chain where fruit were not cooled enough:

- before leaving the pack shed
- at the freight forwarder
- on arrival at importer.

The real-time monitoring also highlighted instances where fruit were held too cold (i.e. less than 10°C), particularly on arrival in the northern hemisphere during winter. Manbulloo has used the real-time data to alert their supply chain partner when the temperature was below the critical limit and hence avoid chilling injury and costly claims.

WHAT ARE THE BENEFITS OF USING REAL-TIME TEMPERATURE LOGGERS?

- Assured of getting back the data (unlike USB loggers).
- The exporters used Emerson Go Real-Time Temperature Trackers as they are the only brand of single trip logger with airline permission ([check the list of carriers](#)).
- Easy to use phone app for tracking (quick display of temperature and location of consignment).

WHAT ELSE WAS DISCUSSED AT THE MEETING?

Other items on the meeting agenda included Market Access Protocols (Peter Creaser, Dept. of Agriculture) and Export Statistics (Robert Gray, CEO Australian Mangoes). See article ‘Developing export markets’ for more information.

The Serviced Supply Chains project is funded by the Hort Frontiers Asian Markets Fund (project AM15002), part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from the Department of Agriculture and Fisheries (Queensland), Department of Jobs, Precincts and Regions (Victoria), Manbulloo (mangoes), Montague Fresh (summerfruit), Glen Grove (citrus), the Australian Government plus in-kind support from the University of Queensland and the Chinese Academy of Sciences

For further information contact: John Agnew, (DAF Senior Horticulturist) on 0436 849 357 or john.agnew@daf.qld.gov.au.



Mango industry participants listening to Andrew Macnish (DAF) discussing temperature monitoring research.

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How many mangoes do I have?

“How many mangoes do I have?” is a question Australian mango growers ask themselves before the start of every harvest season. Understanding the size of the crop is beneficial for planning harvest labour needs, pack-house supplies and trays, and logistics including cold room space and transport services.

It also vital for wholesalers and retailers at the large southern markets, to develop marketing plans in preparation for low and high supply periods. Good forward planning enables fruit entering the market to be moved quickly in peak periods, minimising lower prices to the farmer and maintaining good quality fruit for the consumer.

Fortunately, for Australian mango growers, retailers and consumers there are a number of exciting new high-tech forecasting methods under development in a new Hort Innovation-led Rural R&D for Profit research project that promises to rapidly and accurately predict fruit yields, fruit quality and harvest times at both the paddock and regional scales. These include orchard and yield mapping via satellite imagery supported by ground-truth sampling; and the identification and counting of individual fruit on the tree using vehicle mounted cameras with advanced “shape recognition” software.

This three-year project, Multiscale monitoring tools for managing Australian tree crops – Phase II, targets five Australian fruit industries including the mango industry and is funded by the Australian Government’s Rural R&D for Profit Program and Hort Innovation. The overall research lead is the University of New England’s Applied Agricultural Remote Sensing Centre (UNE AARSC). The mango component of

this project, led by Central Queensland University (CQU) includes a number of critical partners including, Australian Mango Industry Association (AMIA), the Northern Territory Department of Agriculture and Resources (NTDPIR), Queensland’s Department of Agriculture and Fisheries (DAF) and UNE AARSC.

FOCUS OF PROJECT

Satellite Yield Forecasting

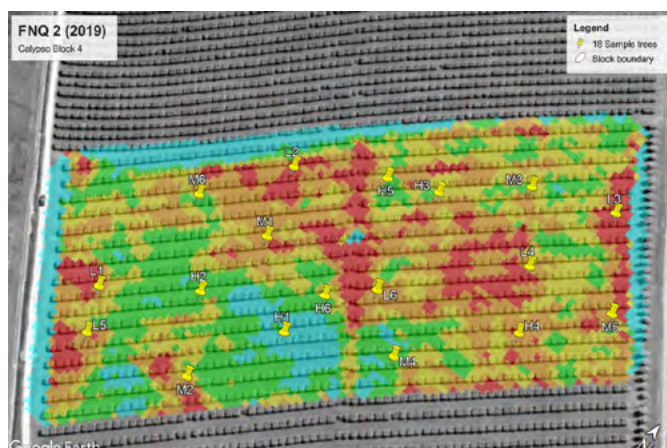
Aussie mango growers are key partners in this project, which was initiated in September 2019, following the successful results achieved through the Phase I Rural R&D for Profit Program. Very high resolution WorldView-3 satellite imagery was captured by the UNE AARSC over three mango orchards in the Northern Territory and six orchards in Queensland this season. From the imagery, maps identifying high, medium and low growth areas of tree health were derived, clearly showing growers where likely constraints to production were occurring. From these variability maps individual trees representing the varying health zones were sampled for yield, maturity and likely drivers of the reduced health by project partners CQU, AMIA, NTDPIR and DAF. Accurate yield maps and yield forecasts were derived from these ground truthed measures, for each orchard, prior to harvest. In previous year’s trials, this method of yield prediction has achieved

accuracies of around 90%, when compared to actual harvested data provided by growers from their pack-houses.

In-field Machine Vision

Machine vision flower and fruit load estimates have also been conducted on seven mango orchards across Queensland and the Northern Territory this season by CQU and the project partners. Cameras mounted on farm equipment (e.g. a Polaris ATV) are driven along tree rows at night, collecting multiple images of the mango canopy, which enables shape/colour recognition software to identify, count and geo-locate individual flowers or fruit. This information enables the development of orchard yield maps and the estimation of total fruit yields. Assessing the suitability of this technology to a wide range of mango orchard designs and varieties is being concurrently assessed at the DAF Walkamin Research Station. A spin-off benefit of accurate fruit geo-location is the potential for development of robotic picking technology. Development of a prototype auto-harvester developed by CQU, which incorporates cameras and fruit recognition technology with multiple arms, is continuing, with trials on two central Queensland mango orchards this season.

Continued page 23



UNE Satellite image map with mango canopy health zones identified as low (red), medium (yellow/orange) and high (green, blue), with locations of 18 sample trees for manual counts.



DAF researchers Ebony Faichney and Riley Graves conducting manual fruit counts on calypso trees, Dimbulah for calibration with satellite images.

NIR Fruit Maturity Assessment

Further refinement of technologies to aid fruit maturity assessment and the optimum timing of harvest are also being trialled this season by CQU. These include assessments of fruit dry matter and internal flesh colour via near-infrared spectrometry (using a Felix hand-held NIR gun) and the use of remotely monitored in-field temperature sensors to record cumulative field heat sums to determine timing of fruit maturity.

Mapping of all Australian mango orchards

This project is also building on the success of the 'Australian Tree Crop Rapid Response Web App' created in Phase I of this project by the Queensland Department of Environment and Science, where all commercial mango orchards more than two hectares were mapped. Since its launch in 2017, the Phase I map has been

viewed over 23,000 times, supporting industry demographics and successfully applied in biosecurity preparedness and natural disaster recovery—most recently in response to the national bushfire crisis.

Under Phase II the map is being updated to include more orchards by scientists at the UNE AARSC. Importantly it will map many new mango orchards as well as smaller plantings and abandoned orchards that may serve as hosts of biosecurity pests in areas such as Queensland's Cape York Peninsula.

Industry adoption of all of these technologies to improve industry profitability is the key focus of this project. Researchers and mango growers will be working closely together over the next few years to improve the practicality, cost and accessibility of these technologies, to achieve greater wide-scale adoption by the Australian Mango Industry.

This project is being delivered by Hort Innovation—with support from the Australian Government Department of Agriculture as part of its Rural R&D for Profit Program and Central Queensland University, University of New England, Australian Mango Industry Association, Queensland Department of Agriculture and Fisheries and the Northern Territory Department of Agriculture and Resources.

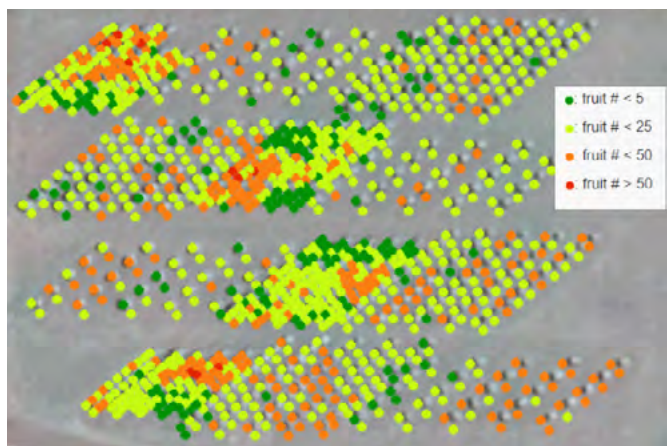
Article provided by Geoff Dickinson, DAF. For more information contact: Kerry Walsh, CQU (k.walsh@cqu.edu.au), Geoff Dickinson, DAF (Geoff.dickinson@daf.qld.gov.au), Andrew Robson, UNE AARSC (arobson7@une.edu.au), Craig Shephard, UNE (cshepha2@une.edu.au), Andy Clark, DES (Andrew.Clark@des.qld.gov.au), Bryony Hackett, AMIA (idm@mangoes.net.au) or Matt Hall, NT DPIR (Matt.Hall@nt.gov.au).



Kerry Walsh and Nick Anderson (CQU) demonstrating the machine vision equipment at a Mango Intensification Systems grower field day at the DAF Walkamin Research Station.



Night-time fruit counts at DAF Walkamin Research Station using in-field machine vision equipment mounted on a standard ATV.



Fruit yield map at DAF Walkamin Research Station trial prepared using in-field machine vision equipment (note differences between high and low density systems).



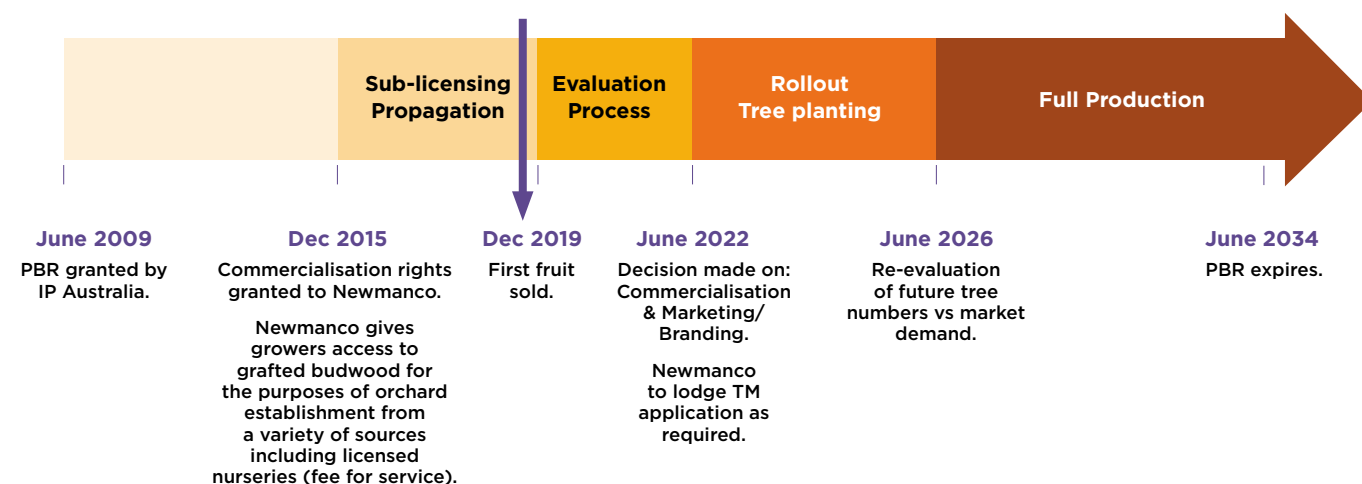
Prototype robotic auto-harvester being trialled near Rockhampton.



New varieties hit the shelves

Over the last few years Newmanco (a subsidiary company of Australian Mango Industry Association), as part of the National Mango Breeding Program (NMBP), has worked with interested growers to plant new varieties [NMBP-1201](#), [NMBP-1243](#) and [NMBP-4069](#).

COMMERCIALISATION TIMELINE



The 2019/2020 season marked the first phase of evaluating commercialisation, with the three new varieties being sent to market for the first time.

All up around 1,000 trays of the new varieties made the journey from orchards to Harris Farm Markets in Sydney and initial feedback has been largely positive.

Australian Mango Industry Association (Australian Mangoes), CEO, Robert Gray noted that, "Although there were some challenges, the high blush of new varieties was noted as a positive feature. Samples were provided to shoppers with mature fruit receiving consistently positive feedback."

Over the next few seasons as plantings mature, it is expected fruit from all participating regions will begin sending product to market, which will assist in evaluating the new varieties prospects in becoming commercialised. As part of the evaluation, both positive elements and any challenges around the new varieties will be assessed, before a decision is made on commercialisation.

Thanks to the growers, [Lamanna Premier Group](#) (ripeners) and [Harris Farm Markets](#) (retailers) for being involved in the trial this season.

In conjunction with the in-market trials this season, there have also been [taste tests](#) conducted by The Department of Primary Industries and Regional Development (Western Australia). Results of these trials are yet to be announced.

Keep an eye out in future Australian Mangoes communication for additional announcements about the National Mango Breeding Program (NMBP). Though we have reached capacity for this phase of the project (evaluation phase) in terms of tree allocations interested growers can become involved in the next phase.

For further information about the new varieties please contact Robert Gray, Australian Mangoes CEO: P: 0418 737 861 or E: ceo@mangoes.net.au.

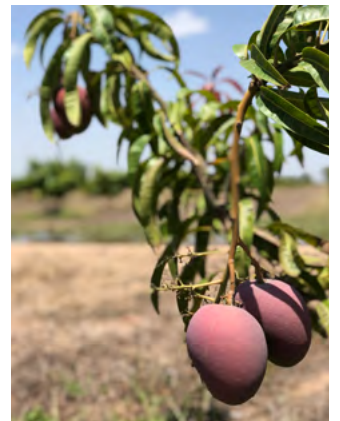
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New varieties in store at Harris Farm Markets:

“All up around 1,000 trays of the new varieties made the journey from orchards to Harris Farm Markets in Sydney and initial feedback has been largely positive.”



Some of the new varieties in the orchard:



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PEOPLE & EVENTS

Thanks to you all for another great season. Here's some happy snaps!





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