

Mango Matters

JULY 2023 | VOLUME 52

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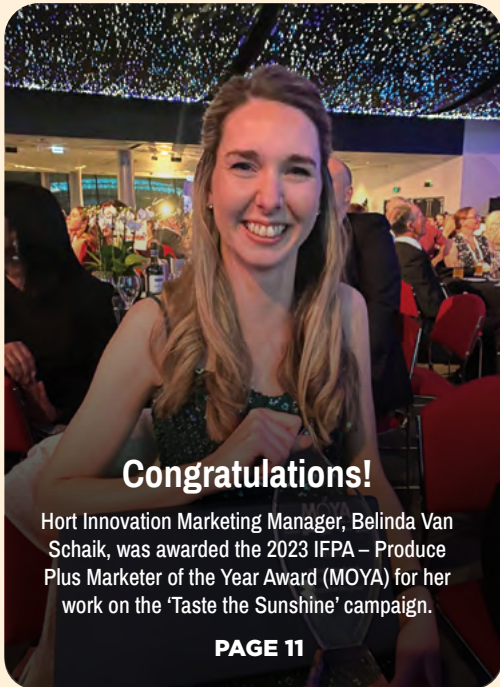


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Congratulations!

Hort Innovation Marketing Manager, Belinda Van Schaik, was awarded the 2023 IFPA – Produce Plus Marketer of the Year Award (MOYA) for her work on the 'Taste the Sunshine' campaign.

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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

Office Address: Unit 2, The Fresh Centre, Brisbane Markets
Postal Address: PO Box 376, Brisbane Markets QLD 4106
Phone: 07 3278 3755 Email: com@mangoes.net.au
Australian Mangoes: www.mangoes.net.au
AMIA: www.industry.mangoes.net.au

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CEO'S REPORT

Brett Kelly

Chief Executive Officer, AMIA
E: ceo@mangoes.net.au
M: 0437 435 363



AMIA CEO Brett Kelly speaking at Hort Connections.

As we now approach the upcoming season, I wish all grower/members a great season ahead. At the time of writing this there have been positive signs of early flowering; let's hope, most importantly, that mother nature does not give us a repeat of last season with the volume/timing issue that led to a huge volume hitting the market all at the same time. Feedback I have had to date from growers is cautiously optimistic in terms of the upcoming season.

Last season was again up in volume on the previous year, as were overall sales of units to the consumer, so our market has grown. The challenge again is getting a fair price and return for our mangoes. Cost of production continues to rise. Labour/worker availability on farm, though improving will still be a challenge in some areas this season, so please ensure you are organised, planned, up-to-date and prepared. Also planning ahead for both domestic and/or export channels to market is imperative to achieving the best possible returns. All relevant industry information can be found on the AMIA industry website www.industry.mangoes.net.au.

All levy funded Hort Innovation contract projects (Best Practice/Extension MG21002, Communications MG21001 and Supply Chain Engagement MG22500) that the AMIA are contracted for are up to date, with all milestones being achieved on time as per contractual obligations.

The industry's SIAP (Strategic Industry Advisory Panel) has now met twice in the past three months to review the SIP (Strategic investment Plan) progress,

as well as the marketing planning and export strategy for this season. You can find all information on the Mango SIP, Marketing and Export Plans on the AMIA site: <https://www.industry.mangoes.net.au/resources/resources-library/mango-strategic-investment-plan-2022-2026>.

The internal strategic plan for the AMIA is progressing well. To achieve more resources in the long term for our grower members we need to build our membership base. This will be a big focus for us over the next twelve months. A stronger and larger AMIA membership will strength our voice and position on all industry issues that affect our growers. I will keep you updated on our progress as we work through the strategy.

We have now recruited and employed a new IDO (Industry Development officer) for the Queensland/NSW region. Adelaide Belyea commenced on the 29th of May. Adelaide brings great experience and is keen to get to know and work with all our grower/members. She can be contacted at adelaide@mangoes.net.au or on 0487 555 095. Marine Empson will be on maternity leave from the 1st of August for six months. We wish Marine and family all the best with the arrival of their second baby. Celine (IDO NT/WA), Adelaide (IDO QLD/NSW) and Gabby (Comms) will be the first port of call for any queries during Marine's leave.

All pre-season roadshows are now booked, and details can be viewed on the AMIA site: <https://www.industry.mangoes.net.au/news-events/events/>. Please try to attend in your region as the roadshows apart from

having informative updates on all industry issues are also a great way to communicate with fellow growers and industry stakeholders. The AMIA team will also be conducting farm visits around the roadshow schedules to get further feedback from growers on issues and opportunities for the mango industry.

The Australian Mango Conference is booked and planned for Cairns on the 21 - 23 May 2024. This will be a 'can't miss conference' for growers and industry stakeholders full of information, presentations, updates, farm visits and interactions. Please book ahead, all details can be found on the AMIA site: <https://www.industry.mangoes.net.au/news-events/events/>.

As I have mentioned previously, please ensure you have a clear strategy for the front end of your business in terms of channels to market and who you are selling to. Again price, profit and sustainability are predominantly determined by how you do business on the front end. Good luck with the upcoming season and I look forward to seeing you at the upcoming roadshows.

CHAIRMAN'S REPORT

Ben Martin

Chairman, AMIA

E: ben@martosmangoes.com.au

M: 0400 125 928



The start of flowering is looking good across the region with some early flowering looking very even across some of these orchards. We are still experiencing cool nights which should continue to push the rest of the flowers out over the next month or two.

"The AMIA has been working with industry on the new work plan for exports into Japan. While we have not yet achieved all of the priorities set by industry, we are still working with the department to try and achieve this."

.....
- BEN MARTIN

The AMIA has been working with industry on the new work plan for exports into Japan. While we have not yet achieved all of the priorities set by industry, we are still working with the department to try and achieve this. This has been a very long and time-consuming task to get to where we are currently and each step will hopefully achieve a positive outcome for the industry.

I would also like to welcome Adelaide as our new IDO for Queensland and thank Paige for her time with the AMIA. Also, with the Mango conference coming up next year I would like members to have a think about what content they would like to see at the Conference. It is a great time to learn new things that can help benefit their farms. If there is something of particular interest that our members would like to hear about, please let Brett or myself know.

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DIRECTORS' REPORTS

Northern Territory & Northern Western Australia



Leo Skliros

M: 0407 919 942
E: sklirosleo@gmail.com

Another season is well and truly on our doorstep. The Darwin region has a great spread of flowering stages to small fruit, all up approximately 70%.

With a warmer than average June & possibly also July/August, harvest should move a week or two earlier than first anticipated. Another announcement from the bureau has suggested it will be warmer and dryer through harvest.

Couple the positive weather outlook with the fact we have many more tourists around, our workforce and consumers should get the boost to make 2023 a fantastic season for the industry.



Geoff Warnock

M: 0438 884 842
E: gullivers@wn.com.au

Having received good soaking rains this wet season and virtually no extreme heat days, indications are that we could possibly have serious flowering by the end of June. This is when the flowering normally starts but with examination of the trees one can find the odd Kensington Pride tree showing the odd flower and a lot of active "push-outs" now.

If the weather continues with mild days and nights between 12-17 degrees, we should see a good setting. Then the challenge will be to keep the fruit on the trees.

The problem that occurred with the Fitzroy River crossing has been resolved with a low level crossing, but this could become a problem if we get early rains because they don't expect to have the bridge rebuilt before the end 2024.

Indications are that we may still have a worker shortage which would make it difficult for a big season. Fingers crossed for any growers that have to deal with these problems.



Mitchael Curtis

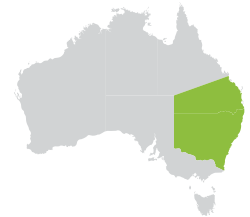
M: 0438 503 158
E: mitchael@me.com

This year is moving fast, we are seeing a few flowers in our orchard now which is nice. We are in a difficult time at the moment due to inflation with everything going up. Also, the current government is adding to it by increasing labour cost and benefits.

There are some good signs as well, fertiliser costs are going down from last season with the international container freight dropping significantly - it is very important to get quotes from multiple sources as some suppliers have stock from when it was expensive last year - So it is best to shop around to save on your input costs at the moment, remembering that every bit helps.

The trees in Katherine are looking good and we have had some good cold spells already, so we look to be back to a good timing for our flowering, not pushing us a bit later like last year. Really hoping for a good season for everyone!

Southern Queensland & New South Wales



Karl Gygar

M: 0481 591 470
E: kgygar@gmail.com

At the beginning of June, the Hort Connections conference was held in Adelaide. It was fantastic to see some growers at this event and I would encourage all growers to consider attending the conference next year.

Some of the speaker sessions were extremely interesting and challenged the horticulture industry to look at its future in an honest light. From sessions on sustainability, through growing and supply chain and of course marketing, the conference covers all areas of the Horticulture Industry.

Perhaps one of the more challenging sessions examined retailing in Australia. The conclusions of the experts were that all growers need to develop strong and clear agreements with their retail/wholesale partners. With grower input costs rising rapidly it is imperative that consumer facing member of the supply chain are informed of the profitability pressures growers are under and they commit to informing growers rapidly of market conditions.

With the above in mind, I would also like to encourage growers to look further along their supply chains and engage with consumer facing members. Educating customers about the pressures farmers face is vital to developing strong and clear communication lines. As growers we take large risks in sending our fruit away in volatile markets, and communication, understanding and agreements are the only way to de-risk our supply chains.

Continued page 7

“On the labour front, we are starting to see growing numbers of backpackers now in Australia. Hopefully, this will take some pressure off the staffing situation we have seen over the past three years.”

- John NARDI

Far North Queensland & North Queensland



John Nardi
M: 0408 334 266
E: johnn@favcoqld.com.au

The costs of doing business are constantly rising with the minimum wage now set to increase by 5.75%. This forces us as growers to be more vigilant on costs, increased efficiencies and trying to achieve better returns for our fruit.

We also need to be smarter in what fruit we put out into the market including grades and pack types to achieve the best overall returns and reducing the possibility of oversupply into the market, especially now with the increased overall annual total mango volumes we are consistently seeing.

The winter season in the Mareeba region has seen some extended warm weather which did cause some trees to throw a flush. We are all hoping this hardens off quickly and does not upset our flowering patterns.

At the time of writing, we have just come out of a few weeks of cooler days which has been welcomed and has the trees settled well. Here's hoping we have some more cooler days coming. While some growers are seeing some bud movement and even some early flowering, it is still a little early for us to determine what it is going to look like just yet. The weather experts are forecasting an El Nino event for the year so we will need to wait and see what the outcomes are for us.

On the labour front, we are starting to see growing numbers of backpackers now in Australia. Hopefully, this will take some pressure off the staffing situation we have seen over the past three years.

I had the opportunity to attend Hort Connections in Adelaide this year. It is a great event and is a great opportunity to catch up with suppliers, marketers and customers as well as seeing the latest innovations and technology in the horticultural space.

On a final note, I hope we all see a great flowering and a great coming season.



John Nucifora
M: 0418 193 885
E: flossndeb@bigpond.com

All growers are now in conversation for the next season's flowering. I'm sure lots of growers want to leave last year in the past.

There have been some cold snaps but still not enough to trigger any flowering in the Mareeba / Dimbulah region.

Most of our area is underway with a winter prune. Trees are just starting to settle down and hardening off. At this stage I am not hearing of any early flower push and so far all is going to plan.

We have a new IDO in our area, Adelaide, and we look forward to a catchup. I would like to wish Paige all the very best on her moving on. It was good working with her.

I hope we all have a great season ahead.

Southern Western Australia



David Morcombe
M: 0414 240 709
E: dw.morcombe@gmail.com

In the southern regions winter is not the favourite season, I think the trees would be better off if they were deciduous. It's the time when disease can get into the canopy and protective sprays are needed.

In the season just gone, the yields in the Gingin region were the best for several years. Unfortunately, we seem to have irregular bearing based on what the weather happens to be doing, but we hope that next season will be a good one too.

After the pandemic induced break we will all be able to get together again at the 2024 conference in Cairns next year. It will be good to gather, catch up with friends and colleagues and find out what has been happening in all aspects of our industry. These events creep up very quickly, so it's best make travel plans before everyone is flat out in the peak of the season.

By the time you read this I expect the national season will be just getting started. I hope that the season goes smoothly and the challenges we have faced in the last couple of seasons have improved. If there is more movement in the export market then hopefully the domestic market will benefit.

New Industry Development Officer (IDO) for QLD/NSW

AMIA is excited to welcome Adelaide Belyea to the team as the new IDO for QLD/NSW. The team at AMIA wish Paige all the best and thank her for her contributions to our industry.

From a film production background in Sydney, Adelaide moved to the Whitsundays in 2000 to pursue her passion of sailing and met her Bowen-based husband. While raising two sons, Adelaide worked as event co-ordinator on the 2017 Mango Conference and more recently worked on projects for the Bowen Gumlu Growers Association as well as contracting on farms to complete compliance and grant work.

She looks forward to the depth of her new role and working within a vibrant and collaborative industry.



Adelaide's contact details are:

P: 0487 555 095

E: adelaide@mangoes.net.au

AMIA Annual General Meeting (AGM)

The AMIA AGM was held on May 31, with Karl Gygar and Leo Skliros re-elected as board members, with Mr Gygar the representative for Southern Queensland and New South Wales, and Mr Skliros the representative for the Northern Territory and Northern Western Australia. Ben Martin was voted in as chairman, with John Nucifora elected as the deputy chair.

Memberships to the AMIA are open and we encourage growers and industry stakeholders to become involved. For more information visit our website: <https://www.industry.mangoes.net.au/who-we-are/membership/> or contact company secretary, Linda Bachmann: accounts@mangoes.net.au

Export Registration for 2023/2024 season

A reminder for those that have yet to complete export registrations to the protocol markets of the USA, China and South Korea. Applications for these markets must be submitted by 5pm on Friday July 21. To register, visit the AMIA website: <https://www.industry.mangoes.net.au/resources/resources-library/export-registrations-now-open/>

Thank you for your participation!

New mango varieties return for another season and are here to stay!

Manbulloo Fruit Company is thrilled to bring back "Project Flavour" - the extraordinary selection of the three new mango varieties introduced to selected retailers and fruiterers as part of Manbulloo Fruit Company's "summer of discovery" campaign last season:

- NMBP 1243 now known as the Yess Mango!
- NMBP 1201 now known as Ah Ha the mango!
- NMBP 4069 known as the Now Mango!

Project Flavour breeding programme began over two decades ago using the legendary "KP" and three unique varieties were chosen for their exceptional attributes and overwhelming flavour and quality.

The 3 mango varieties display vibrant colours - from a soft pink to a strong red blush - enticing aromas of the sweet and rich flavours of a Kensington Pride.

From planting until now, growers across mango growing regions in Australia have nurtured the new varieties to provide the limited volumes of these mangoes that have been welcomed with great excitement by retailers and Australian consumers who were lucky enough to buy them and enjoy the great experience of eating them last season!

Our dedicated team at Manbulloo Fruit Company are currently working with growers, nurseries and retailers planning for the up-and-coming season.

Please feel free to contact us with any queries and for further information.

E: supplychain@manbulloo.com

M: 0474 043 393 PH: 07 3860 6990

Marie Piccone, Karl Gygar, Desda Cullearn, Jeannette Ayala

Australian Mangoes Export Update

The 2022/2023 season was another challenging one for Australian mango exports which saw a 20% reduction in volume compared to the 2021/22 season.

A few factors were at play, including a lack of freight capacity due to more travellers and smaller passenger aircrafts, increased freight costs driven by higher input costs (such as fuel, terminal fees, and expensive aircraft maintenance) and the cessation of the International Freight Assistance Mechanism (IFAM) on June 30, 2022. For Australian exporters, outbound air freight pricing was at least three times more expensive than pre-COVID.

In Figure 1, we can see that overall mango export was down compared to the 2021/22 season and with a slower start. This later start matches the production delay experienced in the Northern Territory and although exports were down overall, it was positive to see a rise in exports in January 2023 with similar export numbers for January – March period.

Key Export Markets

The largest downturn in export was for the New Zealand market with 30% less volume than the previous year (Figure 2). In addition to the reduced freight capacity and expensive rates, New Zealand experienced additional challenges with refuelling restrictions due to poor quality fuel, Cyclone Gabriel, and very low global vessel schedule reliability which would have negatively impacted cargo capacity. Due to the rain, fruit quality was also an issue and some New Zealand customers finished their Australian mango program earlier than in 2021/22.

There were positive signs in the Middle East market with a rise in exports to Kuwait and only a small reduction in exports to the United Arab Emirates.

The industry is very appreciative of exporters' efforts over the last few years to keep markets open and to keep supplying existing customers during very challenging times.

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| | 2021/22 Season | 2022/23 Season |
|---|----------------|----------------|
| Total production (7kg tray eq) | 9.8 million | 10.7 million |
| Exported volume (Metric tonnes) | 4,747 | 3,710 |
| Exported volume (7kg tray eq) | 678,086 | 529,973 |

-20%

Figure 1. Total mango export tonnage by week for the 2021/22 and 2022/23 seasons

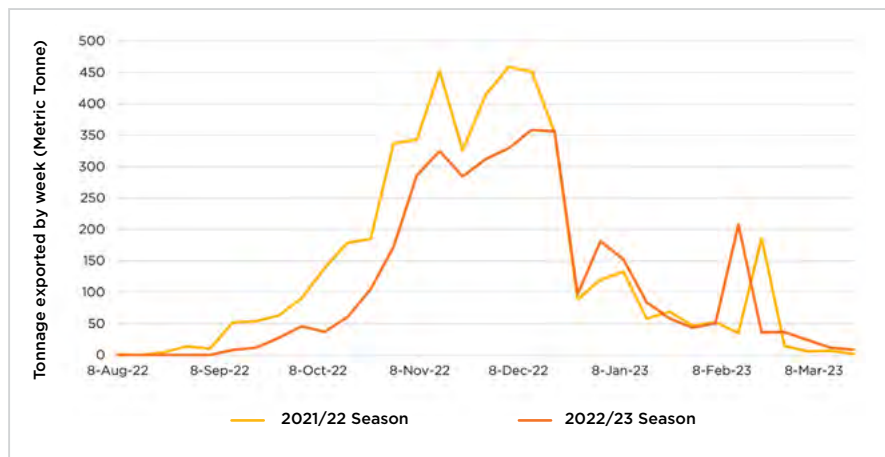
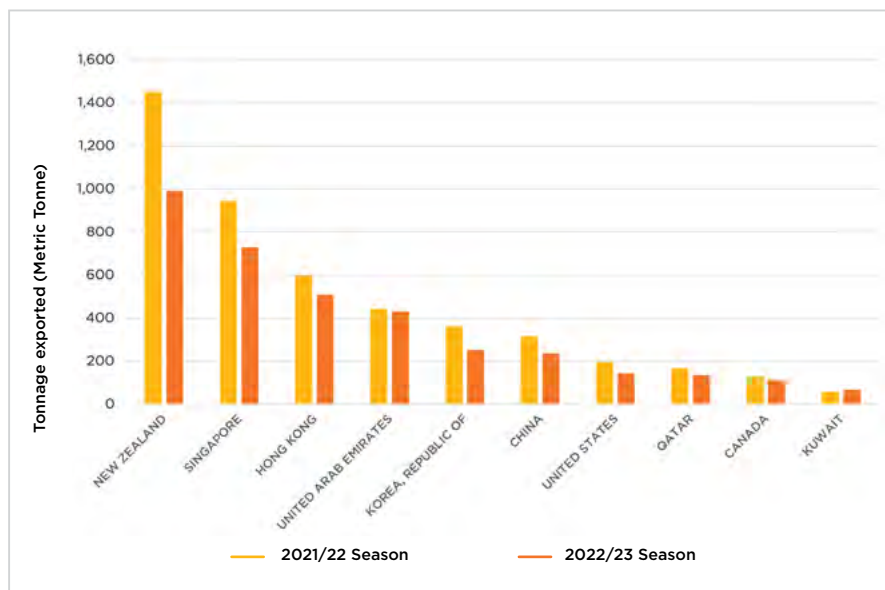


Figure 2: Export volume by country for the 2021/22 and 2022/23 seasons



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Global Flight Recovery¹

Flight recovery from Australia to key export markets varies.

In terms of flight numbers now vs. pre-COVID, the two strongest markets are India and South Korea, where flights are at 250% and 152% respectively.

Great Britain, Indonesia, New Zealand, Qatar, and Vietnam are now also at or above 100% compared to pre-COVID.

China and Hong Kong have improved rapidly in recent months (China from 36% in April to 56% in June; and Hong Kong from 47% to 58%) but remain the lowest in terms of overall flight number recovery, due largely to impacts of prolonged border closures and COVID policies on airlines and broader economies.

2023/2024 Season

AMIA has managed to secure some funding to support two QLD mango businesses to export mangoes to

Export registration for the 2023/2024 season is closing soon, so don't forget to register!



the United States of America (USA). The project will also deliver a growers/exporters guide to the USA, travel for a United States buyer to Queensland and targeted marketing activities in the USA.

AMIA is hoping that this project will provide resources and information to help growers across the industry learn about the exporting experience. The growers involved have been invited to share their experience at the 2024 Mango Conference.

In other positive signs for the export market, the Cairns Export Hub has been completed and is hoping to see an increase in airfreight flight numbers for the upcoming season.

China has also updated the export list from 2019, allowing access for more growers this season.

Export registration for the 2023/2024 season is closing soon, so don't forget to register!

¹Source: ESCS Supply Chain Snapshot, June 2023.

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Award-winning ‘Taste the Sunshine’ campaign with Australian Mangoes

Aussies across the country have been inspired to ‘Taste the Sunshine’ through this season’s Australian Mango marketing campaign.

The task for the Australian Mangoes marketing campaign was to encourage behaviour change, as measured through an increase in the number of Australian households purchasing mangoes this season versus prior year. The consumer insight underpinning the campaign is that Australians want small indulgences and personal pleasures, however fruit rarely comes to mind. That is until summer rolls around, with all its unique, iconic and sensory experiences. The campaign positions mangoes as one of the joys of summer that can be enjoyed as a regular everyday treat. The campaign used different ways to communicate the message, such as outdoor panels near supermarkets, online videos, social media and advertisements on Coles and Woolworths online shopping websites. Consumer research found that ‘messiness’ and ‘ease of preparation’ are the current top barriers to purchase. This presented an opportunity to educate and inspire Aussies through the ‘hedgehog’ approach, which is simple, easy and creates minimal mess. The hedgehog preparation technique was featured across campaign activities with the ‘slice, dice, devour’ message to demonstrate how to cut the cheeks and dice a mango, for ease of enjoyment.

A positive shift was seen when comparing the percentage of Australian households purchasing mangoes from this season to last season.

- Over the past 52 weeks: 56.7 per cent to 59.4 per cent (an increase of 2.7 per cent)*
- Over the past four weeks: 14.6 per cent to 19 per cent (an increase of 4.4 per cent)*

*Source: NielsenIQ data to 26.02.23

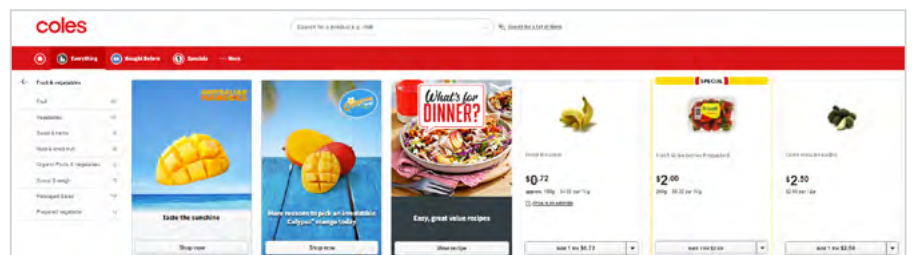
Measuring the campaign’s impact

The Hort Innovation Marketing Team uses research company Cubery to conduct a pre-launch analysis of how effective marketing activities are before they go out to market. For the Taste the Sunshine campaign, the performance results exceeded the norm for advertisements tested in Australia. Through research testing, the campaign performed above industry averages across all key measures to ‘captivate’ (stand out and grab attention), ‘connect’ (ability to recall the product/brand) and ‘compel’ (motivate behavioural change through positive influence of thoughts, feelings and behaviours). Not only was the advertisement enjoyed by consumers, each of the mango key messages tested were clearly communicated, credible and relevant, exceeding all norms for ‘in season now’, ‘delicious’, ‘great for summer’ and ‘a treat to be enjoyed regularly’.

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Above: campaign poster; below: online promotions with Coles and Woolworths.



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Post-campaign, all the key performance indicators (KPIs) for reach, frequency and opportunities to see the mango key messages were met or exceeded. The campaign delivered the following reach:

- Outdoor panels: 4.1 million reach
- Social media: 3.5 million reach
- Online video: 3.7 million reach
- Retail online: 900,000 opportunities to see the content
- Public relations: 57.9 million+ opportunities to see the mango key messages via 169 pieces of coverage.

To further understand impact, brand tracking research was conducted during the campaign period. Results show that the advertisement provides a persuasive reminder and emotive connection, with more than 59 per cent of consumers more likely to buy mangoes after exposure to the advertising.

Award Winning Campaign

The 'Taste the Sunshine' campaign recently received recognition at Hort Connections where Hort Innovation Marketing Manager, Belinda Van Schaik, was awarded the 2023 IFPA - Produce Plus Marketer of the Year Award (MOYA).

MOYA judges were impressed by the way the campaign used clear and consistent messaging across all channels to address common purchase barriers with mangoes, namely 'ease of preparation' and 'messiness', which were identified through consumer research.

These barriers presented an opportunity to educate and inspire a hero preparation method that was "simple, easy and creates minimal mess". The so-called 'hedgehog' technique became the key visual for all touchpoints, including point-of-sale activations. The technique highlighted



Hort Innovation Marketing Manager, Belinda Van Schaik.

WHAT DID THE CAMPAIGN INVOLVE?

Retail media: Digital display banners on Coles and Woolworths online shopping websites, as well as digital displays and posters positioned prominently in major retail stores. Panels were also located outside supermarkets to inspire shoppers and provide a timely reminder prior to entering the store.



Social media and online videos: Delivered cost effective mass reach, using a mix of images and videos communicating different messages relevant to the timing of the season. For example, for the start of the season the message was 'The wait is over, mangoes are back, taste the sunshine'.

Public Relations: To demonstrate how delicious and juicy the new season crop was, a range of assets and a media release were pitched to various media outlets, accompanied by:

- Seasonal mango data.
- Videos and imagery educating Aussies on how to hedgehog a mango, in a visually exciting format that shows the sensory-loaded, delicious eating experience of a mango.
- Interviews and imagery with mango growers Bec and Luke McMullin.
- Interviews with Brett Kelly, Australian Mango Industry Association CEO.
- Interviews and photos with the top bidder of the first tray of mangoes sold at The Brisbane Markets Mango Auction.

the 'slice, dice, devour' message to illustratively demonstrate how to cut and dice mango cheeks.

"The campaign presents as a masterclass in marketing strategy and execution," said Matthew Jones, Editor of Produce Plus Magazine. "Drawing on consumer research, Belinda identified a consumer pain point and leveraged it into an educational opportunity. The process that went into selecting the right marketing tools for the consumer audience was extremely well thought out, while the uniformity of the messaging across all touchpoints was undoubtedly a key to the campaign's success."

MOYA judges were also impressed by how the campaign played to the sensory experiences that mangoes evoke over the summer season.

"Employing messaging such as 'The wait is over', along with a 'Taste the sunshine' call to action, the judges felt

the campaign did an outstanding job of building and maintaining consumer anticipation over the course of the mango season," Jones said.

Congratulations to the other two finalists, Red Rich Fruits & Manbulloo, led by Erin Hart for their 'Kensington Pride Mangoes' campaign, and Zespri International for the 'Crazy Tasty' campaign.

Belinda was given the opportunity to speak on receiving the award: "Thank you and congratulations to everyone who makes up 'team mangoes': our growers who produce this delicious, iconic fruit, which is synonymous with the Australian summer; the industry representatives who co-created the marketing plan; the retailers who ensured prominent placement in-store and catalogue features; and finally, the Hort Innovation team, who bring so much passion and positivity in their efforts to help drive the horticulture sector."



For further information please contact:
Belinda Van Schaik, Hort Innovation Marketing Manager:

M: 0411 844 441 E: belinda.vanschaik@horticulture.com.au

Supply chain engagement

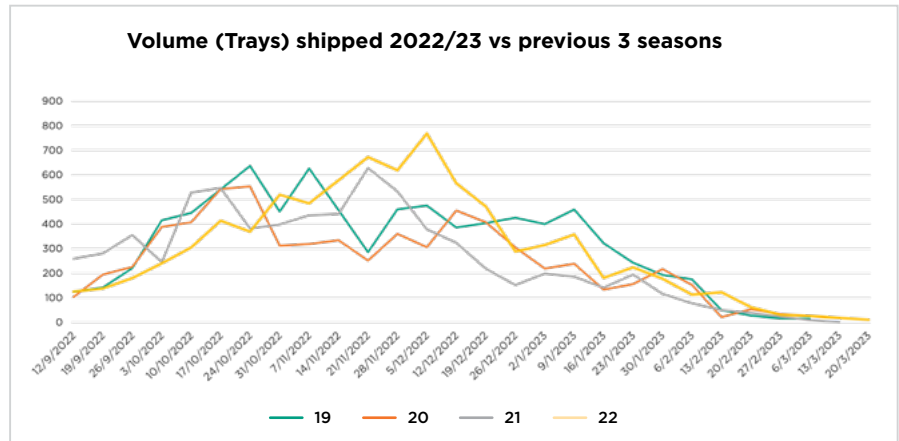
Australian mangoes featured heavily within retailers' produce sections for the 2022-23 season, despite what could be considered a trying season for many growers.

The season was one that started slowly with volumes well down on previous years before the merging of growing regions created a large supply. This situation created a perfect storm for consumers within the Australian retail markets.

The communication plan from a marketing point of view before the season start was solid, exciting and well planned and will be replicated next season. We wanted and needed to awake the consumer to the news via a targeted and an extensive public relations program that "the wait is over", mangoes are back and the season's supply has begun, whilst at the same time aligning the launch communications with targeted instore activities through our retailer partners. The plan was to start strong and get the household penetration up early in the season and grow from an already lifted base of consumers through the entire season. As the graph above highlights, (Volume (Trays) shipped 22/23 vs previous 3 seasons) the launch of the season due to significant wet weather conditions was hampered and therefore slowed the entry of significant fruit into the marketplace. Also, with death of Queen Elizabeth II, the official launch and PR campaign had to be rescheduled and held back for a number of weeks.

The retail market undertook a staggered approach to the season with individual retailers deciding when to launch, based upon the available volumes of mangoes. However, as the volumes started to support national distribution, bright, plentiful and colourful displays were evident through the season and the retailer messages grew in number along with the supply.

From a consumer point of view, due to the high availability of fruit late November and December and favourable pricing, along with assistance from the mango marketing campaign provided, we experienced large increases in sales and importantly for the next season a large increase in national household penetration, that grew from 57% to 60% (an extra 300,000 households versus 21/22, 1/2 million more households versus 20/21). The industry, if able to hold onto this new increased consumer base, will benefit from purchase increases in the seasons ahead.



A selection of catalogue ads that ran throughout the mango season with Woolworths, Coles, IGA and ALDI.

For further information please contact:
Andrew Burns, AMIA Supply Chain Engagement Manager:
 M: 0428 662 726
 E: andrew@mangoes.net.au

Managing early fruit drop in mango

Every season, a considerable amount of fruit is lost prematurely as result of fruit dropping before reaching maturity. Studies show that early fruit drop occurs because of the complex interplay among dynamic changes in molecular signalling, plant hormones, sugars, nutrients, and plant stresses. Little is known about the molecular regulation of early fruit drop in mango, and it is hoped that this project could shine a light on some of the important processes involved.

The University of Queensland PhD student, Sophie Jones, is investigating this as part of the Hort Innovation funded project '*Investigating the control of fruit drop in mango to support innovative solutions for Australian growers (MG21004)*'. This project is in collaboration with Dr Lindsay Shaw and Professor Christine Beveridge at The University of Queensland, Dr Ryan Orr and Dr Gerhard Rossouw from the Department of Agriculture and Fisheries (DAF, Queensland), and Dr Harley Smith from (CSIRO, South Australia). Sophie is trying to develop targeted management strategies to minimise early fruit drop by understanding the molecular pathways that regulate fruit drop in mango. She is particularly focusing on the relationship between plant hormone pathways, and carbohydrate reserves, and the effects of externally applied plant growth regulators (PGRs) on these pathways.

What hormones regulate fruit abscission?

The signalling molecules that play a crucial role in the growth and development of plants are known as phytohormones (plant-derived hormones or commercial PGRs). There are five main hormones that control the development and ripening of fruit. There are plant growth promoting hormones, auxin, cytokinin and gibberellins. These hormones are more abundant during the early season. They promote cell division and enlargement which plays a critical role in the regulation of fruit development and size. These promoter hormones are also involved in regulating floral induction and seed germination.

Additionally, there are plant growth inhibiting hormones, ethylene and abscisic acid. They are more abundant towards the end of the season, where they both play a significant role in fruit ripening. They do this largely by stimulating the degradation of the cell wall, which causes the fruit to ripen. In many fruit crops, high levels of these inhibiting hormones combined with a reduction of growth promoting hormones stops fruit growth and causes the early fruit drop process. However this has not been investigated in mango.

How can early fruit drop be controlled?

PGRs have been widely used in horticulture as an attempt to control early fruit drop, as well as improve flowering and fruit quality. They do this by modifying hormone levels or interacting with their synthesis and signalling. The four main PGRs that have been used to control fruit retention are: gibberellic acid (GA3), 1-naphthaleneacetic acid (NAA, a synthetic auxin), N-(2-Chloro-4-pyridyl)-N'-phenylurea (CPPU, a synthetic cytokinin), and paclobutrazol (PBZ, gibberellin biosynthesis inhibitor). Some of these products are not currently registered for use in mango, and can only be used for experimental purposes.

Previous experimental trials using these PGRs in mango have had variable results. For example, pre-harvest application of CPPU at low concentrations has shown to improve fruit retention, as well as promote



Sophie Jones harvesting mangoes at the DAF Walkamin Research Station.

fruit enlargement and increase fruit firmness, but other studies have shown no effect. The effectiveness of NAA application on fruit retention appears dependent on time of application and the concentration used. Some studies report up to three-fold increases in fruit retention using applications of 25 and 50ppm, while many studies have not found an effect on fruit retention. A similar trend is seen with application of GA3, particularly when applied early in the season. Combinations of PGRs may be more effective than single treatments because of the multiple phytohormones that are targeted through their application.

The variability of these results appears dependent on PGR concentration, timing of application, and cultivar. As the majority of PGR studies have been conducted outside of Australia, it is essential to investigate the effects of these PGRs on Australian cultivars grown under Australian conditions.

What role do carbohydrates play in this?

Plants rely on carbohydrates- such as sugars and starches for growth and reproduction. Plants acquire sugars from mature leaves and green stems via the process of photosynthesis. In tree crops, these sugars and starches are essential for fruit development, and can be used directly or are initially stored as reserves until required. These reserves further contribute to fruit development. However, if insufficient sugars are available to support fruit development,

Continued page 15

this can lead to early fruit drop as the plant tries to balance carbohydrate availability against demand. It has been suggested that carbohydrates and phytohormones work together to regulate fruit abscission through a complex signal transduction system, however very little is known about the molecular signals involved in this interaction in mango.

Exploring the regulation of fruit drop in mango

This project aims to identify and measure changes in molecular signals associated with early fruit drop. Using a recently developed method, we'll be able to simultaneously measure phytohormone levels and gene expression from a piece of tissue as small as a grain of rice. Using the available mango genome sequences, we are identifying and monitoring genes potentially associated with hormone biosynthesis and signalling, sugar signalling and fruit ripening. We are also able to measure levels of starch and complex sugars, including sucrose, fructose, and glucose, in a variety of mango tissues. With these tools, we'll be able to observe molecular changes occurring throughout mango fruit development and relate these changes to fruit drop. We can then assess how application of PGRs influence these molecular interactions and identify an optimal timepoint for application of PGR treatments to improve fruit retention.

Acknowledgements

The project 'Investigating the control of fruit drop in mango to support innovative solutions for Australian growers (MG21004)' is a strategic levy investment under the Hort Innovation Mango Fund. This project has been funded by Hort Innovation, using the mango research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture. Sophie Jones is a recipient of an Earmarked scholarship from The University of Queensland.



Unlocking the role of carbohydrates in mango trees: enhancing productivity

Carbohydrates are a key factor controlling fruit bearing capacity of mango trees. An insufficient supply of carbohydrates can impede tree growth, disrupt flowering, fruit development and retention, and lead to irregular bearing. Dr Gerhard Rossouw, from the Queensland Department of Agriculture and Fisheries at Mareeba, is investigating how mango trees use carbohydrates under the five-year National Tree Crop Intensification in Horticulture program (AS18000). This research will help develop management strategies to improve yields and reduce year-to-year fruit bearing variability.

Why is it important to investigate carbohydrates in orchard intensification research?

Intensified orchards, characterised by increased planting density and smaller, highly productive trees, require careful management of carbohydrates for optimal fruit development. The objective of the research being conducted through the National Tree Crop Intensification in Horticulture program is to examine the impact of orchard intensification on carbohydrate use. The findings will guide development of management approaches that promote sustainable and productive orchard systems.

To achieve this, two experiments are underway at the Walkamin Research Station based trial (Mareeba, Far North Queensland). The first aims to investigate the impact of variety and planting density on carbohydrate reserves and their correlation with fruit yields.

The second takes an innovative approach by investigating the impact of extreme cropping on carbohydrate status within the tree and the implications for future productivity. By pushing the boundaries of cropping intensity, the project aims to shed light on the thresholds and limits of carbohydrate reserve use, as well as the potential long-term impacts on orchard productivity.

Carbohydrates, mainly starch and sugars, play pivotal roles in regulating both vegetative growth and crop development in mango trees. During leaf photosynthesis, light and carbon dioxide from the atmosphere are used to generate sugars. These sugars are transported to growing organs like flowers and fruits, providing energy and the building blocks for growth. Excess sugars are stored as starch in various tissues, including the roots, trunk, branches, and shoots. When growing tissues require more sugars than are available from the leaves, starch reserves are converted back into sugars to meet the demand.

A tree with an ample supply of carbohydrates can bear larger and more fruit, producing a higher yield. However, an excessive availability of carbohydrates can lead to disproportionate vegetative growth, disrupting the balance within the tree's canopy. This imbalance can negatively affect productivity and fruit quality. On the other hand, insufficient carbohydrate supply can also have detrimental effects.

Continued from page 15

The effects of inadequate carbohydrate status on mango reproductive development.

| Low carbohydrates |
|--|
| Greater proportion of non-fruiting terminals |
| Poor flowering and irregular bearing |
| Poor fruit set |
| Smaller, fewer fruit |
| Increased fruit drop |
| Slow/incomplete maturation, low dry matter |
| Poor fruit colour and flavour development |
| Low yields |

Buds, flowering, and fruit set

Sugar availability influences terminal bud fruitfulness. Sufficient sugars enhance the likelihood of flower formation, while inadequate sugars result in vegetative buds or limited growth, reducing future fruiting potential. Once flowers are formed, sugar availability contributes to the success of flowering and fruit set.

Fruit retention and growth

Insufficient sugar supply to fruit triggers fruit drop, leading to fewer fruit at harvest. Furthermore, low sugar availability during fruit growth results in smaller fruit size compared to trees with ample carbohydrate availability.

Fruit maturation, composition, and colour

Inadequate sugar supply can delay or hinder fruit maturation, leading to reduced fruit dry matter, starch, and sugar content. Consequently, post-harvest shelf-life and fruit quality may be compromised. Sugar accumulation in fruit also influences peel colour, with low sugar levels corresponding to green fruit with limited blush development, negatively impacting marketability.

Striking the balance: leaves and reserves in fruit growth

The interaction between leaf photosynthesis and the mobilisation of starch reserves is critical for optimal fruit growth. While reserves generally have a secondary role, they become more important when trees are overcropped or face challenges such as suboptimal leaf area or impaired leaf function. However, relying too heavily on reserves can lead to irregular fruit bearing. To ensure robust fruit production, a highly

functional canopy is needed during fruit growth. This can be promoted by measures such as maintaining an optimal nutritional status and ensuring adequate water availability and pest and disease control.



To understand the thresholds, limits, and use of carbohydrate reserve in mango, we use innovative experimental treatments, such as defoliation. By subjecting trees to these challenging conditions, we aim to uncover their response mechanisms and develop optimised management strategies to improve orchard performance.



Strategic partnership initiative













The *National Tree Crop Intensification in Horticulture Program* is funded by the Hort Frontiers Advanced Production Systems Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from Queensland's Department of Agriculture and Fisheries, Queensland Alliance for Agriculture and Food Innovation- The University of Queensland, Plant & Food Research and the Western Australian Department of Primary Industries and Regional Development, and contributions from the Australian Government.

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Freelance Robotics Receives Accelerating Commercialisation Grant to Automate the Australian Mango Harvest

Freelance Robotics, a Queensland engineering firm providing cutting-edge robotic solutions, has secured over \$760,000 from the Department of Industry, Science and Resources to automate the mango harvesting process. This grant, combined with matched funding from the company to a total \$1.5 million budget, will propel the commercialisation of two groundbreaking systems.

The Orion mango crop load estimator utilizes advanced algorithms and vision technology to assess the crop load across the flower and fruit stages on the same tree, enabling growers to optimize resource allocation and improve yield predictions. The second Orion product, an auto harvester, is a state-of-the-art robotic system designed to automate the labor-intensive process of picking ripe mangoes with precision and care.

“Both the Orion crop load estimator and auto harvester have been developed in close collaboration with industry partners and feedback from on-farm trials, ensuring they meet the specific needs of mango growers,” says Freelance Robotics Chief Executive Officer William Pagnon. “These solutions look to greatly enhance the efficiency, productivity, and profitability of mango farming operations across the country.”

The need for this technology on farm is highlighted by Australia’s largest mango growers, Niceforo Farms, coming on board as an industry collaborator and early adopter. Freelance Robotics secured an exclusive IP license from Central Queensland University, under Hort Innovation. Over the project’s timeline they will continue to work with CQUniversity’s Institute for Future Farming Systems team lead by Professor Kerry Walsh. Professor Walsh was appointed as a Member of the Order of Australia (AM) earlier this year for his substantial contribution to horticulture.

Freelance Robotics remains dedicated to collaborating with industry partners, mango growers, and agricultural experts to refine and optimize the Orion systems for the mango harvesting process. By leveraging advanced technology and upskilling labor, the company is well-positioned to bring about a transformative change for soft fruit tree growers.

Keep up to date at www.agriculturalrobotics.com.au



Auto harvester.



Crop Load Estimator - flower detection.



Crop Load Estimator - fruit detection.



Crop Load Estimator - vehicle mount.

Safeguarding mango growers against climate extremes

It's well documented that climate change and variability has critical impacts on mango production. A national tool delivered by the Bureau of Meteorology and Australia's national science agency, CSIRO, is set to help mango growers better manage climate risk in their orchards.

Climate Services for Agriculture provides the agriculture and horticulture sectors with information on historical weather data, seasonal outlooks and climate projections in one place.

The online platform helps mango growers understand past and future climate at their location, at a 5 km² resolution, to support decision making and business planning.

Tailored climate information for mango growers

The platform provides information on climate variables directly relevant to mango growing, how these have changed over the past 60 years, and how they might vary in future.

These variables were developed by CSIRO and the Bureau with direct input from mango growers and mango industry stakeholders, and include:

- extreme temperatures at pollination and fruit set
- onset of cool inductive weather
- frost risk during flowering
- growing degree days between flowering and harvest
- days promoting flowering
- rainfall at harvest.

In addition to the commodity-specific information, the Climate Services for Agriculture platform provides a comprehensive range of general climate information for a selected region, including rainfall (annual and seasonal), temperature, heat risk, soil moisture (annual and seasonal) and evapotranspiration (seasonal).

The tool features historical data back to 1961, as well as future climate projections based on the 15 years before and after 2030, 2050 and 2070, for a given location.

Supporting informed decisions for mango enterprises

The platform supports growers to make informed decisions now, to help safeguard their business decades into the future.

For example, the 'onset of cool inductive weather' feature allows users to compare the first day the temperature falls below 18°C in the period February to December and how this date is changing over time. The feature can be customised, meaning users can adjust the temperature and date thresholds to make it relevant to their farm and business.

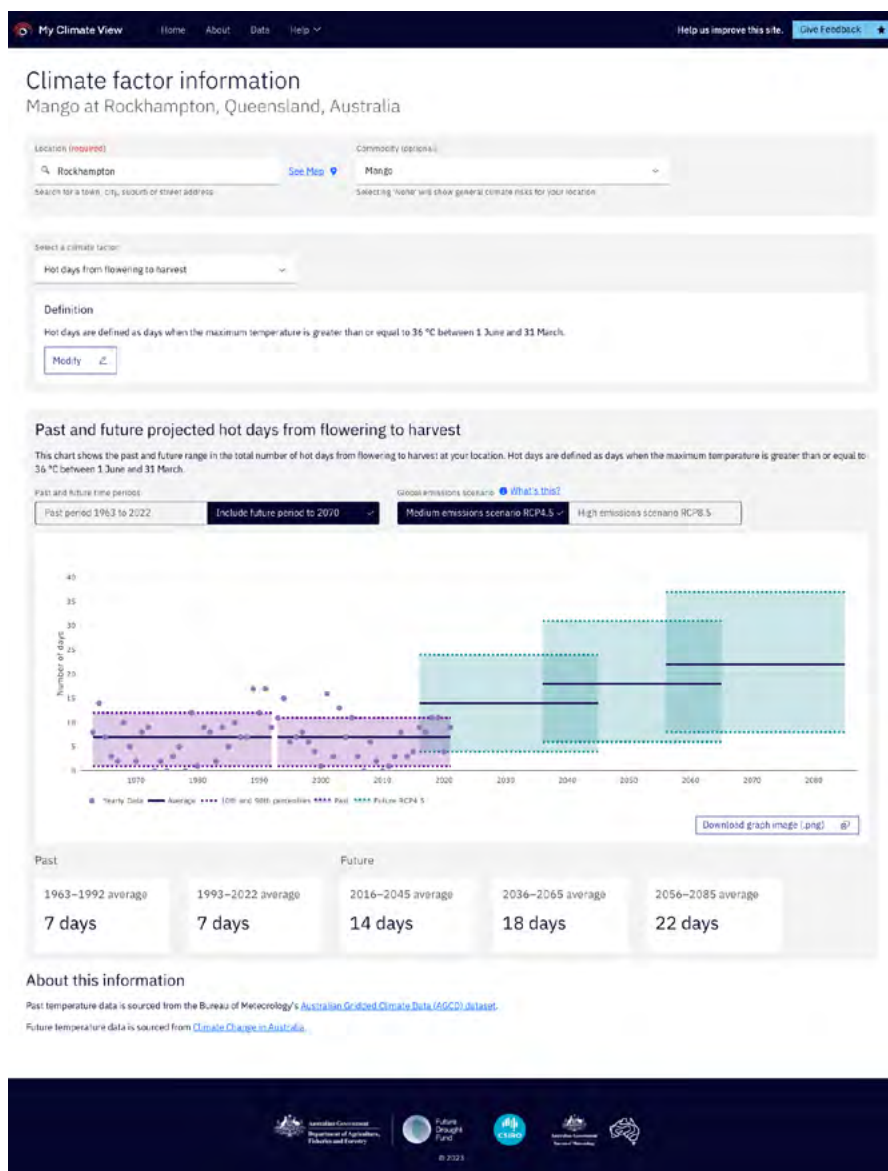
Using the projections, growers may consider different orchard management and agronomy for their region and

climate, or they may consider investing in infrastructure for current and prospective orchards.

Select location, commodity and climate information

Sigrud Tijs, Program Lead for Climate Services for Agriculture, said the design of the platform makes it easy for mango growers to navigate and access the information they are looking for.

Continued page 19



Climate data.

Continued from page 20

“Users can select their location, their commodity and the climate information related to their commodity.

“For example, a mango grower can explore past and future climate information for their location such as rainfall at harvest, growing degree days between flowering and harvest, or extreme temperatures at pollination and fruit set.”

Sigrid said the Climate Services for Agriculture team worked with the agriculture, horticulture and viticulture sectors to determine the type of climate information most useful to their businesses and tested the platform prototype with end users to ensure the decision support tool meets their needs.

“Feedback gathered during engagement activities has also highlighted how the platform can support decision making around researching new locations that may be better suited for growing mangos,” Sigrid said.



Input is also welcome from mango growers to continue to shape the platform to make sure it is practical and provides insights into how they can adapt their business to increase climate resilience.

Using the climate information

The Bureau and CSIRO’s customer engagement team are keen to work with advisors and extension officers to promote adoption of the platform.

Input is also welcome from mango growers to continue to shape the platform to make sure it is practical and provides insights into how they can adapt their business to increase climate resilience.

The Climate Services for Agriculture team can be contacted by email at CSAEnquiries@csiro.au or through the platform via the feedback button.

Climate Services for Agriculture is delivered in partnership with Australia’s national science agency, CSIRO and the Bureau of Meteorology, and funded by the Australian Government’s Future Drought Fund through the Department of Agriculture, Fisheries and Forestry.



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Shelf life modelling for more orderly marketing

A new project is demonstrating how monitoring and shelf life modelling may support a move away from first-in, first-out marketing towards delivering more predictable fruit quality to consumers.

The Serviced Supply Chains II (AM21000) project is a 3.5-year investment in providing Australian fruit and vegetable growers with decision support for managing current supply chain risks and delivering consistent fresh produce quality.

It builds off a phase I project that demonstrated the benefits of regular monitoring of supply chain conditions to identify opportunities to improve handling practice and fresh produce quality. The phase I project also developed decision aid tools based on the monitored conditions and predictive shelf life modelling to guide handling practices for R2E2 and Kensington Pride mangoes. Key project outcomes included:

- Exporters associated with > 69% of all mango export volume adopted modern real-time consignment monitoring technologies in the past 2-4 years
- Sharing the monitoring data with chain partners encouraged improved cool-chain practice
- One exporter achieved a reduction in average R2E2 mango airfreight temperatures from 17°C to 13°C and an increase in shelf life of 2-3 days

The phase II project is extending this success to other commodities and cultivars, including 'Honey Gold' mangoes. It is an opportunity to develop more reliable predictive models and associated decision aid tools that consider production



Dr Hung Duong assessing 'Honey Gold' fruit firmness.

factors, harvest maturity and phytosanitary treatments that can significantly influence product quality. The project will also build capacity in consignment monitoring and outturn quality assessment in several key markets to provide reliable feedback to Australian growers.

The project has three main components:

1. Developing predictive shelf life models through monitoring and simulations
2. Applying the models to develop practical decision aid tools
3. Establishing an online information portal for access to decision support tools and resources

Monitoring and simulating supply chains

During the 2022/23 mango season, 16 random 'Honey Gold' consignments were tracked using real-time data loggers from pack sheds near Darwin, Katherine, Mareeba and Bundaberg to a ripener in Melbourne. Average supply chain air temperatures varied from 13.5 to 21.0°C over the 6 to 11-day transit time. Based on these monitored conditions and grower suggestions, a series of supply chain simulation trials were completed to quantify the impact of different handling scenarios on fruit quality and shelf life.

Commercially harvested 'Honey Gold' fruit with dry matter content of 16% to 18% were sourced from five production districts - Darwin, Katherine, Bowen, Tablelands and Bundaberg. The fruit were held between 8°C and 20°C for up to 32 days to simulate potential domestic and export supply chain conditions. Sub-samples of fruit were removed from cold storage every 4 days and held at 20°C to evaluate remaining shelf life. Selected fruit were treated with 100 ppm ethylene gas at 18°C for 2 days. The end of shelf life was reached when fruit were oversoft (<38 Shore units) or displaying extremely poor appearance quality.

Preliminary observations indicated that:

- 85 to 92% of variation in shelf life was accounted for by differences in postharvest handling conditions

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Continued page 21

- Gassing fruit with ethylene coordinated more uniform ripening
- Fruit sensitivity to chilling temperatures varied between the orchards

These data are being used to model the fruit response and once validated in future commercial shipments will form the basis of decision aid tools such as shelf life prediction algorithms and rules of thumb advice.

Piñata Farms Pty Ltd are a co-investor in the project. Managing Director, Gavin Scurr says the business was attracted to this project because they source Honey Gold mangoes from all major production regions and 30 farms. "We are interested in a model that can predict the saleable life of fruit from each grower. We could then ensure fruit with a shorter shelf life went to closer markets, while more robust fruit would be prioritised for longer supply chains."

Accessing shelf life models

The initial Serviced Supply Chains project developed shelf life prediction algorithms for R2E2 and Kensington Pride mangoes, with a validated accuracy of ± 0.2 to 3.2 days. The project partners are keen to make

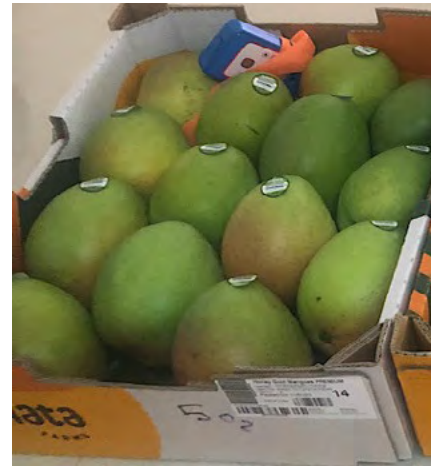
these algorithms available to Australian mango growers and supply chain businesses. A public call for expressions of interest in the R2E2 and Kensington Pride algorithms is expected to open on 14 July 2023. Licencing the intellectual property will ensure the algorithms are protected and remain only available to Australian mango businesses.

Article provided by Andrew Macnish (andrew.macnish@daf.qld.gov.au), Hung Duong and John Agnew from the Queensland Department of Agriculture and Fisheries.

Acknowledgements

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'Honey Gold' mangoes with a real-time data logger.

Territory Department of Industry, Tourism and Trade, Western Australia Department of Primary Industries and Regional Development, Piñata Farms Pty Ltd and Summerfruit Australia Ltd. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.



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Refining Heat Unit Targets for Australian Mango Cultivars

The bottom line (presented as the ‘top line’!)

Based on a multi-region, cultivar and season, an improved method of calculating heat units (HU) or Growing Degree Days is proposed. This method includes a penalty for high temperatures above 32°C as well as low temperatures below 12°C. The HUs required to progress from the asparagus stage of flowering to harvest maturity, as defined by cultivar specific flesh colour and dry matter content, was documented as 2185, 1728, and 1740 HU for the cultivars Keitt, Calypso and Honey Gold, respectively. A national set of colour cards suitable for on-tree maturity assessment of all cultivars is also proposed. A flesh colour harvest maturity card specification of 9 was proposed for the cultivar Honey Gold and 13 for the cultivar Keitt. Similar work is proposed for other cultivars.

The aim of the work

A forward estimate of harvest date is required several months before harvest for organization of harvest resourcing, including for hire of harvest labour, and for market planning. A forecast of harvest date from a given date of flowering can be done using heat units (HU). HU are estimated using a historical record of daily minimum and maximum temperatures, updated with



Mango flowering.

current season temperature data as the season progresses.

This study was undertaken to improve harvest maturity prediction, with the aim of developing a method for assessing heat unit requirements for fruit maturation, and an all-cultivar colour card set for determination of harvest maturity by flesh colour.

Why do this work?

In past research to establish HU targets there was no agreement on the base threshold temperature nor the starting flower development stage. Moreover, the assessed flower development stage was an ‘eyeball’ average across the orchard and harvest maturity was often taken as the date of commercial harvest. The use of whole tree or orchard assessments of flowering and commercial harvests is convenient, but a more accurate estimate of the heat unit target can be achieved by tracking of individual fruit from flowering to harvest maturity.

Several groups have produced colour cards to assist growers in judging flesh colour. The Calypso colour cards were a product of the work of Whiley and Hofman. The NT Farmers Association have produced a ‘business card’ colour swatch for Kensington Pride, and the US National Mango Board have released a set of colour swatches for Keitt and other Floridian cultivars. However, colour differences exist between printing runs, and no ‘all cultivar’ colour swatch series exists.

Calculating heat units

The heat unit calculation involves summation across days of the average of daily minimum and maximum temperature minus a ‘minimum base temperature’ (Tb), which assumes fruit development halts below this temperature, and can involve penalty for temperatures above a ‘maximum base temperature’ (TB), which assumes fruit development slows at high temperatures.

An alternative calculation uses a function that penalizes high temperatures as well as low temperatures. This method produced later maturity date estimations in hotter climates, e.g., in Darwin, but had no impact in cooler climates, e.g., Rockhampton.

We also investigated the optimal value of the minimum and maximum base temperature. This work requires data from multiple sites. From this work, we recommend use of 12 and 32°C as the minimum and maximum base temperatures, respectively.

Using the method detailed below, we recommend the heat unit values shown in Table 1. Note that different flowering stages can be used as a start point. This work should be confirmed and extended to other cultivars.

Continued page 23

Table 1. Recommended cultivar specific minimum harvest maturity specifications and associated heat units using Tb of 12 and TB 32°C as the minimum and maximum base temperatures, respectively.

| Cultivar | Colour Card | DMC (% w/w) | HU (from asparagus stage) | HU (from elongation stage) | HU (from Christmas Tree Stage) |
|------------|-------------|-------------|---------------------------|----------------------------|--------------------------------|
| KP | 7 | 15 | 1600 | 1510 | 1420 |
| Calypso | 7 | 16 | 1728 | 1634 | 1540 |
| Honey Gold | 9 | 18 | 1740 | 1648 | 1560 |
| Keitt | 13 | 16 | 2185 | 2050 | 1936 |

Colour cards

We propose a new maturity colour card series to service all cultivars (Table 2), with use of a colour quality control on printing.

Table 2. Proposed fruit maturity colour swatches, with maturity targets specific to cultivar.

| | | | |
|----|------------|----------------|----------------|
| 3 | 5 | 7 (Calypso/Kp) | 9 (Honey Gold) |
| 11 | 13 (Keitt) | 15 | 17 |

Recommended method for HU estimation

Temperatures can vary across a farm and in context of tree canopies, shed walls, etc. We found that placing sensors inside dense tree canopies resulted in lower daily maximum temperatures, such that, in hot climates, HU calculated without use of a high temperature penalty from the inside-canopy sensor was similar to HU calculated with a high temperature penalty, from the outside-canopy sensor. We recommend that a sensor for temperature measurement should be mounted in a shade screen, 1.2 m above mulched or grassed ground (not bare earth) and located close to the orchard.

As the HU calculation using an upper base temperature somewhat complicated, an online calculator (<http://fruitronics.com/>) is recommended. This resource accesses a remotely logged temperature logger in each growing region, or farm specific sensors, to calculate cumulative HU for the season, with forecast onwards from the current date based on 10-year historical average temperatures.

At a given site, tag 10 panicles at asparagus stage on each of 20 trees, with panicles selected from around the tree canopy. Panicles should be tagged at a reproductive stage that has a short duration, commonly asparagus stage (Figure 1a). If time allows, visit the site as flowers mature and record the time when 'elongation' and 'two thirds of flowers open' stages are reached. The 200 panicles typically result in >20 fruit, but in some cases fewer fruit will be retained to harvest maturity.

Fruit from these panicles can be destructively harvested in the weeks before and after the date of anticipated harvest, as estimated from existing HU recommendations. Fruit flesh colour (card value) and NIR or oven-DM are then used to establish the date of optimal harvest maturity.

Fruit should be cut lengthwise about 1 cm from the stone (Fig. 2). Flesh colour should be assessed indoors under good light.

Recommended use of HU

Visit each orchard block weekly and record the week at which a significant number of panicles, e.g., more than 20% of terminals, are at elongation phase. This defines the flowering events of the orchard. Enter these dates into the on-line calculator along with the target HU for the cultivar. The time between harvest maturity dates will be shorter than between flowering events as fruit of later flowering event 'catch up' as

weather warms. You can then decide on how many actual harvests are warranted for the block.

Article supplied by Marcelo H. Amaral, Cameron McConchie, Geoffrey Dickinson and Kerry B. Walsh

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Figure 1. Stages of development of flowering illustrated by images of cultivar



Calypso: (a) asparagus stage, (b) elongation stage, (c) Christmas tree stage (two thirds of flowers on panicle open), (d) fruit set stage.

Figure 2. Flesh of cv Keitt compared with colour cards



High-density orchard plantings still the winner after 7 harvests



Mango production in the Mareeba-Dimbulah district was generally high in 2022 – 2023. This was also the case in the Queensland Department of Agriculture’s long running Mango Planting Systems Trial, which is a feature component of the National Tree Crop Intensification Program (AS18000).

The Trial is based on Walkamin Research Facility (Mareeba, Far North Queensland) and compares production and fruit quality between three mango varieties (Calypso, Keitt and Yess! (Formerly NMBP-1243)). The trees are planted at 3 densities – low (208 trees/ha), medium (416 trees/ha) and high (1,250 trees/ha), with two training systems (conventional and single leader) within the high and medium density treatments.

One of the concerns raised by growers about high-density tree plantings is the potential impact on production

when trees fill their allocated space and require more pruning to maintain the smaller tree size.

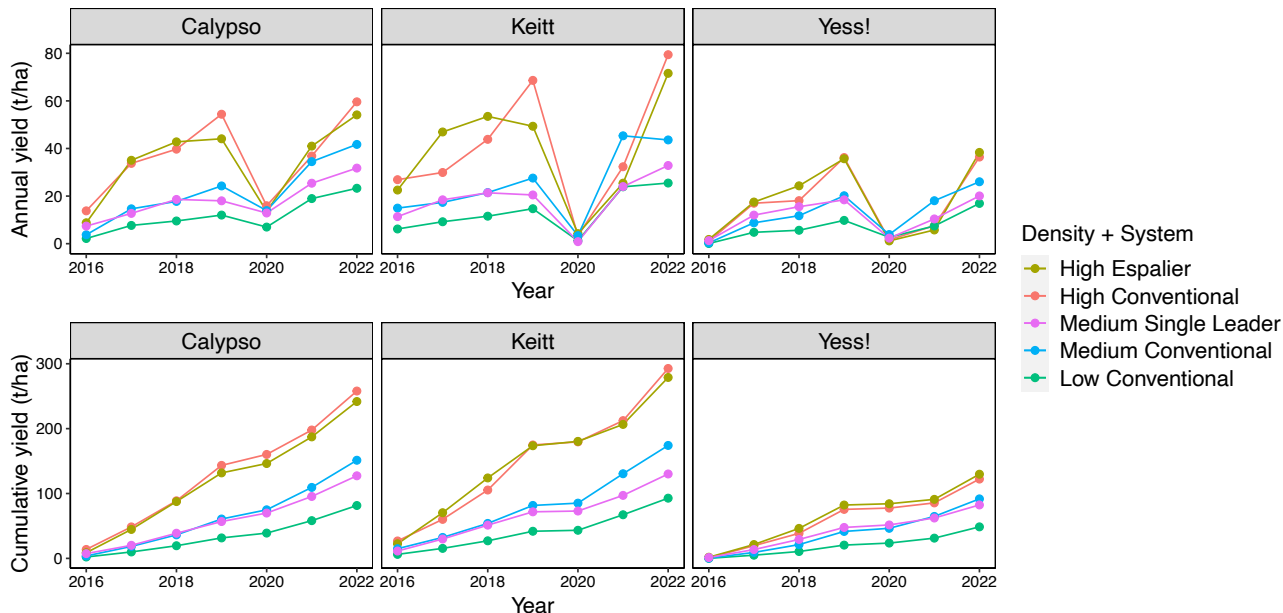
In the 2021-2022 season, the medium density treatments had the highest yield per hectare and there was some speculation that this would become the trend for future harvests. However, even after 7 harvests, the high-density plantings were the highest yielding in 2022 - 2023!

This past season, the high-density planting achieved the highest yields in the trial so far, where Keitt yielded 80

t/ha, Calypso 60 t/ha, and Yess! 38 t/ha (Figure 2). These were about two to three times higher than the low-density plantings.

Despite the fluctuation in annual yields, when we look at the cumulative yields over seven seasons, the early, high yields in the high planting densities have boosted and maintained higher overall productivity, putting them well ahead of the lower planting densities.

The Mango Planting Systems Trial will continue to at least mid-2025 and each harvest of this trial reveals new insights that will be integral to the development of intensification recommendations for the industry.



The National Tree Crop Intensification in Horticulture Program is funded by the Hort Frontiers Advanced Production Systems Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation, with co-investment from Queensland’s Department of Agriculture and Fisheries, Queensland Alliance for Agriculture and Food Innovation- The University of Queensland, Plant & Food Research and the Western Australian Department of Primary Industries and Regional Development, and contributions from the Australian Government.

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Big Bash in Bowen for the Big Mango's 21st Birthday

The coastal town of Bowen marked a massive milestone on May 25, 2003 - the Big Mango's 21st birthday.

Kicking-off bright and early with a live national breakfast television broadcast from the site of the Big Mango, the festivities also included a networking event attracting more than 120 business owners and tourism operators.

The celebrations were organised by Bowen Tourism and Business - a not-for-profit organisation which works to showcase Bowen and its businesses.

Testament to its international popularity, the Big Mango was also commemorated via a special alteration to the Google logo across Google's homepages on the day.

An estimated 1.5 million people from across the world have had their photo taken at the Big Mango since it was erected on 25 May 2002 as a tourist attraction and tribute to Bowen's mango industry.

Weighing a whopping five-tonnes and made of fibreglass, the 10-metre-high structure, which cost \$90,000 to construct, continues to attract an estimated average of 80,000 visitors each year.



As part of the celebrations, there was a replica of the Big Mango in the form of a cake - weighing 12kg and standing 52cm high.

The Chair of Bowen Tourism and Business is Jenn Honnery who has first-hand experience growing mangoes on a small family-owned and operated farm just outside of Bowen.

"This iconic tourist attraction promotes our region but also increases the awareness of the Bowen Special and other mango varieties, such as the R2E2 and Honey Gold, grown right here in Bowen," she said.

The Big Mango symbolises the Kensington Pride variety of mango, which is also known as the 'Bowen Special'.

The Big Mango stands proudly next to the Bowen Visitor Information Centre, five kilometres south of Bowen on the Bruce Highway and is available 24 hours a day, every day for selfies. The information centre sells a large range of local produce and mango-inspired merchandise including sauces, chutney, soap, candles and mango daquiri mix.

For more information about Bowen—including the limited-time special discount offer as #BowenCelebrates the Big Mango, visit tourismbowen.com.au.

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Mango Conference 2024

The Australian Mango Conference has been confirmed for May 21-23 in Cairns.

It will predominantly be held in the newly renovated Cairns Convention Centre and will include a tradeshow, field day and gala dinner. Sponsorship packages are now available and interested parties are urged to contact Gabby at com@mangoes.net.au as tradeshow spaces will fill up fast.

Growers will be encouraged to provide feedback on the conference program at upcoming pre-season roadshow events.

Pre-season roadshows

Dates and venues are now being finalised for this year's pre-season roadshows with programs confirmed for Darwin, Kununurra and Katherine.

The Darwin (Monday July 31) and Katherine (Thursday August 3) roadshows will include a free spraying workshop (see the flyer for details). The Kununurra workshop is being held on Wednesday August 2.

The dates have also been confirmed for our North Queensland and Far North Queensland pre-season roadshows with the Bowen/Burdekin region confirmed for Monday September 11 and the Mareeba/Dimbulah region for Wednesday September 13.

For more information, visit the AMIA website: <https://www.industry.mangoes.net.au/news-events/events/>

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- **Social networking**
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More details on the AMIA Events page:
<https://www.industry.mangoes.net.au/>

Register to your regional IDO:
M: 0457 555 939
E: celine@mangoes.net.au

DARWIN

31 July
1.00pm
@Berry Creek
Packing Company

KATHERINE

3 August
1.00pm
@Niceforo Farms
(Carbeen Rd)

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