Mango Matters

APRIL 2023 | VOLUME 51

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Hort Innovation
Strategic levy investment
MANGO FUND
AUSTRALIAN MANGOES

PRE-SEASON ROADSHOWS SPONSORSHIP PACKAGE

About the Australian Mangoes pre-season Roadshows

Australian Mangoes pre-season Roadshows are the main regional networking events for the mango industry that take place every year in each mango growing region of Australia:

In Queensland:

Bowen/Burdekin	Mareeba/Dimbulah	Rockhampton	Bundaberg
Mid-September		Mid-November	

In the Northern Territory and Western Australia:

Darwin	Katherine	Kununurra	Carnarvon	Gingin/Perth
Late July/early August			Early December	

The pre-season Roadshows (9 events in total) bring growers together for a series of presentations from experts on current and relevant industry matters such a research and development updates, pest and disease information, activities undertaken across the industry, etc. These events also feature social networking opportunities to foster conversations between growers and industry and encourage collaboration.

Sponsorship package

20% DISCOUNT FOR AMIA MEMBERS*

Australian Mangoes offers a sponsorship package for up to three sponsors per event.

Cost: **AU$1000 per sponsor** (excl. GST)

What is included:

- Exhibition space at the event to showcase your business and display your banner, products and marketing collateral to growers and industry stakeholders
- Recognition of sponsorship with logo in the event agenda and in our e-newsletter
- Acknowledgment of sponsorship in social media posts
- Sponsoring organisation's logo on the Events page of the Australian Mangoes website with hyperlink to the organisation's website
- The opportunity to network with growers and industry stakeholders

If you are interested, please contact our Communication Manager, Gabby Taylor:
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E: com@mangoes.net.au

***Become a member of AMIA today! Benefits include:**

- Access to members only resources
- Discount on all advertising in publications
- Discount on the 2024 Australian Mango Conference tickets

Further information can be found here.

Australian Mango Industry Association Ltd
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www.industry.mangoes.net.au

The bees-knees of bee biosecurity

The National Bee Pest Surveillance Program (NBPSP) is intended as a national early warning system to detect new incursions of exotic bee pests and support Australia's pest freedom claims.

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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.

Australian Mango Industry Association (AMIA) Contact Details

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CEO'S REPORT

Brett Kelly
Chief Executive Officer, AMIA
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"We need to seriously look at how we manage our front end (channels to market) in relation to our business strategies."

- BRETT KELLY

With the picking season now finished there will be a full analysis and review as statistics become available. We will publish this detail when received and finalised. At this point it is looking that volume was up on the previous season, quality generally good and demand grew once again.

Aside from the usual challenges in labour and weather, the biggest key challenge for the season was the volume/timing issue which caused a crossover in regions. This resulted in a huge amount of volume all hitting the market at the same time. Being the industry works predominantly off supply and demand this type of outcome puts immediate pressure on price as well as causing some panic in the industry trying to move volume out as quick as possible.

Export was hampered by lack of available space (flow on from covid shutdowns) and ever-increasing freight costs.

As you have heard me say before, we need to seriously look at how we manage our front end (channels to market) in relation to our business strategies. I will discuss this in more depth during grower visits and upcoming roadshows. I have compiled a list of questions at the end of my update for you to consider asking yourself regarding your own business strategy. Please feel free to contact me if you wish to discuss further.

All current Projects as per the industry SIP (Strategic Investment Plan) Best Practice/Extension (MG21002), Communications (MG21001) and Supply Chain Engagement (MG22500) are progressing well with the AMIA team achieving all milestones and action points on schedule. We will again give you a comprehensive update at the upcoming roadshows and grower visits in your region. The SIP (Strategic Investment Plan) for Export is available on the AMIA site for your information.

(At the time of writing), the Mango SIAP (Strategic Investment Advisory Panel) are due to meet with Hort Innovation team in March to review the marketing plans and industry strategy update. The independent evaluation of HARPS (Harmonised Australian Retailer Produce Scheme) by the SPP (Strategic Project Partners) report engaged by Hort Innovation has been finalised and we will get a full run down on the recommended outcomes at the next meeting. I will update you all on all recommendations once finalised.

Marine Empson IDM (Industry Development Manager) and our IDOs (Industry Development Officers) are again busy with organising all upcoming regional pre-season roadshows. Please attend, if possible, as the roadshows are full of informative presentations and are a great opportunity for industry/grower interaction. All dates and agendas when set will be available on the AMIA site.

At the time of writing this our IDO for QLD/NSW Paige Liebich, has given notice to move on to a new role. I would like to thank Paige for all her hard work, and she will still be involved in the Mango industry so you will see her around. We are currently recruiting for a new IDO to fill this role. I will update you all on who the successful applicant is when the recruitment process has been completed.

The AMIA Internal Strategic Plan is progressing well. The Cost of Production Spreadsheet template is available to all members. Please utilise this tool as it is the key starting point in clearly understanding your business costs. The next template will be a strategic business plan for members to fill in to help with establishing their own business strategy and direction. Again, we must get better at strategically managing the front end in order to achieve acceptable pricing, profit returns and long-term sustainability in our industry. At our regular meetings with all major retailers, we continue to update them on industry issues in particular the ever-increasing costs of production and business.

The below questions are from the Strategic Business Plan template currently being drafted for members. The questions address the front end and ultimately price, profit, and sustainability planning. As we know it goes without saying that all best practice and standards on farm are critical ongoing, as a base for quality assurance consistency. However long-term sustainability price and profit come from the front end. Take some time and answer these regarding your specific business:

- What are my business objectives over the next five years?
- Who specifically is the end customer I am selling to?
- Do I want to sell to agents/market, direct to retail, be part of a licensed marketer, be part of a collective group, route/food service, export, niche or other?
- Is there potential for myself and growers in my region to form a collective or co-operative to achieve better efficiencies, branding, and a stronger united negotiation position in selling our mangoes?
- What is my cost of production?
- What are my living costs after my cost of production and have I built this into my forecast?
- Who is the most successful mango grower/group I know and why?
- What is my point of difference and competitive edge in my channel to market as perceived by the end customer?
- What is my strategy short and long term?
- Do I have a clear and precise business plan?
- What measurement tools for reviewing my progress do I have in place?
- What support/mentoring/advice can I get?

I will continue to rotate around with grower visits where I can get your feedback and discuss industry issues. Please do not hesitate to call any of the AMIA team if you have any queries.

CHAIRMAN'S REPORT

Ben Martin
Chairman, AMIA
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"A strong export industry can relieve the pressure on our national markets, which will ultimately benefit all growers."

- BEN MARTIN

AMIA Chairman Ben Martin with QLD Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities, Mark Furner, and Federal Minister for Agriculture, Drought and Emergency Management, Murray Watt.

A consistent message from most Director Reports in the January 2023 Mango Matters was that grower profitability was reduced resulting from two factors: one being the overall high production levels resulting in low market pricing, and secondly the weather conditions impacting fruit quality. Couple this with the higher cost of production and we will have many growers struggling to break even from the 2022/2023 season.

The mango industry continues to be in a growth phase with plantings and production volumes increasing across most regions. This last season's results highlighted the fact that the current market access opportunities must be expanded and modernised in order to cope with the increasing production levels of our industry. A strong export industry can relieve the pressure on our national markets, which will ultimately benefit all growers.

In February, I had discussions with both Mark Furner (Queensland Minister for Agricultural industry) and Murray Wyatt (Federal Minister for Agriculture) to discuss the industry constraints and to progress the market access protocols.

I will also be attending the Hort Innovation Marketing Workshop with a strong focus on their vision of improving demand creation for Australian mangoes, as well as an evaluation of their overall performance of the market category from the previous season.

I must convey our industry's support to all within the agricultural industries who have suffered from extensive rainfall and floods across Northern Australia. Of late, there has been far too many distressing images of losses and hardship across this region, and we can only hope for a rejuvenation of agriculture in 2023 and beyond.

DIRECTORS' REPORTS

Northern Territory & Northern Western Australia

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The Darwin region is on the cusp of a new season with some of the green varieties flowering on the scattered orchards.

After a disappointing 2022 season across most regions, growers are hoping 2023 brings relief for the account balance.

With great rainfall totals & forecast predictions moving us into a drier weather pattern (hopefully during next harvest) we plan with anticipation.

Hoping for slight relief on some expenses, with labour costs and availability still being a major issue. We are constantly trying to elevate this issue.

Wishing all the best for 2023/2024 season!

Geoff Warnock
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To date the region has experienced a very positive wet season with good steady soaking rainfalls with minimum of flooding.

The area is experiencing a period of isolation due to road outages, but these should be resolved well before mango production begins. However, it has interrupted availability of fertilisers and other resources to a certain degree. Compared to the flooding that other regions have had to deal with, we have been lucky.

Most growers have completed pruning and post-harvest and the trees are looking better than they have for a number of years.

I take this opportunity to wish all growers the best for the coming season as I am sure it will have its challenges, if the past 2 are any indication.

** Note – No report received from Mitchael Curtis.*

"The more time spent reviewing what went well and what needs to improve the more likely everyone is to see a better result next season."

- KARL GYGAR

Southern Queensland & New South Wales

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We are now drawing to the end of another mango season in the southeast. At the time of writing some growers are still finishing the harvest of late varieties but most of the fruit has been harvested.

We will soon see the finish, of what has been a trying mango season, for most growers across the country. Depressed pricing, increased costs and supply chain disruptions have put strong pressure on grower profitability. The AMIA has worked hard on addressing these issues by lobbying for worker reform and developing a marketing program to increase demand.

We now enter a time of preparation for the new season with pruning and fertilising in full swing on most farms. I would strongly recommend that growers take this time to speak with their supply chain partners and develop individual marketing and logistics plans. The more time spent reviewing what went well and what needs to improve the more likely everyone is to see a better result next season.

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Far North Queensland & North Queensland

John Nucifora
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Mareeba has now finished harvesting and everyone is underway with clean up and fertilising.

The reports I'm getting from my fellow growers is that it was a very hard season. The weather played a big part and also the main complaint was that the returns on the mangoes is making it very difficult to remain viable. The cost of production is increasing well about what we can afford. Growers feel like it's not going to get easier at all. Times are getting hard and us older generation are not coping with this downturn. We hope that in the near future prices can be a little more sustainable.

The AMIA is consistently working on the cost of production. That's good to see. Personally, I think we need more promotional money to support this increase in volume.

We look forward to the next season and wish everyone well in the 2023/2024 mango season.

John Nardi
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At the time of writing, the Mareeba-Dimbulah season is wrapping up for most growers with just a few still going for a little longer. We have been through one of the most challenging seasons for most with a tough Kensington Pride and R2E2 season both from a growing, and a marketing point of view. I would go as far as to say it was the toughest season I have ever endured.

Weather was a challenge for most as well, especially for the late varieties, but fruit quality was generally good across the season for most. Transport posed some real issues for most this past season with transport companies struggling to cope with the volumes of produce coming out of the region.

Growers will be into or planning their post-season field activities now to start tree preparation for the next season. Luckily, we did not see any major COVID-19 issues this year and while labour was still a challenge, it was certainly better than the previous year. I expect this will continue to get better with backpackers slowly starting to build up numbers again.

We still face increasing costs across the business from cardboard to freight, and field inputs. Let's hope we can see the markets start to lift in price in the near future to compensate growers for these increased costs.

I wish growers all the best for a happy and safe Easter and here's hoping for a successful season ahead.

Southern Western Australia

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In mid-March picking is still in full swing in Gingin. It has been a late season for Kensington Pride, presumably due to the cooler spring last year, but not so much for the R2E2. Volumes are a bit higher than expected despite there being a high load of nubbins (parthenocarpic fruit) on the trees.

Labour has still been an issue and packing has had problems due to the changeover in WA of carton sizes to the same as the other states, causing some confusion.

Carnarvon finished their season with sound prices. Recent news out of there is that Harvest Road has acquired former members Gary and Kathleen Gibson's property in what appears to signal an intention to keep moving ahead with their push into mangoes. As a long-term grower, Gary will be missed.

AMIA & INDUSTRY NEWS

Hort Innovation Australian Horticulture Statistics Handbook 2021/2022

The Horticulture Statistics Handbook is released each February and captures the previous financial year's data. The user-friendly guide includes figures on national and state-level production values and volumes, exports and imports, processing volumes, fresh supply, retail and food service distribution. The full handbook (PDF and online tableau tool) is available at: www.horticulture.com.au/hort-stats-handbook

Workplace updates—secure jobs, better pay

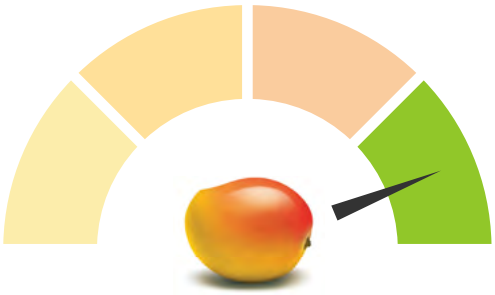
The Fair Work Act has been amended to change a number of existing rules and include a range of new laws. A number of these new changes have come into effect.

From January 7, job advertisements can't include pay rates that would breach:

- The Fair Work Act, or
- A fair work instrument (such as an award or enterprise agreement)

From March 6, the Fair Work Act will prohibit sexual harassment in connection with work, which includes in the workplace. The protection won't apply to sexual harassment of a worker that starts before 6 March 2023.

For more information on the Secure Jobs Better Pay changes and when they come into effect, go to: https://www.fairwork.gov.au/newsroom/news/secure-jobs-better-pay-changes-to-australian-workplace-laws



Grower survey

The AMIA is currently requesting the participation of all mango growers in our grower survey. It is an opportunity for growers to have their say about the key issues they have faced this season. The responses will also help to establish a baseline of grower knowledge and practices to help with the development of project resources and activities. The survey can be found at: https://forms.gle/VGLZdByy2RP79N6C9

Thank you for your participation!

Varroa mite update

The Australian Mango Industry Association has continued to play an active role in the national response to Varroa mite as part of the Consultative Committee on Emergency Plant Pests (CCEEP), supporting the NSW Government Emergency Response. The March 21 update showed that there has been a total of 137 infected premises, all in NSW. A Biosecurity Emergency Order was signed on March 13, 2023. More information on the situation can be found at: https://www.dpi.nsw.gov.au/emergencies/biosecurity/current-situation/varroa-mite-emergency-response

Chemical updates

For the latest Chemical Update from Hort Innovation head to: https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt20007/.

Sulfoxaflor (Transform) has been updated from permitted to registered for use in Fruit-spotting bug (Amblypelta nitida) and Banana-spotting bug (Amblypelta lutescens). The registration details can be found on the APVMA website, under Product No. 64101. The new withholding period is 3 days. Please check the label before use and follow the directions.

The handy guide for the major mango pests and diseases has also been updated on the AMIA website to reflect this change.

Hort Innovation update

New Industry Service and Delivery Manager, Hort Innovation – Sarah Strutt

As the *Industry Service and Delivery Manager* for the mango industry, I am the first point of contact for information about your levy investments. Please don't hesitate to contact me with any questions or issues you may have regarding your levies, their investment, resultant projects and outputs. Call, text message or email me as needed on details below. I hope to attend most industry events to meet growers and build insight to current issues and opportunities for the mango industry. I'm also happy to work in farm-visits and 1:1 catch-up whenever possible.

You may recall, previously I was the Regional Extension Manager for Northern Australia (see intro in Mango Matters Autumn, 2022). I took this new role following changes at Hort Innovation announced last October that resulted in the Hort Innovation regional extension function being dissolved to provide resources to build the new Industry Services and Delivery Team. This unit brings together the company industry service and delivery, fund management, data and insights and industry development investment activities, previously dispersed across the company. The changes have significantly increased the size of the team working with growers (12 roles dedicated to 37 levied industries), commodity peak industry bodies and representative groups to deliver industry Annual Investment Plans.

The other industries in my portfolio are bananas, lychees and papaya. I am still based in Townsville and would be keen to catch-up if ever you are in town. My contact details remain:

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Sharon Strutt.

PR & MARKETING

Taste the Sunshine campaign shines brightly

Driving demand for Australian mangoes through celebrating the glorious experience of eating a mango and positioning mangoes as the iconic taste of the Australian summer was central to the 2022-2023 season's marketing program.

The campaign built upon the previous year's campaign with a focus on the 'hedgehog' method of preparing a mango to help consumers overcome perceptions of mangoes as 'messy' or difficult to prepare.

Program Activities

The advertising campaign from October 2022 to end of March 2023 aimed to build awareness that Australian mangoes are now in season and in store. A key consideration in the channel selection was the Christmas holidays, with more people being out and about and therefore exposed to different forms of media. Another consideration was the increased cost of living and its impact on how households spend their money.

The advertising included out of home shopper panels close to supermarkets, YouTube, retail online and social media advertisements.

Out of Home Advertising

The creative concept continued to build on the theme of mangoes as the joyful, iconic taste of summer, with the campaign visual focussing on the hedgehog preparation method with the suggestion to 'slice, dice and devour'. The purpose of these visuals was to drive awareness and intent to purchase on the path to purchase.

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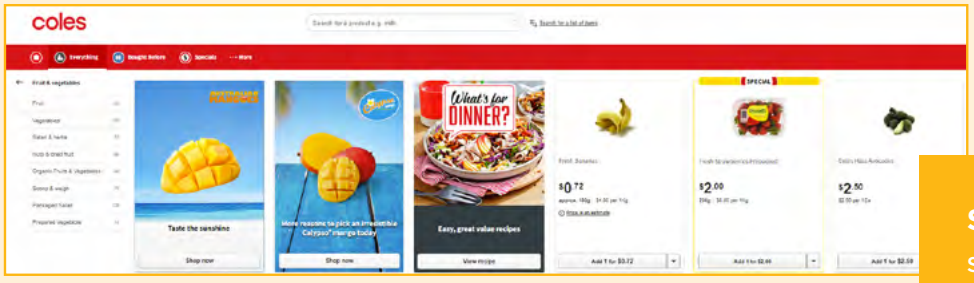
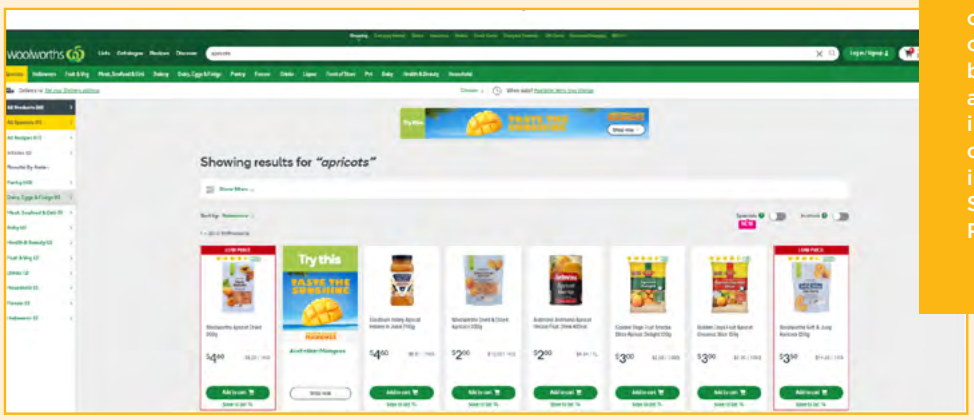




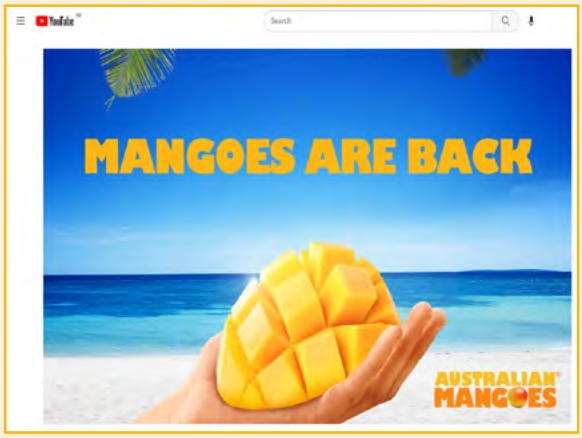
Shopper

Shopper marketing included digital display banners on Coles and Woolworths online, to prompt 'add to basket' purchase, as well as point of sale advertising in major retail stores, complemented by retailer incentive program (see Supply Chain Engagement Report for more details).

Social Media and YouTube

Social media was utilised to deliver reach at scale, where adverts were placed natively within people's newsfeeds, rather than relying on consumers following a specific mangoes page.

To raise awareness, YouTube also featured a six-second video message, "the wait is over, mangoes are back, taste the sunshine".



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Public Relations

Summer was made even sweeter by announcing that the magic of Australian mangoes was back.

To demonstrate how delicious and juicy the new season crop was, a video showcased how to hedgehog a mango and included quotes from Bec and Luke McMullin, first-generation mango farmers from Riverfarm Mangoes in the Ord Valley of Western Australia, who were very excited for Aussies to embrace their perfect summer fruit.

Recipe inspiration such as simple Mango and Strawberry Kebabs and a dessert with a nutritious twist, Mango Chia Pudding, were shared, encouraging interesting ways to feature the fruit and enjoy them in the sunshine.

The PR campaign was launched on the same day at the Brisbane Produce Market Mango Auction.

To announce the new season, a range of assets and a press release were pitched, accompanied by:

- Seasonal mango data
- Autonomous sensory meridian response (ASMR) video and imagery, educating Aussies on how to hedgehog a mango, delivered in a visually exciting format that shows the delicious eating experience of a mango
- Interviews and imagery with growers Bec and Luke McMullin
- Interviews with Brett Kelly, AMIA CEO
- Interviews and imagery with top bidder at the Brisbane Markets, Sam Etri from Skippys at Victoria Point
- Interview with the owner of the Brisbane Fresh Produce Markets

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sunrise

1,500,000 reach

Asset inclusion, campaign mention, call to action.

Daily Mail

Why Australia's first tray of mangoes for the season sold for a whopping $20,000 – and how long it'll be before you can get your hands on some

- First tray of mangoes for the 2022 season sells for $20,000 at auction
- The annual Brisbane Produce Market Mango Auction kicked off the season
- All proceeds go to Queensland charities, with $1 million raised since 2002

By BEN TAUNTYRE FOR DAILY MAIL AUSTRALIA

78 shares

The first juicy introduction to summer has gone under the hammer with the first crate of mangoes for the season attracting a bidding war.

With the mango season officially launching on Thursday at the annual Brisbane Produce Market Mango Auction, the first tray of mangoes sold for $20,000 - with all proceeds going to charity.

The annual first tray of mango auction has now raised $1 million for Queensland charities since its inception in 2002.

10,600,000 reach

Asset inclusion, spokesperson inclusion, campaign mention.

ABC

Why this Kimberley couple traded nursing and police work to grow Ord River mangoes

Key points:

- Despite having no experience in agriculture, Bec and Luke McMullin are pursuing their farming dreams in the Ord Valley
- The nurse and police officer are hoping mango farming will

16,000,000 reach

Spokesperson inclusion.

news.com.au

NOW PLAYING

Australian Mangoes are here to help you enjoy Australia's juiciest fruit

15,900,000 reach

Asset inclusion, brand mention.

FRUITNET

Australian mango season ramps up

Annual auction builds excitement as Queensland production comes online

103,000 reach

Asset inclusion, brand mention.

lifehacker

Mango Season Is Back, Here's the Best Way to Cut Them Up

Spring is here and as the weather warms up it means more fruits are coming into season. One particular Aussie favourite is the mango and the juicy fruits are popping up in stores by the tray load already. Whilewe can all agree on the fact that mangoes are delicious (fight me), one thing that is often debated is the best way to cut a mango.

788,000 reach

Brand mention.

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New Zealand Marketing Campaign

The consumer marketing program was also extended to New Zealand, featuring out of home supermarket panels and social media advertising to share the joy of Aussie Mangoes beyond our shores.

Marketing Snapshot Australia

Results achieved:

- Out of home advertising reach: 3,525,248 people
- Meta (Facebook and Instagram) advertising reach: 2,837,000 people
- YouTube advertising reach: 2,961,539
- Public Relations media outreach: 57.9 million+ opportunities to see the mango key messages via 169 pieces of coverage

Comparing the percentage of Australian households purchasing mangoes, positive shifts have occurred versus last season:

- Last 52 weeks: 56.7% to 59.4% **(+2.7pp)**
- Last 4 weeks: 14.6% to 19% **(+4.4pp)**

NielsenIQ data to 26.02.23

Out-of-home advertising

3,525,248

reached

2,837,000

reached

2,961,531

reached

Public Relations media outreach

57.9 million+

opportunities

For further information please contact:

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Hort Innovation

A season of change—supply chain engagement

The 2022-2023 mango marketing program includes a range of activities to help drive consumer demand for mangoes throughout the season.

It was really important for us this year to start the season with what we called an "awakening" event. A managed public relations (PR) event that would let the Australian population know that mangoes were back and that the mango new season of supply had begun. As informed in the marketing update, we aligned ourselves with the Brisbane Markets Mango Auction that heralded the start of the season.

The picking season however didn't fully cooperate and mother nature slowed the season down with major rain and weather events that resulted in the delayed arrival of fruit as was originally forecast. This delay pushed back the store activities from our retail partners due to the delay in receiving plentiful stocks at stores, which in previous years, would have normally been delivered in large bountiful quantities and displayed with vigorous intent throughout the nation's supermarkets upon the official launch date.

The crop forecast and actuals provide the back story. We saw a late season versus the previous year (see Crop flow forecast) and fruit from differing regions combining into large quantities (see crop flow location) which changed the retail landscape for both the growers and the supermarkets this season.

We did witness this season however, a measured and tailored approach as the fruit became available with its entry into the major markets. It wasn't until around September 26 that we saw the first Kensington Pride stocks starting to arrive in stores with other varieties filtering in, in the weeks after, rolling out to fill the national supply requirements.

As the season progressed and the volumes grew, we also started to see the arrival of multipacks providing the consumer with a plethora of assorted mango options to purchase. When reviewing each week and looking at what was available within the majors (whom have online shopping), we saw with increasing supply from farms, the SKUs (stock keeping units) also increasing in number. This provided a wide mixture of product types and sizing, and of course price variability towards, and during the peak of our season. There were plenty of mango options for our consumers to purchase.

Although a little later than originally planned, mango displays were plentiful, positioned at the front of stores, and in multiple locations, priced by variety and highlighted with marketing communications and specific point of sale derived and supplied from both the Hort Innovation Marketing Team and the retailers in-house marketing departments. Sales increased and retailers' reported that they were quickly catching up to, and increasing their sales positions versus the prior season.

Retailer support has been strong for our mango category again this year. Their support included for this season the featuring of Mangoes 480 times in retailers brochure/catalogue activities versus 488 times in the prior year. These numbers, however, do not include any TV commercials or use of mangoes within the retailers' Christmas TV campaigns. Retailers also heavily focused consumers on mango availability and the consumption ideas, with retailers investing their marketing support, and airing their festive related commercials, frequently, amplifying the mango marketing message at the peak timing of our season.

At the time of writing this report, the season's supply is reducing as the season moves to a close. We now eagerly await the end of season and the all-important data that will flow through, and with analysis provide the lessons and opportunities to move forward.

I look forward to providing you with that detail in the next edition and at the upcoming roadshows.

Retailer support has been strong for our mango category again this year.

For further information please contact:

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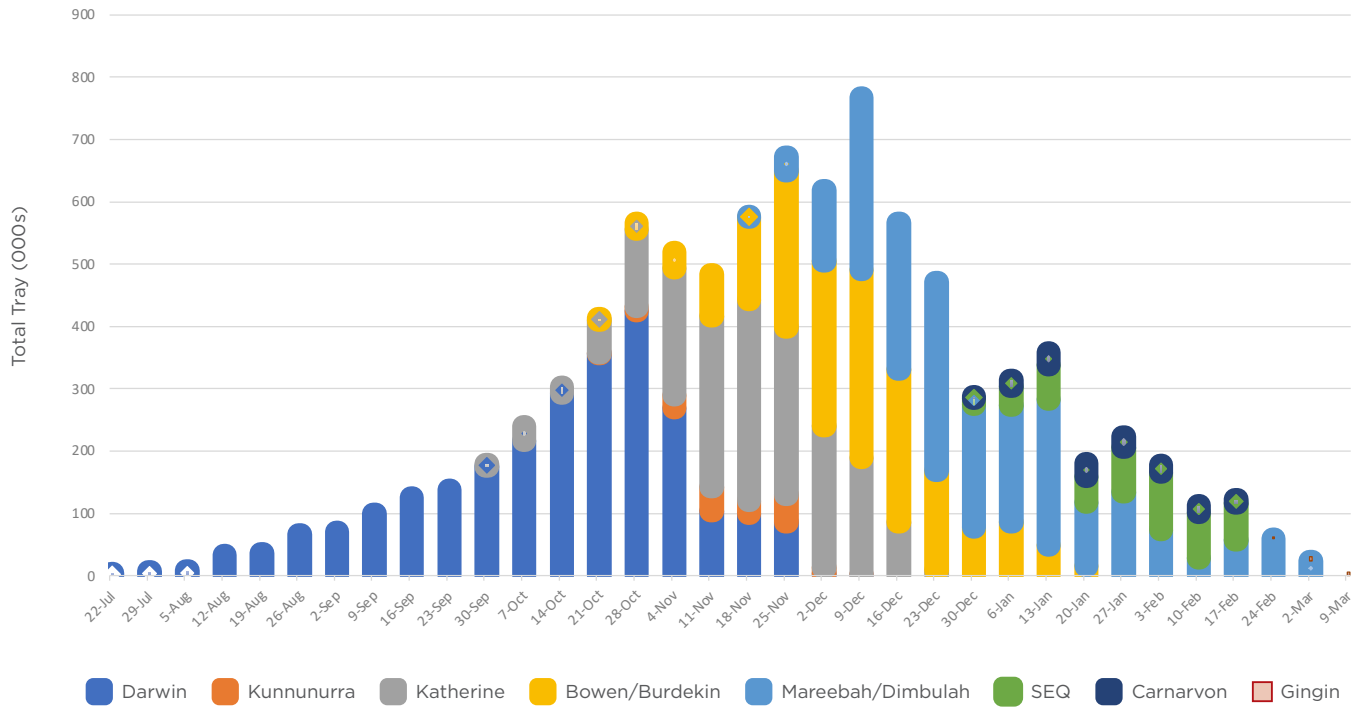
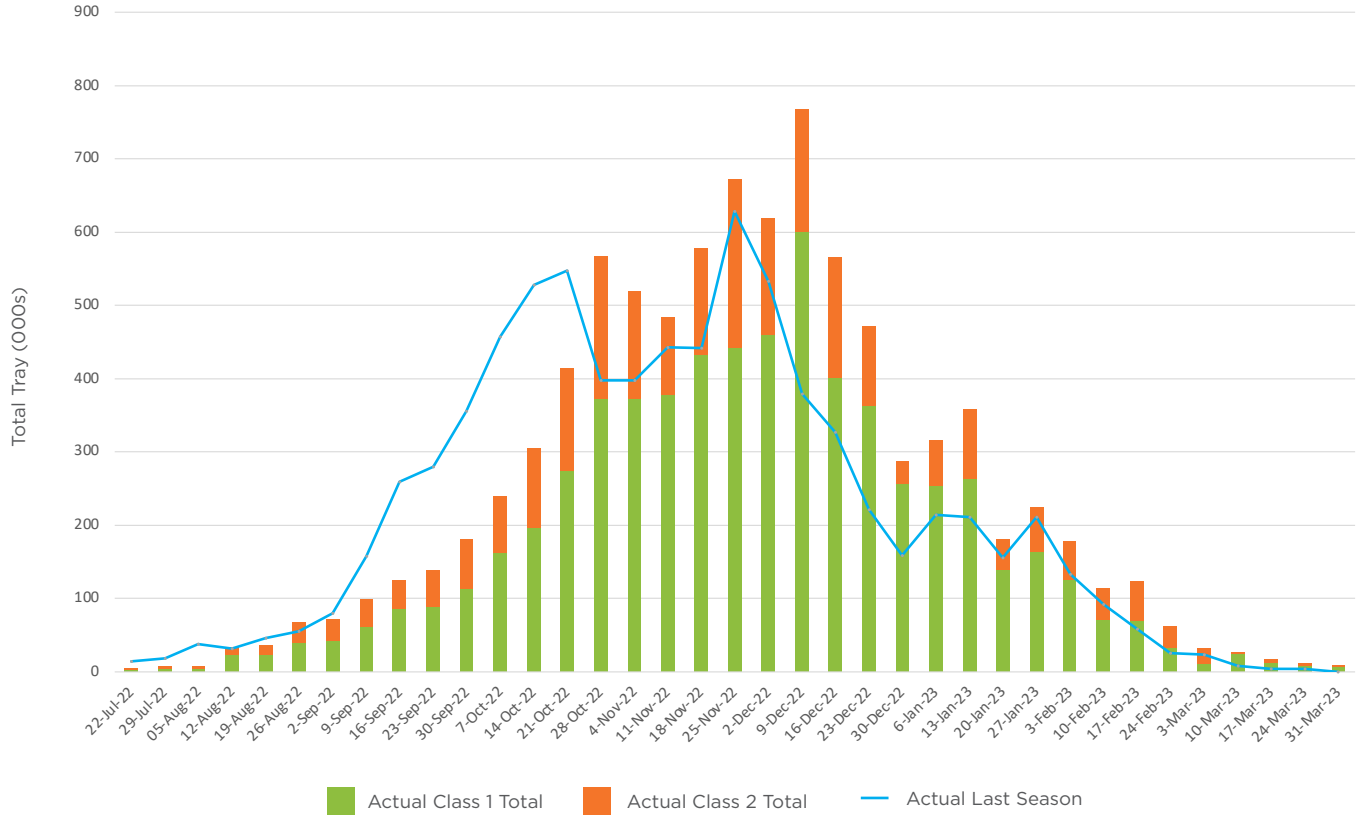
Crop Flow Location



Actual and Forecast vs Previous Season



Sweet news for mango lovers in Australia

The consumer and sensory research (CSR) team at Queensland's Department of Agriculture and Fisheries (DAF) are working with the Australian Mango Breeding Program (AMBP) team to understand mango consumer behaviour and preferences to help guide the future breeding of new varieties.

Consumer research can seem like a no-brainer but the truth is, this powerful research can often be forgotten when developing new varieties of fruit. Consumer research allows breeders and food scientists to understand what drives customer behaviour and can inform the development of business strategies and the varieties of fruit offered to consumers.

When working with fresh fruit it's important to understand the preferences of current real-world consumers and point to ways to attract new ones.

While plant breeders have successfully created varieties that consumers have loved and enjoyed for many years, it's important to remember that the consumer environment is continually changing and at a rapid rate. Where farmers once dictated what landed on the supermarket shelf, consumer demand now dictates what, when and how produce is delivered.

The project – Genetics of Fruit Sensory Preferences

During the genetics of fruit sensory preferences project the CSR team are collaborating with the DAF food chemistry and genetic improvement teams to identify the genes associated with key consumer qualities of different mango varieties.

Figure 1. Mango varieties tested in sensory and consumer panels.

Figure 2. Mango sensory descriptors generated by trained sensory panel (wordcloud generated using https://www.wordclouds.com/).

The CSR team are working with consumers to understand what they prefer in a mango, including appearance, aroma, flavour and texture. They are developing detailed sensory profiles of these varieties to link consumer and sensory panel data with fruit genetics. This research will help plant breeders to understand what traits to look for when screening the genetics of plants, informing breeding progeny and as a result producing tastier mango varieties that appeal to consumers.

Sensory profiling

In January 2023, the DAF CSR team profiled 10 different mango varieties (Figure 1) with DAF's specially trained sensory assessment panel. The team developed a sensory vocabulary (lexicon) to describe the appearance, aroma, flavour and texture of each mango variety (Figure 2).

This lexicon can now be used as a common language by both industry and scientists to describe the sensory attributes of a mango. Some interesting descriptors generated by the trained panel included edge fibrousness, fruit salad and herbaceous.

Consumer evaluation

In January 2023, the DAF CSR team conducted consumer evaluation of the same 10 mango varieties, this time with 131 consumers. This evaluation took place at DAF's state of the art specialised sensory facility at the Food Pilot Plant in Coopers Plains, Queensland (Figure 3). The team collected information

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Figure 3. DAF's specialised sensory facility in Coopers Plains.

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on likes/dislikes, purchase barriers and opportunities for product optimisation.

Overall, the new NMBP varieties performed very well amongst the sample set which included the well-known Australian variety Kensington Pride, Florida varieties, Tommy Atkins and Irwin, Indian varieties, Mallika and Bangalora and Southeast Asian varieties, Maha Chanok and Nam Doc Mai. This result was very encouraging and demonstrated that Australian mango breeders are producing new varieties that Australian consumers find superior to existing varieties.

This and further research as part of the project has developed a more comprehensive understanding of current consumer preferences, purchasing and consumption patterns, and how the taste, smell, look and feel of fruit contribute to these behaviours. These new insights can be used to validate current industry thinking and will identify new opportunities for product diversity or value adding.

A platform and tools will be developed to measure and present consumer trends over successive years, including a common language across the industry for sensory traits.

We hope to use the underlying biology of these sensory qualities to profile the genetics of different varieties to develop breeding tools that will assist mango breeding programs in Australia to deliver superior varieties more efficiently.

The genetics of fruit sensory preferences project will continue until March 2026.

Article provided by Simoné Moller – Consumer and Sensory Scientist, Philippa Lyons – Senior Consumer and Sensory Scientist, Natalie Dillon – Senior Biotechnologist and Ian Bally – Senior Principal Horticulturist, Queensland Department of Agriculture and Fisheries

Acknowledgement

This project (Genetics of Fruit Sensory Preference AS19003) was funded by Hort Innovation as part of the Hort Frontiers strategic partnership initiative, with co-investment from Queensland Department of Agriculture and Fisheries (DAF) and contributions from the Australian Government.

The DAF Consumer and Sensory Research team are working closely with the DAF Food Chemistry and Genetic Improvement teams to achieve the project goals.

Disclaimer: The above information is sourced from research conducted by the DAF Consumer and Sensory Research team. The Queensland Department of Agriculture and Fisheries, and Horticulture Innovation Australia provide the above information as a guide only and take no responsibility for the performance of the varieties on individual farms.

Steritech X-Ray facility in Melbourne. The solar panels pictured generate enough renewable energy to offset all the domestic fresh produce treatments at the facility last year. Steritech is in the process of expanding this solar system to be four times larger, keeping pace with forecasted growth of produce treatments at the site. Photo: Steritech.

X-Ray irradiation offers growers a chemical-free alternative with potential for carbon-neutral certification

A project led by Agriculture Victoria has brought together world-leading expertise to build capacity and encourage the adoption of phytosanitary irradiation technology.

Phytosanitary irradiation is the controlled use of x-ray and gamma rays to sterilise hitchhiking pests on commercial fresh fruit and vegetable shipments.

The process is unique – generically effective, rapid, heat-free, and chemical-free.

The project entitled "AM19002 Building Capacity in Irradiation: alternate pathways for export of Australian horticulture" started in June 2019 and is set to finish in June 2023.

Agriculture Victoria Senior Portfolio Manager Martin Bluml said the project team were happy with the project's progress looking to future applications of the technology.

"With the project end in sight, the project team are now finalising experiments and preparing a roadmap that will outline how key domestic and international barriers to use can be addressed," he said.

Phytosanitary irradiation is recognised as generically effective for treating any fruit fly in the world, in any crop.

The treatment is simple and reliable, with zero known failures in over 17 years of use in Australia.

It plays an increasingly significant role in preventing the spread of fruit fly in Australia and around the world.

Steritech Fresh Produce Business Manager Ben Reilly said it is the only end-point treatment that effectively treats all common mango insect pests including fruit fly and seed-weevil.

"This simple, reliable off-farm treatment is helping industry comply with increasingly complex biosecurity and maximum residue limit requirements which vary between markets," he said.

"The generic efficacy data and sustainable nature of the treatment ensures phytosanitary irradiation protocols will help maintain Australia's trade in the event of a new insect incursion or the loss/restriction of in-field chemical controls."

The use of phytosanitary irradiation in Australia's horticulture sector has grown significantly in the past seven years, with over 60 Australian-grown crops now using it to reach both domestic and international export markets.

Australian treatment volumes reached new heights during the COVID-19 pandemic, despite the disruption to airfreight.

"Approximately 80 per cent of our treatments are for air-freight shipments, most of these sales are filling inelastic ultra-premium market segments," Mr Reilly said.

"Irradiation protocols enable Australia to deliver fruit faster and fresher creating a unique commercial advantage for Australian exporters."

Australian consumers and retailers have not been missing out either, embracing the option in recent years with Steritech now treating daily domestic consignments of produce to Western Australia, South Australia, and Tasmania.

Mr Reilly said mangoes have been a significant part of this growth in both domestic and export markets, being the second largest crop treated by volume.

"The AM19002 project has created broader attention and awareness within the Australian industry, which has helped many producers benefit from the modern treatment alternative," he said.

Continued page 19

> *"Irradiation protocols enable Australia to deliver fruit faster and fresher creating a unique commercial advantage for Australian exporters."*
>
> BEN REILLY, STERITECH FRESH PRODUCE BUSINESS MANAGER

An example of how Australian retailers are promoting the benefits of X-ray technology to consumers. Photo: Steritech.

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To learn more about this project and how phytosanitary irradiation can protect and grow Australia's horticultural industries, visit hin.com.au/current-initiatives/strategic-workshop-building-capacity-in-phytosanitary-irradiation.

Acknowledgement

AM19002 Building Capacity in Irradiation: alternate pathways for export of Australian horticulture is funded by the Hort Frontiers Asian Markets fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from Agriculture Victoria, Steritech, New South Wales Department of Primary Industries (NSW DPI), South Australian Research and Development Institute (SARDI), Aerial (France), New Zealand Institute for Plant and Food Research (NZPFR), Radservices (NZ) and contributions from the Australian Government.

AGRICULTURE VICTORIA

The bees-knees of bee biosecurity

The iconic Australian mango, grown locally since the 1800s across the north of Australia, relies on a range of insect pollinators, including some visitation by honey bees. It is estimated that honey bees contribute $14.3 billion to the Australian economy through these pollination services and associated products.

In recognition of this reciprocal relationship, the mango industry works collaboratively with the honey bee industry via Hort Innovation, through their investment in the National Bee Pest Surveillance Program (NBPSP).

Delivered by Plant Health Australia (PHA) with additional funding from state and territory governments, the Australian government, the Australian Honey Bee Industry Council (AHBIC) and Grain Producers Australia (GPA), the NBPSP is intended as a national early warning system to detect new incursions of exotic bee pests and support Australia's pest freedom claims.

The program uses a range of surveillance methods conducted at high-risk sea and airports throughout Australia, considered to be the most likely entry points for bee pests and pest bees. Surveillance at additional ports are provided through in-kind contributions by state and territory governments.

The NPBSP specifically targets nine exotic bee pests that could pose a significant threat to the honey bee population and in turn those industries reliant on their pollination services. Targeted pests include *Varroa* mites, *Tropilaelaps* mites, tracheal mites, and Asian bees such as *Apis dorsata* and *Apis florea*. Both *Varroa* mites and *Tropilaelaps* mites are identified within the top 10 National Priority Plant Pests for Australia.

Various surveillance techniques such as sentinel (live) hives, swarm and nest capture, inspection of catchboxes and floral sweep netting are used to detect these pests. Different techniques and alternative surveillance activity timings are utilised at each of the port locations to target the bee pests mostly likely to enter at those locations. For example, Northern Australia ports are considered high-risk entry points for the Asian honey bee species and the pests they

EVOLUTION OF BEE SURVEILLANCE

Continued page 21

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may carry. In order to target this particular threat, specific techniques are used such as the assessment of Rainbow bee eater pellets to detect Asian honey bee wings and aerial pheromone ballooning to detect drone bees – the male bees responsible for populating the hive.

The surveillance work undertaken in NPBSP generates national data used to back Australia's freedom from pest claims - which is needed to retain market access. To support these claims, data collected throughout Australia, needs to be consistent and meet a set of standards. Funded by the Department of Agriculture, Fisheries and Forestry and using the NBPSP Standard Operating Procedures as a basis, a set of resources were developed for staff involved in the NPBSP, to guide their surveillance activities and the consistent collection of data.

A handy quick reference guide designed for use in the field, includes information on exotic and established pests to aid the quick identification and reporting of suspected pests. The inclusion of information on insects such as the Blue banded bee, Stingless bee, Bee mimic flies and the Metallic green carpenter bee, ensures these native insects commonly mistaken for exotic pests are not reported. The guide also provides step-by-step preparation for surveillance activities and simplified protocols with images for quick referencing. Additional training videos on acaricide application for early detection of exotic mites, bee collection for diagnostics and honey sampling for maximum residue level analysis were also produced and incorporated in the Bee Surveillance Course on PHA's Biosecurity OnLine Training (BOLT).

PHA has coordinated the delivery of the NBPSP for the past 10 years however bee pest surveillance in Australia has been underway for over two decades with the first sentinel hive inspections occurring in the late 90s. Today, PHA as the national coordinator for the plant biosecurity system, works with the mango industry to manage biosecurity risks and pollination needs, and also with other pollinator industries and emerging industries such as the native bee industry, to develop plans and resources aimed at building biosecurity awareness and preparedness.

"PHA has embedded a strong coordination component in this project and will undertake consultation for a sustainable funding mechanism for any future surveillance programs," said Sarah Corcoran Chief Executive Officer.

The NBPSP will run until December 2024 and will continue to focus on a consistent national approach for the early detection of target pests.

Acknowledgement:

The NBPSP is funded by Hort Innovation using research and development levies of 14 horticultural industries, with significant co-investment from states and territories and contributions from the Australian Honey Bee Industry, Grain Producers Australia and the Australian Government. The NBPSP is coordinated by Plant Health Australia and delivered by states and territories.

Bee frame hives.

Understanding the control of mango flesh colour

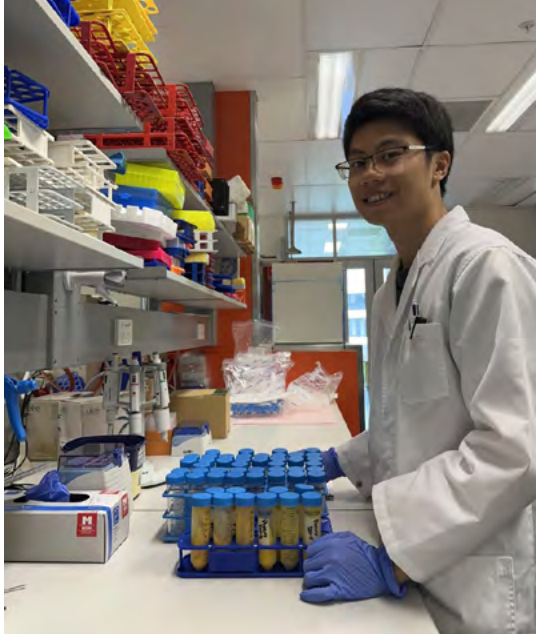

Figure 1. The University of Queensland PhD student Tatsu Takagi in the laboratory working on mango samples.

We all know that as mangoes ripen, they get more yellow, or even orange. This is a similar phenomenon for most, if not all, mangoes. But why does the flesh of some mango varieties only reach a pale lemon colour, while others produce a dark orange that would not be astray in a ripe pumpkin?

University of Queensland student, Tatsu Takagi (Figure 1), is currently investigating this question as part of his PhD with Associate Professor Tim O'Hare at the Queensland Alliance for Agriculture and Food Innovation (QAAFI, University of Queensland), in conjunction with the Department of Agriculture and Fisheries (DAF Queensland). Understanding the mechanism behind mango flesh colour is the first step in the development of breeding tools to enable our mango breeders to design tailor-made mangoes specifically suited to target markets in Australia and overseas. Not surprisingly, not everyone in the world likes the same colour.

In cooperation with DAF scientists, Dr Natalie Dillon and Dr Asjad Ali, Tatsu has been able to access one of the most diverse mango collections in the world, located at Walkamin Research Facility on the Atherton Tableland. This collection includes mango varieties ranging from a pale lemon to a deep orange flesh colour when fully ripe.

Why are some mangoes pale lemon while others are dark orange?

The pigments that give all mango fruit their vivid yellow and orange flesh colours are known as carotenoids. Although there are hundreds of carotenoids that vary in colour from yellow to orange to red to salmon, the principal carotenoid in mangoes is beta-carotene. Beta-carotene is also known as pro-Vitamin A, because when eaten it is converted to retinol (Vitamin A), which amongst other health benefits, is known for its association with improving night vision.

So, why are some mangoes pale lemon while others are dark orange? There are a number of potential reasons. In a study of 26 differently coloured varieties, the palest lemon varieties tended to have the lowest concentration of carotenoid pigments, whilst the more orange varieties tended to have a higher concentration.

However, it appears to be more complicated than this. When we think of colour, we tend to think of it like the colours of the rainbow. But, colour is a combination of two factors - its hue (yellow through to orange) and the intensity of that hue (pale orange through to dark orange). Consequently, what we are observing is a complex matrix of flesh hues across varieties that also range in colour intensity.

Mango varieties and their flesh colour

At one extreme, we have a mango variety like 'Himayat Pasand' which is pale yellow, while at the other extreme we have a variety like 'Willard', which is dark orange. In between, we have a more familiar variety such as 'Calypso®', which is a mid-range orange-yellow colour. In the Figure 2, we can see the range of flesh colour starting with the pale yellow 'Himayat Pasand' on the left, all the way to the deep orange 'Willard'

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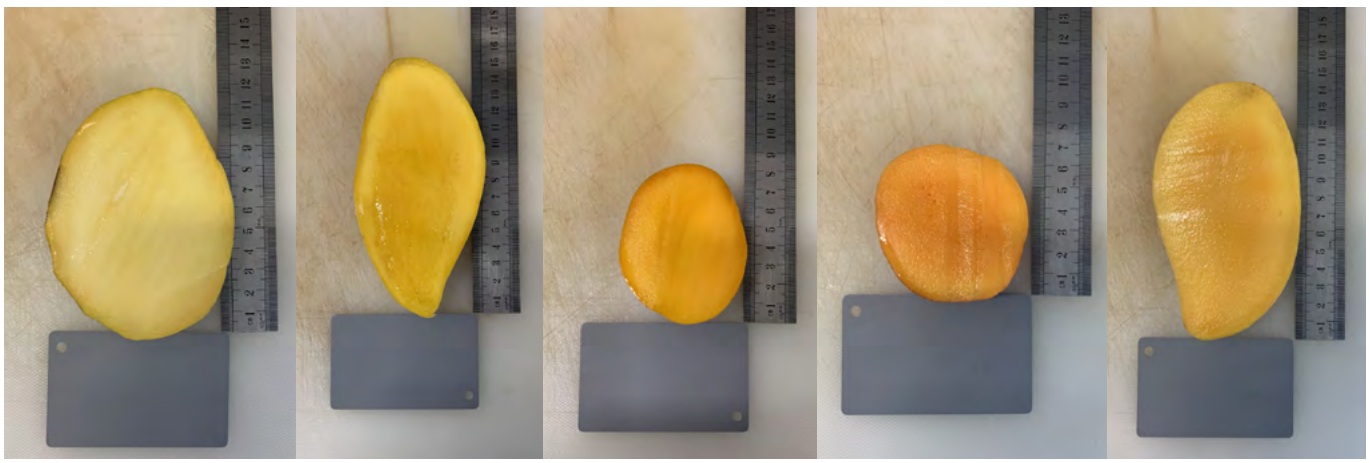

Figure 2. Five varieties of mangoes all ranging in flesh colour from pale yellow (left) to deep orange (right). The varieties are 'Himayat Pasand', Nam Doc Mai', 'Xoài Boui', 'Oh'Ure Pio' and 'Willard' from left to right.

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variety on the very right. The other varieties shown in between are 'Nam Doc Mai', 'Xoài Boui' and 'Oh'Ure Pio', from left to right, respectively.

Interestingly, as mango varieties increase in their 'orangeness', the variability of the colour intensity also seems to increase. Consequently, a variety such as 'Carrie' can be the same orange hue as the variety 'Julie' and 'Kimba', but each of these varieties varies greatly in the intensity of this orange colour.

Identifying the cause of variation in mango flesh colour

Trying to understand what causes the variation in both their hue and intensity of flesh colour is the challenge. A first step to solving this is to analyse the carotenoid profiles of all these varieties, including what carotenoid pigments are present, and how much of each pigment. This requires ripening all the fruit to the same ripeness, and then carefully extracting the carotenoids, before identifying and quantifying the individual carotenoids using high-performance liquid chromatography. Working together with UQ analytical chemist, Dr Hung Hong, Tatsu has optimised this methodology for mangoes.

Once this step is completed, the next step is to identify how this complicated profile of carotenoid pigments is related to both the flesh hue, and to the intensity of this hue. In this way, it is hoped we can develop an insight as to what combination of pigments is required to attain a dark orange mango flesh or a pale lemon flesh, or somewhere in between.

Genes and flesh colour

Just knowing what profile of carotenoid pigments leads to a certain colour unfortunately does not provide a tool to developing tailor-made mango flesh-colour. Breeders also need to be able to control the mix of carotenoids that are present.

The amount of each carotenoid pigment ending up in a ripe mango is fundamentally controlled by its DNA. Small changes in the genetic code of genes making up the DNA can have significant impact on flesh colour. Numerous genes are responsible for producing enzymes, which in turn are responsible for determining how much of a particular carotenoid pigment is present in the fruit, and consequently its colour. Finding out which genes are the important ones is the next challenge.

There are a couple of ways to work out which are the important genes, and Tatsu will be using a number of approaches. Firstly, simply looking at the carotenoid profile of an individual mango variety gives us an educated clue as to what genes are important, particularly within the biosynthesis pathway in which these pigments are made. These are 'candidate' genes, which can increase total carotenoid production or just modify the level of a particular carotenoid pigment.

An additional approach, called 'GWAS', or 'Genome-wide association study', is another way to find the important genes controlling flesh colour. This requires the sequencing of the DNA genomes of hundreds of mango varieties, and then matching them with their ripe fruit colour. Fortunately, the genome sequencing has already been completed within another UQ/DAF project, so the next step is to use this data. This approach will confirm if the candidate genes have a significant effect on flesh colour, but also is likely to identify unrelated genes that may indirectly affect mango flesh colour.

Breeding for flesh colour

As a new mango cultivar takes years to breed, it would be ideal to have genetic markers for breeders to use to identify seedlings with a targeted flesh colour. A newly bred mango plant can take decades to develop and can require considerable resources raising thousands of seedlings to fruiting stage. And using this method, the flesh colour, amongst other traits, is a gamble. It is hoped that Tatsu's PhD study will help us understand how to manipulate flesh colour in future generations of mangoes.

Acknowledgement

Tatsu's PhD study is part of a joint UQ/DAF Hort Innovation Frontiers project AS19003 'Genetics of Fruit Sensory Preferences'. This project was funded by Hort Innovation as part of the Hort Frontiers strategic partnership initiative, with co-investment from Queensland Department of Agriculture and Fisheries and contributions from the Australian Government.

Benefits to flow from mango hot water treatment trial

A research project has unblocked the barrier to using hot water treatment to meet international protocols for fruit fly disinfestation in mangoes, paving the way to lower treatment costs and improved market access.

While hot water treatment is used extensively to disinfest other fruit and vegetables, its application on mangoes has been hindered by scalding to the skin – compromising fruit quality and value.

The research led by Griffith University, in collaboration with the Department of Primary Industries and Regional Development (DPIRD), found two varieties of mangoes responded well to the hot water treatment, without scalding, when the fruit was preconditioned to ambient shed temperatures.

Two years of trials were undertaken at DPIRD's Frank Wise Agricultural Research Institute at Kununurra, as part of an Australian Centre for International Agricultural Research (ACIAR) project.

DPIRD research scientist Tara Slaven said two mango varieties, the well-known export mango R2E2 and the new NMBP-4069, responded well to preconditioning treatments producing no scald damage.

The trial examined two preconditioning treatments of six and 24 hours for both mango varieties.

This was followed by hot water treatment at the protocol standards of 46C for 20 minutes and 47C for 15 minutes, followed by hydrocooling at 30C for 30 minutes.

"NMBP-4069 proved to be the more versatile variety, with two preconditioning treatments responding well," Ms Slaven said.

"This included six hours preconditioning at 34.8C, prior to hot water treatment of 46C for 20 minutes, as well as 24-hour preconditioning at 34.8C, before a 15 minute hot water treatment at 47C.

"R2E2 also performed well under preconditioning of 42C, for six hours when treated at 46C for 20 minutes."

Ms Slaven said the trial results opened the way to an alternative disinfestation option at significant lower infrastructure costs to vapour heat treatment and irradiation for mango growers and packing houses.

DPIRD technical officer Helena O'Dwyer (left), research scientist Tara Slaven and Griffith University senior horticulturalist Peter Johnson worked on a hot water treatment disinfestation trial for mangoes in Kununurra, which produced positive results.

"The trial has shown that preconditioning these mango varieties at ambient Kimberley temperatures could be a useful, cost effective, efficient system to disinfest mangoes without scalding the skin," Ms Slaven said.

"The process still needs refinement, including examining how to keep the water temperature constant, whether the process can be adopted in other environments, like Carnarvon, and examining the potential to scale up for automation."

The trial results are now being shared with industry stakeholders internationally, as part of the ACIAR's work where scientists use their skills to benefit partner countries, while contributing to solutions that meet Australia's own agricultural challenges.

Griffith University senior horticulturalist Peter Johnson said the outcomes from hot water treatment trial could generate far reaching benefits to mango growers around the world.

"This comparatively simple treatment makes disinfestation accessible to mango growers in countries that cannot afford typical treatments, which could help improve fruit quality and profitability," Mr Johnson said.

"It will also assist mango growers to satisfy increasingly discerning phytosanitary requirements, enabling exporters to target premium markets, like New Zealand, Korea and Japan."

For more information on this ACIAR project visit www.aciar.gov.au and search for 'mango production'.

ACIAR is the Australian Government's international agricultural research for development agency.

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

Griffith UNIVERSITY
Queensland, Australia

PEOPLE & EVENTS

IDO visit to the Gingin/ Dandaragan region

AMIA NT/WA Industry Development Officer, Celine Jordens, travelled to the Gingin/ Dandaragan region in Western Australia in February to conduct dry matter testing ahead of the season, which started towards the end of February.

Border closures during the pandemic have made farm visit and face-to-face contact with our WA growers challenging over the past couple of years. Conducting on-farm dry matter testing was also a great opportunity to catch up and share industry updates with growers.

The trip to Southern WA also included a tour of the Perth Market kindly hosted by Shane Wilton from Quality Produce International (QPI), who welcomed AMIA Board Director David Morcombe, WA DPIRD Researcher Dario Stefanelli and AMIA IDO Celine Jordens for a tour of their facilities as some late season mango varieties from Carnarvon were being dispatched from their market floor.

A grower meeting was also organised to enable discussions between growers, AMIA and the WA Department of Primary Industries and Regional Development (WA DPIRD). Dario Stefanelli, Senior Research Scientist and Lead of Fruit and Perennial Crops with WA DPIRD, presented on current mango research undertaken in the different research stations across Western Australia.

The meeting also aimed to foster conversations between industry and government on the direction of the industry, and how working together can assist in meeting R&D needs, such as developing trial sites on farm to support existing and new research.

AMIA would like to thank all meeting attendees for their input into these discussions and thank all growers for their time and for receiving us on farm.

A special thanks to Joseph Ling from AGRIFresh for providing the photos.

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Farm visit and NIR dry matter testing at AGRIFresh.

Farm visit with the AGRIFresh team – thank you to Joseph Ling for providing the photo.

Farm visit and NIR dry matter testing at AGRIFresh.

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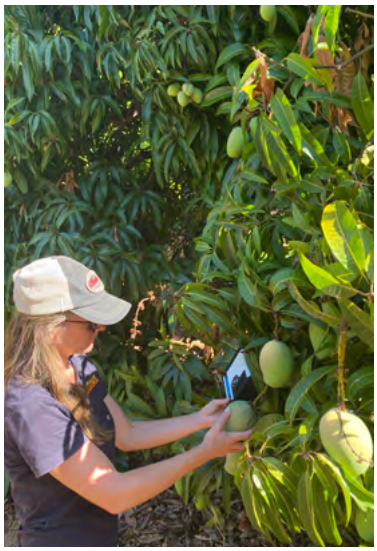

NIR testing.

Heidi and Valencia Pride mangoes from Carnarvon at the Perth Market.

Thank you to Shane (Quality Produce International) for taking the team for a tour of their facilities at the Perth Market (from left to right: David Morcombe, AMIA Board Director; Dario Stefanelli, WA DPIRD; Celine Jordens, AMIA; Shane Wilton, Quality Produce International).

Valencia Pride mangoes from Carnarvon at the Perth Market.

Hort Connections 2023

The AMIA are excited to again be an Industry Partner of Hort Connections.

Hort Connections 2023 in Adelaide will follow on from a successful 2022 event held in Brisbane. The horticulture industry will be recognised and celebrated at the conference, bringing together members from right across the vegetable, fruit and floral sectors. Hort Connections will highlight and display exciting new possibilities that will help to shape the industry – whether it be technological, financial and labour solutions or environmentally sustainable options that are now available on the Australian market.

WHEN: 5-7 June 2023
WHERE: Adelaide Convention Centre
REGISTRATION AND FURTHER DETAILS: https://hortconnections.com.au/registration/

Make sure you select Australian Mangoes from the industry tab when you register.

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