

# **\$7 million invested in sensory genetics**

n investment of \$7 million is being made into a new sensory genetics program that aims to make papayas and other fruit taste, smell and look delicious.

Funded by Hort Innovation, and led and co-funded by the University of Queensland's Queensland Alliance for Agriculture and Food Innovation (QAAFI), the Queensland Department of Agriculture and Fisheries (DAF) and Griffith University, this research seeks to address a key knowledge gap on consumer buying traits with current markets and populations.

Scientists will work over the next five years to determine what today's fruit buyer wants in their papayas. The project sets out to enhance the flavour, colour, size, texture, and smell of papayas.

Papaya Australia Chair and Mareeba papaya grower, Gerard Kath, said providing a great eating experience every time is top of mind for the industry.

"Papaya production varies between the growing regions, but one thing that most growers agree on is that consistent papaya production, including fruit quality and flavour, is one of our highest priorities," he said.

By developing new varieties of fruit through Department of Agriculture and Fisheries (DAF) and Griffith University breeding programs, growers will be able to confidently meet market demand through consistent fruit production.

Hort Innovation Research and Development Manager, Dr Vino Rajandran, said the research aims to enhance the overall sensory experience of Australians and those in export markets each and every time they bite into an Aussie-grown fruit.

"Studies show one bad fruit eating experience can turn a shopper off buying a fruit or vegetable," he said.

"So, the ultimate situation for a grower is to produce a good quality fruit that consumers love every time. This will lead to less food waste at home and along the supply chain."

Read more via Hort Innovation at: https://www.horticulture.com. au/globalassets/documents-forexternal-links/media-release\_ food-sensory\_17.12.21.pdf?mc\_ cid=524362c4c6&mc\_eid=fc7a3be91c. @

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### Hort PAPAYA

This project has been funded by Hort Innovation using the papaya research and development levy and funds from the Australian Government. For more information on the fund and strategic levy investment visit horticulture.com.au



"Throughout the second half of 2021 the Carnarvon region continued to feel the effects of the February floods with some growers losing up to 100% of their crop. Higher than average rainfall led to pest and disease pressures which became more manageable throughout the latter half of 2021. Growers have more recently experienced good summer growing conditions despite some extreme heat events in December and January which is as per usual."

Nic Cuthbert, CGA Operations Manager, Carnarvon, WA



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Hort Innovation is the growerowned, not-for-profit research and development corporation for Australian horticulture.

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## See your levy at work!

Get an update on all new, current and recently completed levy funded activity on the Hort Innovation Papaya Fund page at *www.horticulture.com.au/papaya*.

You can access easy-to-read project updates, a snapshot of the Papaya Fund, research reports and resources, key industry contacts and more. Don't miss the Hort Innovation 'Growers' section to keep informed on your levy investments, upcoming events, scholarship opportunities and other handy info!

Stay in the loop with your levy by becoming a member of Hort Innovation, the grower-owned, not-for-profit research and development corporation for Australian horticulture. Paying a levy doesn't automatically make you a member but signing up is free at **www.horticulture.com.au/membership**.

# From the Chair: Papaya industry

### GERARD KATH

quick hello to all in papaya world. I trust that all is going well with production, fruit quality and prices.



I note that we still have several weeks of the wet season to go before a clear indication can be reached as to how the year will pan out. To date, there has been a clear lack of wet season for the Far North, with most rain being from storms coming from the west. There has been no major system – monsoonal trough or cyclone – that has wreaked havoc in the Far North, however, there has been some local flooding with approximately 160 millimetres coming in the space of only a couple of hours.

Further south, the worst of the rain has been mainly coastal in South East Queensland and New South Wales. I have heard of one metre of rain in a week, and even a very small area just north of Gympie receiving 600 millimetres in approximately 12 hours. The flooding and damage this causes would be a death knell for any papaya crop. All of this could have likely changed by the time you get to read this edition.

#### **Cost of production**

The last six months have seen a very steep increase in farm input costs.

Fuel, fertiliser, some chemicals, transport, and capital expenditure such as buildings and machinery, have all gone up – in some cases 200%. Some of the main fertilisers such as calcium nitrate, potassium nitrate and soluble phosphorous are all needed in the production of papaya for yield and fruit flavour and shelf life.

The above-mentioned costs are vital for growers to keep producing, yet most likely will have to be paid for by growers having a finer profit margin. It is so often that prices can be lower in the short term due to supply and demand or quality problems, which leads to a decrease in the production base or growers exiting the industry.

The reasons given for input cost rise vary from the effects of COVID-19 to the impact of Chinese relations, and now the Russian conflict. If history shows anything, it is that when prices for inputs go up, then eventually consumers will have to pay more for food at the checkout. This in turn leads to upward inflation which leads to less money in the pocket, particularly for consumers of our product.

#### Personnel changes

Recently, there has been a lot of change in industry service personnel.

Chat (plant breeder) has moved back to central Thailand, to take up a lecturing role at a major university. I want to acknowledge the work and effort that Chat put into the breeding project and look forward to the prospective new varieties that will come out in the coming years. I wish Chat all the very best in her future endeavours. We welcome Fawad Ali as Chat's replacement who will still be employed through Griffith University. I understand that there are challenges ahead to finalise this project for the next 18 or so months.

I'd also like to note that Maria Fathollahi has been appointed as a replacement for Corine Jasper as our industries strategic partner from Hort Innovation. I would like to acknowledge the work that Corine did for us and wish her the best for the future. We look forward to Maria's involvement and hope that she is about for a long time to come.

I trust that all people associated with our great industry are keeping well and safe, and wish everyone all the best in the foreseeable future.

Best Regards, Gerard Kath

## UNDERSTANDING POWDERY MILDEW IN PAPAYA – WE NEED YOUR SAMPLES!

Powdery Mildew has the potential to downgrade large volumes of papaya fruit in certain seasons, and the lack of understanding about which species are present in Australian papaya poses a productivity risk to the industry.

On papaya, the white powdery growth usually develops in the crown of the plant, on young fruit, as well as on stems and leaves of seedlings. As the fruit expands the powdery growth dies off, leaving light grey circular scarring. This tissue does not expand underneath this scarring, which can cause misshapen fruit. Infected leaves can become distorted with yellow/green patches and in seedlings, Powdery Mildew can cause defoliation and death of plants if not treated.

### The story of confusion

There is significant confusion around how many, and what species of Powdery Mildew are problematic for papayas worldwide. Some research indicates that there are five species, others suggest a dozen, but they all agree that historically there has been considerable misidentification of the species.

This confusion has largely occurred because until recently, pathologists used to identify diseases by the visible disease traits which were not always obviously different and allowed for human error. However, through new DNA analysis technology, specific pathogens can be identified with much greater accuracy.

### **Back in Australia**

The story of confusion in Australia is no different.

The Department of Agriculture and Fisheries Queensland (DAF) database has recorded eight different species of Powdery Mildew between 1927 and 2012 but there is a lack of capacity and capabilities to definitively assess and identify which species these are and therefore the best control method.

Emily Pattison from DAF is project



coordinator for the 'Papaya industry extension and communications program' (PP20000).

"The most reliable identification was from a North Queensland sample collected in 2012 and re-verified in 2018 as *Podosphaera xanthii*. However, public information states the species we have is *Sphaerotheca humuli* but to add further confusion, the fungicide product registered to control papaya powdery mildew (Triadimenol®), states the organism as *Erysiphe cruciferarum*," Ms Pattison said.

"To help improve identification and better understand which species we have and the associated risk, DAF is looking for papaya growers to submit samples with recent identifications of powdery mildew to better understand what specie(s) we have in Australia, and particularly in North Queensland."

### What's in a name and why is it important?

Each species have vastly different characteristics which can make identification challenging. For example, *Sphaerotheca humuli* develops in cool, dry conditions, whereas Oidium caricae-papayae develops in hot, humid conditions such as Hawaii, where it is the primary cause of Powdery Mildew in papaya.

Powdery mildew is not considered a major disease in papaya, however it does down-grade large volumes of fruit in certain seasons. Knowledge of which species we have in Australian papaya is the first step in understanding risk and identifying the most effective disease management techniques. Identifying the disease may also assist in additional chemical registrations for the management of this disease.

For more information or to submit a sample, please contact Emily Pattison at *Emily.pattison@daf.qld.gov.au* or 0491 379 771 who will arrange collection.

The 'Papaya industry extension and communications program' (PP20000) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

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# Young farmer prioritises investment in education and technology

**GROWER CASE STUDY: CHRIS MAISEL, MAREEBA** 



here is a strong future in Australian papaya with the next generation increasingly looking to education and technology adoption to solve changes and increase productivity on-farm.

Three years ago, young papaya farmer, Chris Maisel, decided to start farming papaya after returning to his hometown of Mareeba in North Queensland.

Having grown up on a cane operation and with no previous experience in papaya, Chris purchased an established yellow pawpaw and lime farm in 2019 and has continued to grow the enterprise, branching out into red papaya, avocados and even pumpkins.

"Purchasing the farm was the start of my horticulture journey. There was a lot to learn along the way, and I really threw myself into the deep end," Chris said.

"I had no experience whatsoever in papaya and it is such an intense style of farming and working with a perishable food product has certainly taken some time to get used to.

"Although I had a lot to learn about the crop, I have kept with it as I really enjoy it. I like pushing the boundaries of what current technologies can do; making changes now that will result in increased efficiency. Small changes that I make now can really compound to make a big difference to my business in the future."

After studying a double degree of a Bachelor of Applied Science/Bachelor of Agribusiness at the University of Queensland, Gatton, Chris said his education taught him critical skills in business planning and helped shape his perspective on analysing current processes on his own farm.

"The agribusiness component of my degree taught me to take a step back and critically analyse the business. This has really changed the way I run the farm, allowing me to focus more on future planning to ensure I am set up for the long run," he said.

Though he is taking a business approach to the farm, it is clear Chris has a passion for being a farmer.

"The plan was always to start and build my own farming business. After graduating from university, I went and worked at a corporate farm which helped build some of my skills which helped build me up to take on the risk of going out on my own," said Chris.

Chris admits though that taking on papaya with limited horticultural experience was a lot to digest, particularly in that first year.

"Working with a perishable food product has taken some getting used to. The product and the packaging have to be perfect and safe for consumption, on top of all the associated accreditations that come with growing, picking and packing your own produce. It's a lot," he said.

"Developing my own fertiliser programme, learning to scout for pest and disease and the crop's water requirements, as well as managing labour requirements, have been the other big challenges over the last couple of years."

When discussing the future of the papaya industry, Chris said technology will lead the way for growers to overcome common problems like phytophthora.

"In terms of technology on-farm, I want to get away from planting multiple seedlings in the same hole. There are massive penalties in starting column height and root systems of the cut out (undesired sex) plant are a harbour for phytophthora, so I'm keen to look at how technology can be integrated into the business to find a way around this in future seasons," he said.

For other young growers thinking about getting into papaya production, Chris said there are several challenges, but the benefits are worth it.

"Getting into papaya in a sizable scale from off-farm is a challenge. A lot of capital is required to buy a farm and then the costs required to set everything up are quite high, but in a small operation where you provide most of the labour yourself, the costs are much lower," Chris said.

"The returns in papaya are also quick in comparison to other tree crops which can take about three years at least, but papaya only takes a single year to fruit. A papaya operation is something you can start small and learn a lot, then scale up as you get comfortable."

Chris is also a supporter of growing as an industry; regularly interacting and providing input into some of the levy funded projects.

"We currently grow reds and yellows, RB1 and 1B varieties, so I keep an ear to the ground to find out the results of levy funded projects around the new varieties. I am a big supporter of the breeding work and have one of the breeding plots on my farm.

"All in all, as a young person getting into papaya, it is a lot of work but I certainly don't regret my choice to invest in setting myself up in papaya, and I think the future of the industry is really positive," he said.

For more information about 'National papaya breeding and evaluation program' (PP18000), head to: https://www.horticulture.com.au/ growers/help-your-business-grow/ research-reports-publications-factsheets-and-more/pp18000/.

## **Papaya Strategic Investment** Plan 2022-26 now available

he recently published 2022-26 Papaya Strategic Investment Plan (SIP) provides a roadmap to guide investment for papaya industry levies and Australian Government contributions over the next four years.

A total of \$353,059 in papaya levies were collected in 2020-21. The industry has recorded continued growth with production volumes increasing year-onyear from 12,704 tonnes in 2012-13 to 19,648 tonnes in 2019-20.

To drive productivity and profitability in Australia's papaya industry, four key outcome areas have been identified

including: demand creation; industry supply, productivity, and sustainability; extension and capability; and business insights.

The Papaya SIP has been developed to guide investment in the priority areas identified and agreed by the papaya industry. Improving knowledge and access to tools required to improve onfarm management practices, specifically postharvest management and access to new papaya varieties which have improved taste, performance, and quality to meet the demands of customers



To access the 2022-26 Papaya Strategic Investment Plan, visit: horticulture. com.au/globalassets/hort-innovation/ levy-fund-financial-and-managementdocuments/sip-2022-2026-pdfs/hortinnovation-sip-2022-26-papaya.pdf

# **Breeding investment** heading to farmgate in 2022

## National papaya breeding and evaluation program

he 'National papaya breeding and evaluation program' (PP18000), led by Griffith University, is working to characterise in-depth the key flavour type preferences of both red and yellow papaya and develop a library of chemical fingerprints for future selective breeding and marketing.

The team is currently focussed on assessing advanced breeding lines set to be harvested in 2022 and with F1 hybrid varieties due to be established in 2023.

The papaya breeder, Dr Fawad Ali, Research Fellow from Griffith University, said that the seeds of the F7 red papaya inbred lines are set to be harvested from April this year until the end of the year.

"The advanced inbred lines of red papaya (F6 generation) are more cylindrical in fruit shape compared to the commercial variety RB1, making them easier to pack," Dr Ali said.

In terms of yellow papaya, the F6 yellow papaya advanced breeding lines are set to be harvested from March this year and the seed of the F7 inbred lines will be produced by mid-2023.

"Interestingly, we're seeing that the selected F5 yellow breeding lines taste sweeter with higher Brix levels than the commercial 1B variety, and the saleable yields of 1B and the advanced F5 lines are the same," Dr Ali said.

"The advanced lines, that will become the new varieties, are a culmination of eight years of selective breeding that has been directly informed by growers, industry and consumer requirements. These will have preferred flavour profiles, sweetness levels, flesh firmness and fruit size and shape.

"Additionally, the papaya trees themselves will set fruit much lower to the ground than current varieties, reducing the need for mechanical picking interventions, and have other beneficial agronomic traits.

"The outputs from your investment are coming to your farmgate toward the end of this year so please stay tuned for more to come."

For more information on the current breeding outputs, please contact Dr Fawad Ali, **fawad.ali@griffith.edu.au**.

The 'National papaya breeding and evaluation program' (PP18000) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

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## **Get connected: Meet Dr Fawad Ali**



### r Ali is a Research Fellow at the Centre for Planetary Health and Food Security, Griffith University, and is currently based in Mareeba.

Working with Professor Rebecca Ford, Dr Ali will now be leading the 'National papaya breeding and evaluation program' (PP18000) project.

An agriculture scientist, Dr Ali has an extensive background in plant breeding and genetics, plant science, environmental science, statistical analysis, plant biology, plant quantitative genetics, genetic mapping, quantitative trait locus (QTL) mapping, molecular biology, gene quantification, genetic transformation, and in sustainable crop production.

He graduated with a PhD in Plant Breeding and Genetics from Southern Cross University, Lismore, in February 2021, after completing his Master of Science (Hons.) in Agriculture – Plant Breeding and Genetics at the University of Agriculture Faisalabad in Pakistan. Dr Ali is passionate about plant breeding and genetics and is looking forward to continuing the work of PP18000 and getting out to grower site meetings to connect with industry! Connect with Dr Ali at: fawad.ali@griffith.edu.au 1

# What's behind a tasty papaya?

### National papaya breeding and evaluation program

### MS ZIWEI ZHOU, DR CHAT KANCHANA-UDOMKAN, DR IDO BAR AND PROF REBECCA FORD





lavour is a genetically complex trait made up of multiple biochemical compounds that produce a perfect combination of sweetness, sourness and other sensations that please the human palate.

Current commercial papaya varieties vary greatly in their flavour, likely because breeders over the years have made their selections based primarily on fruit appearance rather than flavour.

Industry is now at a stage where we are working hard to breed for new superior flavour papaya varieties that taste, smell, and feel good to eat.

The 'National papaya breeding and evaluation program' (PP18000), run by a project team at Griffith University, is working to characterise in-depth the key flavour type preferences within the whole papaya chain and develop a library of chemical fingerprints that will be used as a tool to differentiate flavour types.

Ziwei Zhou, the PhD student on PP18000 from School of Science from Griffith University, is working with the team to determine which combinations and levels of specific bio compounds align best with consumer preferences.

"To start, I initially described and compared the preferred consumer flavour profiles in five common varieties including three red varieties, RB1, RB4, Skybury and two yellow varieties, H13 and 1B," Ms Zhou said.

"I conducted sensory panel testing with trained tasters to select the best tasting fruit.

"Once the preferred and nonpreferred flavours were identified, I assessed for differences in their biochemical compounds and amounts detectable in ripe fruits."

The data from this assessment was collated to determine the exact levels of various sugars, acids, and volatile compounds to produce the optimal flavour, finding that the flavour profile of preferred red flesh papaya is quite different from the preferred flavour profile of yellow pawpaw.

"We found that consumers prefer red papaya to have a sweet, caramelized flavour and sweet aftertaste, but prefer yellow pawpaw varieties to have a slightly musty flavour and a stronger smell," Ms Zhou said.

"To demonstrate the difference in the flavour profiles currently available, I then constructed a set of radar plots based on the trained panel scoring of flavour descriptors among the varieties assessed.

"This will be useful as a marketing tool for existing and new varieties, enabling customers to quickly choose the papaya flavour that they prefer." For more information, please contact Dr Ido Bar, *i.bar@griffith.edu.au*.

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# MARKETING AND SOCIAL MEDIA UPDATE

Papaya Australia continues to support the consumption of Australian grown papayas and increase purchase consideration by promoting the positive health benefits of the fruit through new marketing activity.

### **MEDIA PARTNERSHIP**

The papaya marketing program aims to drive increased household purchasing by aligning the activities with key flushes for papaya.

With a new marketing campaign live including a first-time partnership with News Corp, Papaya will experience increased exposure to the target audiences of Main Grocery Buyers and Independent Singles who love to cook and eat healthy snacks.

Through home page take overs and simple applications and recipes on Taste.com.au Australia's number one food site, consumers will be able to learn how to eat this delicious fruit and understand more about the reasons why they should.

Activity for Papaya is split across two bursts – the first was in November 2021 and the second in March-April 2022.

Burst One involves a high impact digital advertising across Taste.com.au. The recipes add an inspiration element for



this burst and is coupled with display media to build consumer awareness.

Burst Two is packed with content on Taste TV and social boosting, Instagram stories, recipe pages including surrounding media, Taste TV video, social media content shared to Facebook and recipes uploaded to the recommendation module.

### **SOCIAL MEDIA**

Papaya Australia social media activity continues to attract and engage consumers with regular postings across Facebook (*facebook. com/papayaaustralia*) and Instagram (*instagram.com/papayaaustralia*). Three new recipes and a suite of lifestyle images have been created to inspire consumers to eat more papaya. This content will be shared across social media as part of the FY22 campaign, leaning into the weekend breakfast occasion.



