Final Report

Papaya Industry Extension and Communications Program

Project leader:

Geoff Dickinson

Report authors:

Emily Pattison and Geoff Dickinson

Delivery partner:

Queensland Department of Agriculture and Fisheries

Project code:

PP20000

Project:

Papaya Industry Extension and Communications Program (PP20000)

Disclaimer:

Funding statement:

This project has been funded by Hort Innovation, using the Papaya Industry 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.

Publishing details:

Published and distributed by: Hort Innovation

Level 7
141 Walker Street
North Sydney NSW 2060

Telephone: (02) 8295 2300

www.horticulture.com.au

Contents

Public summary

The Papaya Industry Extension and Communications Project (PP20000) is a 3-year project, initiated in July 2021 and delivered by the Queensland Department of Agriculture and Fisheries and Dentsu Creative. The objective of this project was to benchmark, co-develop, demonstrate and communicate industry adoption of better IPDM, agronomic and supply chain practices to improve the profitability and sustainability of the Australian papaya industry. The broad areas of the project were agronomic practices which improve input efficiencies, integrated pest and disease management (IPDM) and improved post-harvest value chain management practices.

Key achievements of this project were:

- Engagement with at least 95% of the industry by area
- Over 400 hours of direct engagement with growers (either in-person or through a phone call)
- Development of the Papaya Australia "For Growers" website and the Best Practice Compendium
- Nine issues of the Papaya Press, distributed to 80 growers
- Six workshops delivered:
  1. Industry RD&E priority setting workshop (21st August, 2021, Brother's Leagues Club, Innisfail)
  2. Spray efficiency workshop co-delivered with Allan Blair spray consultant (28th April, 2022, RMC Farming, Innisfail)
  3. Breeding R&D workshop co-hosted with Griffith University (5th August, 2022, DAF offices, Mareeba)
  4. Papaya post-harvest bus tour (19th January 2023, Skybury Farms, Mareeba)
  5. Pest and Disease Forum (19th October, 2023, DAF offices, Innisfail)
  6. Nursery Bus tour (14th June, 2024, DAF offices, Mareeba)
- Six on-farm demonstrations/trials:
  1. Early sex determination of papaya seedling through PCR
  2. Nitrogen requirements of papaya
  3. Phytophthora systems management
  4. Monitoring leafhopper populations for phytoplasma control
  5. Comparison of single plants and quad plantings
  6. Investigating the potential of incorporating predatory mite release into pest mite management strategies

The engagement with industry underpinned the success of the project in terms of practice change. Approximately 80% of the industry had input into the initial priority setting activities which guided the setting up of activities throughout the project. The focus areas were Phytophthora management, phytoplasma diseases, IPDM, mite control, spray efficiency, post-harvest dipping, nitrogen and phosphorus nutrition, nursery practices and seedling efficiencies. Demonstration sites were established on commercial farm properties and were co-designed and managed in partnership with the farmer using the 'Farmer Participatory Research' model. As a direct result of these activities the knowledge, awareness, skills and aspirations of the growers changed as well as creating examples of practices change. Examples of KASA and practice change are summarized below:

- IPDM – At least 90% of the industry showed improved KASA as a result of the workshops and one-one-one visits. There were examples of positive practice change to at least 70% of the industry. These practices include adopting biocontrol, improving chemical product selection and adoption of cultural practices. These practice changes will reduce chemical input, improve fruit quality and yields, and increase industry sustainability.
- Agronomic practices and improved input efficiencies – At least 90% of the industry showed improved KASA as the result of workshops and one-on-one visits. At least 60% of the industry showed positive practice change in this area. These practices include improved spray coverage, optimising nursery practices, improving fertiliser programs and moving to the single planting method. These practice changes will reduce input waste, improve fruit quality and increase profitability.
- Post-harvest value chain management – At least 90% of the industry showed improved KASA as a result of workshops and one-on-one visits. There are examples of positive practice change for about 5% of the industry. These practice changes include adoption and improvement of hot water post-harvest dips, which reduces the chemical inputs and improves the sustainability of the industry.

A key achievement of the project was identifying an alternate seedling establishment method, moving from “four plants per site” to a “single plant per site” technique. This practice has shown early productivity gains between 20% and 50%. The project adopted an existing protocol for early papaya sex determination using molecular methods and has trained 5 growers to use this method. Three growers have since commenced the development of their own labs, with one grower now using this method commercially.

KASA change was driven through the five workshops which used a practical demonstrative approach, content and topic input from growers and group learning to improve outcomes. The positive outcomes from these workshops were measured through post event evaluation. Participants were asked to rank the value of the workshops on a scale of 1 to 5 where 1 was useful and 5 was extremely useful. These results for the RD&E priority setting workshop, Spray workshop and Pest & Disease forum measured 4.3, 4.1 and 4.6 respectively, recognizing the high impact project outcomes have provided to the Australian papaya industry.

Key recommendations from PP20000 are:

- The extension and communications strategy used have proven very effective and should be continued in future projects. Stakeholder consultation completed by Hort Innovation found that this project had brought the industry together, improved relationships and industry networks, and supported positive industry change in high priority practice areas.
- A participatory adaptive approach (Farmer Participatory Research) strategy, incorporating farm visits, workshops and a foundation of six on-farm demonstration trials, co-designed and managed with farmer partnerships, was a major contributor towards improved research outcomes and greater practice adoption and this should be continued in future extension programs.
- Development activities conducted in PP20000 for a number of high-priority practices should be continued. In particular, the single planting technology is an innovation with potential to greatly improve efficiency and profitability of papaya production.
- The disease Phytophthora is a large and on-going threat to the productivity of the papaya industry and further research, development and extension work is required to develop effective integrated management systems to manage this disease.

Keywords

Papaya, extension, communication, practice change, KASA, co-design, profitability, sustainability, farmer participatory research

Introduction

The objective of this project was to benchmark, co-develop, demonstrate and communicate industry adoption of better integrated pest and disease management (IPDM) as well as agronomic and supply chain practices that have been identified as able to improve the profitability and sustainability of the Australian papaya industry.

The Australian papaya industry is a small but growing tropical fruit industry with over 130 growers. Papaya is produced in tropical Australia, particularly north Queensland (85%), with remaining commercial production occurring in Western Australia (8%) and the Northern Territory (7%). The volume of papaya production has remained relatively steady over the last six years (approximately 20,000 tonnes), while value has increased from $30 million to $40 million over this period. Two main varieties of papaya are grown, including the red-fleshed variety known as papaya which accounts for approximately 65% of production volume, and the yellow-fleshed variety known as pawpaw that accounts for approximately 35% of production volume.

This project raised industry knowledge, awareness, skills, aspirations (KASA) of improved papaya industry practices. Adoption of improved practices was achieved through the implementation of an integrated communication and extension program which achieved measurable changes in industry KASA and adoption of more profitable and sustainable practices.

The project worked with the papaya industry, relevant stakeholders and value chain members to co-design and implement an improved management practice and adoption program for the papaya industry, that is focused on:

- Agronomic practices which improve input efficiencies
- IPDM
- Improved post-harvest value chain management practices.

Increased KASA and adoption of best management practices that will support increased profitability and sustainability of the Australian papaya industry were a major outcome of this project. This was achieved through the initial design and implementation of a National Papaya Extension and Communication strategy in consultation with papaya industry stakeholders, which then delivered:

- A compendium of industry best practices
- Six on-farm development and demonstration trials
- Two stakeholder meetings/events in two of the main growing regions annually
- A triannual Papaya Press magazine for papaya growers
- End-of-program benchmarking of changes of KASA and best practice adoption levels.

The project supported the 3 Papaya industry Strategic Investment Plan (SIP) priorities of:

- Outcome 1 – Increased quality to ensure consistency of supply to the consumer
    - 1.2 Increase grower focus on quality through improved engagement and dissemination of best practice information.
    - 1.3 Research and adoption of improved postharvest packing, treatment protocols, storage, distribution and retailer processes to improve quality and increase shelf life.
- Outcome 2 – Access to new varieties and improved pest and disease management to improve growers' productivity and profitability
    - 2.1 Continue research, trials and adoption of effective pest and disease management.
    - 2.3 Develop and adopt an IPDM plan.
    - 2.4 Continue to research and refine agronomic practices to improve productivity, quality and environmental outcomes.
- Outcome 3 – Improved market access and increased consumer demand to increase returns to growers

- 3.3 Support research, development, adoption of growing practices and marketing initiatives to position papaya as a naturally grown fruit with significant health benefits

Methodology

Phase 1: Consultation and strategising

This three-year project was structured over two distinct phases. The initial 4-month phase focused on establishing foundational elements:

- **Best Practice Compendium:** A comprehensive literature search was compiled into an EndNote library, with the structure and priorities for the best practice compendium established.
- **Benchmarking Pre-Program KASA and Practice Levels:** An Industry Priority Setting Workshop was held in Innisfail in August to support on project design, growers were asked to rate their knowledge and skills on major areas in the project. This helped to determine areas that need work to improve knowledge and skills before attitude and adoption change could happen. Additionally, five one-on-one interviews were conducted with a diverse group of growers (Coastal, Tablelands, corporate-style, and family farms) to assess current practices.
- **Industry-Centred Design Process:** At the initial industry priority setting workshop growers and stakeholders participated in two key activities:
    1. **Money Allocation:** Growers each allocated $100 of "papaya money" to research areas they deemed most important.
    2. **SWOT Analysis:** A SWOT analysis of the papaya industry was conducted to identify key drivers and threats. For those unable to attend in person, the money allocation activity was available online via Survey Monkey.
- **Initial Project Logic and M&E Plan:** The project logic and monitoring and evaluation (M&E) plan development was led by Dentsu Creative with support from the Queensland Government's Department of Agriculture and Fisheries (DAF). The project logic was developed by focusing on strategic industry priorities and mapping desired long-term outcomes. Activities were then designed to align with these outcomes, ensuring relevance in the short and medium term. The M&E plan ensured that effective strategies were being used to monitor the effectiveness of the extension project.

- **National Papaya Extension and Communication Strategy and Stakeholder Engagement Plan:** The National Papaya Extension and Communication Strategy and Stakeholder Engagement Plan development was led by Dentsu Creative with support from DAF. The strategy was crafted to effectively reach all stakeholders, while the engagement plan identified the most effective communication methods for each stakeholder group.

Phase 2: Implementation and Engagement

Phase 2 spanned the remainder of the project, focusing on executing learnings from Phase 1. Key objectives included facilitating the National Papaya Extension and Communication Strategy, producing triannual Papaya Press magazines, revising and finalising the Best Practice Compendium, annually reviewing project logic and M&E plans, and benchmarking end-of-program KASA levels.

- **Facilitating the National Papaya Extension and Communication Strategy**
  A participatory adaptive approach (Farmer Participatory Research) strategy, incorporating farm visits, workshops and a foundation of six on-farm demonstration trials co-designed and managed with farmer partnerships, was used to achieve improved research outcomes and greater practice adoption. The demonstrations were particularly successful in showcasing innovative practices and enhancing industry engagement.

  The following trials were conducted:

  1. Early sex determination of papaya seedling through PCR

This trial involved using molecular techniques to determine the early sex of papaya seedlings. This trial was initiated by multiple growers wanting access to planting single plants as opposed the conventional quad plants. A scoping activity was undertaken including looking at providing access to contract tissue culture providers and other molecular techniques. Polymerase chain reaction (PCR) was selected as it required the least capital expenditure, was relatively easy to conduct without molecular skills, and already had a robust protocol in place.

2. Nitrogen requirements of papaya

Growers expressed the need for better nitrogen guidelines in papaya production, focusing on tissue testing to ensure relevance across various farming areas and soil types. A 12-month trial was established in Tully in November 2022 on a commercial property, with five treatments ranging from 250 kg N/ha to 600 kg N/ha. Initial metrics such as plant height and trunk circumference were recorded, and productivity was assessed over five periods from June to November 2023.

3. Phytophthora systems management

Phytophthora was identified to be the most important issue for papaya growers at the 2021 priority setting workshop. A scoping exercise was undertaken looking at research that had been conducted in other crops such as avocados. A trial was designed for papaya using some of the outcomes from the other crops to see if they were applicable to Phytophthora management in papaya. The trial aimed to investigate the role of organic matter and gypsum on phytophthora suppression was planted on October 2022. The treatments were: control, pretreatment of 5t/ha of gypsum, 2.5t/ha of microfine prilled gypsum (OzCal) spread around the tree monthly, and mulch applied pre-planting.

4. Monitoring leafhopper populations for phytoplasma control

Phytoplasmas were also identified as a major issue for papaya growers in the priority setting workshop. A demonstration trial was designed to use sticky traps to monitor leafhoppers and relate them to dieback in order to determine whether this method could be used as a predictive tool for growers.

5. Comparison of single plants and quad plantings

As a result of the success from Demonstration 1 – Early sex determination through PCR – and grower interest, further work was conducted on developing information for growers around the potential gains of the system. A trial was designed and planted in November 2023, to test the growth and production advantages of single versus quad-planted papaya seedlings.

6. Investigating the potential of incorporating predatory mite release into pest mite management strategies

Demonstration 6 evaluated the use of predatory mites for managing two-spotted and African spider mites in papaya, aiming to find alternatives to conventional miticides. Conducted on an organic farm, the trial compared the effectiveness of releasing *Neosiulus californicus* predatory mites via drone against using Naturasoap, an organic insecticide. Pest mite populations were monitored and compared to a control to evaluate the effectiveness of the approach.

Six workshops were held over the three-year project, tailored to industry needs and focused on improving KASA or responding to specific requests of the industry:

1. **Industry Priority Setting Workshop (21st August 2021, Innisfail)**
   The primary aim of this workshop was to feed into the strategy of the project and fulfil the industry centred design process. There were however three presentations from papaya levy funded projects aimed at increasing awareness for papaya growers of the work that was occurring.

2. **Spray Efficiency Workshop with Allan Blair (28th April 2022, Innisfail)**
   This workshop directly focused on an area which growers has identified as one that they would like to improve their knowledge and skills in. A practical workshop held in conjunction with an industry professional with experience in spray in papaya was held at RMC Farming, Cowley.

3. **Breeding and R&D Workshop/Field tour with Griffith University (5th August 2022, Mareeba)**
   Support was provided to Griffith University to hold this workshop as part of the levy funded 'National papaya breeding and evaluation program' (PP18000). Extension staff assisted by presenting work conducted in PP20000, organising the venue, logistics, catering and promoting the event to growers.

4. **Papaya Post-Harvest Bus Tour (19th January 2023, Mareeba)**
   The post-harvest bus tour aimed to extend some of the research that was conducted by DAF previous to the project on hot water post-harvest dips in comparison to the industry standard fungicide dips or flood sprays. The timing of the project coincided with the time where two of the largest commercial papaya farms were building new pack sheds and had the opportunity for adoption. The tour visited two commercial mango farms which were using hot water flood sprays as a post-harvest treatment to demonstrate the technology and visited a commercial papaya packing facility. The tour concluded with a lunch-time workshop including disease presentations and event evaluation activities.

5. **Pest and Disease Forum (19th October 2023, Innisfail)**
   A workshop which was focussed on addressing growers desire for greater knowledge and skills in the areas of pest and disease management was held. The aim of the event was to connect growers and stakeholders to chemical company representatives to better inform chemical spray decisions as well as make growers aware of some of the relevant work occurring in sustainable pest and disease management.

6. **Nursery Bus Tour (14th June 2024, Mareeba)**
   This event was initiated due to multiple enquiries from papaya growers who were struggling with nursery and seedling health issues. A nursery bus tour was arranged due to the success of the post-harvest bus tour (Workshop 4). The event visited two commercial nurseries in the Mareeba region to illustrate practices and technologies used in the commercial nursery industry which might also have application for papaya growers. The focus of the tour were labour efficiency and hygiene. The event concluded with a presentation from an experienced papaya nursery manager on some of his recommendations of best practices for papaya nurseries.

- **Triannual Papaya Press:** In collaboration with the sub-contracted media and communications organisation, Dentsu Creative, three editions of Papaya Press were released annually, with an increased focus on engaging and informative content tailored for papaya growers. Content planning involved on-going industry scoping for potential articles and quarterly meetings between Dentsu Creative and DAF. The effectiveness of the publication was evaluated in the two annual communications and extension survey (Appendices 9 and 13), an outcome from the 2022 M&E plan review.

- **Revision and Finalisation of the Best Practice Compendium:** Throughout Phase 2, the Best Practice Compendium was gradually developed. A project variation allowed for the creation of a "For Growers" section on the Papaya Australia website, ensuring easy access to the compendium and other industry resources. The compendium is now hosted on the Papaya Australia website and is designed to be easily updated as new information emerges.

- **Annual Review of Project Logic and M&E Plan:** The project logic and M&E plan were reviewed annually by Dentsu Creative and DAF to ensure alignment with project objectives.

- **End-of-Project Benchmarking:** Benchmarking was conducted through event feedback and case studies, showing notable practice changes and shifts in attitudes, particularly in spray calibration and the adoption of single-plant systems. Workshops followed by post-event support proved to be the most effective method for promoting best practices among growers.

Results and discussion

Phase 1: Consultation and strategy development

The consultation phase identified IPDM as a top priority for growers through a pre-program survey and an industry-centred design process. Growers expressed a need for increased knowledge and skills in this area, viewing it as the greatest threat to the industry and a key focus for research.

- **Benchmarking Pre-Program KASA and Practices:** The initial survey results (see Appendix 1) revealed that growers had the least knowledge and skills in integrated pest and disease management, which was important to address for meaningful practice change. Interviews indicated a gap in best practices between small farms (lower) and commercial operations (higher).
- **Industry-Centred Design Process:** The design activities (see Appendix 2) were vital for the early understanding of industry priorities. The "money allocation" exercise identified pest and disease management, particularly Phytophthora, fruit rot, and phytoplasmas, as top concerns. Plant nutrition ranked third. The SWOT analysis highlighted the importance of papaya's year-round cash flow but emphasised concerns over disease susceptibility and weather-related threats.
- **Project Logic and M&E Plan:** The project's long-term outcome was set to achieve targeted increases in KASA across the industry, guiding activities and outputs. The M&E plan ensured that the information provided was measurable and relevant (see Appendix 3).
- **National Papaya Extension and Communication Strategy & Stakeholder Engagement Plan:** The strategy (see Appendices 4 and 5) targeted key outputs such as the best practice compendium, on-farm demonstrations, workshops, and the Papaya Press magazine, to enhance industry priorities. The stakeholder engagement plan mapped social interactions within the industry to ensure comprehensive social coverage. The strategy also noted sources of information that could inform the industry of wider issues.

Phase 2: Implementation and Engagement

Phase 2 of the project focused on implementation and engagement, yielding positive outcomes in KASA among growers and creating some shifts in practices. Demonstration trials and events were particularly effective in engaging growers, with the Papaya Press playing a crucial role in disseminating results and case studies. The events were also effective at fostering measurable changes in KASA.

Below is a summary of the key activities and outcomes from Phase 2:

- **Demonstration Trials:** The six demonstration trials effectively engaged growers, leveraging industry participation to improve practices and drive adoption. Key outcomes from these trials are summarised below, with a more detailed overview available in Appendix 6.

    1. **Early Sex Determination of Papaya Seedlings through PCR:** The demonstration established the PCR technique as a reliable method for early sex determination of papaya seedlings, achieving 100% accuracy in initial trials. Expanded testing confirmed its effectiveness, with one grower attaining a 98% success rate after conducting approximately 6,000 tests. The required investment of $12,500 in equipment presents an affordable option for broader industry adoption, reducing the need for multiple seedling plantings and enhancing productivity. This will not only be available to growers through adopting the practice directly but there is commercial interest from some growers to provide the test as a contract service to other growers. PCR early sex determination has now been adopted by three growers with a further three more potentially to adopt the practice. An analysis was conducted on this practice change (including the use of contractor labs) using the on-line CSIRO ‘ADOPT Tool’ (Adoption Diffusion Outcome Prediction Tool) which indicates that this practice could have a 91% adoption rate in eight years, which is a very positive outcome from this project.

2. **Nitrogen Requirements of Papaya:** Results indicated that higher nitrogen levels generally led to increased yields, with the 600 kg N/ha treatment yielding the highest at 134 t/ha over 12 months. Tissue samples correlated well with the nitrogen treatments, showing higher tissue nitrogen levels with increased fertiliser application. The control group (250 kg N/ha) gave a lower disease rating and higher Brix, suggesting a potential trade-off between yield and fruit quality.

3. **Phytophthora Systems Management:** Plant losses to Phytophthora were between 20-30% across all treatments, with no significant differences observed. However, mulched trees exhibited faster growth, with an average height increase of 40 cm compared to the control. This growth, however, was accompanied by a higher height to the first fruit, potentially indicating a production penalty.

4. **Monitoring Leafhopper Populations for Phytoplasma Control:** Red sticky traps were deployed for two months but did not intercept any leafhoppers, leading to the hypothesis that red may not be the optimal colour for attracting this species. Further trials are needed to determine the most effective colour and trap style for leafhopper attraction.

5. **Comparison of Single Plants and Quad Plantings:** Single plantings significantly outperformed quad plantings, with an 82% survival rate compared to 24% for quads. Single plants also demonstrated better growth, with an average height to first fruit 23 cm lower and a trunk circumference 2.4 cm thicker. Harvest data was limited but will continue to be monitored.

6. **Investigating Predatory Mite Release in Pest Management:** The trial faced challenges due to high initial mite populations, limiting the effectiveness of both treatments. Naturasoap showed moderate effectiveness, however predatory mites were less successful, likely due to the high initial mite levels and the accuracy limitations of the drone release method. Improved release techniques and earlier intervention may enhance outcomes.

- **Events:** The effectiveness of events was evaluated through post-event surveys. Detailed evaluation data is available in Appendix 7.

1. **Industry Priority Setting Workshop (21st August 2021, Innisfail):** Attended by 31 industry stakeholders, the workshop was well-received and set a positive precedent for the project. Feedback indicated that growers valued the R&D updates and expressed interest in more discussions in the future.

2. **Spray Efficiency Workshop with Allan Blair (28th April 2022, Innisfail):** Attended by 14 industry stakeholders (eight growers). The workshop demonstrated that air induction nozzles could improve coverage on papaya leaves, enhancing pest management. Attendee feedback was very positive, with participants reporting increased knowledge and confidence in applying the techniques on their farms. Follow-up conversations revealed that post-event, three growers trialled air induction nozzles on their air blast sprayers, indicating a practice change.

3. **Breeding and R&D Workshop/Field tour with Griffith University (5th August 2022, Mareeba):** Attended by 16 industry stakeholders. No formal evaluation data was collected at this event, however verbal feedback was good. Growers, researchers and the PP18000 Project Reference Group members were given the opportunity to provide important feedback to Griffith University on the new breeding lines and to DAF on the progress of PP20000. A field visit to the PP18000 papaya variety trial site at Mareeba was conducted after the workshop.

4. **Papaya Post-Harvest Bus Tour (19th January 2023, Mareeba):** Attended by 30 industry stakeholders, the bus tour received high ratings, with 100% of growers reporting increased KASA. However, growers

expressed concerns about the practicality of hot water treatment for post-harvest. Two growers have since moved towards adoption of the technology. One of these growers improved the hot water system they already had, using some of the ideas from one of the mango pack sheds. The other was an organic farmer who was driven to adopt this technology, as under their protocols they couldn't use post-harvest chemicals.

5. **Pest and Disease Forum (19th October 2023, Innisfail):** With 37 attendees, this was the largest papaya event in the project. Feedback indicated increased knowledge and positive attitudes towards Integrated Pest Management (IPM), with interest in further research and chemical availability for fruit spotting bugs and mites.

6. **Nursery Bus Tour (14th June 2024, Mareeba):** The event, attended by 19 industry stakeholders, was successful in improving knowledge and attitudes toward nursery practices. Post-event conversations revealed that some growers implemented changes based on what they learned, such as improving hygiene practices and adjusting potting mix textures.

- **Triannual Papaya Press:** The triannual Papaya Press was an excellent tool for communicating the progress of Hort Innovation levy funded projects, industry news, and showcasing growers using best practice as well as promoting outcome from industry events. A full compilation of all the Papaya Press editions can be found at Appendix 8 as well as on the website. The 2022 communications survey (Appendix 9) showed growers rated the publication 7 out of 10 and 50% of the respondents used it to gain industry information and R&D advice. The 2024 communications survey showed that 100% of respondents had engaged with the Papaya Press showing the value to the industry demonstrating its value as an extension tool.

- **Revision and finalisation of the best practice compendium:** The best practice compendium has been finalised into a series of factsheets being hosted on the Papaya Australia website. The factsheets can be accessed through the Papaya Australia "for growers" website.

- **End-of-Project Benchmarking:** The end-of-project benchmarking report (Appendix 10) demonstrates increased KASA for the papaya industry in pest management, disease management, sprayer efficiency, nutrition, nursery practices and productivity. It also provides several demonstrations of practices change as a direct result of the project.

Outputs

Table 1. Output summary

Output	Description	Detail
Pre-Program Benchmarking Report of KASA and papaya industry practice levels	Developed through industry surveys and in-depth grower interviews in Phase 1 of the project	Not publicly available but attached in the Appendix 1.
Annual Program Logic and Monitoring and Evaluation Plan	Reviewed annually to ensure project activities aligned with desired outcomes.	Not publicly available but attached in the Appendix 3.
National Papaya Industry Extension and Communication Strategy	Informed and targeted activities to achieve project outcomes.	Not publicly available but attached in the Appendix 4.
Stakeholder Engagement and Communication Plan	Strategy to ensure effective delivery of the project to its intended stakeholders.	Not publicly available but attached in the Appendix 5.
Triannual Papaya Press Magazine	Communicated project outcomes to the papaya industry.	Publicly available on the Papaya Australia website under the "For Growers" section. A compilation is also in Appendix 8. Hard copies were mailed to levy payers.
Post-Program Benchmarking Report of KASA and papaya industry practice levels	Developed through citing instances of KASA and practice change as a result of the project.	Not publicly available but attached in the Appendix 10.
Project risk register	Developed to mitigate potential project risks.	Not publicly available but attached in the Appendix 11.
Six monthly milestone reports	Outlined achievements, outputs, and outcomes for Hort Innovation.	Public summaries are available on the Hort Innovation website: Hort Innovation | Papaya industry extension and communications program (PP20000) (horticulture.com.au)
Best Practice Compendium	A series of factsheets outlining best practices in papaya growing.	The best practice compendium will be hosted on the Papaya Australia website on the “for growers” section which will allow growers to easily access.

Outcomes

Table 2. Outcome summary

Outcome	Alignment to fund outcome, strategy and KPI	Description	Evidence
Intermediate outcome: Growers and stakeholders have increased awareness, knowledge and understanding of key outcomes/findings from PP20000 and other levy funded projects.	**Outcome 2: Industry supply, productivity, and sustainability:** The Australian papaya industry has increased profitability, efficiency, and sustainability through innovative R&D, sustainable BMPs and varieties. **Outcome 3: Extension and capability:** Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.	Growers have had access to activities and materials through the Papaya Press, workshops, demonstration trials, and the best practice compendium which could assist them with improving practices.	• Appendix 10 (end-of-project benchmarking report) demonstrates activities and materials that increased industry KASA • Appendix 8 (Papaya Press compilation) shows that 65 updates across 14 levy funded projects were published over nine editions • Appendix 7 (post event evaluation data) shows that events increase industry knowledge and awareness.
Intermediate outcome: Understanding of major issues and their priorities to growers and stakeholders	**Outcome 2: Industry supply, productivity, and sustainability:** The Australian papaya industry has increased profitability, efficiency, and sustainability through innovative R&D, sustainable BMPs and varieties. **Outcome 3: Extension and capability:** Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.	A high-level strategic engagement plan with growers throughout the project ensured relevance and supported incremental industry improvement.	• Appendix 2 (Industry centred design process results) shows that the project was based around a co-design principle • 400 hours of direct engagement with growers logged through the M&E plan (Appendix 12) showing engagement with growers to understand issues.

Intermediate outcome: Increased knowledge and awareness of management surrounding major issues and access to further knowledge through the Best Practice Compendium.	**Outcome 2: Industry supply, productivity, and sustainability:** The Australian papaya industry has increased profitability, efficiency, and sustainability through innovative R&D, sustainable BMPs and varieties. **Outcome 3: Extension and capability:** Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.	The Best Practice pruiium, hosted on the Papaya Australia "For Growers" page, facilitates easier access to production information, aiding the adoption of best practices.	• The Best Practice Compendium is available through a series of factsheets that can be accessed through the Papaya Australia “for growers” website
End-of-project outcome: Increased KASA and adoption of best management practices that will support increased profitability and sustainability of the Australian papaya industry.	**Outcome 2: Industry supply, productivity, and sustainability:** The Australian papaya industry has increased profitability, efficiency, and sustainability through innovative R&D, sustainable BMPs and varieties. **Outcome 3: Extension and capability:** Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.	Strategic planning and execution of events, trials, publications, and industry engagement have contributed to increased sustainability and profitability in the papaya industry. This included. IPDM – At least 90% of the industry showed improved KASA as a result of the workshops and one-one-one visits. There were examples of positive practice change to at least 70% of the industry. These practices include adopting biocontrol, improving chemical product selection and adoption of cultural practices. These practice changes will reduce chemical input, improve fruit quality and yields, and increase industry sustainability. Agronomic practices and improved input efficiencies – At least 90% of the industry showed improved KASA as the result of workshops and one-on-one visits. At least	• Appendix 10 (end-of-project benchmarking report) summarises some of the events and activities which increased KASA and practice changes which were observed in the industry as a result of PP20000.

		60% of the industry showed positive practice change in this area. These practices include improved spray coverage, optimising nursery practices, improving fertiliser programs and moving to the single planting method. These practice changes will reduce input waste, improve fruit quality and increase profitability. Post-harvest value chain management – At least 90% of the industry showed improved KASA as a result of workshops and one-on-one visits. There are examples of positive practice change for about 5% of the industry. These practice changes include adoption and improvement of hot water post-harvest dips, which reduces the chemical inputs and improves the sustainability of the industry.	

Monitoring and evaluation

Table 3. Key Evaluation Questions

Key Evaluation Question	Project performance	Continuous improvement opportunities
Effectiveness		
To what extent has the project increased the awareness of best practices surrounding major papaya issues?	The project enhanced awareness of best practices in pest management, disease management, post-harvest processes, nutrition, nursery practices, and productivity to at least 90% of the industry.	Further efforts are needed to transition some growers from awareness to the adoption of best practices.
Did the project facilitate increased awareness and understanding of extension and R&D project outcomes?	The project effectively used tools like workshops and the Papaya Press to increase awareness and understanding of project outcomes.	Strengthening the connections between R&D and extension projects will ensure more consistent communication of outcomes.
Relevance		
To what extent has the project met the needs of industry levy payers?	The project successfully met the needs of levy payers, as evidenced by the extension and communications survey.	Additional surveys to direct implementation should be delivered to engage and target segments of the papaya-growing community that did not participate in the online survey.
Process appropriateness		
What was the engagement of the industry in extension activities both in-person and online?	The project engaged at least 80% of the industry in events and over 90% at some point during the project. Online engagement was relatively low.	Launching the new Papaya Australia website could boost online engagement. Continuity of project personnel is essential to maintaining high levels of industry engagement.
Have regular project updates on extension and levy funded projects been provided to growers through the Papaya Press?	The Papaya Press delivered 65 stories on 14 levy-funded projects across nine editions.	Posting updates through the Papaya Australia “For Growers” industry news channel will enable more regular communication with growers.
How accessible were extension events to industry levy payers?	Extension events were accessible to 85% of the industry with half events being held in Mareeba and the other half in Innisfail.	Growers in NT and WA were unable to attend most events, highlighting a need for greater geographic inclusivity.
Did the project engage with industry levy payers through their preferred content type and did the content encourage growers to seek more information or adopt R&D findings?	The majority of engagement was one-on-one, aligning with growers' preference for word-of-mouth communication, as identified in the 2022 communications survey. Time was also spent with agronomists, reflecting this preference. Workshops were also held for efficient information dissemination	Strengthening relationships with agronomists could enhance the delivery of R&D updates through preferred channels, potentially accelerating industry adoption.

	and group learning.	
Efficiency		
What efforts did the project make to improve efficiency?	The project improved efficiency by serving as a liaison between growers, R&D projects, and Hort Innovation, helping to streamline prioritisation and ideation.	The process could be made more efficient by adopting a more structured and methodical approach.

Recommendations

- The extension and communications strategies used in PP20000 have proven very effective and should be continued in future projects. Stakeholder consultation completed by Hort Innovation found that this project had brought the industry together, improved relationships and industry networks, and supported positive industry change in high priority practice areas.
- A participatory adaptive approach (Farmer Participatory Research) strategy, incorporating farm visits, workshops and a foundation of six on-farm demonstration trials, co-designed and managed with farmer partnerships, was a major contributor towards improved research outcomes and greater practice adoption and this should be continued in future extension programs.
- Development activities conducted in PP20000 for a number of high-priority practices should be continued. In particular, the single planting technology is an innovation with potential to greatly improve efficiency and profitability of papaya production.
- The disease Phytophthora is a large and on-going threat to the productivity of the papaya industry and further research, development and extension work is required to develop effective integrated management systems to manage this disease.

Intellectual property

No project IP or commercialisation to report

Acknowledgements

Dentsu Creative is acknowledged as a valued partner and contributor towards communication, extension and strategic design activities, particularly the delivery of the triannual Papaya Press magazine. Papaya Australia provided valuable assistance with grower communication and regular advice to the PP20000 project team. We thank all the papaya growers and industry stakeholders who collaborated with the project team and particularly the papaya growers who co-designed and hosted the six demonstration sites. We would also thank the following DAF personnel; Kathy Grice, Kaylene Bransgrove, Massimo Bianco, Yan Diczbalis, Noel Ainsworth, Dale Bennett, Tamaya Peressini and Nandita Pathania, who were team members within PP20000 or provided collaborative support to this project.

Appendices

1. APPENDIX 1 Pre-programme KASA and practice benchmarking
2. APPENDIX 2 Industry centred design process results
3. APPENDIX 3 Papaya Extension and Communication ME Plan and project logic
4. APPENDIX 4 National Papaya Extension and Communication Strategy
5. APPENDIX 5 Stakeholder engagement plan
6. APPENDIX 6 Demonstration trial summary
7. APPENDIX 7 Post event evaluation data
8. APPENDIX 8 Papaya Press compilation
9. APPENDIX 9 2022 PP20000 Annual Extension and Communications Survey Results
10. APPENDIX 10 Post programme KASA and practice change benchmarking report
11. APPENDIX 11 National Papaya Extension Project Risk Register
12. APPENDIX 12 M&E Grower Contact log
13. APPENDIX 13 PP20000 Annual extension and communications survey results

Appendix 3: Project M&E Plan

Papaya Industry Extension and Communications Project

Project code: PP20000

Milestone number: MS102

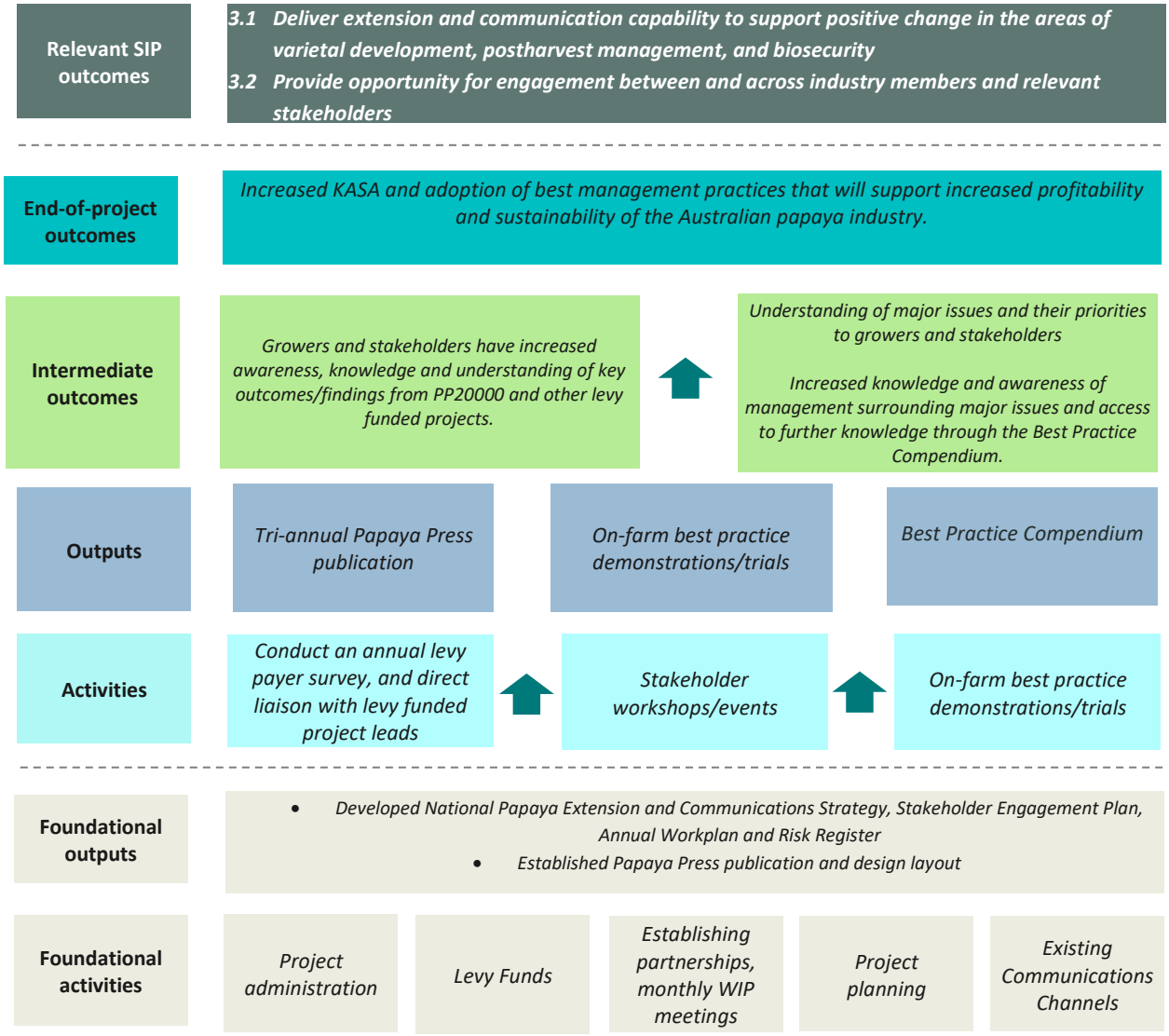
Project leader: Geoff Dickinson

Delivery partner: Queensland Department of Agriculture and Fisheries

Project and delivery partner details

Project title	*Papaya Industry Extension and Communications Project*
Project code	*PP20000*
Delivery partner (Organisation)	*Queensland Department of Agriculture and Fisheries*
Lead researcher	*Geoff Dickinson*
Date completed/updated	*15 December 2021*

1. Program logic



2. Project M&E scope

Key evaluation questions

Table 1: Project key evaluation questions

Key evaluation questions	Project-specific questions
Effectiveness	
1. To what extent has the project achieved its expected outcomes?	To what extent has the project increased the awareness of best practices surrounding major papaya issues?
	Did the project facilitate increased awareness and understanding of extension and R&D project outcomes?
Relevance	
2. How relevant was the project to the needs of intended beneficiaries?	To what extent has the project met the needs of industry levy payers?
Process appropriateness	
3. How well have intended beneficiaries been engaged in the project?	What was the engagement of the industry in extension activities both in-person and online?
	Have regular project updates on extension and levy funded projects been provided to growers through the Papaya Press?
4. To what extent were engagement processes appropriate to the target audience/s of the project?	How accessible were extension events to industry levy payers?
	Did the project engage with industry levy payers through their preferred content type and did the content encourage growers to seek more information or adopt R&D findings?
Efficiency	
5. What efforts did the project make to improve efficiency?	What efforts did the project make to improve efficiency?

3. Performance expectations, data collection and analysis

Table 2: Project monitoring plan

Logic level	What to monitor	Performance expectation	Data collection (and source)	Timing (responsibility) and reporting
Foundational activities	1. Project management team formed to develop and deliver Project ME work plans and communication strategies over project lifetime. 2. Pre-program KASA and best practice levels quantified and draft best-practice compendium framework designed. 3. Inception and R&D priority workshop and electronic surveys delivered, including prioritization of 6 best practice demo topics. 4. Project governance documents completed including Project Logic, M&E Plan, Stakeholder engagement/communications plan and National Papaya Extension and Communications Strategy.	1. Bi-monthly WIP meetings (DAF and Cox Inall) with informal updates to Hort Innovation Papaya Australia 2. 80%* of industry surveyed (*by production volume) 3. 80%* of industry surveyed 4. All documents developed and finalised by DAF/Cox Inall based on industry consultation.	1. Meeting notes (DAF/CoxInall) 2. Interviews, farm visits, surveys and questionnaires. (Growers, Industry Stakeholders) 3. Event questionnaires, interviews, farm visits and surveys. (Growers, Industry Stakeholders) 4. Event questionnaires, interviews, farm visits and surveys. (Growers, industry stakeholders)	1. Monthly (DAF) via Milestone Reports 2. Completed by 1/11/21 (DAF) via Milestone Reports, Industry magazine/website 3. Completed by 1/11/21 (DAF/CoxInall) via Milestone Reports, Industry magazine/website 4. Completed by 1/11/21 (DAF/CoxInall) via Milestone Reports, Industry magazine/website
Activities and Outputs	1.Papaya industry meetings/field day events conducted 2.Best practice trials or demos conducted 3. On-going information sharing across Australian papaya industry via direct contact 4. Papaya industry updated on RDE information via tri-annual papaya press 5. Best Management practices compendium annually reviewed and updated. 6.Project Logic and ME Workplan annually reviewed and updated. 7.Final KASA and best practice adoption levels summarsed.	1. Two industry events held annually with 80%* of industry engaged. 2. Two best practice trials implemented with 70% of information recipients confirming they have improved their practice knowledge/skills. 3. 80%* of industry engaged annually via direct contact and farm visits 4. Three copies of Papaya Press and annual extension & comms survey to assess value placed on outputs and if the content has	Surveys (workshop evaluation and feedback form provided to attendees; annual extension & communications survey; and post-project survey). Papaya Australia to supply page views and downloads data on Papaya Press publications. (Note that this is dependent on access to data from Papaya Australia.)	Timing will be ongoing across the project, and at completion. Data collection and compilation is the responsibility of DAF and Cox Inall). Milestone Reports. Final Report. Papaya Press editions. Best Management Practices Compendium. KASA and Best Practices adoption Summary.

		4. Surveyed growers indicate a greater understanding and awareness of levy funded R&D and extension outcomes (aiming for a 60%* response rate to 10 question survey).		

4. Reporting, learning and continuous improvement

Across the course of the project, there will be several opportunities to assess, evaluate and improve program activities and outputs on an ongoing and regular basis.

Survey results and grower interactions will be key evaluation methods as part of the project and M&E. Surveys will be conducted in a quantitative manner with results to be summarised for milestone reports and the final end-of-project report.

As per the research agreement, milestone reporting dates to be assessed in each for the remainder of the project are:

Milestone 103 (set to be delivered on 7 July 2022): Measurement and evaluation results to be included in this report include:

- Data from the annual extension & communications survey (to be run in March 2022). This will assess the sentiment of growers to the communications and extension program, the value placed on the Papaya Press, and whether the content and activities has encouraged growers to seek more information or adopt R&D findings. Findings and insights will guide content planning for the following editions of the Papaya Press to continually improve content and ensure its relevant and valuable to growers.
- Data from extension workshop feedback and evaluations forms, to be provided to attendees and collated by DAF. Information gained will evaluate the workshops and help guide and inform upcoming areas/issues focused on through the program.
- Direct grower interactions will be categorized in the reports and details provided in the appendices.
- Monitoring data from the 'For Growers' page on the Papaya Australia website, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press and Best Practice Compendium). Please note that this is dependent on access being granted to project team by Papaya Australia.

Milestone 104 (set to be delivered on 7 January 2023): Measurement and evaluation results to be included in this report include:

- Monitoring data from the 'For Growers' page on the Papaya Australia website, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press and Best Practice Compendium). Please note that this is dependent on access being granted to project team by Papaya Australia
- Direct grower interactions will be categorized in the reports and details provided in the appendices.

Milestone 105 (set to be delivered on 7 July 2023): Measurement and evaluation results to be included in this report include:

- Data from the annual extension & communications survey (to be run in March 2023). This will assess the sentiment of growers to the communications and extension program, the value placed on the Papaya Press, and whether the content and activities has encouraged growers to seek more information or adopt R&D findings. Findings and insights will guide content planning for the following editions of the Papaya Press to continually improve content and ensure its relevant and valuable to growers.
- Monitoring data from the 'For Growers' page on the Papaya Australia website, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press and Best Practice Compendium). Please note that this is dependent on access being granted to project team by Papaya Australia.
- Data from extension workshop feedback and evaluations forms, to be provided to attendees and collated by DAF. Information gained will evaluate the workshops and help guide and inform upcoming areas/issues focused on through the program.

- Direct grower interactions will be categorized in the reports and details provided in the appendices.

Milestone 106 (set to be delivered on 7 January 2024): Measurement and evaluation results to be included in this report include:

- Monitoring data from the 'For Growers' page on the Papaya Australia website, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press and Best Practice Compendium). Please note that this is dependent on access being granted to project team by Papaya Australia.
- Direct grower interactions will be categorized in the reports and details provided in the appendices.

Milestone 190 (end of project report set to be delivered on 30 July 2024): Measurement and evaluation results to be included in this report include:

- In the final report, the change in KASA over the course of the project will be presented as a percentage change across the project. This will be reported in the final project report.
- In terms of the practice change, this will be presented as current change (change over the life of the project) and projected change (where growers are intending to make a change but need to overcome certain barriers first).
- Direct grower interactions will be categorized in the reports and details provided in the appendices.
- Data from extension workshop feedback and evaluations forms, to be provided to attendees and collated by DAF. Information gained will evaluate the workshops and help guide and inform upcoming areas/issues focused on through the program.
- Data from the annual extension & communications survey (to be run in March 2024). This will assess the sentiment of growers to the communications and extension program, the value placed on the Papaya Press, and whether the content and activities has encouraged growers to seek more information or adopt R&D findings. Findings and insights will guide content planning for the final edition of the Papaya Press for PP20000, as well as inform recommendations to be provided at the end of the project.
- Evaluate data and percentage increases/decreases from the 'For Growers' page on the Papaya Australia website, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press and Best Practice Compendium) across the course of the program. Please note that this is dependent on access being granted to project team by Papaya Australia.

Queensland Government

COX·INALL dentsu

APPENDIX 4: NATIONAL PAPAYA EXTENSION AND COMMUNICATION STRATEGY 2021

AUSTRALIAN PAPAYA INDUSTRY

OCTOBER 2021

Contents

1 Industry overview

The Australian papaya industry is a small but growing tropical fruit industry, produced in tropical Australia, particularly north Queensland (85%), with remaining commercial production occurring in Western Australia (8%) and the Northern Territory (7%). The volume of papaya production has remained relatively steady over the last 6 years (15-18,000 tonnes per annum), while value has increased by $7.5 million (or 38%) to $27.5 million. Two main varieties of papaya are grown: the red-fleshed variety known as papaya accounts for approximately 65% of production volume; the yellow-fleshed variety known as pawpaw accounts for approximately 35% of production volume.

Papaya is grown all year round, which provides consistent supply of fruit to consumers and year-round income to growers. Production is dominated by several large producers but there are over 130 growers nationwide. Papaya grown in Queensland can be transported to all Australian states and territories except Western Australia.

The grower-raised statutory papaya R&D levy is set at 1 cent per kilogram for fresh fruit, and 0.25 cents per kilogram for processing fruit. The marketing levy is set at 1 cent per kilogram for fresh fruit.

Hort Innovation manages the papaya levy funds directed to research and development (R&D) and marketing. In 2019/20 a total of $381,903 of papaya levies were collected.

The Papaya Strategic Investment Plan 2022-26 (SIP) has been developed to guide investment in the priority areas identified and agreed by the industry.

1.1 Communications background, project management and risk mitigation

Specialist agribusiness public relations agency Cox Inall dentsu has been appointed by the Department of Agriculture and Fisheries Queensland (DAF) to support and promote levy-funded R&D activities and marketing activities via the newly contracted Hort Innovation funded ‘Papaya industry extension and communications program’ (PP20000).

This is the first combined communications and extension focussed project under Hort Innovation for the papaya industry and will run from 2021-24. Cox Inall delivered the previous three-year ‘Papaya industry communications program’ (PP16001), the first of its kind for the industry.

The aim of this project is to generate a greater understanding of levy funded R&D and marketing across its portfolio to equip each industry with the latest findings, best practice resources, as well as identify emerging opportunities and risks.

Throughout the project DAF and Cox Inall dentsu will work closely with key Hort Innovation staff Industry Strategic Partner (ISP), Corrine Jasper, Regional Extension Manager for Northern Australia, Olive Hood, Marketing Manager Ben Woodman and Lauren Jones, Content Manager as well as members of the Strategic Investment Advisory Panel (SIAP) and other key representatives from the papaya industry.

The ‘better together initiative’ provides a flow of information from Hort Innovation to DAF, Cox Inall and Papaya Australia. In terms of project management, this means that there is less direct

involvement from Hort Innovation on the reporting of R&D progress and outcomes and Cox Inall and Papaya Australia work together to generate the communication outputs.

Cox Inall's papaya communications team includes Group Account Director Suzanne Lewis, Senior Account Manager Meg Pearce and Account Executive Reagan Ruppell. Our project management approach is to work closely with DAF to effectively deliver project outcomes, keeping comprehensive notes on our liaison with industry and other stakeholders when preparing outputs to ensure that in the event of any staff changes during the project, information is not lost.

It is assumed that peak industry body, Papaya Australia, will provide database details to ensure the successful distribution of outputs included in this strategy.

1.2 Extension background, project management and risk mitigation

The Department of Agriculture and Fisheries (DAF) is the contracted lead agent for the **'**Papaya industry extension and communications program' (PP20000).

The Department's first objective in the DAF Strategic Plan 2017-2021 is to 'create the conditions for successful agribusiness and supply chains which encourage innovation and productivity'**.** This objective supports the vision of productive and profitable agriculture.

DAF is a major provider of research and extension services for a range of horticultural crops, including a long and successful history of project work and industry development for the Australian papaya industry as well as other key tropical industries including banana, mango, avocado and pineapple.

DAF is one of the lead organisations for the delivery of tropical fruit research, development, and extension in both Australia and overseas. DAF has extensive expertise in the areas of papaya agronomy, extension, plant pathology, entomology, and post-harvest management. These experts are based at the two major papaya growing regions at Mareeba and at South Johnstone and at Brisbane.

Key DAF personal working on PP20000 is:

- Dr Geoff Dickinson, Principal Development Horticulturist, Mareeba is the project lead for PP20000. He is responsible for overall project management, coordination, and reporting. Geoff is the Team Leader for Tropical Fruits at DAF and has over 30 years research, development and extension experience within the horticulture, forestry, agroforestry, and natural resource management disciplines. His research interests include the development and extension of best management practices for the improved sustainability and profitability of tropical agriculture.
- Emily Pattison, Horticulturist, DAF Mareeba is the project officer for PP20000 and will co-ordinate and manage day-to-day project activities and stakeholder engagement. Emily joined DAF at the start of this project and had been working as a consulting agronomist in banana, papaya, citrus, mango, and other tropical fruit crops based in Innisfail and Mareeba for the past 4 years. She has specific skills in IPDM and nutrition practices and is experienced with grower engagement.
- Mr Yan Diczbalis, Principal Development Horticulturist, South Johnstone has worked in a research and development capacity initially with grain crops and tropical horticulture

industries since 1990, including mango, tropical exotics (rambutan, mangosteen and durian), papaya, lychee, and cocoa. He is currently a member of the Papaya and Lychee SIAPs and has been involved in a number of projects involving papaya industry R&D; including the development of postharvest hot water treatment to control papaya decay and evaluation of papaya hybrids.

- Mr Noel Ainsworth, Principal Supply Chain Horticulturist Brisbane, will provide leadership on post-harvest practices and will provide specialist extension and communications inputs into the development of Communications and M&E plans.
- Ms Kathy Grice, Senior Experimentalist (Plant Pathology), Mareeba has over 30 years' experience in research and diagnostics. She has a broad knowledge of the fungal diseases that affect the range of horticultural, agricultural, and ornamental cropping systems grown in tropical Queensland. She has been an integral part of project teams that have worked both chemical and cultural management of papaya diseases, specifically black spot and papaya fruit and root rot on the wet tropical coast and the Atherton Tablelands.

NB: Refer to Appendix 2 for the PP20000 risk register.

1.3 Strategy development

This strategy has been developed by Cox Inall and DAF, taking into consideration the priorities outlined in the 2022-26 SIP, feedback garnered by DAF during industry extension workshops, and insights from PP16001.

This process has included the development of an M&E and Stakeholder Engagement Plan, a review of previous communications outputs developed, past and current R&D projects/reports, and taking into consideration the annual grower survey results from PP16001.

2 Program objectives

The objective of this project is to benchmark, co-develop, demonstrate, and communicate industry adoption of better IPDM, agronomic and supply chain practices that have been evaluated as able to improve the profitability and sustainability of the Australian papaya industry.

This project will raise industry knowledge, awareness, skills, aspirations (KASA) of better or improved papaya industry practices. Adoption of improved practices will be achieved through the implementation of an integrated communication and extension program aimed at achieving measurable changes in industry KASA and adoption of more profitable and sustainable practices. KASA and adoption targets will depend upon levels of co/investment available, industry preparedness and the time frame of the project.

The main objective of this project is to work with the papaya industry, relevant stakeholders and value chain members to co-design and implement a papaya industry better management practices development and adoption program, that is focussed on:

- Agronomic practices which improve input efficiencies
- IPDM (particularly Papaya meleria virus and Phytophthora)
- Improved post-harvest value chain management practices.

The key communication objectives of the program are to:

- Support the update and awareness of extension activities delivered through the program
- Support papaya business profitability by facilitating uptake of R&D
- Provide information and knowledge through industry updates and events, and articulate the return on investment from the papaya industry R&D and marketing levies
- Increase the reach of the papaya industry R&D and marketing program by engaging stakeholders in the industry value chain
- Inform primary and secondary stakeholders about current issues relevant to the papaya industry
- Provide primary and secondary stakeholders and the broader community with information on the benefits that the industry levies (R&D and marketing) deliver.

The 2021-26 SIP lists four desired outcomes for the papaya industry from levy investment, two of which will be supported through PP20000 with the primary outcomes being 3.1 and 3.2:

- **Outcome 2: Industry supply, productivity, and sustainability:** The Australian papaya industry has increased profitability, efficiency, and sustainability through innovative R&D, sustainable BMPs and varieties.
    - 2.2 Refine agronomic practices to improve productivity, quality and environmental outcomes
    - 2.3 Review current postharvest protocols and guidelines to identify opportunities for practical demonstration, extension and future investment
    - 2.4 Improve industry preparedness and resilience to biosecurity threats
- **Outcome 3: Extension and capability:** Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand
    - 3.1 Deliver extension and communication capability to support positive change in the areas of varietal development, postharvest management and biosecurity
    - 3.2 Provide opportunity for engagement between and across industry members and relevant stakeholders

As of October 2021, there are four active R&D projects for the papaya industry (including the extension and communications program). R&D levy funds also oversee support of Minor Use Permits for the industry under project PP16000. There are other projects of interest to papaya levy payers, such as the Biosecurity plan for the lychee, papaya and passionfruit industries (MT18006), consumer behavioural and retail data for fresh produce (MT17015), ex-post impact assessment (MT18001), and regulatory support and response coordination (pesticides) (MT20007).

3 Target audience

The primary audiences for all activities carried out under the extension and communications program are the growers who pay the papaya levy.

The audiences/stakeholders can be further divided as follows:

- Internal:

- All Australian papaya growers
- Papaya levy payers
- Papaya Australia Executive (when active)
- Papaya Strategic Investment Advisory Panel
- Local grower associations
- Hort Innovation

- External:
  - Broader supply and value chain and industry stakeholders (retailers, researchers, seed companies, agronomists, chemical companies, packers, packing companies, Plant Health Australia, state government biosecurity and agriculture departments)
  - Media
  - General public (consumers/community)

NB: Refer to Appendix 1 for the full Stakeholder Engagement Plan.

4 Project outcomes

Outcomes from this project will be increased KASA and adoption of best management practices that will support increased profitability and sustainability of the Australian papaya industry.

This will be achieved through the initial design and implementation of a National Papaya Extension and Communication strategy in consultation with papaya industry stakeholders, which will then deliver:

- A compendium of industry best practices
- A series of on-farm development and demonstration trials
- Annual stakeholder meetings/events in two of the main growing regions
- A tri-annual Papaya Press publications for papaya growers
- End-of-program benchmarking of changes of KASA and best practice adoption levels

5 Program outputs

As part of the Hort Innovation funded ‘Papaya industry extension and communications program’ (PP20000) DAF and Cox Inall is tasked by Hort Innovation to provide the following deliverables:

- National Papaya Extension and Communications Strategy, Stakeholder Engagement Plan, Annual Program Logic, Monitoring and Evaluation Plan, Annual Workplan and Risk Register
- On-farm best practice demonstrations/trials
- Stakeholder workshops/events
- Pre-Program and Post-Program Benchmarking Report of KASA and papaya industry best practice levels
- Papaya industry Best Practice Compendium
- Tri-annual Papaya Press magazine

All activities are aimed at increasing KASA and the adoption of best management practices that will support increased profitability and sustainability of the Australian papaya industry. This will also help to demonstrate the value of the work being undertaken by Hort Innovation and the return on levy investment.

5.1 Extension Outputs

5.1.1 Papaya industry Best Practice Compendium

A compendium of industry best practices will be co-developed through the project and will be built over three stages. First at MS102, a literature search will be conducted to identify existing knowledge and practice and build a structure around the key topic areas and practices.

Best practices will be progressively summarised on a priority and knowledge basis which will include links to existing resources, updating of older resources and the development of new resources where knowledge and resource gaps are identified. It is envisaged that with industry support these will be regularly updated on the Papaya Australia 'For Growers' website. After 24 months (MS105) an update of the progress of the developing Best Practice Compendium will be provided. The final compendium will be delivered at the end of the project (MS190), incorporating all revisions and priority resources, which will be made available through channels such as the Papaya Australia and Hort Innovation web sites.

5.1.2 On-farm demonstrations/ trials

A minimum of six demonstrations/trials will be established/implemented with industry stakeholders to address identified industry priority practices, with a target of two established in each year of the project. (MS103, MS105, and MS190). Depending on industry advice these will include agronomic practices, Integrated Pest and Disease Management (IPDM) and harvest/post-harvest practices and in both the Mareeba and wet tropics regions of Queensland.

5.1.3 Stakeholder workshops/events

Six stakeholder events/workshops will be conducted to engage and communicate industry news and RD&E findings with papaya industry stakeholders. These will involve two workshops in each year of the project, including one at Mareeba and one in the Wet Tropics. The format, content and location of these events will be identified by ongoing stakeholder consultation. These workshops will align with demonstrations and trials to allow growers to interact with trial and provide feedback.

5.2 Communications Outputs

All activities are aimed at ensuring R&D findings are communicated in a practical way, using appropriate language and examples, to stimulate greater uptake of R&D and build industry profitability and resilience. This will also help to demonstrate the value of the work being undertaken by Hort Innovation and the return on levy investment.

5.2.1 Tri-annual 'Papaya Press' magazine

The tri-annual magazine is the cornerstone publication of the program and will be developed to showcase current research projects and results from concluding and previous research outcomes and communicate key Hort Innovation updates.

Each edition will be eight pages, delivered to the Papaya Australia owned and managed database. The hard copy publications will be printed and sent to Papaya Australia, who post each print edition to 60 grower members and email a web-ready PDF to their entire grower database of around 120 growers.

Please note that Cox Inall and QDAF do not have access to Papaya Australia's database. In liaison with Hort Innovation, the Papaya Press publications will also be made available as a web-ready PDF via the industry website (www.australianpapaya.com.au). Cox Inall, with the support from DAF and industry stakeholders, will also share the Papaya Press publications with relevant, key stakeholders identified in the Papaya Industry Stakeholder Engagement Plan. The editions will be distributed in October, February, and June each year.

The publications will be prepared and published by Cox Inall with support from DAF, and with distribution support from Papaya Australia. Content will cover activities undertaken through the program of extension, progress and final reports on the papaya levy funded R&D and marketing projects, broader papaya industry news (seasonal updates and Hort Innovation updates), as well as grower case studies.

Respondents from the annual grower survey carried out in June/July 2020, as part of PP16001 (2017-20 Australian Papaya Industry Communications Program), said they wanted to see more of the following type of content which will be reflected in the Papaya Press workplan:

- R&D outcomes
- Case studies
- Biosecurity advice and updates

Typical Papaya Press content plan

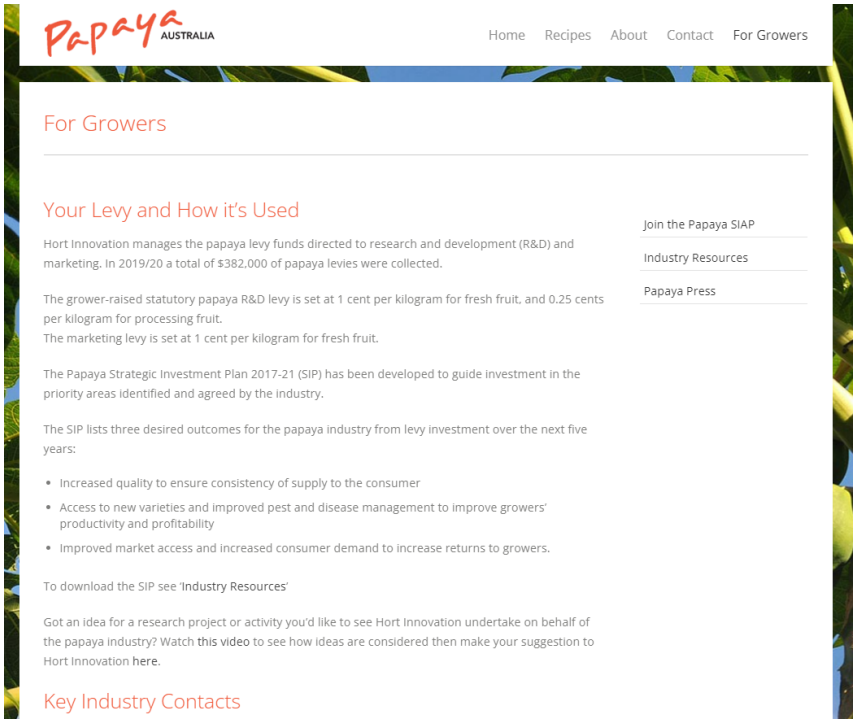
Front page	• Banner title plus feature story and photo • Breakout strip detailing two or three top articles included in the magazine
Page 2	• From the Chair column: from Chairperson of Papaya Australia • Papaya Australia and Hort Innovation logos; funding acknowledgement • Short article on industry-related news (challenges and/or opportunities facing the sector)
Page 3	• R&D project update
Page 4-5	• Regional Round-Up/ grower case study • Get Connected; case study/profile on a researcher, industry stakeholder
Page 6	• R&D project update
Page 7	• Minor use permits update

Back page	• Hort Innovation update • Marketing update/ biosecurity advice

5.2.2 R&D specific webpage

The 'For Growers' page on the Papaya Australia website (www.australianpapaya.com.au) houses relevant R&D and Marketing content and other news.

As of October 2021:



This page appears on the home page navigation menu and provides information on the levy system and key industry contacts.

The PP20000 project team will ensure that Hort Innovation are provided with the content and instructions to regularly update the 'For Growers' page.

On the side of this page there are links to:

- Join the Papaya Industry SIAP
- Industry resources
- Papaya Press

5.2.3 Annual grower surveys

Three grower surveys are to be conducted over the life of the communications program.

The first will be conducted in March 2022 (one month after the distribution of the February edition of the Papaya Press) and will be repeated every 12-months later for comparative measures and to ensure content continues to be valuable and of interest to growers.

The surveys will help to gauge growers' level of understanding about the levy, extension activities for PP20000 as well as other R&D projects levy funded projects being carried out and the rate of adoption and engagement with research findings.

They will also provide feedback on the communication outputs delivered (Papaya Press and the new R&D focused webpage) and track any changes to the preferred content covered in the publications.

Surveys will be developed by Cox Inall and DAF and distributed via Survey Monkey and promoted with the support of Papaya Australia. All data will be collated by Cox Inall.

Survey results will track progress from the communications strategy, and annual plans will be updated to reflect the feedback and incorporate any changes to the mix of outputs being produced.

6 Key Messages

Below are overarching key messages that will be reflected in the communications outputs outlined in this strategy.

- The Australian papaya industry has the potential to be even more robust and profitable with the adoption of quality R&D outcomes
- Papaya is a high quality, healthy and nutritious product
- R&D plays an important role in providing information and insights to Australian papaya growers to help them improve management practices and ultimately increase profitability.
- Australia's papaya industry is diverse, with the R&D and extension portfolio catering to both small and large producers.
- Papaya growers have an opportunity to help set R&D priorities and projects funded by the levy, through the Strategic Investment Advisory Panel and the Innovation Concept Pipeline.

7 First annual workplan

The table below provides indicative delivery dates for the current outputs referenced in this strategy.

Month	Outputs
January	• Website maintenance • Work in Progress monthly meeting (including editorial discussion for February 'Papaya Press') • Develop database of contacts outlined in Papaya Industry Stakeholder Engagement Plan
February Planting (SEQ)	• Website maintenance • Work in Progress monthly meeting • February Papaya Press (printed, sent, and emailed to growers and other industry stakeholders. February edition of Papaya Press to be

	uploaded to the 'For Growers' website in PDF web format to R&D page)
March Planting (NQ, CQ, Tablelands. SEQ)	• Website maintenance • Work in Progress monthly meeting • Grower survey
April Planting (NQ, CQ, Tablelands)	• Website maintenance • Collate growers survey responses • Work in Progress monthly meeting
May Planting (NQ, CQ, Tablelands, NT)	• Website maintenance • Work in Progress monthly meeting (including editorial discussion for June 'Papaya Press')
June Hort Connections; Brisbane (**6**-**8** June 202**2)**	• Website maintenance • Work in Progress monthly meeting • June Papaya Press (printed, sent, and emailed to growers and other industry stakeholders. June edition of Papaya Press to be uploaded to the 'For Growers' website in PDF web format to R&D page) • Two on-farm best practice demo trials initiated • Second stakeholder event
July	• Website maintenance • Work in Progress monthly meeting • Undergo review of external stakeholder list • Review and revision of annual project logic and M&E Work Plan • Milestone 103 Report • Workshop based around one of the best practice demo trials held by this date
August	• Website maintenance • Work in Progress monthly meeting
September Planting (NQ	• Website maintenance • Work in Progress monthly meeting (including editorial discussion for October 'Papaya Press')
October Planting (NQ, CQ, Tablelands)	• Website maintenance • Work in Progress monthly meeting • October Papaya Press (printed, sent, and emailed to growers and other industry stakeholder. October edition of Papaya Press to be uploaded to the 'For Growers' website in PDF web format to R&D page) • Annual evaluation and update of DAF/Cox Inall stakeholder database
November Planting (NQ)	• Website maintenance • Work in Progress monthly meeting
December	• Website maintenance • Work in Progress monthly meeting • Third stakeholder event

8 Evaluation

The annual survey (March 2022, March 2023, March 2024) will be the best opportunity to assess the sentiment of growers to the communications program, the value placed on the Papaya Press, and whether the content has encouraged growers to seek more information or adopt R&D findings.

The ‘For Growers’ page on the Papaya Australia website will also be monitored, including unique views, length of time spent, click through rates to each side-tab link (e.g., Papaya Press) and specific articles/content on the R&D webpage. Please note that this is dependent on access being granted to Cox Inall by Papaya Australia.

Through direct industry engagement and consultation, the project team will ensure that content is meeting expectations and continues to be of interest and helpful in implementing on-farm practice change. Engagement with growers through the annual survey will help the project team to better understand value placed on outputs, and whether the content has encouraged growers to seek more information or adopt R&D findings.

On an ongoing basis, the ‘For Growers’ page on the Papaya Australia website will updated with the Papaya Press editions, Best Practice Compendium, the new SIP, Fund reports, and additional resources as provided.

9 Appendix 1

9.1 Papaya Industry Stakeholder Engagement Plan

The following stakeholder engagement strategy outlines how the key internal and external stakeholders identified are to be engaged though the roll out of the papaya industry communications strategy.

9.1.1 Stakeholders

The following key internal and external stakeholders have been identified, including the level of engagement required and tools and channels to be used to communicate.

A summary is outlined below.

Internal Stakeholders	Description	Level of Engagement	Tools and channels
Levy payers (growers)	Around 120 growers contribute levies to R&D and Marketing	Highest	Papaya Press magazine, website (grower specific page), AGM
Papaya Australia Ltd Board	**Chairperson** • Gerard Kath **Members:** • Joe Zappala • Sherri Soncin (Secretariat)	High	Papaya Press magazine, website (grower specific page) Board meets every two months AGM each year
Seed companies	Papaya Seeds Australia (fully owned by Papaya Australia)	High	Papaya Press magazine, website (grower specific page), AGM, any field days
Grower organisations	• Innisfail Papaw and Papaya Growers Association • Mareeba District Fruit & Vegetable Growers Association Ltd (FNQ Growers) • NT Horticultural Association	High	Papaya Press magazine, website (grower specific page), organisation meetings, AGM
Papaya Industry Strategic Investment Advisory Panel	• Gerard Kath, Grower, QLD • Joe Zappala, Grower, QLD • Yan Dizcbalis, QDAF, QLD • Paul Fagg, Skybury, QLD • Mark MacLaughlin, Skybury, QLD	High	Papaya Press magazine, website (grower specific page)

	• Amanda Arbuckle, Grower, QLD • Tayla Mackay, Mackay's Bananas, QLD		
Horticulture Innovation Australia	Corrine Jasper, ISP Olive Hood, Regional Extension Manager for Northern Australia Lauren Jones, Content Manager Ben Woodman, Marketing Manager	High	Papaya Press magazine, website (grower specific page)

External Stakeholders	**Description**	**Level of engagement**	**Tools and Channels**
Wholesale agents	JETippers, Premier Fruits, Express Fruits, Romeos Best, H.E Heather & Co, Brisbane (main conduit between growers and retail)	Medium	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage. Regular contact with PAL board and local grower associations
Chemical/fertiliser suppliers	Local suppliers: Landmark, Elders, Lindsay Rural, Grow Force etc.	Medium	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage. Regular contact with PAL board and local grower associations
Packing and packers	VISY, Amcore, Norfoam etc	Medium	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage. Regular contact with PAL board and local grower associations
Transport	Lindsay's, Richards, JAT, MRT, Blenners, BradCo Transport etc.	Medium	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage. Regular contact with PAL board and local grower associations
Plant Health Australia		Medium	Provide information on their levy funded projects to PHA

Retail	Coles, Woolworths, Aldi, IGA, Harris Farms	Medium	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage.
Machinery	Local suppliers: John Deere, New Holland, Kubota etc	Low	Re-engage to ensure key contacts receive Papaya Press and have awareness of new grower specific webpage.

9.1.2 Engagement opportunities

Cox Inall and DAF envisage several opportunities where both internal and external stakeholders will be engaged in the extension and communications program, providing an opportunity for feedback and two-way engagement.

These include:

- Annual communications and extension survey
- Engaging broader industry stakeholders through the demonstration trials, attending Papaya Growers Association meetings and direct liaison with key target audiences through the program and biosecurity activities.
- Communications outputs where there can be stakeholder input and a two-way flow of information are valuable engagement opportunities for the industry and include:
  - Papaya Press triannual 8-page magazine
  - Grower specific webpage on Papaya Australia website

It is also critical that the external stakeholders listed are re-engaged in the new communications outputs outlined in the strategy. The development and continual update of a database of growers and external stakeholders by Cox Inall and DAF across the course of this project will be central to enabling this opportunity for re-engagement by sharing of the Papaya Press with key targets following distribution of each edition.

One way to achieve this is by ensuring the PAL Board and the local grower associations update the key contacts on the new outputs. Articles in the Papaya Press magazine featuring external stakeholders would also be useful.

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 7 - OCTOBER 2021

Flavour does matter

National papaya breeding and evaluation program

DR CHAT KANCHANA-UDOMKAN

The research team Left to Right, Emily Pattison, Dr Jiraporn (Nui) Surachartkumtonkun, Dr Chat Kanchana-udomkan, Ms Ziwei Zhou, Mr Luke Trabucco, Dr Mai Nantawan

Claudia and Michael Oldano, and Chat

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.

The project team selected commercial red RB1 and yellow 1B papaya from Lecker Farming, Mareeba to represent two distinct flavour profiles and compared differential gene expression between these two varieties using RNA-sequencing technique.

Project lead, Dr Chat Kanchana-udomkan from Griffith University said that about 180,000 genes were detected in fruit samples of both varieties, and only half of them expressed differently between the two varieties.

"5,000 of the genes showed differential expression at the ripe fruit stage and may relate to the flavour of papaya, so we narrowed the number of genes down to 70 that were related to sugar, (fructose, glucose, and sucrose) and volatile compounds," Dr Kanchana-udomkan said.

"These 70 genes will be investigated further to validate the function of genes on flavour of papaya and can potentially develop as a tool to predict flavour of papaya to assist papaya breeders."

The research team from Griffith University and Department of Agriculture and Fisheries (DAF) Mareeba also conducted a consumer survey on the current commercial varieties at Mareeba Market on Saturday, 8 May 2021.

This survey aimed to examine consumers' papaya consumption and to assess the consumer acceptance of different types of papaya and received strong engagement with 124 participants.

Dr Kanchana-udomkan said three clusters 'Papaya Lover', 'Red Lover' and 'Not a Papaya Fan' were identified, and the favourite varieties were RB1, Skybury and H13.

"We have now got in-depth data on candidate genes relating to papaya flavour, specific volatile compounds making up a variety, descriptions of papaya flavour from an experienced, trained panel, and consumer preference toward commercial varieties," she said.

"Next steps for the project will be to analyse data to correlate the favourite varieties, characteristics and chemical profiles to candidate gene expression. This will create a reliable and accurate model to predict new emerging varieties."

The papaya flavour research aligns with the new research project AS19003: Genetics of Fruit Sensory Preferences which is a collaborative project with the University of Queensland and DAF.

For more information, please contact Dr Chat Kanchana-udomkan, ***c.kanchana-udomkan@griffith.edu.au***.

Ziwei Zhou, the PhD student on PP18000 also won the three-minute thesis challenge from School of Science from Griffith University and published a review article on 'Papaya (Carica papaya L.) Flavour Profiling'. This can be accessed at: ***https://www.mdpi.com/1272018***.

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

IN THIS ISSUE

Papaya Press Issue 7 was produced for Papaya Australia by Cox Inall dentsu and Department of Agriculture and Fisheries Queensland.

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

Hort Innovation
Strategic levy investment

PAPAYA FUND

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, 'Steady as she goes'

GERARD KATH

Firstly, welcome to all who have an interest in our wonderful industry. We are after all a small but vibrant industry in the context of all fruit and veg within Australia.

We are steadily growing by fruit volume and value, though the number of growers and people in the whole industry are somewhat decreasing. It is a strange world we find ourselves in, particularly the last two years, with no clear outlook on the implications the COVID-19 phenomenon has on shopping habits, labour supply, compliance issues, as well as government decisions and dictatorial rules that are implemented at a drop of a hat. I would suggest that change is the one constant in business and that we are all going to have to deal with it. Good luck.

There has, however, been a positive COVID effect on demand and price, with an increasing percentage of fruit going to the three main supermarkets in Aldi, Woolworths, and Coles. I know that they are actively looking at the tropical fruit category to drive growth in sales, understanding that papaya is at about 20 per cent market penetration and has massive room for growth. There is a challenge to industry to meet this demand and remain viable and we're also seeing increasing demand for red papaya being driven by consumers who have been happy with the product and knowing the health benefits that exist. Interesting times ahead for the next five years!

Papaya Australia has also been involved with our industry's Biosecurity Plan. Both Joe Zappala and I have been engaging with Trevor Dunmall, Biosecurity Australia to help finetune the Plan. Looking closely at all the different types of pests and diseases that exist in the world, all I can say is that prevention is a long way better than dealing with an incursion.

I know that there is still evidence of papaya sticky disease, yellow crinkle, dieback, blackspot, bacterial leaf diseases, fruit spotting bugs and spider mites, just to name some of the challenges of growing papaya. It doesn't seem to get any easier with time.

I recognise that most papaya operations are all year round, so labour shortages may not be as severe as in the short-term seasonal industries. However, there is an effect still being felt by growers. Backpackers alone has fallen from approximately 160,000 pre-COVID to about 30,000 thousand and dropping by approximately 2,000 a month across Australia. The effects are very real and painful in certain areas and crops, so there is a strong push to fill gaps with the Pacific Island Worker Scheme, but this will take time. Growers may find increasing pressure to retain and find workers in the time ahead.

Now to compliance… this one is getting harder by the year. The latest push to audit Fair Farms and SEDEX leaves me baffled. For SEDEX, a UK based company to convince major chains to enforce their suppliers to a code for industrial relations and have growers pay for this 'privilege' is extremely frustrating. Australia has one of the strictest industrial and workplace laws in the world, so for me, it would make more sense to enforce noncompliance to Australian laws, rather than dream up a new 'voluntary' code to look to be doing the right thing.

I feel that I have vented some frustration, (don't feel that much better) and had better get out there and attend to something more constructive.

Until next issue, Merry Christmas and Happy New Year and happy papaya production for the foreseeable future.

Regards,
Gerard Kath

From the Papaya Australia office: Papaya Australia Ltd financial members will receive a one cent per seed discount on papaya seeds purchased from Papaya Seeds Australia as of Monday, 1 November 2021. If you would like to become a financial member of Papaya Australia Ltd, email ***admin@australianpapaya.com.au*** and request a membership form.

NEW EXTENSION PROJECT DELIVERS FIRST PAPAYA WORKSHOP

The inaugural workshop under the new three year 'Papaya industry extension and communications program' (PP20000) was held in Innisfail in August 2021.

Led by the Queensland Department of Agriculture and Fisheries (DAF), 34 industry stakeholders attended the workshop which aimed to give industry an introduction to the new levy funded project and provide growers with an opportunity to have input into key research and development priority areas.

The workshop commenced with presentations from local papaya grower, Joe Zappala and Regional Extension Manager for Northern Australia at Hort Innovation, Dr Olive Hood, as well as Cox Inall who will be leading the communications component of PP20000 including the continuation of the now triannual Papaya Press grower magazine. Attendees received updates from project leads on several papaya levy funded projects including the 'Papaya Clean Seed Program' (PP18001), the 'National Papaya Breeding and Evaluation Program' (PP18000), and 'Nutrient Requirements for Papaya Production Review' (PP20002).

DAF project coordinator, Emily Pattison said the event was a great way to introduce the new extension and communication project to industry and get their direct insights on key priorities.

"A key part of the workshops was prioritising research under the new project. We conducted two activities to enable participants to share their outlook for the industry and influence key priority areas for the program over the next three years," she said.

"The first activity was a SWOT analysis, with the second a money allocation activity where growers and agronomists were allocated 100 'papaya dollars' which they had to allocate wholly or in parts to the research areas they wanted to see prioritised. This activity was then shared online so growers who couldn't attend could have their say.

The workshop was held at Brothers Leagues Club, Innisfail and was well attended

"Recognising current industry priorities is vitally important to set the themes for the delivery of the next three years of activities through PP20000. This project has a target of 6 trials/demonstrations over the project and topic selection will be based on the identified priorities.

"Thank you to everyone who presented, attended the workshop and participated in the research prioritisation activities. We look forward to running more of these sessions over the next three years."

Stakeholder communications throughout the project will be conducted via 6 workshops and the 9 tri-annual Papaya Press publications over the 3 years. The workshops will include updates on project activities including trials, information resources and industry R&D updates, as well as provide growers the opportunity to network with other growers and industry stakeholders.

For more information, please contact ***Emily.pattison@daf.qld.gov.au***.

RESULTS FROM RESEARCH PRIORITY ACTIVITY

27 agronomists and papaya growers allocated their 2,700 papaya dollars across the below priority areas:

Integrated Pest and Disease Management: received $1,486 total allocation across Phytophthora ($511), Phytoplasmas ($442), Spray Efficiency ($131), Black Spot/Brown Spot ($131), Two Spotted Mites ($72), Fruit Spotting Bug ($62), Pythium ($40), Sticky Disease ($30), African Spider Mites ($27), Powdery Mildew ($22), Oriental Scale ($16), Nematodes ($1), and Fruit Piercing Moth ($1).

Agronomic Practices: received $686 total allocation across whole papaya plant nutrition ($206), soil health ($121), seedling issues ($101), nursery issues ($94), fruit consistency ($80), irrigation efficiency ($62), phosphorus efficiency ($16), and nitrogen efficiency ($6).

Post-Harvest and Supply Chain: received $528 total allocation across Phytophthora ($337), Anthracnose ($111), break-down ($54), ripeness/flavour ($20), supply chain issues ($5), and Phomopsis ($1).

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

New biosecurity plan safeguards papaya industry

PLANT HEALTH AUSTRALIA

Plant Health Australia (PHA) has been working with Papaya Australia to develop a new industry Biosecurity Plan, a timely refresh that builds on the previous Plan developed in 2011.

Developed by PHA in collaboration with Papaya Australia, Hort Innovation, state and territory governments and leading technical experts through the 'Biosecurity plan for the lychee, papaya and passionfruit industries' (MT18006) project, the Plan is in the final stages of development and is expected to be published later this year.

Australia has an estimated 130 commercial papaya growers in Queensland (QLD), Western Australia (WA) and the Northern Territory (NT) who produced over 19,000 tonnes of papaya in 2020, valued at more than $30 million.

After the previous plan was developed in 2011, exotic papaya sticky disease was detected. Since detection, the QLD Department of Agriculture & Fisheries (QDAF) has been working with industry on new testing methods to detect all the four known viruses that cause the disease, as well as improved management programs, including clean seed protocols.

"The occurrence of papaya sticky disease highlighted the need for growers to remain vigilant as new pests and diseases can impact production as well as market access and trade," said Papaya Australia Chairman, Gerard Kath.

"There are a range of direct and indirect effects that new pests and diseases have such as loss of production, increased management costs and potential trade restrictions that all impact the bottom line for growers."

Industry, government, and technical experts from QDAF, NT Department of Industry, Tourism and Trade (DITT) and WA Department of Primary Industries and Regional Development (DPIRD) have provided invaluable input in the development of the biosecurity plan.

Mature papaya trees in field. Image supplied by Joe Zappala, papaya grower, far north Qld

"A refreshed biosecurity plan for the Australian papaya industry is important as it provides an opportunity to revisit the future outlook and adjust industry strategies to better prepare for and to minimise the threat posed by exotic pests and diseases," said Trevor Dunmall, PHA's Biosecurity Planning Manager.

PHA develops crop-specific biosecurity plans for plant production industries in collaboration with industry and government. Biosecurity plans undergo regular reviews to ensure they remain up to date, along with an annual review by biosecurity reference panels to help monitor and drive implementation.

Biosecurity planning provides a mechanism for the papaya industry, government and other stakeholders to assess current biosecurity practices and future biosecurity needs.

"The papaya industry relies on sound production practices, and good on-farm biosecurity is already an essential part of the production process," said Mr Kath.

Early detection and reporting of exotic pests or pathogens provides the best opportunity for containment and eradication. Growers are encouraged to report any suspicious symptoms to the Exotic Plant Pest Hotline on 1800 084 881.

For more information on papaya biosecurity, visit the PHA at: ***www.planthealthaustralia.com.au/industries/papaya***

KEY BIOSECURITY THREATS

The biosecurity plan identifies key biosecurity threats to the industry, outlines risk mitigation activities and focuses on five key areas:

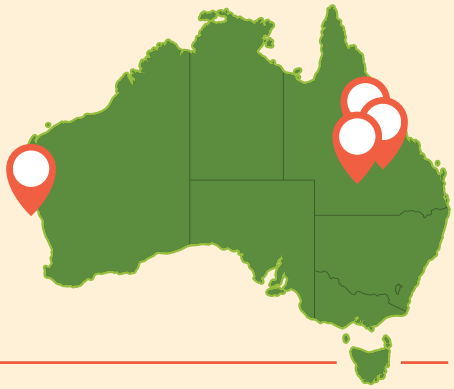
- high priority exotic pests and established pests of biosecurity significance
- threat identification and risk assessment
- risk mitigation and preparedness
- response management
- biosecurity plan implementation

The 'Biosecurity plan for the lychee, papaya and passionfruit industries' (MT18006) project is funded by Hort Innovation using lychee, papaya and passionfruit industry levies and funds from the Australian Government.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

REGIONAL ROUND-UP



TABLELANDS, QLD – Gerard Kath

Large yields have again been majorly produced by the larger three to four growers, with a significant increase in production on the Tablelands.

The last 12 months have again been dominated by large production volumes of mostly good quality fruit. This fruit has sold well, with prices being very reasonable with good grower viability.

It wasn't a cold winter, so the weather conditions have been quite favourable on the Tablelands, and the fruit is coming on nicely as a result.

Seed production wise, growers haven't planted as much this year, which is part of the reason why we're seeing a lesser crop compared to the last year or two.

There are no significant disease problems impacting growers at the moment, with issues remaining pretty steady and consistent.

TULLY, QUEENSLAND– Nicholas Mackay

Winter this year was mostly absent on the coast, which meant fruit volumes have been consistent with only a minor decrease through the winter months.

Coming into the warmer months, we are expecting a minor increase in production volumes which usually coincides with an increase in fruit sugar content (Brix) making for a better eating product.

Planting for the 2021 season has brought many challenges with wet weather limiting and delaying plans. The planting season for the coast will wrap up soon before temperatures get too high, and the wet season begins.

CARNARVON, WESTERN AUSTRALIA – Caranarvon Growers Association

The Carnarvon region experienced flooding earlier in the year which continued into heavy rainfall but are now heading into warmer weather.

The market looks good for papayas and pawpaws in comparison with market numbers from last year and we are hopeful for another successful year.

WANT TO SUBMIT AN UPDATE FROM YOUR GROWING REGION?

Email Meg Pearce, Cox Inall dentsu: *meg.pearce@coxinalldentsu.com.au*

GET CONNECTED

Meet Emily Pattison, the project lead for the new Papaya Industry Extension and Communications Project (PP20000).

Emily grew up in Innisfail with involvement in the banana industry and has a great interest in agricultural science, having attended the University of Queensland, Gatton to study a Bachelor of Agricultural Science.

After working in various research roles across the vegetable, banana, cotton industries and as junior agronomist, Emily eventually followed her passion for tropical horticulture and began work as a consulting agronomist for Total Grower Services in Tully in papaya and bananas. After a year, she was transferred to the Mareeba Branch and began consulting on citrus, mango, avocado, papaya and other niche crops in the area.

Emily joined the Queensland Department of Agriculture and Fisheries in April 2021 as a Horticulturist.

"I'm particularly interested in agronomy and looking at farming systems holistically, covering nutrition, irrigation and their effect of pest and disease management. So, I'm excited to be leading this project, particularly given the project's breadth and the prospect of being able to look at the whole papaya growing system," said Emily.

Connect with Emily at: ***emily.pattison@daf.qld.gov.au***.

Emily Pattison

An emerging problem: African Spider Mite

African Spider Mite (*Eutetranychus africanus*) has been detected on papaya farms in the Innisfail, Tully, and Mareeba districts at increasing levels, raising concerns for Australia's papaya growers.

An exotic mite species, African Spider Mite is believed to have been present in Australia for at least 10 years, possibly more. This mite has several distinct differences from the well-known Two Spotted Mite which impacts management practices for this emerging pest.

Emily Pattison Queensland Department of Agriculture and Fisheries (DAF) project coordinator for the 'Papaya industry extension and communications program' (PP20000), said African Spider Mite reproduction is very temperature dependent and under warm north Queensland conditions, populations can boom.

A laboratory study in Taiwan has found eggs will not hatch under 12°C and that their reproduction was greatest at 27°C. At higher temperatures the life cycle progresses faster, but the longevity of the mite reduces. At 32°C the African Spider Mite will go from a newly hatched egg to an adult in nine days.

"On top of that, rapid life cycles increase the risk of chemical resistance in the population, so chemical management and rotation are critical.

"Papaya and citrus farms in Taiwan and Japan suffer from this pest, and it's unknown how long this mite has been present in north Queensland's papaya growing areas," she said.

Small grey 'dotty' feeding marks joining together to give a 'washed out' look

Ms Pattison said Integrated Pest Management principles for controlling African Spider Mite are similar to those recommended for the Two Spotted Mite.

"If you are having issues with African Spider Mite or Two Spotted Mite, it's important to consider your chemical, cultural and biological management responses," she said.

"For example, be sure to rotate chemicals to avoid resistance and always use registered pesticides and follow the label, make sprays fit into the life cycle of the pest, and choose chemicals that fit the problem.

"With cultural strategies – rigorous monitoring programs helps increase the chance of early detection, make sure papaya plants don't experience water stress, and remember that nitrogen is a major contributor to mite populations in other crops so consider reducing nitrogen fertiliser application.

"Finally, lady beetles are important mite predators in papaya so monitor populations and reduce the use of broad-spectrum chemicals to conserve these beneficial populations. Beneficial mites may also be effective against the African Spider Mite so allowing groundcover to come up underneath papaya plants will help predatory mites persist in orchards as they use pollen as an alternative food source."

For more information, please contact ***Emily.pattison@daf.qld.gov.au***.

SPOT THE DIFFERENCE: AFRICAN SPIDER MITE AND TWO SPOTTED MITE

- The African Spider Mite lives on the upper surface of the leaf, in contrast to the Two Spotted Mite, which lives on the underside.
- Damage will look different. African Spider Mites leave small grey dots on the top of the leaf where they have fed. Eventually these grey marks will join to give the 'washed out' look and will continue to cause the leaf tissue to die, giving the leaf a 'tattered' look.
- African Spider Mite do not create webbing like the Two Spotted Mite.

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

Papaya clean seed project delivers 10 clean parental lines

The 'Papaya clean seed program' (PP18001) has officially ended after three successful years of research conducted by the Department of Agriculture and Fisheries Queensland (QDAF) in collaboration with Griffith University.

Working to better protect the papaya industry from papaya sticky disease by delivering a clean seed protocol, the project set about providing clean parental lines to produce virus-free hybrid seed, as well as some basic knowledge development in relation to the virus involved in the disease.

Dr Paul Campbell, project lead at QDAF said the project was successful in generating ten parental lines through embryo rescue free from the virus that causes papaya sticky disease.

"From over 500 plants generated through embryo rescue, only six infected plants were identified, and at least six representatives of each of the clean parental lines were able to be entered into tissue culture to safeguard industry investment," Dr Campbell said.

Through the project, a small-scale field trial with over eighty plants from six parental lines were planted in the field at both the Tablelands and on the coast.

"Plants were regularly sampled and tested for papaya meleira virus (PMeV-Aus), to evaluate virus movement in the field," Dr Campbell said.

"Within three months of planting there was approximately 30 per cent infection with PMeV-Aus.

"The rapid re-infection of the virus demonstrates that careful management of the parental lines is required to produce virus-free seed. But the benefits of growing clean seed will not be fully realised without proper management plans until localised virus pressures drop."

The 'Papaya clean seed program' found that the characterisation of PMeV2-Aus, the causal agent of sticky disease, found significant differences to the situation reported overseas.

Papaya sticky disease

"It seems to be a double-stranded RNA virus, not a single stranded RNA virus, and a second virus reported to be contributing to virus replication overseas is not found in Australian plants," he said.

"Although virus particles are easily found, there does not seem to be recognisable coat protein in the virus genome sequence. This is very unusual for plant viruses and the method by which the virus obtains the proteins to form a particle is currently still unknown.

"Now that there is a supply of healthy plant material, many questions about the epidemiology of PMeV2-Aus that can impact management decisions can be answered, including what is spreading the virus, how soon after infection can the virus be detected, and how soon after infection can the virus be transmitted to other plants?"

To find out more on the project and read previous project updates, please head to: ***www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/pp18001/***

The 'Papaya clean seed program' (PP18001) is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

MARKETING AND SOCIAL MEDIA UPDATE

Through marketing activity, Papaya Australia has continued to support the consumption of Australian grown papayas and increase purchase consideration by promoting the positive health benefits of the fruit.

HEALTH REPORT AND CONTENT CREATION

The 2018 Papaya Health Report was updated with input from Dietician, Caitlin Reid APD, identifying compelling health messages and contributing up-to-date research.

Original recipes were developed to create engaging content for a public relations media campaign, including an immune-boosting papaya and chicken salad and a mood-boosting papaya and lime cake.

The report highlighted the myriad of health benefits in papaya which were shared via social media and earned public relations media, inspiring and educating consumers to include papaya in their diet.

Access a copy of the Papaya Health Report, at: ***australianpapaya.com.au/website/wp-content/uploads/2020/11/Papaya_Health_report_2020_SinglePages.pdf***

Australian Papaya: 2020 Nutrition Review

Top performing Papaya Australia Instagram post for engagement

PUBLIC RELATIONS

The marketing team developed three media bursts of activity to increase consideration of purchase for papaya during the spring and autumn flushes.

Using the recipe assets, health messaging and media releases, coverage was secured in several top-tier media titles. Key highlights from the public relations activities include:

- 47 pieces of coverage across traditional and social media
- 9.7 million total opportunities to see our papaya message (versus KPI 6.9 million)
- 100% of coverage contains at least one key message
- 60% of coverage contains two or more key messages

Media coverage was secured in titles including the Sunday Telegraph, Woman's Day, Westfield, MiNDFOOD, Woolworths, Australian Women's Weekly and Healthy Food Guide.

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***).

For the 2021 campaign, the papaya social media channels were updated twice per week under one of three content pillars: Eat Me; Love Me; and Know Me.

Having a strong media presence combined with social advertising has helped to optimise the reach and engagement of posts to drive awareness and consideration. Key social media highlights include:

- Over 4.4 million impressions across Facebook and Instagram during the campaign
- Over 128,600 engagements across Facebook and 128,600 across Instagram, demonstrating that key messages are resonating with the audience.

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 8 – MARCH 2022

$7 million invested in sensory genetics

An 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-for-external-links/media-release_food-sensory_17.12.21.pdf?mc_cid=524362c4c6&mc_eid=fc7a3be91c***.

IN THIS ISSUE

Hort Innovation Strategic levy investment | PAPAYA FUND

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

What's happening in the west?

"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

Papaya Press Issue 8 was produced for Papaya Australia by Cox Inall dentsu and Department of Agriculture and Fisheries Queensland.

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

A 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.

Mild Powdery Mildew Scarring

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.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

Young farmer prioritises investment in education and technology

GROWER CASE STUDY: CHRIS MAISEL, MAREEBA

Chris Maisel

There 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-fact-sheets-and-more/pp18000/***.

Papaya Strategic Investment Plan 2022-26 now available

The 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-on-year 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 on-farm 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-management-documents/sip-2022-2026-pdfs/hort-innovation-sip-2022-26-papaya.pdf***

Breeding investment heading to farmgate in 2022

National papaya breeding and evaluation program

The '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.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

Get connected: Meet Dr Fawad Ali

Dr 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***

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

Determining sugar level from papaya juice

Preparing papaya puree samples for volatile evaluation

Flavour 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 non-preferred 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***.

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

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.

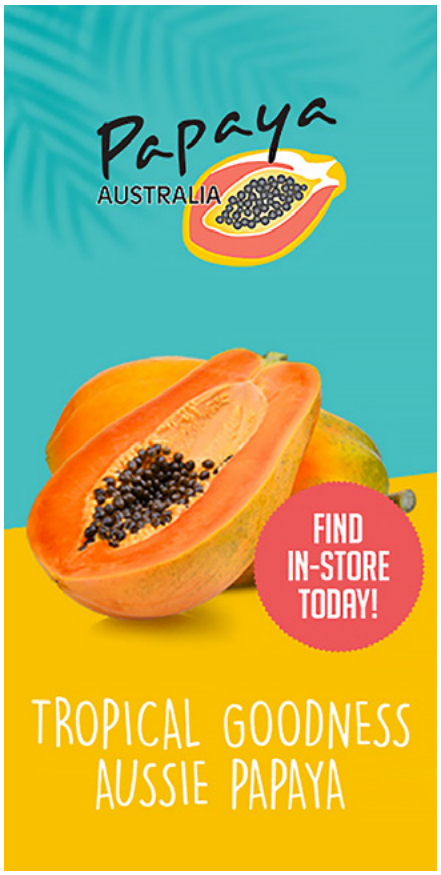
Burst One involves a high impact digital advertising across Taste.com.au. The recipes add an inspiration element for this burst and is coupled with display media to build consumer awareness.

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.



Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 9 – JUNE 2022

COWLEY WORKSHOP A BLAST FOR GROWERS

A papaya spray workshop was held on Thursday, 28 April as part of the three-year 'Papaya industry extension and communications program' (PP20000).

Organised by the Queensland Department of Agriculture and Fisheries (DAF) and hosted by Michael Oldano of RMC Farming in Cowley, Queensland, the workshop revisited key concepts behind air blast spraying in papaya, and provided practical demonstrations of newer technologies in air blast spraying such as air induction nozzles.

The workshop was run by Allan Blair, a former papaya farmer and previous DAF employee, who is an expert in spray technology and calibrations and author of the spraying section in the Agrilink Papaw Information Kit from 2000.

DAF project coordinator, Emily Pattison, said a key part of the workshop was discussing African Spider Mite as one of the new challenges facing papaya growers within their spraying practice.

"This mite is found on the upper surface of the leaf, in contrast to the more familiar Two Spotted Mite which is found on the underside. This presents a particular challenge for growers to achieve adequate spray coverage to control the mite, particularly in tall trees," Emily said.

In the workshop, two sprayers were compared; one that was fitted with a standard hollow cone nozzle with very fine spray quality, and the second with standard hollow cones but with two air induction nozzles.

IN THIS ISSUE

Figure 1: A comparison of the coverage on the underside of the leaf between a standard hollow cone sprayer set-up (bottom leaf) and a set-up including 2 air induction nozzles. Coverage on the underside of the air induction nozzle is considered inadequate for a large portion of the leaf area. Further investigation is required to overcome this issue.

With the standard set-up, two different volume outputs were trialled – 250L/ha and 450L/ha – and the difference in coverage between all the different set-ups was visualised at night using fluorescent dye and ultraviolet torches.

Air induction nozzles are designed to produce air bubbles within a spray droplet, which makes the droplet larger without increasing its volume, and to reduce drift. But when considering pests

Continued on page 3

This edition has been developed by Cox Inall and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

A quick hello to all in papaya world.

Papaya Australia is leading the new levy funded project, 'Papaya market supply data capture and analysis' (PP20003), which is tasked with collecting, collating, and publishing weekly industry production figures. Put simply, it is the total number of pellets sent weekly by the four main transport companies. It will show the production numbers of yellow and red, and the split between the main growing areas of North Queensland. This information will start flowing shortly, so keep an eye out. See the article below for more on this project.

Since our last issue, production has been fairly high, and thereby, prices have been moderately low. This has been challenging for most growers who continue to face the ever-increasing cost of production in freight, energy, fertiliser, chemicals, and labour. I note that fruit seems to be on the other end of the profitability scale compared to veggies. Our industry is facing challenging times ahead, but it's important to note that we're not as bad off as some industries like avocados and bananas.

Finally, I'd like to draw everyone's attention to the upcoming R&D Field Day being held in Mareeba, Queensland on Friday, 29 July. The main peak industry bodies will be in attendance, along with several key staffers from Hort Innovation. There will be a number of forums held in the form of a Q&A session that discuss both current conditions and predicted outlook for the various production industries, as well as a series of emerging opportunities showcased such as carbon trading and value-adding. We're confident that there will be a large turnout at the event and that it will be farmer beneficial and friendly. Though, I must take this opportunity to declare my conflict of interest in promoting an event I'm helping organise! Hope to see you there.

Best Regards,
Gerard Kath

NEW PROJECT: Papaya market supply data capture and analysis

Led by Papaya Australia, a new levy investment is tasked with collecting production figures for the main growing areas of North Queensland.

Production figures will be tallied to give a production overview on the tablelands and coastal areas. The focus of the reports will estimate the weekly production volume in pallets by asking transport companies to report total pallets sent to the main eastern seaboard markets, with the assumption that pallet weight represents approximately 800 kilograms of fruit.

In 2020, the papaya industry was valued at $27.5 million, with the industry producing an average of 15,000 tonnes per year. It estimated that close to 94% of Australian papayas are produced in the wet tropics of far north and central Queensland, with a further 5% in north-western Australia and 1–2% in the Northern Territory.

As this data is no longer recent it is important for industry to know current production figures from the largest producing area.

Reporting will be circulated on a weekly basis to all stakeholders, as well as the Papaya Press and a summary given to transport companies who will be involved in providing the information.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

COWLEY WORKSHOP A BLAST FOR GROWERS *(continued)*

on the upper surface of leaves, the larger droplet size has a better chance of coming up and then dropping back down in comparison to the traditional hollow cone design. The theory was successful!

The air induction nozzles achieved excellent coverage, based on 16 droplets/cm^2 on the upper side of approximately 2.5-3 metre trees on single rows.

One issue was that the coverage on the upper side of the leaf was superior to the coverage on the underside. It was suggested that in this scenario, potentially only one air induction nozzle may be required but further trialling will need to be undertaken to refine the set-up.

In terms of output volumes, the 450L/ha achieved the best coverage, but the 250L/ha still achieved adequate coverage over 16 droplets/cm^2 with potentially much less wastage.

"An important consideration from the workshop is that a successful spray set-up on one farm may not be transferrable to another, particularly when comparing double row and single row and different row and plant spacing," Emily said.

"Grower response to the workshop was excellent with 100% of growers saying they learnt something new, and they felt confident applying it at their own properties.

"I would like to thank everyone for coming along, and particularly to growers Michael, Adam and Josh Oldano, presenter Allan Blair, and agronomist Dave Doolan (GF Rural) for all their help in making the workshop a success."

For more information, please contact: ***Emily.pattison@daf.qld.gov.au***.

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

LEVY FUNDED PROJECT UPDATES

NATIONAL PAPAYA BREEDING AND EVALUATION PROGRAM

New papaya genetic lines have been developed through the 'National Papaya Breeding and Evaluation Program' (PP18000) that are agronomically superior with improved flavour, shape, size and eating quality through research from Griffith University's Centre for Planetary Health and Food Security.

Funded through Hort Innovation, developing genetically stable red- and yellow papaya varieties is the culmination of eight years of selective breeding that has been directly informed by growers, marketers, and consumers. The program is expected to be completed by mid-2024.

Papaya breeder and PP18000 project leader, Dr Fawad Ali, Research Fellow from Griffith University, said significant progress has been made against the breeding program goals, developing new varieties that suit the industry requirements and consumer preferences for both the Tableland and coastal climates in Tropical North Queensland, where 85% of papayas are produced.

"The new F6 advanced breeding lines grow fruit much closer to the ground than current varieties, reducing costs associated with mechanical picking. They also have a superior flavour, sweetness, and shape, with smaller cavities than the current commercial varieties," he said.

"A range of sizes for each line have been developed to suit different marketplaces, from consumer-preferred mango size to larger sizes that suit packing and transportation requirements.

"The percentage of heritability and genetic gain from the strategic breeding for the agronomic and fruit quality trait selection are currently being monitored and calculated.

"This is achieved through breeding successive generations and multiple trial sites to ensure trait stability and within the distinct agri-geographical climates of the two major growing regions.

"So far, many of the traits have been found to be highly heritable, meaning that they will be stable in the new varieties once released.

"Plant Breeders' Rights (PBR) stage I are also being applied to the advanced breeding lines that will become the new varieties. This involves further field trials and the 'Qualified Person' collating and submitting the agronomic and fruit trait data for registration purposes.

"Once finalised, these will be the first papaya varieties with PBR status and commercialisation partners will be invited."

Dr Fawad Ali, Research Fellow-Papaya Breeding and Genetics Centre for Planetary and Food Security

For more information on the 'National Papaya Breeding and Evaluation Program' (PP18000) please contact Dr Fawad Ali at ***fawad.ali@griffith.edu.au***.

In-field comparison between breeding lines F6 (left) and RB1

The 'National Papaya Breeding and Evaluation Program' (PP18000) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

CONTINUOUS CONSUMER USAGE & ATTITUDE & BRAND TRACKER (PILOT PROGRAM)

To complement the NielsenIQ Homescan 'Consumer behavioural data program' (MT21004) and upcoming 'Consumer demand spaces for horticulture' (MT21003) projects, Hort Innovation have partnered with FiftyFive5 over a five-year period to deliver a consistent approach to tracking consumer usage and attitudes.

This contract is the first of its kind for the research and development levy and consists of two types of modules, an:

- 'Always on' module: This includes a monthly usage and attitude survey that tracks all Fruit/Veg/Nut levies in order to understand key topics such as future purchase intent, type of meal occasion the industry is purchased for, how consumers are using the produce, who they are consuming it with, and more. By tracking industries over time, the Papaya industry will be able to understand how behaviours change throughout the year and therefore be able to unlock future growth opportunities and potential areas for further R&D research.
- 'Ad-hoc' module: These modules are incremental to the 'always on' module and allow for industry to further analyse a specific commodity to answer industry-related questions.

This investment will initially begin as a three-month pilot to test and measure core metrics with results being available to industry in the coming months.

For more information on this investment, please contact ***george.margin@horticulture.com.au***, Hort Innovation's Consumer Insights Manager.

The 'Continuous Consumer Usage & Attitude & Brand Tracker (pilot program)' (MT21201) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

NEW PAPAYA BIOSECURITY PLAN RELEASED

Plant Health Australia (PHA) completed the updated Papaya Biosecurity Plan late last year. Developed in conjunction with Papaya Australia, Hort Innovation, state and territory governments and leading scientific specialists, the new plan builds upon the previous Papaya Biosecurity Plan developed in 2011.

Biosecurity planning provides a mechanism for the papaya industry, government, and other stakeholders to assess current biosecurity practices and future biosecurity needs. The Papaya Biosecurity Plan outlines key biosecurity threats to the industry and highlights the risk mitigation activities the industry should adopt.

THE PLAN FOCUSES ON **FIVE KEY AREAS:**

1. **High priority exotic pests, and established pests of biosecurity significance**
2. **Threat identification and risk assessment**
3. **Risk mitigation and preparedness**
4. **Response management**
5. **Farm biosecurity**

Trevor Dunmall, PHA's Biosecurity Planning Manager, said as expected the suite of ***exotic fruit fly*** remains on the high priority pest list as these pests have the potential to impact both production and trade.

"Many growers will remember the incursion of Papaya fruit fly in the 1990's and the impact this incursion had on them and their businesses," Mr Dunmall said.

"Growers and their employees are at the forefront of managing pests and diseases and are often the first people to identify pests or disease symptoms they are unfamiliar with.

"Early detection and reporting of an exotic pest or pathogen provides the best opportunity for containment and eradication."

Growers are encouraged to report any suspicious symptoms to the Exotic Plant Pest Hotline on 1800 084 881. This will put you in touch with the relevant government department, wherever you are located.

For more information on papaya biosecurity, visit the PHA at: ***www.planthealthaustralia.com.au/industries/papaya***.

The 'Biosecurity plan for the lychee, papaya and passionfruit industries' (MT18006) project is funded by Hort Innovation using lychee, papaya and passionfruit industry levies and funds from the Australian Government.

INDUSTRY NEWS

Horticulture and Reef regulations

Many growers in the Great Barrier Reef Catchments would be familiar with Reef protection regulations for grazing, cane, and banana industries.

While there is an increased expectation for horticulture growers to reduce negative impacts to water quality coming off the farm, there is still some time before other horticulture industries will be regulated.

Here is what you need to know about the future of Reef regulations:

- Minimum practice agricultural standards for existing grains and horticulture production are proposed to start on 1 December 2024. Development of the standards has not commenced and will be done in consultation with industry.
- However, growers must apply for an environmental authority (permit) if starting new or expanding cropping or horticulture activities on five hectares or more of land that does not have a cropping history.
- Horticulture industries can demonstrate their stewardship through the Hort360 program implemented through Growcom.

Engaging with Growcom's Hort360 program not only ensures growers are recognised as good environmental managers, but can provide ideas about improved outcomes for farms as well as for water quality.

For more information, contact Tamaya Peressini on, ***Tamaya.peressini@daf.qld.gov.au*** or 0476 528 302.

Two-steps to achieve certification

1. **Complete the Reef Certification module**
2. **Then, if you want to be Reef Certified, undergo a formal audit process**

BENEFITS OF ACHIEVING REEF CERTIFICATION

Hort360 Reef Certification is entirely optional.

To reduce the administration burden for growers pursuing Reef Certification, the compliance criteria for Hort360 Reef Certification is aligned with Freshcare Food Safety & Quality and Freshcare Environmental. This allows growers to be audited for Hort360 Reef Certification at the same time as Freshcare.

Becoming Reef Certified is a quality, credible certification pathway for horticulture growers to demonstrate their environmental stewardship and industry best practice standards in Great Barrier Reef catchments.

TO FIND OUT MORE INFORMATION:

The Hort360 Reef Certification module can be completed as a self-assessment or with the support of a Growcom extension officer.

The program is entirely voluntary, and users say it helps identify potential risks and opportunities for their business.

To find out more about the program, please contact your local Hort360GBR extension officer if you would like to discuss the program:

- Phil Laycock – Far North Queensland – ***phillaycock@growcom.com.au***
- Luke Hargraves – Bowen / Burdekin – ***lhargreaves@growcom.com.au***
- Michelle Haase – Burnett / Mary – ***mhaase@growcom.com.au***

To access Hort360, please login or register at: ***https://www.hort360.com.au/***

Hort360: The best management practice program for horticulture

Growcom has developed a best management program for horticulture growers called Hort360, a computer-based risk assessment tool that gives a holistic view of farm business operations.

Covering key areas from business management to irrigation, Hort360 also includes a Reef Certification module for growers in the Great Barrier Reef catchment, affording them an opportunity to demonstrate environmental stewardship in their industry.

The Reef Certification module focusses on four key management practice areas that have been recognised as affecting a farm's profitability and water quality outcomes: nutrient, sediment, pesticide, and water.

Get connected: Meet Tam Peressini

Tamaya, or Tam, grew up in Cairns and is passionate about the future of farming in Far North Queensland. Her great interest in agricultural science and biology saw Tam study a Bachelor of Plant Science at the University of Queensland.

Tam found her passion for tropical horticulture working across vegetables, cocoa and banana research in South-East Asia and the Pacific. What she found most interesting was the variety of challenges that can affect farming businesses and how growers adapt.

Having previously worked for the Australian Banana Growers Council (ABGC), Tam enjoyed working with and learning from banana growers improving sediment and nutrient practices through the BMP program.

Since starting at the Department of Agriculture and Fisheries in March 2022, Tam has been learning the ropes in tree-crop agronomy. She is interested in working with industry to understand and improve nutrient management practices.

With input costs increasing, and growing expectations to improve water quality in catchments, Tam is keen to help the future of horticulture in the tropics remain profitable and sustainable.

Connect with Tam at: ***Tamaya.peressini@daf.qld.gov.au*** or 0476 528 302.

REGIONAL ROUND-UP

What's happening in papaya production?

CARNARVON, WESTERN AUSTRALIA – NIC CUTHBERT

Carnarvon has experienced heavy summer rains which has resulted in weed pressure for many producers who are still feeling the pinch of a reduced labour market.

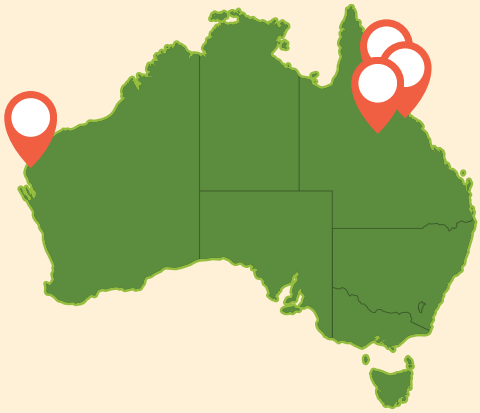
TULLY, QUEENSLAND – NICHOLAS MACKAY

The late wet season rain has been challenging for the papaya all round, affecting fruit quality and in field disease control.

Phytophthora continues to be the major disease issue affecting farm production on the coast. Some dieback has been noted in the recent weeks also.

Cooler, dryer weather is required to get the new plantings in on time and to better spread production throughout next year. The last few years have seen issues with acquiring labor (as seen in all agriculture sectors), however with the opening of borders and easing of restrictions we are more confident these issues will have less impact this coming year.

Wish everyone a great season!



TABLELANDS, QUEENSLAND – GERARD KATH

There have been no major changes in production in the last four months. With planting, there has been a minor increase by the major growers.

The wet season and winter so far have been very normal. No damage has been done from the wet and no cold yet to speak of.

The outlook is for an average winter production for the next two to three months, then a standard upsurge from September to December.

MARKETING AND SOCIAL MEDIA UPDATE

The Australian Papaya marketing program continues to drive awareness for Australian Papaya and engage consumers to start the weekend with a taste of the tropics via engaging content shared on social and digital media.

MEDIA PARTNERSHIP

The second burst of the media partnership is now live and includes recipes page branded takeovers, social media amplification of ***Taste.com.au*** video recipes and a feature in the In Your Kitchen Essentials.

SOCIAL MEDIA

The April social media activity resulted in 275,749 impressions and 3,558 engagements (excluding video views).

The highest reaching posts in April were both beautiful produce shots from the recent content shoot, accompanied by strong health messaging on the benefits of eating papaya.

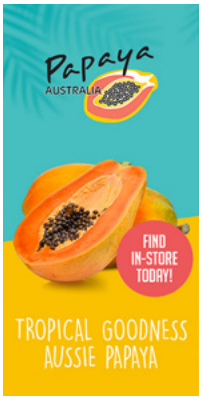
The top engaged Facebook post this month was a colourful Mexican papaya bowl (926 engagements, including 33 shares and 31 link clicks), while the highest engaging Instagram post was an image of papaya tiramisu (759 engagements, with a strong ER of 24%).

Other highlights include:

- Highest reaching ***Facebook*** post: 30,422 people reached, 34,408 impressions.
- Top engaged ***Facebook*** post: 926 engagements, 8% engagement rate
- Highest reaching ***Instagram*** post: 26,948 people reached, 30,607 impressions
- Top engaged ***Instagram*** post: 759 engagements, 24% engagement rate

Sharing tips and helpful information in post captions continues to assist driving strong awareness for Aussie papaya and its unique benefits inspiring fans to eat more of the fruit.

Fans love unique recipe ideas with exciting new ways to enjoy Aussie papaya with a tropical twist, and those which focus on breakfast and brunch.



CHECK OUT SOME OF THE NEW RECIPES ON SOCIAL:

Air Fryer French Toast

- Instagram: ***https://www.instagram.com/tv/CcEyKaYI_vL/?igshid=YmMyMTA2M2Y=***
- Pinterest: ***https://www.pinterest.com.au/pin/230246599690800666/***

3-Ingredient Papaya Smoothie

- Tiktok: ***https://www.tiktok.com/@taste.com.au/video/7088980698614271234***

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 10 - NOVEMBER 2022

Finding success in organic papaya production

Grower case study: Ben Abbott, Innisfail

Innisfail based brothers, Matt and Ben Abbott, have diversified their banana business into papaya production to help enhance the sustainability and profitability of their organic farming enterprise.

Already renowned organic banana farmers in the Innisfail area, the Abbotts were heavily impacted by Cyclone Niran which wiped out a large portion of their banana crop in 2021. This led them to explore alternative options to mitigate risk.

Innisfail grower, Ben Abbott

Though papaya is a challenging crop to grow, Ben said he was looking for some fallow options that would potentially reduce the nematode numbers for his next banana crop.

"We weren't sure whether we would be harvesting it, but so far, the papaya crop has been pretty good," Ben said.

Growing papayas organically has similar challenges to conventional production, but Ben said the solutions have become far more creative and effective.

"Since we started papaya production, we've been able to keep the leaf disease at bay. We have a couple of foliar organic products which have been effective to date," Ben said.

"Though we've been using some sulphur, mites have been a problem, and we had a pretty bad flare up about a month ago.

"Fertilising, however, has been okay. We have access to an organic liquid nitrogen, and plant our blocks at about a third of the density of conventional papaya. This has allowed crops to grow quite vigorously, so much so that I've had to cut back on the fertiliser. We've also been using some meat meal for phosphorus, but have now cut that back as well."

Marketing was one of the major barriers for the Abbotts in the beginning, with organic papaya being a relatively unfamiliar product in the major central markets.

"The markets were really slow to begin with, but they are starting to pick up a bit now," Ben said.

"Over the last few weeks our production dropped, and our agents have been really pushing us for more produce."

Ben said that there has been a lot of learning along the way, with post-harvest treatment being one aspect that has taken some working out for papayas.

"Running an organic enterprise, our only option is a hot-water dip. We've been in the market for a second-hand hot-water unit, but they're relatively hard to find," Ben said.

"We've had to get creative and find an alternative solution which currently seems to be working, but we are looking to improve. It's definitely a learning journey.

"While there have been moments where I've questioned whether papaya was a suitable crop for our business, I'm happy with how our systems are working and I'm looking to plant more into the future."

IN THIS ISSUE

This edition has been developed by Cox Inall and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

Welcome all, to this edition of the Papaya Press.

Spring is well and truly here, and Christmas is just around the corner. The year as always, is going far too fast.

Most growers will be very busy harvesting and setting up new blocks. The hot weather and early storms have created conditions for extreme plant growth and fruit ripening. As we all know, a lot can happen in a week at a papaya plantation, and the pest pressure, namely fruit spotting bugs and spider mites, are currently at their menacing best!

There is always constant change and challenges that growers must contend with. The latest is the increasing cost of production. Energy, in particular fuel, and labour are having an impact across the supply chain from freight, fertiliser, and chemicals to packaging and compliance. These are just some of the cost pressures that will affect growers' margins and ultimately be felt by consumers.

Growers are continually having to adapt to additional compliance such as increasing quality assurance audits, and ethical and environmental standards. All this change and uncertainty will be impacting grower confidence, which may lead to a consolidation of our industry. Time will tell.

I hear constantly that consumers feel that we're heading into uncertain times which can have an impact on purchasing habits. This is a result of domestic and global economics, political power tussles, and certain trends and agendas that seem unrelated to daily life.

Our most challenging time of year is just around the corner – the wet season. It has now been several years since we've had a major climatic issue, but the obvious concerns are cyclones which can devastate either the Coast or the Tablelands, as well as storm and hail damage.

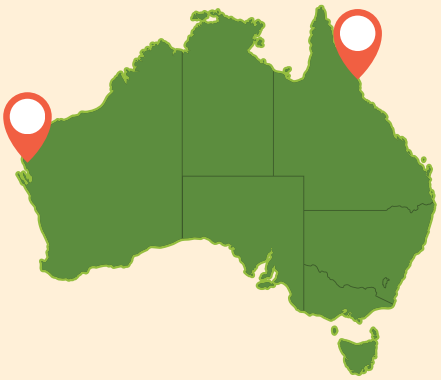
I wish everyone all the best for the upcoming weather season, as life and business are challenging enough without Mother Nature throwing any curveballs our way.

Until the next edition.

Best Regards,
Gerard Kath

REGIONAL ROUND-UP

What's happening in Tully and the west?



CARNARVON GROWERS ASSOCIATION, WESTERN AUSTRALIA

As we lead up into the warmer months, we are expecting above average rain this summer due to the return of La Niña. The growing season has gone well and we are looking forward to harvest.

TULLY, QUEENSLAND – NICHOLAS MACKAY

Papaya production held up well through the first months of winter with a late drop off in production through August.

The recent change in weather has seen production start to increase with the expected spring flush incoming.

Phytophthora disease had an impact this year with the extended wet weather through winter and remains the Coastal growing region's main disease concern.

Plantings this year have gone in earlier than usual and continued to the end of October as planned. We're expecting an increase in production area and improved yields through the use of virgin papaya ground for next year's crop.

Skybury develops test to detect Papaya Sticky Disease

Skybury Farms has been collaborating with Associate Professor Nitin Mantri from RMIT University in Melbourne to develop a simple and easy test to perform Lateral Flow Device (LFD) to aid in the detection of Papaya Sticky Disease (PSD).

This test will enable papaya growers to detect Papaya Meleira Virus (PMeV) both in tissue cultures, and in the field.

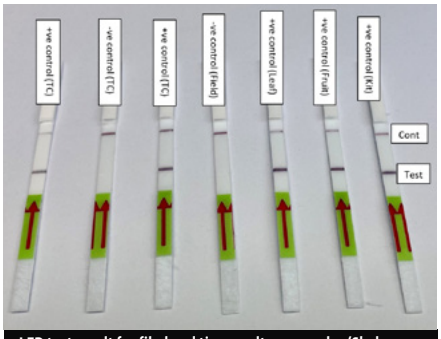
Though field demonstrations of the LFD method were delayed due to COVID-19 related travel restrictions, trials have been recently completed with excellent results.

Ian MacLaughlin, Chairman of Skybury Farms, said this novel, simple and reliable PSD detection technology will help to further accelerate the in vitro breeding of papaya.

"Skybury has an on-farm research and development facility and is currently undertaking research in papaya, passionfruit, avocado and other crops," Ian said.

In 2017, Skybury turned to clonal (tissue culture) plantings due to a shortage of suitable seed materials.

The shift to Tissue Culture and in vitro breeding improved productivity and accelerated selection of superior lines,



LFD test result for filed and tissue culture samples (Skybury lab, 13 September 2022). Top band (Control), bottom band (Test)

Skybury Lab demonstrating the LFD test (13 September 2022)

improving fruit qualities such as flesh colour, flavour, and sugar content.

"Around 2015-16, PSD caused by PMeV became a serious problem in Australia," Ian said.

"Co-funded by the Innovations Connection Grant from the Australian Government with a matching contribution from Skybury, Skybury Farms' R&D team decided to use a two-pronged approach to tackle this disease which included the development of a quick and easy to use assay to detect the pathogen from the field samples and production of disease-free planting material using in vitro technology."

In 2018, Skybury R&D Manager, Dr Puthiyaparambil Josekutty, in collaboration with Assoc. Professor Mantri developed an ultra-sensitive RT-PCR method to detect PSD in tissue culture, nursery, leaf, and fruit samples that enabled accurate testing for PSD and helped Skybury achieve PSD-free, clean papaya plant materials using in vitro breeding.

KEY INSIGHTS FROM THIS PROJECT INCLUDED:

- Firstly, the project team screened for PSD using real-time PCR based primers reported from Brazil and Mexico. These primers were not able to detect the Australian strain of PMeV so the genome of the virus was sequenced and probes specific for detection of Australian PMeV were developed.
- Over 500 tissue culture and 100 field samples were screened to determine the effectiveness of the real-time PCR based screening method.
- This test was also used to identify PSD-free papaya clones before they were planted at Skybury. The PMeV-free plants remained symptom free and productive for their life cycle and there was little evidence of cross infection from those plantings that had PSD symptoms.
- Then, a Recombinant Polymerase Amplification (RPA) LFD based test was developed to allow detection of PSD at room temperature, and with little laboratory facilities.
- The test was validated using over 100 field and tissue culture samples.

To build on these findings, the Skybury team is currently working on developing a more simplistic method, similar to the COVID-19 virus Rapid Antigen Test (RAT) where a drop of plant leaf extract can be directly mixed with the right probes to detect the presence of PMeV.

The take home message from Skybury is that industry-led R&D achieves results in a relatively short time and on a limited budget.

LEVY FUNDED PROJECT UPDATES

PAPAYA PRODUCTION FIGURES PROJECT UNDERWAY

The 'Papaya market supply data capture and analysis' (PP20003) project, led by Papaya Australia, has been collecting papaya industry production figures in the main growing areas of North Queensland.

This project aims to support papaya growers in making more informed decisions regarding their in-season and longer-term production and marketing.

Production figures are tallied to give a total number of both red papaya and yellow paw paw pallets sent from the Tablelands and coastal areas, and their destination.

To obtain the data, transport companies report the data which is then circulated on a weekly basis to all stakeholders, and a summary is given to transport companies who are involved in providing the data.

Papaya Australia Chair and project lead, Gerard Kath, said those who have been involved in the industry a long time will notice that these types of figures were collected around 25 years ago, and that it's the same template the banana industry has used to collect data.

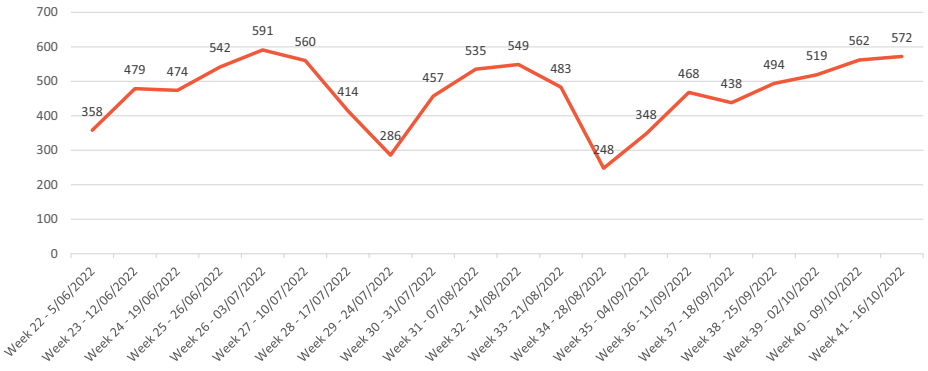
"We're not inventing the wheel here, but it provides very good insight into where the industry is at, and what the peak consumption is in a week," Gerard said.

"To date, the peak production has been 591 pallets for the week at end of June. This fruit was all sold and consumed, and it was in the cold time of year so it provides a good example of what can be done more regularly, particularly at this time of year.

"I would also suggest that over time, growers from different areas would be able to see production trends and thereby tailor their production systems to better align with market opportunities.

"This project is being delivered with the kind cooperation of the four transport companies who transport fruit from Far North Queensland. I would like to greatly thank Lindsay Transport, Bradco Transport, Followmont Transport and Exodus Transport, without whose efforts in providing figures, the project wouldn't be possible."

PAPAYA/PAW PAW PRODUCTION FIGURES 2022-2023



PAPAYA/PAW PAW CONSIGNMENTS – PALLETS SENT FROM NORTH QUEENSLAND

PERIOD: JULY 2022 TO SEPTEMBER 2022

	Red Coast	Red Tablelands	REDS TOTAL	Yellow Coast	Yellow Tablelands	YELLOWS TOTAL	OVERALL TOTAL
QLD	345	1970	2315	154	266	420	2735
NSW	680	913	1593	129	245	374	1967
VIC	451	363	814	25	73	98	912
SA	13	169	182	3	0	3	185
TOTALS	1489	3415	4904	311	584	895	5799

From July to September 2022, the total number of papaya and paw paw consignment pallets sent from North Queensland was 5,799, with 4,904 (84.6%) of these being of the red variety and 895 (14.4%) yellow. The majority of pallets were sent across Queensland (2,735), followed by New South Wales (1,967), Victoria (912), and South Australia (185).

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

BREEDING PROGRAM UPDATE

The 'National papaya breeding and evaluation program' (PP18000), led by Griffith University and funded through the Hort Innovation Papaya Fund, has now concluded the semi-commercial trials of the advanced generation red and yellow papaya breeding lines.

Included in the semi-commercial trials are the seed of the elite genotypes of F7 red papaya and F6 yellow papaya inbred lines across the two distinct agroecological climates – the Tablelands and Coastal regions in Tropical North Queensland, which contribute almost 85% of the papaya production in Australia.

Papaya breeder and Research Fellow from Griffith University, Dr Fawad Ali, said the advanced generation inbred lines of red papaya (F7 generation) are more cylindrical in fruit shape than commercial 'RB1'.

"The fruit of yellow papaya (F6 generation) breeding lines is pear-shaped than commercial '1B'," Dr Ali said.

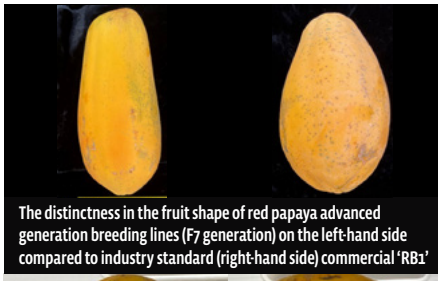
"Interestingly, we're seeing that the selected F7 red and F6 yellow breeding lines taste sweeter with higher Brix levels than commercial 'RB1' and '1B' and are easier to pick, pack and transport.

"The newly developed red papaya hybrids (F1 generation) belonging to PP18000, developed through sib-crossing, were included in the semi-commercial trials across the Tablelands and Coast, for evaluation to be completed next year in November 2023."

Fruit of semi-commercial trials will be harvested from November 2023 onwards. The program is expected to be completed by mid-2024.

For more information on the 'National Papaya Breeding and Evaluation Program' (PP18000), don't hesitate to contact Dr Fawad Ali at: ***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.



The distinctness in the fruit shape of red papaya advanced generation breeding lines (F7 generation) on the left-hand side compared to industry standard (right-hand side) commercial 'RB1'

The distinctness in the fruit shape of yellow papaya advanced generation breeding lines (F6 generation) on the left-hand side compared to industry standard (right-hand side) commercial '1B'

NEW PROJECT TRACKING CONSUMER USAGE AND ATTITUDES

Hort Innovation has made a foundational investment in the newly contracted 'Consumer usage and attitude tracking 2022/23' (MT21202) project.

Commencing mid-2022, this project is being led by market research company, Fifty-Five Five, and is expected to be completed by the end of July 2023.

The project will provide a category tracking service to allow various horticultural categories to understand better consumer usage and attitudes and the effectiveness of marketing campaigns.

The initial phase of the program is now underway, working to ensure that the continuous tracker runs effectively. This first phase Insights Report is set to be released in mid-December 2022.

The insights gained from this program will seek to answer:

- How do consumer trends and movements in behaviours, usage, and attitudes to fresh produce change over time?
- How do these trends and evolving expectations of consumers inform future demand opportunities for both the whole-of-horticulture, as well as individual industries?
- What perception metrics drive usage and purchase?
- What are the barriers to brand/category salience and purchase and how do we overcome these to drive future growth?

The project will also examine the effectiveness of Hort Innovation marketing campaigns to determine how salient they are in market, their impact on consumer usage, attitudes and future purchase intent, and how effective they are at driving messaging comprehension and enjoyment.

To keep up to date on the project, please visit: ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt21202/***

The 'Consumer usage and attitude tracking 2022/23' (MT21202) project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

FOODSERVICE FOUNDATIONAL MARKET INSIGHTS REPORT NOW AVAILABLE

The 'Foodservice foundational market insights' (MT21011) project has now come to an end, with its final report released in August.

Funded by Hort Innovation, the MT21011 project aimed to provide industry members with foundational market insights on the key foodservice channels identified within the project scope and high-level strategic direction regarding how ambitions can be actioned across all of horticulture.

A phased approach was used to deliver this project which involved identifying industry objectives, conducting macro insights analysis, unpacking customer and channel preferences, producing value chain maps, and seeking validation through stakeholder consultations.

Several reports were generated throughout this project. The key outputs are the Market Intelligence Report which includes a Category Snapshot Report that highlights key nuances and foodservice considerations for specific horticultural products, and a Market Insights Strategy that guides industry on how to engage with the foodservice sector, capitalise on identified opportunities and ultimately grow in prioritised commercial and institutional foodservice channels.

CATEGORY SNAPSHOT: PAPAYA FOODSERVICE FOUNDATIONAL MARKET INSIGHTS:

- Despite aligning with several foodservice trends, papayas are less commonly used throughout foodservice channels due to general category unfamiliarity.
- Papayas have the potential to grow in demand across foodservice, however, there may be challenges with institutional channels as they are highly cost-conscious.
- Restaurants and cafés do not widely use papaya since consumers do not generally associate the fruit with typical menu options in these channels.
- Enhancing marketing and education for desirable papaya characteristics and meal options can help improve papaya familiarity amongst consumers and drive demand in foodservice.

Download the final report via: ***https://www.horticulture.com.au/globalassets/laserfiche/assets/project-reports/mt21011/mt21011-final-report-complete.pdf***

The 'Foodservice foundational market insights' (MT21011) project has been funded by Hort Innovation, using the avocado, melon, mushroom, onion, papaya, sweet potato and vegetable research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

INDUSTRY NEWS

Papaya on display at Mareeba R&D Field Day

In July this year, Papaya Australia and members of papaya levy funded projects, participated in the inaugural Far North Queensland Growers R&D Field Day in Mareeba.

The event showcased a wide range of industries, bringing together peak industry bodies, growers, and broader industry stakeholders to network and share the latest in research, development, and extension.

Papaya Australia hosted a stand at the event, run by Sherri Soncin, who said the event was a great day, which provided a good opportunity to come together and share the latest resources and project updates direct with growers.

"I was joined by Phil Slocombe from Papaya Seeds Australia, Emily Pattison, horticulturalist and project coordinator of the 'Papaya industry extension and communications program' (PP20000) from the Queensland Department of Agriculture & Fisheries, as well as Fawad Ali, project lead of the 'National Papaya Breeding and Evaluation Program' (PP18000) from Griffith University," Sherri said.

"Between us, we covered a broad range of areas from spray techniques and information on papaya sex determination to the new levy funded production figures and breeding programs, and much more."

The Field Day started with the Hort Innovation Forum, where Papaya Australia Chair and Mareeba grower, Gerard Kath, had the opportunity to be a panellist alongside representatives from the mango, avocado and citrus industries.

During the session, current conditions and predicted outlook for the various production industries, as well as challenges and future opportunities facing the papaya industry were discussed.

Papaya Australia stand at the R&D Field Day


Gerard Kath speaking at the Hort Innovation Forum

Review your post-harvest disease management

Anthracnose and stem-end fruit rots are ongoing concerns for the Australian papaya industry, causing numerous fruit quality issues, particularly in the wet season.

To help control these issues across the supply chain, there are currently only two chemicals that are registered and permitted as post-harvest treatments which are Prochloraz (Tradename: Sportak) and Fludioxinil (Tradename: Scholar). Sportak is registered for application to papaya fruit as a post-harvest flood-spray whereas Scholar is permitted for application to papaya as a post-harvest flood-spray or dip.

Before Scholar was permitted, a study was conducted in 2013 by Robert Henriod, Yan Diczbalis and Daniel Sole, Queensland Department of Agriculture & Fisheries (DAF), through the 'Effect of curative and protective pre-harvest fungicide and post-harvest hot water applications on decay of papaya' (PP1300) project, a strategic levy investment under the Hort Innovation Papaya Fund.

This project sought to investigate alternative options for management of post-harvest diseases, including Sportak, Scholar and hot water, which resulted in Scholar being permitted.

THE TRIAL

The trial conducted through PP1300 investigated the below treatments on 1B papaya fruit from Innisfail, Queensland in April 2013:

- Ambient distilled water for 5 minutes (control)
- Hot water for 20 minutes at 48°C
- Hot water for 5 minutes at 52°C
- Scholar (260 ml/100 L) for 5 minutes at ambient temperature
- Scholar (130 ml/100 L) for 20 minutes at 48°C
- Scholar (130 ml/100 L) for 5 minutes at 52°C
- Sportak (55 ml/100 L) for 1 minute spray (commercial control)

In the trial, fruit was ripened with ethylene at 26˚C for two and a half days and then cooled to 14˚C for three days following treatment, to simulate the post-chain to get fruit to market shelves. The fruit was then placed at 23˚C to simulate the supermarket shelves and were observed daily for disease incidence, severity, and degreening.

Results found that ambient water provided very low protection against anthracnose and other diseases, while the best performing treatments were the Fludioxonil at high temperatures (52˚C and 48˚C), followed by hot water dipping alone at 52˚C for five minutes. The hot water dip at 52˚C did result in some delays in degreening penalties, however test fruits did reach about 95% yellow skin coverage by day three.

WRAP UP

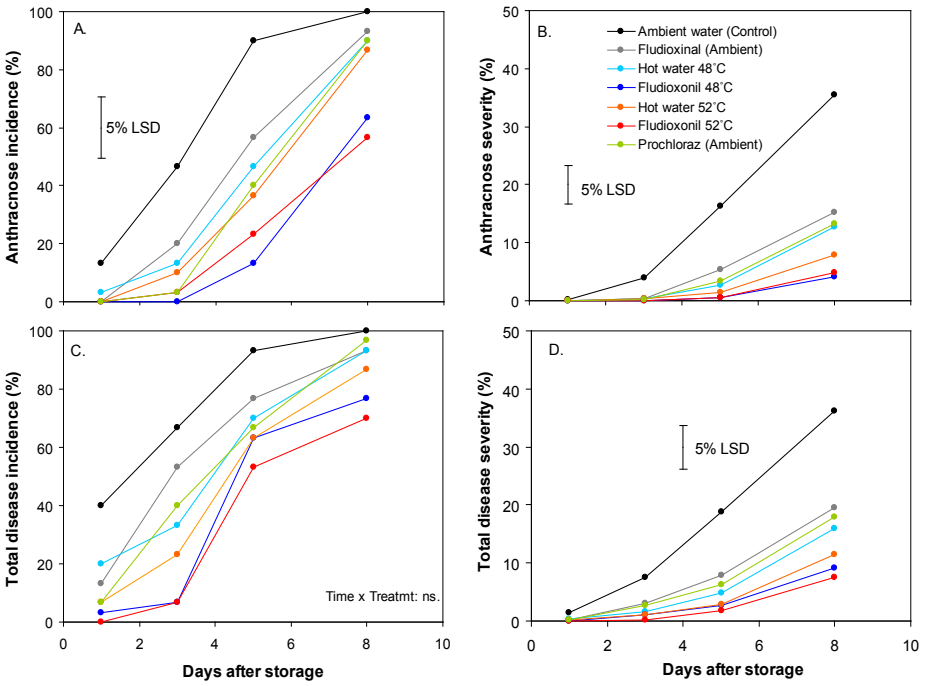
DAF project coordinator, Emily Pattison, said the positive results of Fludioxonil dips and hot water dips show great potential for improved post-harvest papaya fruit quality and potentially savings in terms of post-harvest chemical usage.

"But industry is still facing ongoing challenges around how to utilise existing packshed infrastructure and the practical difficulties implementing hot water treatments into papaya packsheds," Emily said.

"Hot water dipping is a standard practice in many other crops, such as mango. In these systems a half tonne picking bin is dipped in hot water for five minutes, usually in combination with Fludioxonil.

"With papaya, barriers to adopting a hot water dipping system exist largely due to the delicate nature of the fruit, and a need for minimal handling to avoid too much force being exerted onto the fruit by packing too many layers on top of it.

"Hot water sprays, as opposed to dips have also been explored, but there are several issues with sprays including the loss in temperature between the emittance and the fruit as well as coverage with the fruit. That said, hot water spray units have been developed for mangoes that have overcome these issues."



Effect of fungicide and hot water treatments on the (A) incidence and (B) severity of Anthracnose and (C) incidence and (D) severity of all diseases combined (total disease) on papaya fruit held over an 8 day shelf life. Fruit were initially ripened at 26°C for 2.5 days followed by 3 days at 14°C storage, and were then evaluated in a 23°C shelf life room for 8 days.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

REGISTER YOUR INTEREST TODAY

Through the 'Papaya industry extension and communications program' (PP20000), the Queensland Department of Agriculture & Fisheries is looking to run a papaya industry event, providing extension information on post-harvest disease management and hot water dip technology.

The upcoming papaya industry extension will include a tour of both mango and papaya operating packhouses in the Mareeba area, and will likely take place in the December to January 2023 period. If interested in attending, please text Geoff Dickinson on 0407 177 237 or email ***Geoff.dickinson@daf.qld.gov.au***.

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

Hort Innovation Strategic levy investment | PAPAYA FUND

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

HORT INNOVATION UPDATES

Papaya Fund Annual Report now available

Hort Innovation has released the 2021/22 Papaya Fund Annual Report.

The annual report maps out where key levy funds have been invested in 2021/22 and provides a rundown of new, ongoing, and completed research and development and marketing projects.

Top-level data from the Papaya Fund Annual Report shows that:

- 1.2 million Australian households purchased papaya in 2021/22
- $334,551 in levies were collected by the Government and passed on to Hort Innovation for investment
- Papaya production since 2012/13 has grown 44 per cent to 18,330 tonnes in 2020/21
- The value of papayas in the foodservice sector has increased 48 per cent compared to that of its pre COVID-19 value in 2018/19
- The majority of Australia's papaya production happens in Queensland (85 per cent), with the remainder grown in Western Australia and the Northern Territory.

The full Papaya Fund Annual Report can be downloaded here: ***https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/fund-annual-report-pdfs-202122/hort-innovation-far-papaya-2021-22.pdf***

Check out the Hort Innovation Company Annual Report for 2021/22, featuring each of the 37 industries that sit under the Hort Innovation umbrella here: ***https://www.horticulture.com.au/hort-innovation/funding-consultation-and-investing/investment-documents/fund-annual-reports/***

New Papaya Industry Strategic Investment Plan released

The new Papaya Industry 2022-2026 Strategic Investment Plan (SIP) has been released by Hort Innovation.

The Papaya SIP 2022-2026 provides a roadmap to guide Hort Innovation's investment in papaya industry levies and Australian Government contributions, ensuring investment decisions are aligned with industry priorities.

Learning, achievements and analysis of the previous SIP, consultation with Australian papaya levy payers, and synthesis of various strategic documents have been incorporated into the development of this SIP.

With input from the Papaya Industry Strategic Investment Advisory Panel (SIAP), the following four priority areas, outcomes and strategies have been identified:

1. **Demand creation** – Contribute to improving consumer knowledge, attitudes and purchase intent to drive volume growth
2. **Industry supply, productivity, and sustainability** – Improve industry productivity (inputs/outputs) to maintain competitiveness, viability and sustainability of supply
3. **Extension and capability** – Build capability and an innovative culture
4. **Business insights** – Measure industry supply (production) and demand (consumer behaviour) data and insights to inform decision-making.

The industry has continued to grow steadily year on year from a volume of 12,704 tonnes in 2012/13 to 19,648 tonnes in 2019/20. Production volume is expected to continue to grow at this rate over the next five years.

Access the Papaya Industry SIP here: ***https://www.horticulture.com.au/globalassets/hort-innovation/levy-fund-financial-and-management-documents/sip-2022-2026-pdfs/hort-innovation-sip-2022-26-papaya.pdf***

HORT INNOVATION ANNUAL GENERAL MEETING

The Hort Innovation Annual General Meeting (AGM) will be held on Friday, 25 November 2022.

Further details on the format and location of the event will be made available soon and shared with members in the official 2022 Notice of Meeting.

At this year's AGM, Hort Innovation members will use their voting entitlements to elect one or more Directors to the Board, and vote on other matters affecting the company.

Please find more information here: ***https://www.horticulture.com.au/hort-innovation/the-company/corporate-governance/agm-2022/***

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 11 - FEBRUARY 2023

Packhouse bus tour drives post-harvest inspiration

The Papaya Industry Post-Harvest Bus Tour was held on Thursday, 19 January 2023, as part of the 'Papaya Industry Extension and Communications Project' (PP20000).

Delivered by the project team at the Queensland Department of Agriculture and Fisheries (DAF), growers were invited to the Mareeba region to learn more about post-harvest disease control practices, particularly the use of hot-water treatments, which are common in the mango industry.

DAF project coordinator, Emily Pattison, said it was a great day, with twenty-seven participants attending the event at Skybury's Café (a place synonymous with fantastic coffee)!

"Growers were given the opportunity to learn more about the biology of anthracnose and other papaya post-harvest diseases and information from previous DAF papaya trials conducted with post-harvest hot water dips with presentations from Kathy Grice, DAF Plant Pathologist, and I," Emily said.

"Following this, growers went to Deb's Gold, a mango farm in Paddy's Green, where grower, John Nucifora, uses hot water spray as a post-harvest treatment.

"John's relatively new machine from K&W Automation was a hit, setting a gold standard for post-harvest treatment."

Next, the group attended Blue Sky Produce, where grower, Matt Fealy, was packing his Keitt crop. Matt showed the group his older hot-water spray machine, which had been built locally. Matt reported that he was delighted with the machine, and although it was nearly 20 years old, it was still doing a great job. Rising energy costs were of some concern for him using the hot water system.

To conclude the day, the group then visited the Skybury Papaya Pack shed, where grower, Mark McLaughlin, talked through Skybury's post-harvest process from receival to dispatch. Skybury uses an unusual float tank method, similar to banana pack sheds, to wash the fruit at the start of the packline. The fruit then passes on a conveyor through an in-line fungicide spray, at room temperature, before being dried and packed.

John Nucifora of Deb's Gold talking the group through his post-harvest treatment line

IN THIS ISSUE

Continued on page 3 ››

This edition has been developed by Cox Inall and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

Welcome to the first Papaya Press edition for 2023.

It's now halfway through the wet season, and conditions are already proving challenging.

The Tablelands and Coast have experienced exceptionally high volumes of rainfall for approximately 25 days straight. The Tablelands experienced 600 millimetres (mm) of rain in three weeks, with some coastal growers having as much as 600mm in a week.

This amount of rain will have consequences for crops in both the short and longer-term. I have heard of losses of up to 30%, with a potential loss of upward of 50%. The longer-term consequence is tree loss which will impact production over the next six months. To no surprise, this dramatically impacts growers' returns and will adversely affect consumer confidence.

But it is not all doom and gloom... The big positive has been the strength in the underlying demand for our products before Christmas and through to mid-January.

Typically, this period is not a good time for the fruit as it's usually impacted by short-season summer fruit, including mango, lychee, stone fruit, and cherries. However, extreme wet weather in southern Queensland, New South Wales, and Victoria heavily affected a lot of summer fruit.

Finally, thanks to everyone who came to the Mareeba Field Day for post-harvest treatment this month. There has been strong interest on the hot water treatment work that the Queensland Department of Agriculture and Fisheries has previously done. This work, combined with what the mango industry is doing, provided a good insight into what we are likely to have to do in the future to improve our fruit shelf life.

Congratulations to Emily Pattison, Geoff Dickinson and others for running this Field Day event. Special thanks must also go to John and Debbie Nucifora, Matt Fealy, and Mark McLaughlin of Skybury for making their properties available.

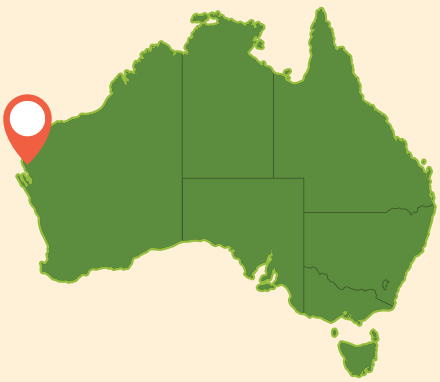
Take advantage of our next Field Day in Q3 of 2023. They are an excellent opportunity to explore new ideas and broaden one's outlook.

Here's hoping the rest of the wet is kinder than lately and the year pans out well.

Kind regards,
Gerard

REGIONAL ROUND-UP

What's happening in the west?



So far, Carnarvon has experienced a mild summer, but growers are still producing excellent crops. Labour shortages appear to be easing, with working holidaymakers drifting back through town.

We look forward to welcoming the industry to our region for the Carnarvon Growers Association's Field Day on 11 March 2023.

NIC CUTHBERT, CGA OPERATIONS MANAGER, CARNARVON, WA


Inspecting the inside of the post-harvest spray unit at Blue Sky Produce


The float system used by Skybury to help process fruit

Packhouse bus tour drives post-harvest inspiration

(continued from page 1)

"A wrap-up session and lunch concluded the event, which allowed growers to share their ideas and discuss what they had seen," Emily said.

"All growers enjoyed that bus tour format and rated it very highly, with 90% of growers also saying they were motivated to try something new in their operation.

"Who knows, maybe we even taught the mango growers a thing or two."

This event was run as part of the 'Papaya Industry Extension and Communications Project' (PP20000) which is funded by Hort Innovation, using papaya levy funds, co-investment from the Department of Agriculture and Fisheries and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Hort Innovation Strategic levy investment | PAPAYA FUND

GET CONNECTED: Meet Kaylene Bransgrove

Kaylene Bransgrove is a Senior Plant Pathologist at the Department of Agriculture and Fisheries (DAF) based in Mareeba, Far North Queensland.

As part of the plant pathology team in Mareeba, Kaylene works on a range of crops, including papaya, as part of the 'Papaya Industry Extension And Communications Project' (PP20000) led by Emily Pattison, DAF Project Coordinator, Mareeba.

Kaylene joined DAF in Mareeba in June 2022 from Brisbane, where she was employed as a plant pathologist with the University of Queensland and as co-curator of the Queensland Plant Pathology Herbarium in DAF. She has a background in plant pathology and diagnostics, mycology, botany, and taxonomy and has worked in Australia and the United Kingdom on various projects in these areas.

Kaylene graduated with a Bachelor of Science (Hons) in plant pathology at the University of Queensland, a Master of Science in taxonomy at the University of Edinburgh and is currently completing a PhD in fungal biodiversity at James Cook University in Cairns.

Kaylene is passionate about fungi and plant pathology in the papaya industry and the identification and taxonomy of powdery mildews.

Kaylene is looking forward to working more with industry to discover solutions for current and future industry issues.

Connect with Kaylene at: ***kaylene.bransgrove@daf.qld.gov.au***.


Kaylene Bransgrove, Senior Plant Pathologist, Department of Agriculture and Fisheries (DAF)

LEVY FUNDED PROJECT UPDATES

BREEDING PROGRAM

Semi-commercial trials of advanced red papaya and yellow papaya breeding lines are now underway on several farms in the Coastal and Tablelands regions of Tropical North Queensland.

The trials are part of the 'National Papaya Breeding and Evaluation Program' (PP18000), led by Griffith University and funded through the Hort Innovation Papaya Fund.

These trials will select new high-performing, agronomically superior, consumer-preferred papaya varieties.

Papaya breeder and Research Fellow from Griffith University, Dr Fawad Ali, said the three new red papaya lines are to be named 'Sunlight 1' and 'Sunlight 2' for the Coastal region and 'Sunlight 3' for the Tablelands region, all with significant trait genetic gains over the current standard red commercial variety 'RB1'.

"Sunlight 1 sets fruit 38% lower to the ground, with a 10% thicker trunk circumference and 10% more marketable fruit than RB1. Sunlight 1 produces preferred medium-sized fruit ~900g with a moderate aroma, and 20% sweeter than RB1 fruit," Dr Ali said.

Papaya Breeder Dr Fawad Ali (on the left) with Ying Benjarat Boonshoo, Manager Tissue Culture Lecker Farms, planted the selected lines at the semi-commercial trial site located at Lecker Farms

Selected lines planted at Lecker Farms

"Meanwhile, Sunlight 2 sets fruit 24% lower to the ground, with a 4% thicker trunk, and producing 12% more marketable fruit than RB1. The fruit is also medium-sized, ~1000g, with a moderate aroma and is 24% sweeter than RB1 fruit.

"Sunlight 3 sets fruit 49% lower to the ground, with a 15% thicker trunk, and producing 18% more marketable fruit than RB1. Additionally, Sunlight 3 produces ~950g sized fruit, with a moderate aroma and is 20% sweeter than RB1."

Dr Ali said the leading two new yellow papaya lines are to be named 'Moonlight 1' and 'Moonlight 2' and are both adapted to the Tablelands region.

"Moonlight 1 sets fruit 27% lower to the ground, with a 31% thicker trunk and produces 12% more marketable fruit than the current commercial standard variety '1B'. The fruit of Moonlight 1 is ~1200g with a moderate aroma and is 11% sweeter than 1B fruit," Dr Ali said.

"Moonlight 2 sets fruit 12% lower to the ground, with a 26% thicker trunk, producing 16% more marketable fruit than 1B. The fruit is ~1300g, with moderate aroma and is 9% sweeter than 1B fruit."

Fruit from the semi-commercial trials will be harvested from November 2023 onwards and used for seed bulking.

Stay tuned for the exciting results from these trials, further indicating trait gain stability and a call for commercialisation partnership, via tender, with Griffith University and Hort Innovation Australia.

For more information on the 'National Papaya Breeding and Evaluation Program' (PP18000), don't hesitate to contact Professor Rebecca Ford at: ***rebecca.ford@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.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

CONSUMER BEHAVIOURAL DATA

The 'Consumer behavioural data program' (MT21004) released its latest set of data in March 2022 which seeks to provide growers and supply chain partners with information and insights to support business decision-making and strategic activities for the wider industry.

Commencing in mid-2021, this multi-industry investment program is led by the global information service, NeilsonIQ and is expected to be completed in July 2026. It provides regular consumer behaviour data and insight reporting to a range of industries through the Harvest to Home platform (***www.harvesttohome.net.au***).

Data is updated every 12 months, with the next set of data to be published in mid-2023.

SNAPSHOT: 2022 CONSUMER BEHAVIOURAL DATA FIGURES

The most recent round of data was released in March 2022, with key papaya insights including:

MARKETING OVERVIEW

- In the 52 weeks (ending March 2022), papaya/papaw was in decline (-12.3%) in terms of dollars ($) and decline (-23.3%) in terms of volume (kg). Buying household percentage fell from 13% to 11%. The average spend ($) rose, from $23.87 to $24.58. The average weight purchased (kg) fell from 6.1kg to 5.5kg.

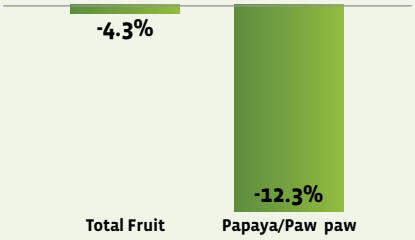
RETAIL OVERVIEW

- Looking at the dollar share of trade, major supermarkets comprised 47.3% of all papaya/papaw. Dollar sales for major supermarkets fell by 13%. Non-supermarkets comprise 35.9% of dollar share of trade, and their dollar sales fell by 17.4%.

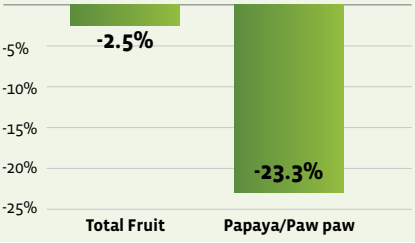
IN SUMMARY

- Recent activity shows that papaya/papaw was falling (-12.3%) in terms of dollars ($), while in decline (-23.3%) in terms of volume (kg).

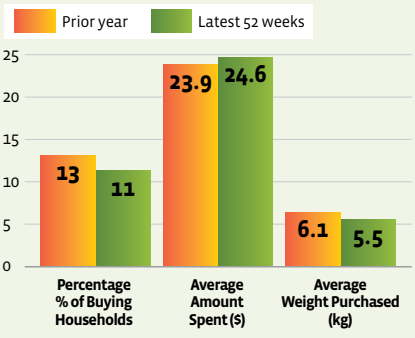
DOLLAR SALES ($) GROWTH VERSUS TOTAL FRUIT



VOLUME (KG) GROWTH VERSUS TOTAL FRUIT



HOUSEHOLD BUYING BEHAVIOUR



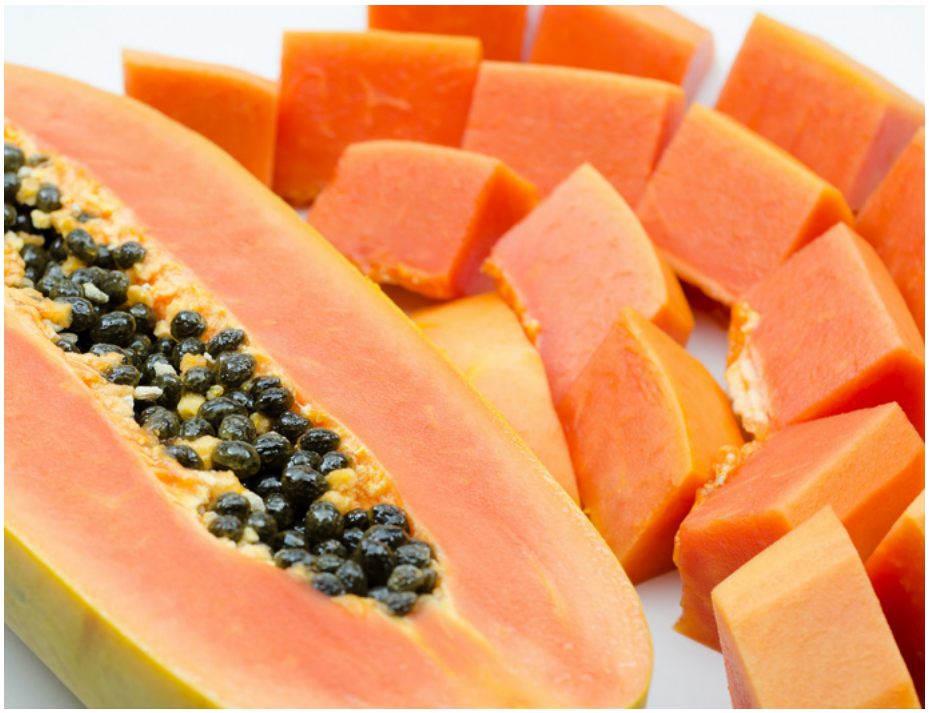
SOURCE: *NielsenIQ Homescan for the 52 weeks ending 27/03/2022 for the Australian market. Copyright © 2023 Nielsen Consumer LLC.*

This program is a part of Hort Innovation's Consumer Insights Strategy which focuses on building a detailed understanding of our consumers and the potential market opportunities for the horticulture sector.

For more information on the 'Consumer behavioural data program' (MT21004), head to: ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt21004/***

The 'Consumer behavioural data program' (MT21004) project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

Hort Innovation Australia have calculated this information based in part on data reported by NielsenIQ through its Homescan Service for the Papaya industry with data to 27 March 2022, for the Total Australia market, according to the NielsenIQ standard product hierarchy.



NEW PAPAYA PRODUCTION FIGURES AVAILABLE

The 'Papaya market supply data capture and analysis' (PP20003) project, led by Papaya Australia, has collected the second set of production figures for papaya in the main growing areas of North Queensland.

This project aims to support papaya growers in making more informed decisions regarding their in-season and longer-term production and marketing.

From July to December 2022, the total number of papaya and paw paw consignments pallets sent from North Queensland was 14,867, with 12,929 (86.9%) of these being of the red variety and 1,938 (13%) yellow. Most pallets were sent across Queensland (6,869.5), followed by New South Wales (4,905.5), Victoria (2,678), and South Australia (414).

Production figures are tallied to give a production overview of the tablelands and coastal areas. To obtain the data, transport companies report the total pallets sent to the main eastern seaboard markets, estimating the weekly production volume in tonnes, with the assumption that pallet weight represents approximately 800kg of fruit.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

PAPAYA/PAW PAW CONSIGNMENTS – PALLETS SENT FROM NORTH QUEENSLAND PERIOD: JULY 2022 TO DECEMBER 2022

	Red Coast	Red Tablelands	REDS TOTAL	Yellow Coast	Yellow Tablelands	YELLOWS TOTAL	OVERALL TOTAL
QLD	1060	4780.5	5840.5	304	725	1029	6869.5
NSW	1855	2351.5	4206.5	356	443	699	4905.5
VIC	1392	1079	2471	51	156	207	2678
SA	23	388	411	3	0	3	414
TOTALS	4330	8599	12929	614	1324	1938	14867

INDUSTRY NEWS

Soil microbial inoculants and sustainable agriculture

Farmers have access to 265 different biological products in Australia. Biological products aim to protect crops and retain production and are seen as "environmentally friendly" alternatives to chemical fertilisers and pesticides. However, the efficacy of many biological products still needs to be improved.

The global biological agricultural input market was valued at US$1.57 billion in 2018, with its application increasing, making it one of the fastest-growing industries. It is common for individual farmers to spend $600/ha annually on biological products.

WHAT ARE BIOLOGICAL PRODUCTS?

Biological products are biofertilisers, biostimulants and microbial inoculants (or bioinoculants).

- Biofertilisers tend to increase soil nutrition, particularly nitrogen and phosphorus, either by containing nitrogen, increasing organisms involved in nitrogen fixation or making nitrogen and phosphorus more available.
- Biostimulants enhance overall plant growth by increasing root growth or stimulating soil microbial activity and water-holding capacity, thereby enhancing plant tolerance and resistance to abiotic stresses.
- Microbial inoculants are bacteria and fungi introduced to perform a specific function, such as protecting plants from pests and diseases, stimulating plant growth, or helping with nutrient availability. Nearly half of the 265 biological products available to farmers are microbial inoculants, with many manufacturers not specifying the organism's activity.

WHAT TO DO BEFORE USING MICROBIAL INOCULANTS

1. Review the claims placed on the product:

- How realistic are the claims being made by the manufacturer, and can they be independently verified?

2. Consider the product's quality and the manufacturer's reputation:

- Is the product likely to contain the organisms in the quantity specified, and are the organisms likely to survive storage, shipment, and application methods?

3. Consider the farm's soil environment:

- Are soil conditions likely to support the introduction of a new organism?
- For example, some microbial products are selected from environments utterly different to the environment they are applying to. In general, conditions that favour crop growth are also suitable for microbial inoculants. That is neutral pH, adequate moisture, adequate organic carbon, good soil nutrient status and low salinity all favour microbial inoculants' establishment, function, and persistence.

METHODS

A decision aid has been developed with six questions to answer (***Table 1***), to help determine the likelihood microbial inoculant products will benefit production systems.

This table will provide a score and determine the level of risk to take around the product and the response rate of using microbial inoculant products.

TABLE 1: Decision considerations of the key factors on the likelihood of crop response to a soil microbial inoculant

Considerations	Response to consideration	Score*	Answer
Is there a likelihood of a response from the microbial inoculant?	Yes, worked previously	10	
	Unsure	5	
	No, failed previously	0	
Does the product claim to address a production problem on your farm?	Yes, the product claims to address my problem	10	
	I do not know if the product addresses a problem on farm	3	
	No, the product is not addressing a problem on my farm	0	
Can the manufacturer's claims be independently verified?	Yes, there is independent information available from a reliable source	10	
	There are good reports from other farmers	4	
	No, there is no supporting independent information	0	

Continued ››

TABLE 1 *(continued)*

What is the likely quality of the product?	High quality product from a reputable manufacturer and supplier	10	
	Manufacturer is unknown but supplier is reputable	5	
	Manufacturer is unknown and conditions of supply are questionable	0	
Is the existing microflora likely to inhibit the establishment of the microbial inoculant?	No, low number of low functioning soil organisms	10	
	Unsure of my soil microbial condition	4	
	Yes, high number of high function soil organisms	0	
Is the soil environment likely to support the establishment of the microbial inoculant?	Yes, soil moisture, organic matter, pH, and temperature are optimal for introduced microbes	10	
	Soil is in good condition, but some soil properties are not optimal	5	
	No, soil moisture, organic matter, pH, and temperature are sub-optimal for introduced microbes	0	
Total	**Maximum**	**60**	

** Suggested scores. Scores may be modified to fit individual situations*

Likelihood of outcomes from your scores	**Your appetite for risk**		
	High	**Moderate**	**Low**
High likelihood of seeing a response by applying the biological inoculant	>40	>46	>51
Moderate likelihood of seeing a response by applying the biological inoculant	25-39	30-45	45-50
Low likelihood of seeing a response by applying the biological inoculant	<24	<29	<44

CHALLENGES

New research techniques, such as DNA sequencing technology of entire soil and plant microbial communities, can help develop an understanding of how soil microbes interact with crops, like papaya, and with other soil organisms, such as Phytophthora. This information can help improve the effectiveness of microbial inoculants, knowing which products are likely to be most beneficial under different conditions.

One of the significant challenges facing microbial inoculant decision aid is the inconsistency in response. Adverse environmental conditions, inconsistencies in manufacturing and misleading claims can all lead to a disappointing response from the application of microbial inoculants.

Knowing when a microbial product is likely to work and when it isn't is an important part of moving microbial inoculants beyond the "snake oil" reputation. Understanding how soil organisms survive in soil in different environmental conditions may go part of the way to addressing this problem.

For more information, please contact Tony Pattison, Senior-Principal Nematologist, Soil Health Team Leader Department of Agriculture and Fisheries at: ***Tony.Pattison@daf.qld.gov.au***

ACKNOWLEDGEMENTS: *This work is based on the concepts developed by O'Callaghan et al (2022) Soil microbial inoculants for sustainable agriculture: Limitations and opportunities. Soil Use and Management 38, 1340– 1369.* ***https://doi.org/10.1111/sum.12811*** *and used the Decision Wizard, decision matrix concept as developed by Cam Nicholson, Nicon Rural Services, based on an idea from Barry Mudge* ***https://decisionwizard.sfs.org.au/****. This publication has been funded by the Australian Government through the Australian Centre for International Agricultural Research. The views expressed in this publication are the author's alone and are not necessarily the views of the Australian Government.*

Rainfall Role Reversal

An anomalous wet season in the North has seen Mareeba, traditionally much drier than the Coast, receive higher rainfall totals for January and much higher rain than the average January. See below for January totals and averages for areas around the Tablelands and the Coast.

	Mareeba TM	Mareeba Airport	South Johnstone	Innisfail Aerodrome	Tung Oil Alert (Upper Daradgee)	Tully Sugar Mill	Babinda PO	Euramo TM
Jan 2023	616.0	404.4	232.4	539.8	325.0	557.6	657.9	573.0
Jan avg.	228.6	229.2	522.9	610.1	551.1	604.6	646.2	435.3

As a result, Tableland growers can expect higher pressure from some of the pests and diseases which are generally more prevalent on the Coast, such as brown spot and higher levels of phytophthora. Control of post-harvest diseases is critical for this period. Extended wet seasons may cause decreased mite pressure.

Washed out crops in Mareeba (Photo: Skybury)

HORT INNOVATION UPDATES

Papaya Demand Plan

Hort Innovation has released its Papaya Demand and Marketing Plan for FY23 and FY24.

The Plan aims to support the consumption of Australian-grown papayas and increase purchases by motivating consumers to try papaya through new marketing activities.

The Plan outlines three consumer trends and implications expected in FY23 and FY24, including:

1. Proudly local

- Consumers want to support local farmers and areas, contributing to local communities and states.
- ***Implications:*** Opportunity to showcase where papaya comes from, farm-to-plate stories.

2. Nourish and Nurture

- The Government recommends two serves of fruit a day per person.
- 51% of Australians don't eat the daily recommended quantity of fruit.
- Papayas contain high levels of antioxidants vitamin A, vitamin C, and vitamin E and offer many health benefits
- ***Implications:*** Opportunity to highlight the health benefits papayas provide.

3. Make it easy at mealtimes

- Working from home means people grab and go from whatever is in the fridge; rarely is lunch purchased. Breakfast and dinner play a bigger role.
- ***Implications:*** Use images to show convenient quick and easy meal solutions.

INDUSTRY PRIORITIES

Based on the consumer trends, the Plan outlines the below industry priorities for FY23 and FY24:

- Recruit new consumers, such as families, main grocery buyers
- Use influencers to test their impact in channels papaya doesn't have, such as TikTok and WeChat, to broaden reach and engagement.
- Pitch to key consumer trade publications/digital channels, such as Woolworths Fresh, Coles Mag, Harris Farm etc.

MARKETING UPDATE

The new Papaya Fund marketing campaign for FY23 and FY24 aims to motivate consumers to try papaya by appealing to them with what they taste like, how to use the fruit, and how to choose.

KEY ACTIVITIES FOR THIS CAMPAIGN

- Social sponsored posts (including influencer content for third-party endorsement/reach expansion on TikTok)
- Media relations (hampers around key flush periods). Push the FY24 Nutrition Report as a new hook
- Website refresh (make it a destination for media and influencers for papaya education/ inspiration).

The campaign's success will be measured through social media impressions, level of engagement and click-through and publication reach and click-through rates to the Papaya Australia website.

Make sure you look out for new social media content, a website refresh, media relations activity, and much more.

SOCIAL MEDIA

The highest-reaching post in January was a no-bake vegan papaya cheesecake recipe promoted on Facebook. This delicious recipe achieved 1300 likes, 165 comments, and 151 shares.

Papaya Australia's social media activity continues to attract and engage consumers with regular postings across Facebook (***facebook.com/papayaaustralia***) and Instagram (***instagram.com/papayaaustralia***).

These marketing activities have been funded by Hort Innovation through the papaya marketing levy.

No-bake vegan papaya cheesecake

LAUNCH of the Australian Horticulture Statistics Handbook

On 28 February 2023, Hort Innovation is holding a launch event for the Australian Horticulture Statistics Handbook 2021-22 to 2023-24 (HA18002).

The Handbook offers the most comprehensive and contemporary data available on all sectors of the Australian horticulture industry in one easy-to-use guide.

The Handbook features information drawn from several supply chain sources, including international trade statistics and industry peak bodies. It includes data on more than 70 horticultural products including fruit, nuts, vegetables, nursery, turf, and cut flowers.

This launch event of the 8th edition of the Handbook will arm participants with the most up-to-date insights and trends pertinent to business and research and development decision-making.

The speakers include Lucy Noble, Industry Analyst at Hort Innovation and Martin Kneebone, Managing Director at Freshlogic.

The launch event will cover the following:

- How the Handbook data is compiled
- Key performance metrics for the sector over 2021/22
- Review of performance trends over the last ten years of time series Handbook data
- How the data is applied to add value for key stakeholder groups.

Date: 10.30 am – 11.30 am AEST, Tuesday, 28 February 2023

Register: ***https://horticulture-au.zoom.us/webinar/register/WN_mfD5SAO4RqSWnDKfz8P5pA#msdynttrid=81DL5Kr-tWEa5X33DG3zAe7cdQGge9TlhUQuoaJ1_so***

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 12 – JUNE 2023

Inducted into air induction

Case Study: RMC Farming, Cowley Beach, Queensland

It marks a year since the Oldano family of RMC Farming hosted the Papaya Industry Spray Workshop on their papaya and sugarcane farm as part of the three-year *'Papaya industry extension and communications program' (PP20000)*. In that time, Michael Oldando and his two sons, Josh and Adam, have been anything but idle.

Organised by the Queensland Department of Agriculture and Fisheries (DAF), the workshop held in April 2022 demonstrated how air induction nozzles could be introduced into an orchard mister to help improve coverage on the top surface of the leaf to control pests and disease.

Since then, Michael has been looking into how air induction nozzles could be utilised in his sprayer set-up and has spent some time finding out how to get the most out of them.

"This past year, I have trialled an array of nozzles on my sprayers, in order to get the level of spray coverage I'm happy with," Michael said.

"I have improved my set-up by changing the number of air induction nozzles used, their orientation, and their spray quality."

Following trials, Michael has settled on a nozzle array that includes coarse-quality air induction nozzles and fine-quality traditional hollow cone nozzles.

Despite the effort in refining the set-up, Michael and his sons, Josh and Adam, are sure it's worth the time.

"We're all really happy with what we've developed," Adam said.

"We're getting good control of disease in the paddock, and so far, this year we've had a minimal breakdown at the market end. I would credit a lot of that to the spray coverage we're getting."

"One of the key pieces of feedback we'd have for growers who are pursuing air induction nozzles, is the necessity for excellent filtration in your systems," Michael said. "Air induction nozzles are more likely to block up. We needed to install an additional 80mm in-line filter as well as individual nozzle sieves."

Michael Oldano and his two sons, Josh and Adam

A follow-up assessment of spray coverage was conducted using UV paint dye in the mix, on the farm's tallest trees to confirm that there is good to adequate coverage across all key areas.

The assessment was completed by Emily Pattison, DAF project coordinator of *'Papaya industry extension and communications program' (PP20000)*, and industry experts Dave Doolan, Agronomist from GF Rural, and Allan Blair, DAF retiree, who specialises in air blast sprayers.

"From the assessment, we concluded it is incredibly important to have a combination coarse and fine droplet," Dave said.

"From a disease perspective, this level of coverage would be building up over repeated fungicide applications, so this shows that the Oldanos are getting excellent coverage with their current set-up."

Continued on page 2 ››

IN THIS ISSUE

This edition has been developed by Dentsu Creative PR and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

Welcome all, to this edition of the Papaya Press.

The year continues to throttle along at a full pace. The wet season is well behind us, and winter is fast approaching.

The southern parts of Australia are experiencing cold and wet conditions which doesn't favour strong demand for tropical fruits, while key production areas of Far North Queensland haven't had major colds yet, so production is still relatively high. This unfortunately could lead to greater supply with decreasing demand.

Recently, fruit rotting and short shelf life have been a bit of a problem for industry. I've seen in our own crop and heard reports from markets that Phytophthora and Anthracnose diseases have been the main cause of infection in fruit for consumers.

It goes without saying that growing conditions of late, being high rainfall and high-intensity sunshine, have greatly contributed to the disease pressures. Greater investment in pre and postharvest treatments, spoken about at the Mareeba Field Day, will be key to mitigating these pressures in the future.

Looking ahead, I do see and feel some dark clouds on the horizon. The value and demand for our product is driven by our ability to consistently produce good quality fruit all year round and consumers' spendable income, which is ever shrinking of late. The rising cost of living along with decreasing consumer confidence will influence our product demand and price. Time will tell.

Despite all of this, things are not all doom and gloom. I'm an optimist who believes in the long-term expansion and future of our sector.

Here's hoping that the time ahead will be kind to all. Until the next edition.

Best regards,
Gerard

Inducted into air induction

(continued from page 1)

Following the assessment, Michael Oldano said that the implementation process has been a really important journey.

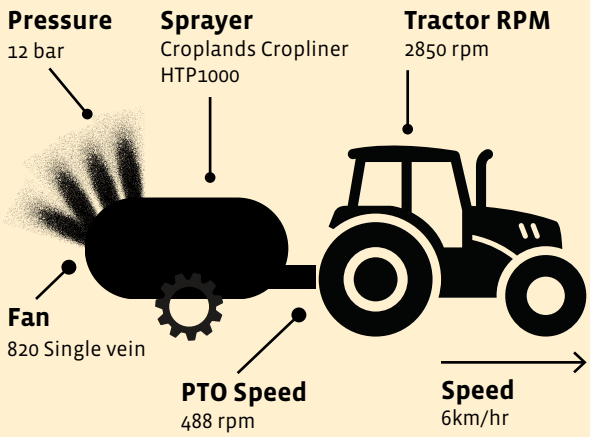
"I'm really happy with where we've landed with it, and I'd like to thank Graham Betts from AskGB, Dave Doolan from GF Rural, and Allan Blair for their assistance in providing expert advice throughout this process," he said.

For more information on air blast spraying please contact ***Emily.pattison@daf.qld.gov.au***.

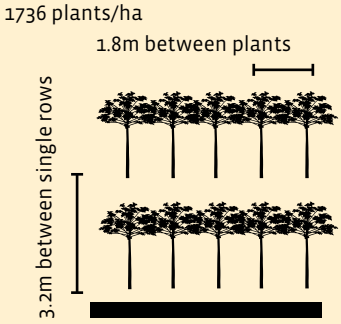
The 'Papaya industry extension and communications program' (PP20000) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

The Oldano sprayer set-up

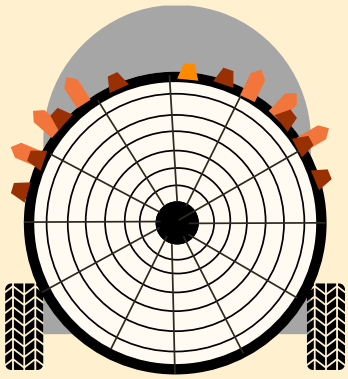
Equipment configuration



Paddock Layout



Nozzle layout



Lechler ITR 80-01
Air induction hollow cone nozzle
Orange
Droplet size in set-up: Coarse

Albuz ATR 80
Hollow cone nozzle
Brown
Droplet size in set-up: Very fine

Albuz ATR 80
Hollow cone nozzle
Orange
Droplet size in set-up:
Very fine to fine

Coverage Profile

Upper canopy

Upper surface

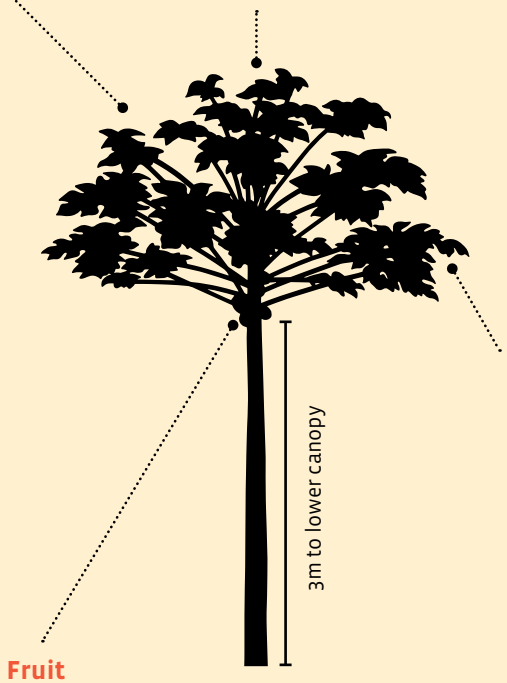
Good coverage due to coarser air induction droplets settling down

Lower surface

Hardest region to contact due to shielding from lower leaves. Reasonable coverage from fine droplets

Crown

Reasonable coverage in the crown, which is a difficult area to contact



Fruit

Fruit is generally exposed and prone to run marks from too much chemical. Some minor running, but generally good even coverage.

Overall

The coverage is generally excellent due to a balance of fine droples from the Albuz nozzles which provide coverage on the underside of the leaf and the coarser droplets from the Lechler air induction nozzles which settle back down onto the upper side of the leaf

Lower canopy

Upper surface

Some effect of shielding from the leaves above, but good coverage from coarse droplets

Lower surface

Excellent coverage primarily from fine droplets

Spray decision guide

Please find below an exhaustive list of in-field chemicals available to the papaya industry for pest and disease control.

Designed as a guide, this list aims to help inform spray decisions by presenting extensive options and is not to be solely relied on.

Please remember to always read the label and/or permit before making a spray decision and follow label directions.

TABLE 1: List of in-field chemical controls registered and permitted in Australia for use on papaya

ACTIVE	TRADENAME (S)	STATUS	TARGET PEST/DISEASE	NOTES
Abamectin	Stealth/Sorcerer	Registered	Two Spotted Mite	Available as either 18EC or 36EC
Acetamapirid & Pyriproxyfen (Double active)	Trivor	Permitted (PER89943)	Fruit Spotting Bug, Queensland Fruit Fly, Mediterranean Fruit Fly, Scale Insects, Mealybugs, Leafhoppers and Plant Hoppers	Permit expires 31-Jan-2024
Beta-cyfluthrin	Bulldock	Permitted (PER13671)	Fruit Spotting Bug Banana-Spotting Bug	Permit expires 30-Nov-2027
Bifenazate	Acramite	Registered	Two Spotted Mite	
Chlorothalonil	Cheers/Bravo	Permitted (PER12592)	Black Spot, Brown Spot	Available in 500g/L or 720g/L Permit expires 30-Apr-2025
Copper (Cupric) hydroxide	Champ/Kocide/ Vitra	Permitted (PER14417)	Papaya Fruit Rot	Available in 350DF, 350SC, 375WG, 400WG and 500DF Permit expires 31-Dec-2024
Difenoconazole	Digger/Score	Permitted (PER12592)	Black Spot	Permit expires 30-Apr-2025
Dimethoate		Permitted (PER87164)	Queensland Fruit Fly and Mediterranean Fruit Fly	Permit expires 31-Mar-2024
Dimethoate		Permitted (PER13859)	Orchard cleanup – fruit fly host crops following harvest	Permit expires 31-Jul-2024
Etoxazole	Paramite	Permitted (PER14098)	Two spotted mite	Permit expires 31-Mar-2028
Fenbutatin Oxide	Vendex	Permitted (PER14097)	Two spotted mite	Permit expires 31-Mar-2028
Maldison	Hy-mal	Permitted (PER1205)	Papaya Fruit Fly and Queensland Fruit Fly	Only to be used in Male Annihilation Technique Permit expires 30-Jun-2028
Mancozeb	Mancozeb/ Dithane Rainshield	Registered	Blackspot	Available as 750WG or 750DF
Metalaxyl	Ridomil/Zee-mil	Permitted (PER14490)	Phytophthora Root Rot and Pythium	Available as 480SL or 50G Permit expires 31-Mar-2027
Phosphorus Acid	Agri-fos	Permitted (PER14490)	Phytophthora Root Rot and Pythium	Available as 400, 600 or 625g/L Permit expires 31-Mar-2027
Propamocarb	Proplant	Permitted (PER91912)	Pythium	Available as 600 or 625g/L Permit expires 31-Dec-2026
Spinetoram	Success	Registered	Caterpillars (various)	
Spinosad	Entrust Organic	Registered	Caterpillars (various)	
Sulfoxaflor	Transform	Registered	Fruit Spotting Bug	
Tebuconazole	Tilt	Registered	Black Spot	Available in 800WG or 750WDG
Triadimenol	Bayfidan	Registered	Powdery Mildew	
Trichlorflon	Lepidex	Registered & Permitted (PER12450)	Fruit Spotting Bug (registered) and Queensland Fruit Fly and Mediterranean Fruit Fly (permitted)	Permit for QFly and Med Fly expires 30-Nov-2025

Powdery mildew update

A well-known disease of seedlings and fruit, powdery mildew is suspected to have undetected diversity in Australia. To better understand the disease and how to treat it, the Queensland Department of Agriculture and Fisheries (DAF) staff have begun to explore the number of species found in the major papaya-growing areas of Australia.

Papaya growers will be familiar with the white powdery growth on seedlings (stems and leaves) and scarring left on fruit from powdery mildew. To the naked eye, all powdery mildew looks the same and there are relatively few formal records of the disease to examine, so whether it's one species or many is unknown.

Understanding the species diversity will help to better understand the disease. This could unearth how varying species attack lines or growth stages, whether some affect seedlings or other fruit, and the biosecurity implications if there are species recorded overseas that are more aggressive than those already present in Australia.

Senior Plant Pathologist at DAF, Kaylene Bransgrove, has been collating and assessing records and literature on powdery mildew to compile a more accurate list of the genera and species found on papaya worldwide and to compare them with what is known in Australia.

"The main source of confusion is a long history of name (nomenclatural) changes for most species. This is normal for all organisms but can take a bit of time to sort out," Kaylene said.

"Worldwide, powdery mildew appears in up to six genera (*Erysiphe*, *Golovinomyces*, *Leveillula*, *Phyllactinia*, *Podosphaera*, *Pseudoidium*), and approximately twenty species are recorded on papaya.

"The records from Australia are a little leaner but indicate three genera are present (*Erysiphe*, *Leveillula*, *Podosphaera*), the earliest available record being a detection of *Erysiphe* in 1927. As there is virtually no native powdery mildew in Australia, it's highly likely all papaya powdery mildews

Continued on page 5 ››

POWDERY MILDEW UPDATE *(continued)*

have been introduced on imported papaya material or other hosts since colonisation."

In winter 2022, a small number of powdery samples were collected from seedlings prior to planting across two sites in the Mareeba area of the Atherton Tablelands, Queensland.

Microscopic view of powdery mildew cell structure

Severe powdery mildew growth on a papaya seedling

Kaylene said that an initial microscopic examination of the samples taken revealed that both were simultaneously infected by two different genera, one an *Erysiphe* and one a *Podosphaera*.

"Considering confusion in the literature around the species names and that DNA is usually needed to identify fungi to species, DAF extracted DNA from all samples, sequenced it, and conducted phylogenetic analysis," she said.

"As expected, this uncovered diversity of species. The species identified in the samples included *Erysiphe diffusa* and *Podosphaera xanthii*, both of which are commonly reported on papaya. However, there are two more samples that need further analysis and may represent genetic diversity within *Podosphaera xanthii* and *Erysiphe*.

"While exciting from a biodiversity point of view, further surveying needs to be done immediately in growing regions to find out what species are really present in Australia. It also indicates that herbarium specimens need to be re-examined using DNA technology to gain a more accurate understanding of the species recorded historically in Australia.

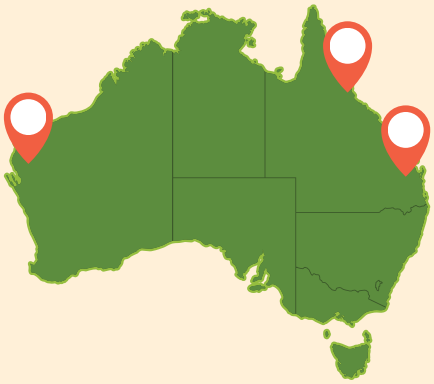
"Powdery mildew season is upon us!"

If growers see powdery mildew on plants or fruit at any growth stage, please get in touch with Kaylene, she'd be very grateful to receive samples.

Kaylene can be contacted at ***kaylene.bransgrove@daf.qld.gov.au***

REGIONAL ROUND-UP

What's happening in the regions?



CARNARVON GROWERS ASSOCIATION, CARNARVON, WA

Growers appear to have had a good season with some fantastic fruit coming off. As expected, we're finding the weather starting to cool off.

TULLY, QUEENSLAND – NICHOLAS MACKAY

It has been a smooth start to 2023, in terms of papaya volume and quality, except for some post-harvest break-down issues mostly related to weather.

The Tully region has not seen large amounts of rain this year but it has been consistently wet, contributing to higher disease pressures on farms.

Looking into the cooler winter months, growth and production are expected to slow significantly and disease pressure on the coast should ease.

Planting for 2024 production has had a great start and will continue throughout the dry period. A strong focus this year is to flatten the production curve coming off farms for a more consistent supply to markets.

INNISFAIL, QUEENSLAND – BOOLABAH FARMS

The Innisfail region can start to focus on planting the next crop now that the puddles around our ankles are starting to disappear.

Despite the recent levels recorded in some rain gauges, the wet season has been mostly kind to us, with extended periods of sunshine allowing our boots to dry out.

War has been declared on African spider mites. Allied farmers have begun to finetune our weaponry and tactics to tackle this foe head-on, with deadly spray nozzles and expert advice from the war council.

If you don't hear from us in the next issue, the mites have won.

LEVY FUNDED PROJECT UPDATES

CHARACTERISING THE FLAVOUR PROFILES OF NEW PAPAYA BREEDING LINES

Consumer surveys, chemical analysis and genetic analysis will soon be undertaken on Australian and international papaya varieties, including the new breeding lines, to determine which varieties are preferred by domestic consumers.

The trials will be undertaken through the *'National papaya breeding and evaluation program' (PP18000)* and *'Genetics of Fruit Sensory Preferences' (AS19003)* research projects, led by Griffith University and funded through the Hort Innovation Papaya Fund.

The predictive chemical models and genetic tests developed by these projects will allow for the characterisation of fruit flavour without requiring extensive consumer surveys.

PhD Researcher, Joshua Lomax, said the first step is to understand what compounds in the fruit are responsible for the different tastes and aromas experienced by consumers.

"Our sensory panel characterisation at the University of Queensland facility in Brisbane involves training members of the public to taste and describe papaya varieties over multiple days. Participants receive flavour references to help accurately describe the fruit's taste, aftertaste, aroma, and texture," Mr Lomax said.

"At the Griffith Analytical Facility, we measure the concentration of specific sugars and aroma compounds in each fruit to link them to corresponding taste and aroma intensities.

"Understanding the flavour and chemical profiles of different papaya varieties will help inform future consumer preference surveys and help us explain why consumers prefer specific varieties."

Two sensory characterisation panels were held in August 2022 and February 2023 using papayas from Rocky Top Exotics and Lecker Farms. Session one included 1B, RB1, Solo, Holland, Tainung No. 2, and advanced yellow breeding lines such as 'Moonlight 1' and 'Moonlight 2', and session two featured RB1 and advanced red breeding lines including 'Sunlight 3'.

In session one, Moonlight 1 and 2 were rated as the sweetest and juiciest with a flavour like Solo and Tainung No. 2. In session two, Sunlight 3 was rated similarly sweet to RB1 but had lower aroma intensity.

Mr Lomax said at the next sensory characterisation panel in November 2023, they will evaluate the next generation of red and yellow breeding lines, including Sunlight 1 and 2, which will coincide with the availability of fruits that are part of the semicommercial trials of the new breeding lines.

"To maximise the nature of these trials, we also plan to conduct a large-scale consumer survey that will be accessible through a QR code sticker attached to each fruit sold in major supermarket retailers," Mr Lomax said.

"The survey will help us determine which varieties are preferred by consumers. Surveys will be conducted in-person for each variety, and we'll be seeking support from stakeholders in helping to promote the in-store survey through social media, print advertisements, and partnerships with retail vendors."

With increased participation, the project hopes to better understand consumer preferences and use this information to improve future breeding efforts.

For more information on the *'Genetics of Fruit Sensory Preferences Program' (AS19003)*, contact Josh Lomax at ***josh.lomax@griffithuni.edu.au*** or Dr Ido Bar at ***i.bar@griffith.edu.au***; and on the 'National Papaya Breeding and Evaluation Program' (PP18000) contact Prof Rebecca Ford at ***rebecca.ford@griffith.edu.au*** or Dr Fawad Ali at ***fawad.ali@griffith.edu.au***.

Hort Innovation Strategic levy investment | PAPAYA FUND

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

CONSUMER BEHAVIOURAL DATA

The 'Consumer behavioural data program' (MT21004) released its latest set of data in March 2023, seeking to provide growers and supply chain partners with information and insights to support business decision-making and strategic activities for the wider industry.

Commencing in mid-2021, this multi-industry investment program is led by the global information service, NeilsonIQ and is expected to be completed in July 2026. It provides regular consumer behaviour data and insight reporting to a range of industries through the Harvest to Home platform (***www.harvesttohome.net.au***).

Data is updated every 12 months, with the next set of data to be published in mid-2024.

SNAPSHOT: 2022 CONSUMER BEHAVIOURAL DATA FIGURES

The most recent round of data was released in March 2023, with key papaya insights including:

MARKETING OVERVIEW

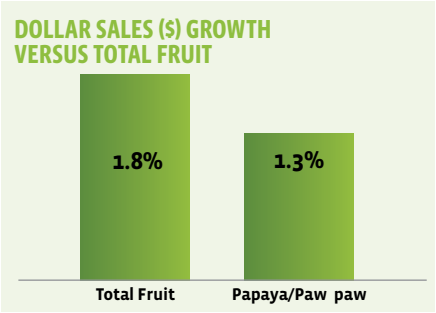
- In the 52 weeks (ending March 2023), papaya/paw paw saw positive growth (1.3%) in terms of dollars ($), and growing quickly, at 7.1% in terms of volume (kg). The percentage of buying households rose from 11% to 12%. The average dollar spend fell from $24.21 to $22.76. Papaya/paw paw remained unchanged in terms of average weight purchased (kg).

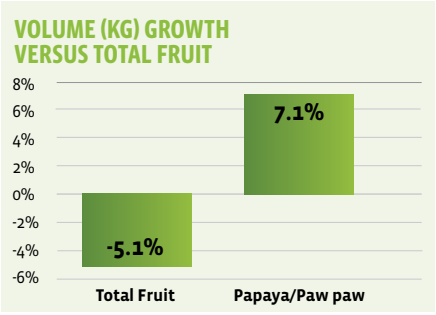
RETAIL OVERVIEW

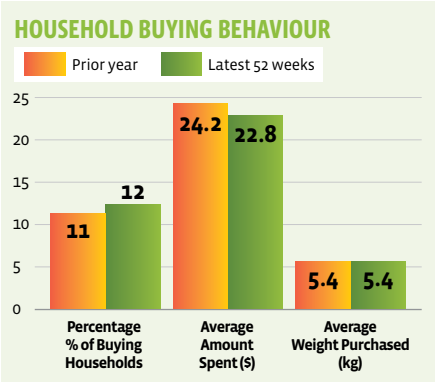
- Major supermarkets comprised 47.8% of all papaya/paw paw sold and showed a change of 0.6%. Non-supermarkets comprised 37.5% of dollar share of trade, and their dollar sales rose by 8.3%.

IN SUMMARY

- Recent activity shows that papaya/paw paw were staying constant at 1.3% in terms of dollars ($), while rising fast, at 7.1% in terms of volume (kg).







SOURCE: *NielsenIQ Homescan for the 52 weeks ending 26/03/2032 for the Australian market. Copyright © 2023 Nielsen Consumer LLC.*

This program is part of Hort Innovation's Consumer Insights Strategy which focuses on building a detailed understanding of our consumers and the potential market opportunities for the horticulture sector.

For more information on the *'Consumer behavioural data program' (MT21004)*, head to: ***https://www.horticulture.com.au/growers/providing-access-to-valuable-data-via-the-harvest-to-home-platform/***

The 'Consumer behavioural data program' (MT21004) project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

Hort Innovation Australia have calculated this information based in part on data reported by NielsenIQ through its Homescan Service for the Papaya industry with data to 27 March 2022, for the Total Australia market, according to the NielsenIQ standard product hierarchy. Copyright © 2022, Nielsen Consumer LLC.

Data released on consumer usage and attitudes

The first phase of the Insights Report has been released as part of the *'Consumer usage and attitude tracking 2022/23' (MT21202)* project.

Commencing mid-2022, this project is being led by market research company, Fifty-Five Five, and funded through Hort Innovation.

At its conclusion, the project will provide a category tracking service to allow various horticultural categories to better understand consumer usage and attitudes and the effectiveness of marketing campaigns.

The program's initial phase ran for three months to ensure the continuous tracker runs effectively, after which a longer-term program will be put in place.

KEY INSIGHTS FROM THE REPORT INCLUDE:

- 13% of consumers love to eat papaya, however this figure is well below key competitors' such as bananas (55%), mango (51%) and berries (63%).
- 50% of consumers who had recently eaten papaya were very satisfied, which is higher than the rating by those who had recently eaten key competitors, mango (47%) and berries (47%), and is in line with bananas (50%).
- 32% of consumers who had eaten a papaya recently strongly agreed that they were worth what they paid, which again is higher than the rating by those who had recently eaten key competitors' mango (30%), berries (26%) and banana (28%).
- Consumers consider papaya as healthy, unique, and exotic. 62% of consumers perceive papaya as healthy versus the average of all fruit at 54%.

The project is expected to be completed by the end of July 2023.

The 'Consumer usage and attitude tracking 2022/23' (MT21202) project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

NEW PAPAYA PRODUCTION FIGURES AVAILABLE

Papaya Australia has released the third set of production figures from North Queensland's main papaya growing areas under the *'Papaya market supply data capture and analysis' (PP20003)* project.

From July 2022 to April 2023, the total number of papaya and paw paw consignment pallets sent from North Queensland was 21,494, with 18,708 (87%) of these being of the red variety and 2,786 (13%) yellow. Most pallets were sent across Queensland (10,002), followed by New South Wales (6,998), Victoria (3,906), and South Australia (588).

The aim of this project is to assist papaya growers in making better production and marketing decisions during the growing season as well as in the long run.

Production figures are tallied to give a production overview of the Tablelands and coastal areas. To obtain the data, transport companies report the total pallets sent to the main eastern seaboard markets, estimating the weekly production volume in tonnes, with the assumption that pallet weight represents approximately 800kg of fruit.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

PAPAYA/PAW PAW CONSIGNMENTS – PALLETS SENT FROM NORTH QUEENSLAND
PERIOD: JULY 2022 TO APRIL 2023

	Red Coast	Red Tablelands	REDS TOTAL	Yellow Coast	Yellow Tablelands	YELLOWS TOTAL	OVERALL TOTAL
QLD	1629	6589	**8218**	621	1163	**1784**	**10002**
NSW	3031	3135	**6166**	412	420	**832**	**6998**
VIC	2396	1343	**3739**	50	117	**167**	**3906**
SA	16	569	**585**	3	0	**3**	**588**
TOTALS	**7072**	**11636**	**18708**	**1086**	**1700**	**2786**	**21494**

HORT INNOVATION UPDATES

NEW Australian Horticulture Statistics Handbook released

The Australian Horticulture Statistics Handbook 2021-22 to 2023-24 (HA18002) was released for the papaya industry in late February.

The annual Handbook offers the most comprehensive and contemporary data available on all sectors of the Australian horticulture industry in one easy-to-use guide.

Information featured is drawn from several supply chain sources, including international trade statistics and industry peak bodies. It includes data on more than 75 horticultural products including fruit, nuts, vegetables, nursery, turf, and cut flowers.

The full Handbook is available on the Hort Innovation website at: ***www.horticulture.com.au/hort-stats-handbook***

The Australian Horticulture Statistics Handbook for the year ending 30 June 2022 is presented by Hort Innovation. It was produced by the multi-industry levy investment Australian Horticulture Statistics Handbook 2021-22 to 2023-24 (MT21006): ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt21006/***

CONSUMER METRICS:

18% of Australian households purchased papaya/paw paw, buying an average of **900g** per shopping trip.

KEY INSIGHTS on the papaya industry from the 2021-22 Handbook include:

- 18% of Australian households purchased papaya/paw paw, buying an average of 900g per shopping trip.
- In 2021-22 there were 16,772 tonnes of papaya/paw paw produced and valued at $35.4M with 2% sent to be processed.
- The wholesale value of the fresh papaya/paw paw supply was $41.6M, with $32.9M distributed into retail and $8.9M into food service.
- As a tropical fruit, red papaya and yellow paw paw production predominantly occurs in the north of Australia, in Queensland, as well as production in the Northern Territory and Western Australia.
- There are currently two main categories grown in Australia. These include red papaya, which accounted for 85% of fresh production and yellow paw paw, which accounted for 15% of fresh production.
- Australia is a net importer of fresh red papaya and yellow paw paw, typically importing between 20-130 tonnes per year. For the year ending June 2022, Australia imported 19 tonnes.
- For the year ending June 2022, 50% of exported fresh papaya/paw paw were sent to New Zealand.

NEW Papaya Australia website

Papaya Australia has now launched its new consumer website.

With a big focus on creating a positive user experience for consumers, the new website will be easy to navigate with clear and intuitive menus and navigation elements, and a fresh look and design to make it visually appealing and modern.

Funded by Hort Innovation using both the papaya research and development and marketing levy, improvements to the 'For Growers' section and the consumer side of the website are also currently underway.

To check out the new website head to: ***https://australianpapaya.com.au/***

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 13 - NOVEMBER 2023

Navigating industry shifts to achieve sustainable growth

GROWER CASE STUDY: Paul Fagg

Paul Fagg with staff at Skybury.

Across his 20-year career, Paul Fagg transitioned from a papaya picker to being a key figure in the marketing team of Skybury, one of Australia's largest papaya producers. Three years ago, he embraced new roles as first Marketing, and then HR Manager at the Jetbest Group, a national wholesaler and food service business.

Skybury, a three-generation family-owned farm spanning 600 acres at Paddy's Green just outside Mareeba, Queensland specialises in red papaya and coffee. With over 120 team members, Skybury manages a daily output of up to 70 pallets, catering to both national retailers and local customers through a partnership with Jetbest.

IN THIS ISSUE

LEVY INVOLVEMENT

Paul Fagg's engagement with the Strategic Investment Advisory Panel (SIAP) commenced in 2016 when he served as an observer. By 2018, he was formally accepted as a member of the SIAP, a role he still serves in.

"My primary motivation was to provide insights and support into marketing. Priorities for the SIAP traditionally emphasised growers (supply side issues), but I believed in a holistic approach, considering both supply and demand," Paul said.

"In my view, 'a rising tide floats all boats'. Addressing both demand and supply benefits the entire industry. I've particularly focused on boosting engagement in the food services sector, taking on advisory and evaluation roles to achieve this and having more meaningful engagement with Hort Innovation on how levy income is best spent.

"During my time on the SIAP, I've been able to leverage my marketing knowledge to enhance levy-funded projects, ensuring alignment with industry objectives.

Continued on page 3 ››

This edition has been developed by Dentsu Creative PR and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

As we approach the end of 2023, the weather is gradually warming and the air is becoming drier, leading to the arrival of fruit!

It's expected that from October through to December, we can anticipate a significant harvest. This winter has been relatively mild, providing favourable conditions for crop production. However, we must be cautious in not reaching an excessive weekly peak in volume, as this would inevitably lead to dwindling prices and narrower profit margins.

Fluctuations in supply and demand are commonplace in our industry, but the great unknown factor this time is how consumer demand will behave. We continually hear about the escalating cost of living crisis in Australia, and one can only assume that this will translate into reduced consumer demand and subsequently, lower prices.

Surprisingly, there is little evidence of deteriorating prices thus far. In fact, over the past two to three months, prices have soared to unusually high levels. Several factors may account for this unexpected trend, including:

- Industry has diligently worked to increase both the volume and quality of fruit over the past few years, expanding our consumer base.
- Our marketing strategies and heightened awareness of fruit quality have convinced more consumers to view papaya as an essential purchase rather than a discretionary one.
- The economic landscape may be starkly divided, with some enjoying disposable income while others must diligently budget to cover the essentials.

> *"It remains imperative that we continuously strive to increase the standard and consistency of fruit volume and quality to uphold and expand our demand base."*

There might be hidden factors contributing to these developments that escape our current perception (I am open to enlightenment). Regardless, it remains imperative that we continuously strive to increase the standard and consistency of fruit volume and quality to uphold and expand our demand base.

Now, let's talk genetics and the breeding program. This project is slated for completion early next year, and the results have been mixed so far. Some lines show promise, while others require further field testing. You can read more on this later in the current edition.

The overarching question for our entire industry as we approach the conclusion of this project is: what's next? Genetic improvement is not a straightforward quick fix, especially when we've already set a high benchmark with RB1 and other lines, and the parameters for the future differ significantly from what they were a decade ago when the current program was initiated.

While still in its research phase, our industry should continue to pursue genetic improvement because any crop that doesn't seek progress is bound to regress. In the year ahead, it's likely that growers will have several opportunities to voice their opinions and contribute to shaping the direction of future breeding programs.

I encourage all growers and industry observers to engage in these discussions to collectively drive forward our genetic advancements. Until next issue.

Best regards,
Gerard Kath

(Continued from page 1)

Navigating industry shifts to achieve sustainable growth

"With a whole-industry perspective, I've actively engaged in diverse projects, across both the Papaya Fund and cross-category projects, such as Hort Innovation project, Foodservice foundational market insights project, which examined how nine fruit categories could better engage with the food service sector.

"The main outcome from this project was highlighting ways papaya can open up new market opportunities beyond the traditional retail sector.

"We have also seen a shift in connecting the grower with the consumer. Telling the grower's story raises awareness and demand in the mind of the consumer."

INDUSTRY TRENDS AND CHANGES

Over Paul's 20-year career, he has seen significant shifts in the industry.

"Traditionally, papaya suppliers operated in distinct summer and winter phases. However, a united effort has now secured year-round consistency of supply, prioritising reliability and availability," Paul said.

"Recent times have seen substantial investments by larger growers, with a firm focus on avoiding supply fluctuations to ensure stability in the market.

"Another notable change is the surge in popularity of red papaya. A decade ago, the industry primarily focused on yellow pawpaw, but today, red papaya accounts for a substantial 85% of Australia's production, marking a fundamental and enduring shift, providing exciting opportunities for the future of our industry."

ADVICE FOR FUTURE GROWERS

Throughout his career, Paul learned that change is a constant, which was especially evident during the COVID-19 era.

"Australian agriculture continues to evolve, driven by changing market conditions, environmental influences, consumer demands, and more. Our industry is no different, demanding adaptability for its ongoing sustainability," he said.

"Collaborating with partners and keeping an open mind is invaluable. Working to understand and meet consumer preferences is paramount – with meeting their expectations and demand essential for successful sales.

"For those starting out in the industry, I'd advise against the misconception of papaya as an easy, quick-return crop.

"Seasoned growers know its challenges, so be sure to reach out to experienced growers for guidance. Their knowledge and lessons will arm you with the correct care and farming practises that need to be adopted to produce a successful papaya crop."

> *"Collaborating with partners and keeping an open mind is invaluable. Working to understand and meet consumer preferences is paramount – with meeting their expectations and demand essential for successful sales."*

GROWTH OPPORTUNITIES

The Australian papaya industry offers significant growth potential, given its current 12.6% household penetration rate.

"To capitalise on this, we must focus on increasing demand and securing a reliable supply chain, for the benefit of the entire industry, as well as new markets and value add products," Paul said.

"Tracking household consumer preference, purchases, and per capita consumption is crucial for growth, and growers play a pivotal role in this. I'd like to see our industry investing more in supply consistency and maintaining the delivery of a consistent, high-quality product. Collaboration among growers is key to unlocking the industry's potential.

"But growth doesn't stop at fresh consumption. There's a promising future in freeze-drying and health foods, offering benefits like extended shelf life, flavour and nutritional content retention, and versatile product applications."

Paul said that despite market, cost of production and environmental challenges, a key factor papaya has on its side is the fact that most of it is Australian grown.

"This helps to not only guarantee freshness and quality but promotes buying fruit locally which is more sustainable given the reduced travel from farm to plate. This also helps support Australian owned businesses, which speaks directly to an ever-growing health-conscious and eco-conscious consumer base.

"We must fully harness and leverage this unique selling point to drive our industry to even greater heights.

"With dedication and a holistic approach, we can navigate changing trends, embrace new opportunities, and together, cultivate a thriving future for this remarkable industry," Paul said.

INDUSTRY NEWS

NEW BIOSECURITY THREAT: PAPAYA MEALYBUG

Papaya mealybug (*Paracoccus marginatus*) has been detected in the Darwin area of the Northern Territory, with the initial case officially confirmed in July 2023.

Papaya mealybug is an exotic pest in Australia and has been classified as non-eradicable. While it is a significant threat to papaya in Asia, the Pacific Islands, and Hawaii, its impact is typically mitigated in its native Central America by natural enemies. The identification of this pest in Australia raises a serious concern for the commercial production of papaya, as it lacks its usual natural predators in this region.

Papaya mealybug has a wide host range, recorded in 25 plant families including hibiscus, avocado, citrus, cotton, tomato, eggplants, beans, peas, sweet potato, mango, cherry, and pomegranates.

Papaya plants face severe infestations primarily on the veins of older leaves and all parts of young leaves and fruit. The honeydew excretion leads to the development of sooty mold, covering leaves, stems, and fruit. In extreme cases, heavy infestations can result in the death of papaya trees within a few months.

A non-commerical papaya plant infected with a papaya mealybug in Darwin

IDENTIFY TROPICAL PESTS WITH PHA'S UTE GUIDE

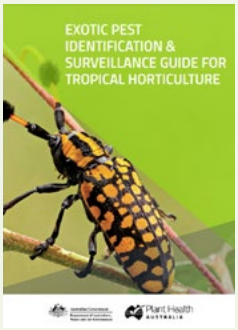
The risk of exotic pests and diseases entering and establishing in Australia is greater than ever with increased worldwide travel and trade, the geographical spread of pests, and the intensification of agricultural production.

The presence of several high priority exotic pests in countries in close proximity to papaya growing regions in northern Australia also increases the risk through spread by natural and assisted pathways.

This initiative is part of the Australian Government's *Agricultural Competitiveness White Paper,* the government's plan for stronger farmers and a stronger economy.

Dr Lucy Tran-Nguyen, PHA's General Manager: Partnerships and Innovation and project lead, said Northern Australia has a diverse range of plants, a sparse population, an extensive coastline and isolated growing regions. It's also close to neighbouring countries with high exotic pest populations. These combine to create specific biosecurity challenges.

To help improve biosecurity surveillance for tropical industries, Plant Health Australia (PHA), the national coordinator of the government-industry partnership for plant biosecurity in Australia, developed the *Exotic Pest Identification and Surveillance Guide for Tropical Horticulture.*



"The Exotic Pest Guide, funded by the Australian Government, also known as the 'Tropical Ute Guide', has been designed to fit in a ute's glovebox for easy identification on the go," said Dr Tran-Nguyen.

"Inspecting crops for signs of new pests is one way to protect Australia's plant industries from exotic pests, as early detection and reporting improves the chances of successfully containing or eradicating new pests.

"Papaya is one of the crops specifically covered, in addition to avocados, bananas, citrus, lychees, mangoes, melons, passionfruit, pineapples and tropical vegetables."

The guide is divided into two sections:

1. **The biosecurity and surveillance** section describes key aspects of on-farm biosecurity, how to undertake pest surveillance in the field and packing sheds, handling pest samples and reporting unusual finds.

   In case something unusual is spotted, there is information about what to do with samples of insect pests and diseased plant material, and how to report the find.
2. **The identification of key exotic pests** section provides information on the high priority exotic pests for several of the horticultural crops grown in northern Australia. The guide has been developed to increase awareness of these pests and provide information on what to do if a suspected pest is found, and the pest identification pages provide images of the pest or disease symptoms.

PHA also developed a *Biosecurity Plan for the Papaya Industry* to provide a mechanism for industry, government and other relevant stakeholders to assess current biosecurity practices and future biosecurity needs.

The document outlines key threats to the industry, risk mitigation plans, identification and categorisation of exotic pests and contingency plans. For a copy, please contact PHA on 02 6215 7700 or email ***biosecurity@phau.com.au***.

Visit the PHA website ***https://www.planthealthaustralia.com.au/industries/papaya/*** for more industry related biosecurity information and to download a copy of the *Exotic Pest Identification and Surveillance Guide for Pests of Tropical Horticulture* (***https://www.planthealthaustralia.com.au/biosecurity/surveillance/exotic-pest-identification-and-surveillance-guide-for-tropical-horticulture/***).

For the latest plant biosecurity news, ***subscribe*** to Tendrils and follow us on ***Facebook***, ***X (Twitter)***, ***LinkedIn***, and ***Instagram*** for the latest in plant biosecurity news.

Papaya mealybug infestation on fruit (Credit: Northern Territory Government)

In Darwin, the parasitic wasp (*Acerophagus papaya*) was discovered alongside some of these infestations. This parasitoid has been intentionally introduced into multiple countries dealing with papaya mealybug issues and has shown effectiveness in controlling the pest.

If you suspect papaya mealybug on your property report it to **Biosecurity Queensland** on **13 25 23 or** contact the **Exotic Plant Pest Hotline** on **1800 084 881**.

For more information on the pest, head to: ***https://ausveg.com.au/app/uploads/2022/07/Papayamealybug_FactSheet.pdf***

BIOSECURITY VEHICLE KIT

Movement between orchards, nurseries and other agricultural regions can quickly spread pests on clothing, footwear, and equipment. Skin and even hair can carry fungal spores or bacteria between properties.

Introducing a disease like Papaya Ringspot Virus *Potyvirus Strain P*, could cause devastating losses to the Australian papaya industry and farmers.

One of the easiest ways to protect your property and the papaya industry from pests and diseases is to use a biosecurity vehicle kit. The kit lets you clean down and implement hygiene measures while on the go.

A biosecurity vehicle kit should be carried and used by anyone working on-farm, such as agronomists, extension officers, farm staff, and seasonal workers and contractors.

The contents of a biosecurity kit can vary from farm to farm. Kits provide provisions to protect clothing against contamination and keep footwear and small equipment free of pests and pathogens.

The essential items should include products to clean hands, shoes, small equipment such as soil moisture probes, and vehicle interiors.

ESSENTIAL ITEMS INCLUDE:

- hard brush and pan to clean out the floor of the vehicle and to remove any soil from the foot pedals and shoes, clothes, equipment and vehicle tyres
- disposable gloves
- handwash or hand sanitiser
- spray bottle containing cleaning agents such as a detergent, BioCleanse, dilute bleach solution, or 70% methylated spirits in 30% water

Biosecurity vehicle kit

- paper towel
- hessian bag/mat
- plastic bags for holding dirty clothes, shoes or equipment
- plastic tub with lid or old esky (to carry items listed above and to use as a foot bath).

Factsheets on high-priority exotic pests for papaya can also be included as a ready reference – these are available on Plant Health Australia's (PHA) website here: ***https://www.planthealthaustralia.com.au/industries/papaya/***

The kit should include contact details for state agriculture departments to report suspected exotic pests and diseases. Smartphones have access to a camera, notetaking and GPS capabilities to take photos of suspect signs and pests and mark the location, with the information recorded being easily shared.

Visit the Farm Biosecurity website (***https://www.planthealthaustralia.com.au/national-programs/farm-biosecurity-program/***) for more information on securing your farm against pests and diseases. If you spot anything unusual, call the **Exotic Plant Pest Hotline** on **1800 084 881**.

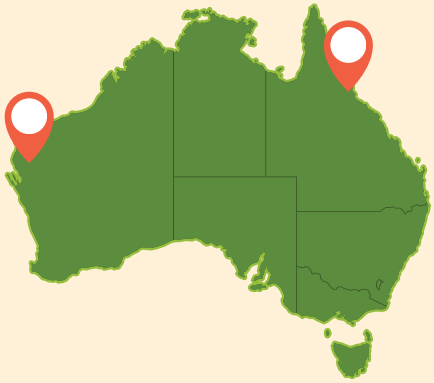
REGIONAL ROUND-UP

What's happening in the regions?

CARNARVON, WESTERN AUSTRALIA – CARNARVON GROWERS ASSOCIATION

Papaya planting is robust, indicating a promising year ahead with an anticipated bountiful harvest in the coming three months.

While the plantation is well-maintained, the upcoming harsh summer conditions, marked by high temperatures and dry winds, may affect papaya tree growth and appearance.



SOUTH JOHNSTONE, QUEENSLAND – BOOLABAH FARMS

As the year progresses, we have not yet found a chance to dry out. The prolonged wet season showers combined with periods of sunny weather, has allowed for a great start to the newly planted blocks.

Despite what we have been finding in the rain gauge, post-harvest disease pressure has been minimal, and morale has been high. Fruit supply has been steady coming out of what was a relatively mild winter.

Spider mite continues to rear its head but has been mostly under control. Using a combination of preventative and curative methods as needed seems to be working so far.

LEVY FUNDED PROJECT UPDATES

BREEDING PROGRAM

Semi-commercial trials of advanced red and yellow papaya breeding lines plus F1 red papaya hybrids are now underway on several farms in the Coastal and Tablelands regions of Tropical North Queensland.

The trials are part of the *National Papaya Breeding and Evaluation Program (PP18000)*, led by Griffith University and funded through the Hort Innovation Papaya Fund.

The key desirable agronomic and productivity traits of breeding lines, including three reds (Sunlight 1 and Sunlight 2 and Sunlight 3), two yellows (Moonlight 1 and Moonlight 2) of novel ten (10), and F1 red papaya hybrids (RH1 to RH10), are under assessment.

Project lead, papaya breeder and Research Fellow from Griffith University, Dr Fawad Ali, said the three new red papaya lines are to be named 'Sunlight 1' and 'Sunlight 2' for the Coastal region and 'Sunlight 3' for the Tablelands region, all with significant trait genetic gains over the current standard red commercial variety 'RB1'.

"Sunlight 1 and Sunlight 2 that were bred for the coast set fruit -16% to -19% lower to the ground, with a 15% to 20% thicker trunk circumference and more marketable fruit (30% to 35%) than 'RB1' on the coastal region," Dr Ali said.

"Sunlight 3 was bred for the Tablelands and also set fruit lower to the ground (-36%) with a thicker trunk circumference (28%) and more marketable fruit (31%) than 'RB1'.

"F1 red papaya hybrids RH9 and RH10 set fruit (-11% to -45%) lower to the ground, also with increased thicker trunk circumferences (10% to 39%), and more marketable fruit (31% to 60%) than 'RB1'.

"The two yellow papaya elite genotypes, Moonlight 1 and Moonlight 2, set fruit lower to the ground (-29% to -52%) with a 12% to 30% thicker trunk, producing more marketable fruit (20% to 31%) than '1B'."

Phylogenetic analysis demonstrated genetic relatedness among the parental advanced breeding lines and F1 hybrid material. Two main clades were observed that separated genotypes into red and yellow genetic backgrounds.

The semi-commercial trial site at the Tablelands (Rocky Top Farms) [(Left; Papaya Breeder and Geneticist Dr Fawad Ali, Research Fellow at Griffith University and (Right; Director & CEO, Mr Chris Maisel-Rocky Top Farms)]

The semi-commercial trial site at the Coast (Jo Zappala Farms)

The diversity created among the F1 hybrids and relationships to parental germplasm was also observed. The heterozygosity (Ho) of the F1 red papaya hybrids (0.15 to 0.32) was often higher than their parents (0.01 to 0.09), showing the significant considerable effect of heterosis breeding.

Fruit harvesting from the semi-commercial trials has started and is expected to be completed by November 2023 and will be used for seed bulking.

Stay tuned for the exciting results from these trials, further indicating trait gain stability and a call for commercialisation partnership via tender with Griffith University and Hort Innovation.

For more information on the *National Papaya Breeding and Evaluation Program (PP18000)*, please get in touch with Professor Rebecca Ford at: ***rebecca.ford@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.

NEW PRODUCE PULSE REPORT: AT A GLANCE

Hort Innovation has recently released a new Produce Pulse Report, highlighting the key learnings and consumer insights from the last 12 months.

The Produce Pulse Report stands as a vital source of foundational data, focusing on two of the most interesting aspects of demand: usage and perception. It's not just about what we eat, it's about how we feel about what we eat.

Key papaya insights from the report include:

- 51% of papaya buyers were very satisfied with the papaya they bought. Only 12% of Australian households bought papaya over the 12 months to March 2023 (***https://www.harvesttohome.net.au/fruitmushroomnuts/latest-highlights/papaya-papaw***)
- 24% of Australians think papaya is easy to cook and enjoy
- 13% of Australian fruit and vegetable buyers describe papaya as fruit they love to eat
- 26% link papaya with Australia
- 79% of Papaya buyers think the papaya they bought was worth what they paid.

Curious to learn more? Access the full report, at: ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt21202/***

This project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

PAPAYA PEST AND DISEASE WORKSHOP HELD IN INNISFAIL

The Papaya Pest and Disease Workshop was held on Thursday, 19 October 2023, as part of the *'Papaya Industry Extension and Communications Project' (PP20000).*

The goal was to bring together growers, stakeholders, and chemical company representatives, in order to help growers make informed decisions about chemical sprays and raise awareness about sustainable pest and disease management initiatives.

The Queensland Department of Agriculture and Fisheries (DAF) project team hosted a workshop at the South Johnstone Research Facility, attended by 37 growers and agronomists. Representatives from Bayer, Corteva, Syngenta, and Sumitomo shared information about chemical options available for papaya growers, and how they can get the most out of their products through registrations and permits. Nufarm and UPL also delivered similar presentations on behalf of their companies.

Afterwards, DAF personnel and Natural Solutions, a company supplying predatory insects, gave presentations. They discussed ongoing levy funded projects in various horticultural crops and presented options for growers interested in using beneficial insects as a tool to control pests.

Emily Pattison, DAF Horticulturalist and project coordinator, said some very interesting information came from the talks.

"There was a consistent message from the chemical company reps about being mindful of the amount of chemical going on at a per hectare level," Emily said.

"A lot of the work was based on 1000L/ha of spray volume, which is much higher than what the average papaya grower uses. In some cases, the permit states that 1000L/ha must be used, but if a grower is only using 500L/ha, then only half the amount of active ingredient is going out as compared to what was intended.

"There was also a lot of interest in some of the Integrated Pest Management (IPM) work which was presented, particularly for fruit spotting bug and mites. While a lot of this is currently being done in other crops, the interest that was gauged by this event hopefully means we will be able to expand this work into papaya soon."

The feedback received after the workshop was excellent. Growers gave it a rating of 8.9 out of 10, indicating that it was highly worthwhile. Additionally, 100% of the participants stated that they learned something new during the event.

Attendees at the Papaya Pest and Disease Workshop held in Innisfail (Credit: Northern Territory Government)

This event was run as part of the 'Papaya Industry Extension and Communications Project' (PP20000) which is funded by Hort Innovation, using papaya levy funds, co-investment from the Department of Agriculture and Fisheries and contributions from the Australian Government.

2023 Annual papaya communications and extension survey

WE WANT TO HEAR YOUR FEEDBACK!

Influence the future of levy extension and communications activities by filling out a short online survey developed through the *Papaya Industry Extension and Communications Program (PP20000).*

Your anonymous and confidential feedback will help inform priority topics and activities covered under the program.

It only takes a few minutes. Fill the survey out here: ***https://www.surveymonkey.com/r/QY9QJ6X***

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

New papaya production figures available

Papaya Australia has released the fourth set of production figures from North Queensland's main papaya growing areas under the *'Papaya market supply data capture and analysis'* (PP20003) project.

From July 2022 to October 2023, the total number of papaya and paw paw consignment pallets sent from North Queensland was 33,408, with 28,548 (85%) of these being of the red variety and 4,860 (15%) yellow. Most pallets were sent across Queensland (15,978), followed by New South Wales (10,785), Victoria (5,782), and South Australia (863).

The aim of this project is to assist papaya growers in making better production and marketing decisions during the growing season as well as in the long run.

Production figures are tallied to give a production overview of the tablelands and coastal areas. To obtain the data, transport companies report the total pallets sent to the main eastern seaboard markets, estimating the weekly production volume in tonnes, with the assumption that pallet weight represents approximately 800kg of fruit.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

PAPAYA/PAW PAW CONSIGNMENTS – PALLETS SENT FROM NORTH QUEENSLAND
PERIOD: JULY 2022 TO OCTOBER 2023

	Red Coast	Red Tablelands	REDS TOTAL	Yellow Coast	Yellow Tablelands	YELLOWS TOTAL	OVERALL TOTAL
QLD	2369	10529	**12898**	1223	1857	**3080**	**15978**
NSW	4608	4585	**9193**	744	848	**1592**	**10785**
VIC	3758	1839	**5597**	57	128	**185**	**5782**
SA	16	844	**860**	3	0	**3**	**863**
TOTALS	**10751**	**17797**	**28548**	**2027**	**2833**	**4860**	**33408**

HORT INNOVATION UPDATES

Social media and marketing update

Papaya's time to shine

Papaya took centre stage at a special event held in Sydney, bringing together food and health influencers, along with media professionals and industry representatives, to highlight the fruit's nutritional benefits and versatile uses.

Hort Innovation, in collaboration with Bite Communications, hosted the event at the well-known Potts Point venue, The Butler. During the event, registered dietitian Caitlin Reid led a discussion on the most recent papaya nutrition research report.

Caitlin highlighted papaya's myriad nutritional properties – from immunity and mood boosting to gut and eye health and glowing skin.

"Papaya is available all year round and is packed with essential nutrients which can be enjoyed in both savoury and sweet dishes," said Caitlin.

"Spicy papaya seeds are nutrient rich and can be added fresh to salads or dried and ground just like peppercorns."

Media and influencers were given an insight into production of the delicious fruit by growers Mark and Paige MacLaughlin of Skybury Farms in Queensland.

Dietitian Caitlin Reid led a discussion around the latest papaya nutrition research report.

Mark spoke to how papaya is grown, its delicious and unique taste and the many ways papaya can be enjoyed.

At the event, 30 people enjoyed a delicious and healthy breakfast featuring various papaya-inspired dishes, such as papaya and banana smoothies, bircher granola cups with coconut yoghurt and papaya, guacamole on sourdough with papaya and mint salsa, and bagels with papaya toppings.

This event, funded by the papaya marketing levy, sparked real interest in the fruit, led to many questions, and opened new opportunities to promote awareness of papaya and its many benefits and uses.

The facts that matter

For the average Australian, a 150 gram serve of papaya provides all their daily vitamin C needs, almost a third of their vitamin A needs and more than a quarter of folate needs.

Those essential facts and more are contained in the *Australian Papaya – 2023 Nutrition Report* that was published recently.

Authored by dietician Caitlin Reid, the papaya marketing levy-funded report highlights 11 reasons why we should all eat papaya, from improved heart health and reduced risk of coronary heart disease, to how its combination of antioxidants can help fight inflammation in the body and supporting immune health.

Find out more in the report, available at: ***https://australianpapaya.com.au/wp-content/uploads/2023/10/Papaya_Health_Report_Digital.pdf***

These marketing activities have been funded by Hort Innovation through the papaya marketing levy.

Media and influencers were given an insight into production of papaya by growers Mark and Paige MacLaughlin of Skybury Farms in Queensland.

Papaya Fund Annual Report now available

Hort Innovation has released its 2022/23 Annual Report and accompanying 2022/23 Fund Annual Report for the 37 horticulture industries it looks after.

This report provides a snapshot of the activities and achievements that drove value and outcomes for the nation's horticulture sector during 2022/23.

Top-level data from the Papaya Fund Annual Report shows that:

- $173,976 invested in R&D
- $115,488 invested in marketing
- $375,819 in levies were collected by the Government and passed on to Hort Innovation for investment.

Head to ***www.horticulture.com.au/annual-report-portal*** to download the report and take a closer look at what has been achieved for the horticulture sector over the past year.

Papaya AUSTRALIA

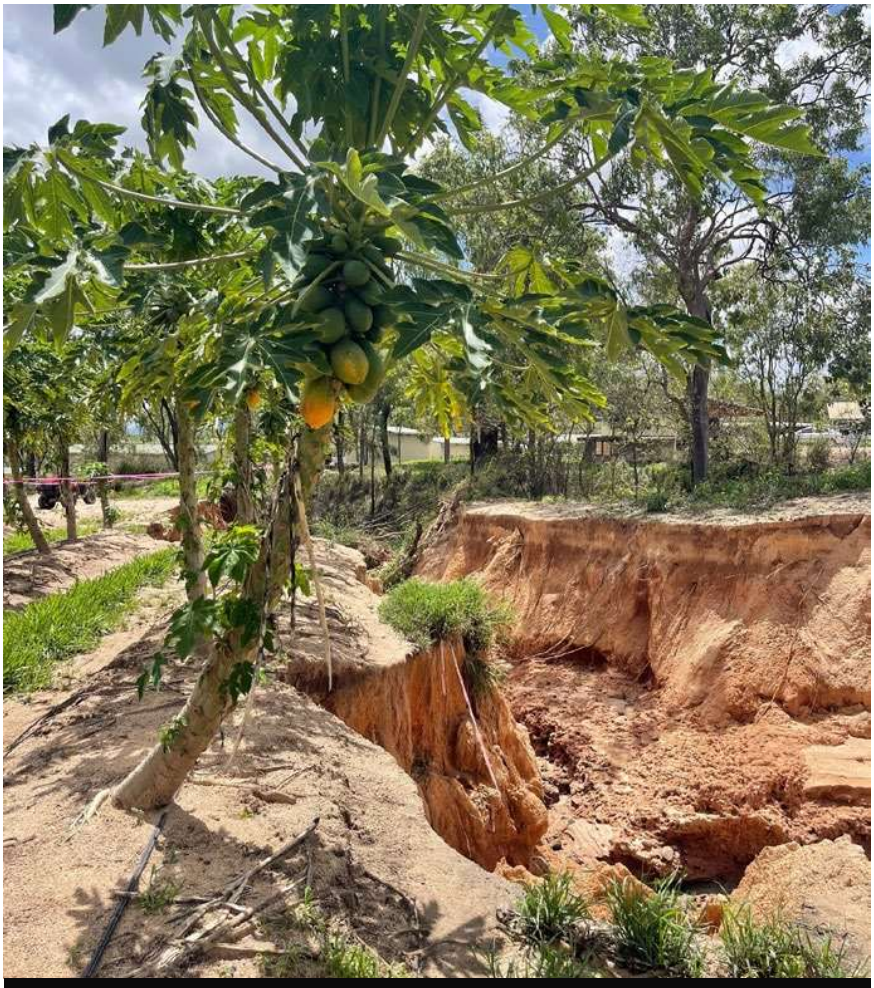
PAPAYA PRESS

ISSUE 14 - MARCH 2024

Cyclone Jasper Devastation

Over the past few months, the papaya industry has faced significant disruptions due to Cyclone Jasper and subsequent flooding.

On 13 December, 2023, Cyclone Jasper made landfall near Wujal Wujal without causing major damage to the primary papaya growing areas. However, it stalled in the peninsula, leading to a convergence zone that stayed for about five days. This resulted in heavy rainfall, affecting all major papaya growing regions and causing issues both on farms and in markets.



Effects of Cyclone Jasper on Skybury Farms

IN THIS ISSUE

The heavy rainfall has resulted in significant damage to papaya plantations, both directly and indirectly. Direct damage is primarily attributed to erosion, particularly in the sandy, granitic soils around Mareeba.

Emily Pattison, Queensland Department of Agriculture and Fisheries (DAF) project coordinator of *'Papaya industry extension and communications program' (PP20000)*, said the rain in Mareeba was the perfect storm.

> *"The combination of heavy rain, the area's slope, and sandy soils led to extensive damage on farms, causing devastation in the region."*

Continued on page 5 ››

This edition has been developed by Dentsu Creative PR and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

Recent weather patterns have become the primary topic of conversation among growers. The past two months have delivered an onslaught of extreme conditions, from relentless rainfall to scorching heat and suffocating humidity. Even seasoned veterans refrain from comparing it to past years, indicating the severity of this season's challenges.

Leading up to the second week of December last year, the region experienced a prolonged dry spell, with the last significant rainfall on the Tablelands recorded in April. When news of Cyclone Jasper in mid-December broke, it was largely welcomed, for hopes of much-needed rain. However, Jasper's path changed unexpectedly after it crossed the coast on 13 December 2023. It was supposed to move across the Cape and head towards the Gulf in a day, but instead, it stalled for four days, pouring down an incredible amount of rain.

Just in Mareeba, a whopping 900mm of rain fell over four days, which is as much as the area usually gets in a whole year. And from January to the first week of February, another 700mm of rain hit the region. There are reports of some areas getting up to 2000mm of rain in just this short time.

I know that some coastal growers would say 'is that all'? It's important to remember that a lot of damage has been reported, and don't forget, we're just getting started with the wet season. Additional to the rainfall has been the heat and humidity. Brutal and unrelenting is often used around these topics. To attend to any tasks in the field is on par with working in a sauna. Picking, packing, desexing, and weed control are all manual tasks that are not done from an airconditioned cab. Most times, clothing is either wet from rain, sweat, or both.

How does this affect our crops? Let's break it down:

- **Harvesting:** We're seeing big losses in the amount of fruit we can gather and sell. This happens because sometimes we can't even get into the fields, or we lose trees, or we must toss out fruit that has gone bad. It's tough because even though we do our best out here, what happens at the markets a few days later can be heartbreaking. And the worst part is when we've already spent money on picking, packing, boxes, and shipping, and still end up with a loss.
- **Tree losses:** Some trees have been lost right away, but we know from experience that we might keep losing trees for the next six months, depending on how bad the rest of the wet season gets. Some growers have lost up to half their trees, and in some cases, entire blocks of trees are gone.
- **Farm damage:** The heavy rain has caused a lot of damage to farm roads, bridges, dams, and buildings. It's also washing away the top layer of soil which is bad for farming. Fixing all this stuff costs a lot of money.
- **Accumulation effect:** We've dealt with disasters like Cyclone Larry and Cyclone Yasi before, but what really adds up is how it affects us financially and emotionally over time. It can really shake our confidence and make it hard to keep going, especially when we're already feeling fragile.

Despite painting a bleak picture, there are still silver linings to be found in these events. As they say, "This too shall pass". I'm optimistic that we'll continue to see plenty of fruit later this year, and once the weather settles down, the quality of the fruit will improve.

I'm looking forward to consumers being able to enjoy ample quantities of high-quality fruit soon. For us growers, let's face the challenges ahead with hope and resilience.

Best regards,
Gerard Kath

Common Wet Season Diseases of Papaya

IMAGE	DISEASE	MANAGEMENT
PRE-HARVEST FRUIT DISEASES		
	**Brown Spot** Most commonly occurs as dark, sunken spots on fruit or as light brown spots similar to the symptom found on leaves.	▪ Apply preventative fungicides (e.g. Bravo, Digger or Luna sensation) every 10-14 days in hot, wet conditions. ▪ Check spray coverage. ▪ De-leafing affected leaves may assist in reducing symptoms on fruit.
	**Phytophthora Fruit Rot** Large lesions on fruit covered by white fungal crusts. It can cause fruit to shrink and mummify.	▪ Apply preventative fungicide (e.g. copper hydroxide) every 10-14 days in hot, wet conditions. ▪ It may help to allow some weed cover to prevent splashing of soil particles up onto fruit.
POST-HARVEST FRUIT DISEASES		
	**Anthracnose** During ripening, sunken black to brown spots develop on the surface on the fruit. These enlarge during storage and can extend well into the flesh.	▪ Apply recommended fungicides in the paddock. ▪ Use a registered post-harvest fungicide (e.g. Scholar or Sportak) and ensure good coverage on the fruit. ▪ Reduce plant stress. ▪ De-leafing older leaves may help by reducing the source of fungal load.
	**Stem-End Rot** Multiple disease can cause this symptom (e.g. Phomopsis or Lasiodiplodia). Wet rots occurring on the stem-end extending into the fruit.	
DISEASE OF LEAVES, TRUNKS AND ROOTS		
	**Phytophthora Trunk Rot** Appears as a white fungal crust on the trunk. Makes trunk weak and very susceptible to wind damage.	▪ Apply preventative fungicide (e.g. copper hydroxide) every 10-14 days in hot, wet conditions. ▪ Plant in well-drained areas, and use mounds. ▪ It may help to allow some weed cover to prevent splashing of soil particles up onto the trunk. ▪ Avoid damage to trunks (e.g. herbicide damage).
	**Phytophthora Root Rot** Rotting of the tap root which can cause the plant to fall easily. In some cases, the plant may linger until the leaves yellow and collapse.	▪ Plant using Ridomil. ▪ Apply Phos Acid fortnightly. ▪ Plant in well-drained areas, and use mounds.
	**Brown Spot** Small, light brown circular spots on leaves. Can cause premature yellowing of lower leaves in severe infections.	▪ Apply preventative fungicides (e.g. Bravo, Digger or Luna sensation) every 10-14 days in hot, wet conditions. ▪ Check spray coverage. ▪ De-leafing may reduce disease levels. ▪ Check nearby hosts such as cucurbits, tomatoes and legumes.

INDUSTRY NEWS

NEW NATIONAL BIOSECURITY TRAINING HUB LAUNCHED

Plant Health Australia (PHA), the Queensland Department of Agriculture and Fisheries, Agriculture Victoria, New South Wales Department of Primary Industries, and Animal Health Australia, have partnered to create the National Biosecurity Training Hub (*https://biotraininghub.com.au/*) – Australia's first one-stop shop for biosecurity training.

Biosecurity is a national priority to protect our food security, our agriculture industry, and the environment. The focus on preserving the Australian way of life continues to drive the demand for training resources to support biosecurity preparedness and response activities and ensure that the necessary skills and knowledge are in place to respond to and manage biosecurity incidents.

Dr Susanna Driessen, PHA's General Manager, Emergency Response, said pressures placed on Australia's biosecurity system require an increased need for governments and industry to work together to ensure we can meet the rising demand for expertise and knowledge.

"A collaborative approach necessitates the need for accessible online training resources to ensure we have the capacity and the capability to respond effectively," Dr Driessen said.

The National Biosecurity Training Hub (the Hub) offers a central location with a database of biosecurity training resources to help reduce the duplication of effort and costs associated with developing and delivering biosecurity training.

The Hub unifies and streamlines training to facilitate national visibility of biosecurity-related training across government, industry, and community in a single location. It's a centralised platform that supports biosecurity prevention, preparedness, response, and recovery by providing users with access to the latest biosecurity-related training materials and courses suited to different industries, levels and skill sets.

Designed with learners in mind, the Hub is easy to navigate with a library of plant, animal and aquatic biosecurity training that is searchable using a topic, keyword, location, and preferred method of delivery. The quality assurance protocols ensure each course listed meets the required standard.

"Australia's biosecurity system is built on shared responsibility for shared benefit. This initiative demonstrates the power of partnerships in improving cross-sectoral national biosecurity capability and capacity to prepare us for future biosecurity risks," PHA's CEO Sarah Corcoran said.

The Hub features 64 online training courses with plans for continuous expansion. Organisations with biosecurity training packages and who are interested in contributing to the Hub are encouraged to contact PHA via ***nbth@phau.com.au***.

> *"A collaborative approach necessitates the need for accessible online training resources to ensure we have the capacity and the capability to respond effectively."*

(Continued from page 1)

Cyclone Jasper Devastation

"Before Cyclone Jasper, there was minimal rainfall, with some farms even facing fires due to dry conditions. This lack of vegetation cover made the land vulnerable," Emily said.

"However, once the cyclone hit, approximately 900mm of rain fell in the town within four days. In certain areas like Paddy's Green, where a significant portion of papaya is grown, the rainfall exceeded 1000mm.

"The combination of heavy rain, the area's slope, and sandy soils led to extensive damage on farms, causing devastation in the region."

The Queensland State Government and the Federal Government have jointly announced funding of up to $75,000 per primary producer to cover infrastructure repair costs, including erosion damage. Additionally, there is a further $250,000 available in low-interest loans. The Queensland Rural Industry Development Authority (QRIDA) is administering these funds.

In addition to direct infrastructure damage, there is significant indirect damage from the rain, particularly from Phytophthora causing plant death and fruit quality issues, as well as other diseases causing post-harvest issues. This has resulted in a decrease in both volume and fruit quality in the markets. With the wet weather persisting, these effects are expected to last for several months.

While there are no grants available to cover lost income or indirect effects of the rain on primary producers, Essential Working Capital loans of up to $100,000 are available to help supplement lost income.

For more information on the grants, please visit: **Extraordinary Disaster Assistance Recovery Grants – Tropical (*qrida.qld.gov.au*).**

For other questions, please contact **Emily Pattison, 0491 379 771, *Emily.pattison@daf.qld.gov.au***

Result of Cyclone Jasper on Skybury Farms.

WET SEASON MONTHLY RAINFALL TOTALS FOR MAJOR PAPAYA GROWING REGIONS IN MM:

	November	December	January
Innisfail Wharf	53	437	659
South Johnstone	31.2	638.4	593.8
Tully Mill	84.1	684.2	679.5
Euramo	92	528	665
Mareeba	2	881	272

REGIONAL ROUND-UP

What's happening in the regions?

TULLY, QUEENSLAND – NICHOLAS MACKAY

2024 has kicked off the same as 2023 ended, with some close calls regarding Cyclones (Jasper and Kirrily) and heavy rain events. Heatwaves and wet weather have meant a rough start to the year, with harvests interrupted by flooding roads.

In the Tully region, younger trees have held up better to the extreme weather and older trees have had significant flower drop that will impact numbers later in the year. There have been no physical losses due to wind, however the continuing heat and wet will bring disease and fruit loss. A major pest in recent times has been cockatoos damaging fruit.

In better news, the sugar levels in the fruit have increased over the last few months and taste great.

LEVY FUNDED PROJECT UPDATES

BREEDING PROGRAM

Semi-commercial trials of advanced red and yellow papaya breeding lines plus F1 red papaya hybrids have been conducted on several farms in the Coastal and Tablelands regions of Tropical North Queensland.

The trials were part of the *'National Papaya Breeding and Evaluation Program' (PP18000)*, led by Griffith University and funded through the Hort Innovation Papaya Fund.

The consumer-driven fruit quality traits of the advanced breeding lines, including three reds (Sunlight 1 and Sunlight 2 and Sunlight 3), two yellows (Moonlight 1 and Moonlight 2), and ten F1 red papaya hybrids (RH1 to RH10), were assessed.

Papaya breeder and Research Fellow from Griffith University, Dr Fawad Ali, said the three new red papaya lines are to be named 'Sunlight 1' and 'Sunlight 2' for the Coastal region and 'Sunlight 3' for the Tablelands region, all with significant trait genetic gains for the fruit quality traits over the current standard red commercial variety 'RB1'.

"Sunlight 1 produces preferred medium-sized fruit, ~900g, with a moderate aroma and is 20% sweeter than RB1 fruit," Dr Ali said.

"Sunlight 2 produces medium-sized fruit, ~1000g, with a moderate aroma and is 24% sweeter than RB1 fruit.

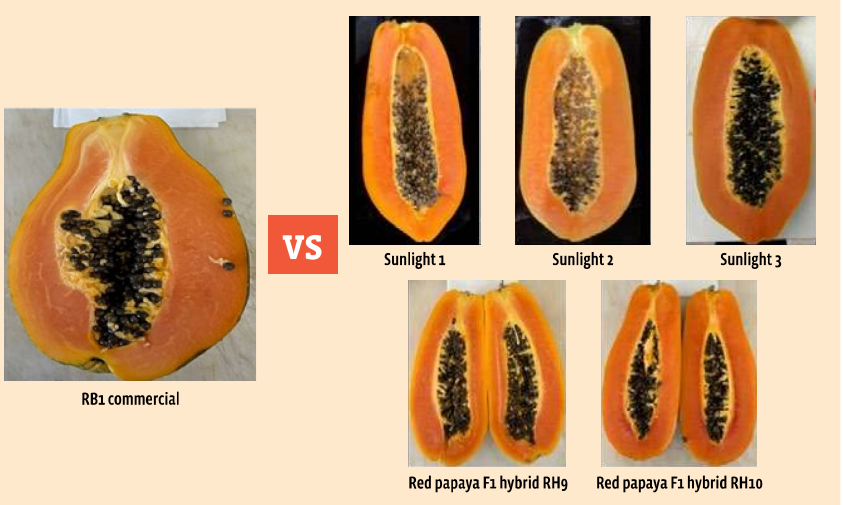
"Sunlight 3 produces ~950 g-medium-sized fruit with a moderate aroma and is 20% sweeter than RB1 fruit.

"The two new yellow papaya lines are to be named 'Moonlight 1' and 'Moonlight 2' and are both adapted to the Tablelands region.

"Moonlight 1 produces ~1200g-sized fruit with a moderate aroma and is 11% sweeter than 1B fruit.

"Moonlight 2 produces a fruit ~1300g-sized, with moderate aroma and is 9% sweeter than 1B fruit."

The next step will be to run commercial trials of selected lines across the Coastal and Tablelands regions and a tender is currently out for this with calls for research providers by Hort Innovation Australia.



Images depicting desirable fruit quality traits of the three best red papaya breeding lines (Sunlight 1) and (Sunlight 2) bred for the Coast, and (Sunlight 3) bred for the Tablelands along with the two best novel F1 hybrids (RH9 and RH10) compared to commercial red 'RB1'.

Images depicting desirable fruit quality traits of the two best yellow papaya breeding lines, Moonlight 1 and Moonlight 2, and compared to commercial yellow '1B'.

At Lecker Farms in the Tablelands (Left; Papaya Breeder and Geneticist Dr Fawad Ali, Research Fellow at Griffith University and Right; Chairman Papaya Seeds Australia and Director & CEO, Gerard Kath, Lecker Farms).

For more information on the *'National Papaya Breeding and Evaluation Program' (PP18000)*, please get in touch with Professor Rebecca Ford at: ***rebecca.ford@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.

ANNUAL PAPAYA COMMUNICATIONS AND EXTENSION SURVEY

The *'Papaya Industry Extension and Communications Program' (PP20000)* is coming to a close this July.

We want to hear your feedback!

Influence the future of levy extension and communications activities by providing your anonymous and confidential feedback on priority topics and activities covered under the program.

It only takes a few minutes.
Fill the survey out here: ***https://www.surveymonkey.com/r/QY9QJ6X***

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

MINOR USE PERMITS FOR THE PAPAYA INDUSTRY

A new minor use permit update allowing for the continued use of beta-cyfluthrin (Bulldock) has been issued to Hort Innovation by the Australian Pesticides and Veterinary Medicines Authority (APVMA), which is in force from 29 November 2022 to 30 November 2027. The permit will allow minor use of a registered agvet chemical product for control of fruit-spotting bug and banana-spotting bug in papaya.

Access the new minor use permit here: ***https://www.horticulture.com.au/contentassets/b26d49c71cfe415eb7a811878d59eb82/per13671v4.pdf***

For a full list of current minor use permits for the papaya industry, head to: ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/pp16000/***

The 'Papaya industry minor use permit program' (PP16000) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

NEW AUSTRALIAN HORTICULTURE STATISTICS HANDBOOK RELEASED

The Australian Horticulture Statistics Handbook 2022-23 was released for the papaya industry in February.

The annual Handbook offers the most comprehensive and contemporary data available on all sectors of the Australian horticulture industry in one easy-to-use guide.

Information featured is drawn from several supply chain sources, including international trade statistics and industry peak bodies. It includes data on more than 75 horticultural products including fruit, nuts, vegetables, nursery, turf, and cut flowers.

The Australian Horticulture Statistics Handbook for the year ending 30 June 2023 is presented by Hort Innovation. It was produced by the multi-industry levy investment Australian Horticulture Statistics Handbook 2021-22 to 2023-24 (MT21006): ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/mt21006/***

New papaya production figures available

Papaya Australia has released the fifth set of production figures from North Queensland's main papaya growing areas under the *'Papaya market supply data capture and analysis' (PP20003)* project.

From July 2023 to 21 January 2024, the total number of papaya and paw paw consignment pallets sent from North Queensland was 14,136, with 11,524 (81%) of these being of the red variety and 2,612 (18%) yellow. Most pallets were sent across Queensland (6,703), followed by New South Wales (4,828), Victoria (2,292), and South Australia (313).

The aim of this project is to assist papaya growers in making better production and marketing decisions during the growing season as well as in the long-term.

Production figures are tallied to give a production overview of the Tablelands and coastal areas. To obtain the data, transport companies report the total pallets sent to the main eastern seaboard markets, estimating the weekly production volume in tonnes, with the assumption that pallet weight represents approximately 800kg of fruit.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

PAPAYA/PAW PAW CONSIGNMENTS – PALLETS SENT FROM NORTH QUEENSLAND
PERIOD: JULY 2023 TO 21 JANUARY 2024

	Red Coast	Red Tablelands	REDS TOTAL	Yellow Coast	Yellow Tablelands	YELLOWS TOTAL	OVERALL TOTAL
QLD	945	4214	**5159**	709	1857	**1544**	**6703**
NSW	1981	1806	**3787**	555	848	**1041**	**4828**
VIC	1561	704	**2265**	17	10	**27**	**2292**
SA	0	313	**313**	0	0	**0**	**313**
TOTALS	**4487**	**7037**	**11524**	**1281**	**1331**	**2612**	**14136**

Key insights on the papaya industry from the 2022-2023 Handbook include:

- 18% of Australian households purchased papaya/pawpaw, buying an average of 900g per shopping trip.
- In 2022-23 there were 21,760 tonnes of papaya/pawpaw produced and valued at $39M with 1% sent to be processed.
- The wholesale value of the fresh supply was $45.8M, with $36.2M distributed into retail and $9.6M into food service.
- As a tropical fruit, red papaya and yellow pawpaw production predominantly occurs in the north of Australia, in Queensland, as well as production in the Northern Territory and Western Australia.
- There are currently two main categories grown in Australia. These include red papaya, which accounted for 85% of fresh production, and yellow pawpaw, which accounted for 15% of fresh production.
- Australia is a net importer of fresh red papaya and yellow pawpaw, typically importing between 20-90 tonnes per year. For the year ending June 2023, Australia imported two tonnes.
- For the year ending June 2023, 48% of exported fresh papaya/pawpaw were sent to New Zealand.

The full Handbook is available on the Hort Innovation website at: ***https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/australian-horticulture-statistics-handbook/#:~:text=The%20annual%20Australian%20Horticulture%20Statistics,%2C%20turf%2C%20and%20cut%20flowers.***

HORT INNOVATION UPDATES

Social media and marketing update

Positive positioning of papaya

After Tropical Cyclone Jasper hit Australian papaya growers hard, a collective effort rallied support, led by influencers on social media to drum up public support and awareness.

Through the papaya marketing levy, the extent of damage was brought to the public's attention via several channels through which the importance of continuing to buy papayas was emphasised.

With ample fruit harvested and stocked on supermarket shelves in advance of the imminent adverse conditions, consumers were encouraged to purchase papayas and support growers.

Social media posts were published to promote the availability of produce while raising awareness about the impact on industry.

In addition, an influencer outreach campaign was conducted, targeting those who attended the recent health report launch event.

These influencers were encouraged to share a call to action in support of growers on their social channels. Through this, messaging was amplified and continued to build advocacy among this core group.

The following influencers actively shared the key messaging about papaya availability:

- Rebecca Gawthorne (@nourish_naturally)
- Lucie Nguyen (@butt.erhand)
- Marianne Hudson (@mycreativenutrition)
- Simon Leong (@simonfoodfavourites).

This engagement from the influencers provided a total of 852,666 Opportunities to See (OTS). OTS is a measure of how often people might see posts throughout a campaign.

The influencers were genuinely concerned about the situation for growers, with feedback such as the following representative of the response:

- "That's terrible news. I will be sure to support the industry. I eat papaya for breakfast."
- "It's so sad to see so many papaya farms devastated by the recent cyclone. I'll definitely share the message of support to buy more papayas."

The influencers were not incentivised or financially rewarded for their help.

These marketing activities have been funded by Hort Innovation through the papaya marketing levy.

Papaya AUSTRALIA

PAPAYA PRESS

ISSUE 15 – JUNE 2024

That's a wrap for the extension and communications program

This issue of the Papaya Press marks the final publication funded by the '*Papaya industry extension and communications program*' (PP20000), which concludes at the end of July 2024 after three years.

The project's objective was to quantify practices used by papaya growers in integrated pest and disease management (IPDM), agronomy, and supply chain management, helping them make improvements and manage industry communications better.

Key activities to achieve these goals included one-on-one engagement, Papaya Press publications, on-farm demonstrations/trials, and workshops. The table on *page 5* provides a summary of the projects achievements.

IN THIS ISSUE

ENGAGEMENT

- **424 hours** of direct engagement with growers (in-person or via phone) by May 20, 2024.
- **Eight issues** of the Papaya Press distributed to 80 growers each.

SIX WORKSHOPS

- **Industry priority setting workshop:** August 21, 2021, Brother's Leagues Club, Innisfail.
- **Spray efficiency workshop:** Co-hosted with Allan Blair on April 28, 2022, RMC Farming, Innisfail.
- **Breeding R&D workshop:** Co-hosted with Griffith on August 5, 2022, DAF offices, Mareeba.
- **Papaya post-harvest bus tour:** January 19, 2023, Skybury Farms, Mareeba.
- **Pest and disease forum:** October 19, 2023, DAF offices, Innisfail.
- **Nursery bus tour:** June 14, 2024, DAF offices, Mareeba.

Continued on page 5 ››

This edition has been developed by Dentsu Creative PR and the Department of Agriculture & Fisheries (Queensland).

This magazine is funded by Hort Innovation using the papaya R&D levy and contributions from the Australian Government.

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

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

GERARD KATH

We are quickly approaching the coldest and shortest days of the year. Papayas, being tropical plants, understandably do not thrive during this season (neither do I)! During this time, trees slowdown in growth and fruit production, leading to poorer flavour and brix levels. This year's high rainfall during the wet season has further impacted our crops by reducing tree numbers, yields, and fruit size.

Reflecting on the past four months, transport production figures show that the industry has produced approximately 15% less fruit compared to the same period last year. This reduction has driven up prices for quality fruit due to strong demand, even amidst significant competition for consumer discretionary spending. The ongoing discussions about the cost-of-living pressures highlight that our economy is more divided than ever, with some consumers under financial strain while others remain unaffected. Our regular and loyal consumers, those with expendable income, have sustained the demand. Had production increased by 15% as it did last year, the additional fruit might have ended up with consumers unable to afford such luxury items, potentially driving prices down to the cost of production levels.

During the last Papaya Strategic Investment Advisory Panel (SIAP) meeting, we had a thought-provoking session directly relevant to all growers. An agenda item required everyone to list issues that keep them awake at night. The topics varied, mostly focusing on production challenges. Examples included fruit spotting bug control, spider mite pressure and control, cost of production versus returns and retail prices, post-harvest fruit rots, staff availability and productivity, and pest pressures from cockatoos and flying foxes. These challenges are common concerns for many growers.

We encourage all growers to share their thoughts to help us gain a comprehensive understanding of the issues. While we may not have immediate solutions or delve deeply into every topic, identifying common issues can guide research and investment efforts.

This edition marks the conclusion of the '*Papaya industry extension and communications program*' (PP20000), which finishes at the end of July 2024 after three years. Thank you to the Department of Agriculture and Fisheries, Queensland and the Dentsu Creative Public Relations teams who has led the charge on the magazine and broader program.

Best regards,
Gerard Kath

REGIONAL ROUND-UP

What's happening in the regions?

SOUTH JOHNSTONE, QUEENSLAND – BOOLABAH FARMS

We have given up on checking the weather forecast in Innisfail. We are still trying to find a bit of sunshine, which hasn't revealed itself to us in Innisfail since December last year, making life difficult in the aftermath of Cyclone Jasper. At the moment, we are trying to stay on top of our spray program to get the next lot of fruit through this wet season. Production has been slow but new

paddocks coming through are looking very good. Nothing outside of the usual challenges we face this time of year.

PLANTING THE SEED FOR IMPROVED NURSERY PRACTICES

THE PAPAYA INDUSTRY NURSERY BUS TOUR WAS HELD ON JUNE 14, 2024 AS PART OF THE 'PAPAYA INDUSTRY EXTENSION AND COMMUNICATIONS PROJECT' (PP20000).

Nursery Manager, Ben Lavers, explaining the batching system used by Turkinje nursery to allow tree traceability

Growers observing the seedling transplanter at Flourish nursery

Elaine Duncan of Flourish addressing the growers in the nursery

Delivered by the project team at the Queensland Department of Agriculture and Fisheries (DAF), growers were invited to join a tour of commercial nurseries around Mareeba, Queensland.

DAF project coordinator, Emily Pattison, said it was a great day, with twenty-three participants attending the event.

"Growers were given the opportunity to visit Flourish, Mareeba's largest commercial nursery, which supplies wholesale nursery plants to retail stores and performs contract nursery work for local farms," Emily said.

"Flourish aims to produce high-quality seedlings at a competitive price while remaining profitable, and the automation and efficiency implemented across this business was amazing to see.

"By producing so many different species (>200) and providing them at a high-quality standard, Flourish represents one of the leaders of nursery innovation in Queensland.

"We are so fortunate to have had the opportunity to visit this nursery and understand what a high-throughput nursery looks like."

Owner and manager, Elaine Duncan, also addressed the group, taking the growers through some of the nursery processes, from creating potting mix to seeding, fertilising, and delivering a quality product.

The group then went to Turkinje Nursery, an accredited tree crop nursery supplying commercial farms in the region.

"Turkinje is accredited through the rigorous ANVAS scheme, which certifies avocado nurseries, particularly around disease management," Emily said.

"Avocados suffer from a similar disease to papaya – *Phytophthora cinnamomi*. A large portion of their accreditation focuses on managing Phytophthora to ensure plants go out disease-free. Their accreditation places Turkinje in the highest nursery best practice category."

Best practice is the baseline for Turkinje nursery manager, Ben Lavers.

"As I outlined procedures to the papaya growers, it was clear that my attitude to hygiene was 'above and beyond'," Ben said.

"Tree hygiene is one of the most important factors in my business. My reputation for producing clean trees is paramount to its continued success."

The visit to the nurseries was followed by a presentation by Phill Slocombe of Papaya Seeds Australia, who shared some valuable advice from his own experience in raising papaya seedlings. This presentation was very well received by the growers.

The event received excellent feedback from the attendees, with all stating they learned something new and were motivated to make changes in their own nurseries.

This event was run as part of the Papaya Industry Extension and Communications Project (PP20000) which is funded by Hort Innovation, using papaya levy funds, co-investment from the Department of Agriculture and Fisheries and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

INDUSTRY NEWS

New papaya production figures available

Papaya Australia has released the sixth set of production figures from North Queensland's main papaya growing areas under the '*Papaya market supply data capture and analysis*' (PP20003) project.

From July 2023 to April 28, 2025, the total number of papaya and paw paw consignment pallets sent from North Queensland was 20,392. The Tablelands received 58.4 % of the red and yellow variety, while 41.6% went to the coast. Most pallets were sent across Queensland (9,460), followed by New South Wales (6,959), Victoria (3,482), and South Australia (491).

The aim of this project is to assist papaya growers in making better production and marketing decisions during the growing season as well as in the long-term.

Production figures are tallied to give a production overview of the Tablelands and coastal areas. To obtain the data, transport companies report the total pallets sent to the main eastern seaboard markets, estimating the weekly production volume in tonnes, with the assumption that pallet weight represents approximately 800kg of fruit.

The 'Papaya market supply data capture and analysis' (PP20003) project is funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

PAPAYA PRODUCTION FIGURES 1ST JULY 2023 TO 28TH APRIL 2024	
Total Red & Yellow to QLD	9460
Total Red & Yellow to NSW	6959
Total Red & Yellow to VIC	3482
Total Red & Yellow to SA	491
TOTAL	20392
Total Red & Yellow for Coast	8481
Total Red & Yellow for Tablelands	11911

ANNUAL PAPAYA COMMUNICATIONS AND EXTENSION SURVEY

The *'Papaya Industry Extension and Communications Program' (PP20000)* is coming to a close this July.

Last call to provide your feedback!

Influence the future of levy extension and communications activities by providing your anonymous and confidential feedback on priority topics and activities covered under the program.

It only takes a few minutes. Fill the survey out here: ***https://www.surveymonkey.com/r/QY9QJ6X***

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

INTRODUCING PHA'S NEW ONLINE PLATFORM FOR PLANT BIOSECURITY KNOWLEDGE

The Australian plant industry has an engaging new online platform for plant biosecurity knowledge.

Plant Health Australia's (PHA) new website incorporates improvements to enhance the user experience, making it easier to access plant biosecurity information, tools, and resources.

As the trusted coordinator of the Australian plant biosecurity system, PHA brings expertise, knowledge, and stakeholders together to generate solutions that improve biosecurity outcomes to ensure the plant biosecurity system is future-orientated and solutions-focused.

With a library of more than 1,300 plant biosecurity resources, PHA's full portfolio of work, newly added 'Our Members' and 'Training' sections, the website is fresh and modern, making it easy for users to navigate and find what they need.

"The new comprehensive resource centre is the ultimate knowledge repository of all things plant biosecurity," said Sarah Corcoran CEO of PHA.

The refreshed website has a contemporary design with simplified navigation, search feature, and resource centre that allows users to seamlessly explore decades worth of plant biosecurity information.

"Designed with our stakeholders in mind, the website is engaging and intuitive, with a responsive mobile-friendly design, ensuring easy on-the-go access," said Ms Corcoran.

The website will regularly be updated with new resources, news, and events to ensure it remains relevant and functional.

Explore PHA's new website now: ***https://www.planthealthaustralia.com.au/***

(Continued from page 1)

Papaya industry extension and communications program conclusion

ON-FARM DEMONSTRATIONS/TRIALS

1. EARLY SEX DETERMINATION OF PAPAYA SEEDLINGS THROUGH DNA ANALYSIS:

- Used molecular techniques to determine the sex of papaya seedlings early. The test was 100% accurate in the field; interested growers were trained to use the technique on-farm.

2. NITROGEN REQUIREMENTS OF PAPAYA:

- Evaluated ideal nitrogen rates for papaya using four rates over 12 months (250 kg/ha to 600 kg/ha).
- Results showed decreased productivity at 250 kg/ha, with 350 kg/ha, 450 kg/ha, and 600 kg/ha yielding similar production levels.

3. PHYTOPHTHORA SYSTEMS MANAGEMENT:

- Investigated the role of organic matter and gypsum on phytophthora suppression starting in October 2022.
- The treatments were: control, pretreatment of 5t/ha of gypsum, 2.5t/ha of microfine prilled gypsum (OzCal) spread around the tree monthly and mulch applied pre-planting.
- No significant treatment differences were found, with the biggest factor being planting position in the paddock.

4. MONITORING LEAFHOPPER POPULATIONS FOR PHYTOPLASMA CONTROL:

- Used sticky traps to monitor leafhoppers and their relation to dieback.
- Red sticky traps did not intercept leafhoppers in two months; further trials are needed to determine the best colour for leafhopper attraction.

5. COMPARISON OF SINGLE PLANTS AND QUAD PLANTINGS:

- A trial started in November 2023 to test growth and production advantages of single versus quad-planted papaya seedlings.
- Single plants had their first fruit on average 48cm lower and trunks were on average 3.2cm thicker in diameter 10cm above the ground.

6. INCORPORATING PREDATORY MITE RELEASE INTO PEST MITE MANAGEMENT STRATEGIES:

- Tested the effectiveness of releasing predatory mites as part of an IPM system for Two-spotted mite and African spider mite.
- Drone-released predatory mites were ineffective due to high pre-treatment pest populations and challenges with the drone release method, indicating a need for more targeted application strategies.

Comparison of single plants and quad plantings

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

LEVY FUNDED PROJECT UPDATES

TRIALS COMPLETE ON CONSUMER PREFERENCES FOR PAPAYA FRUIT FLAVOUR

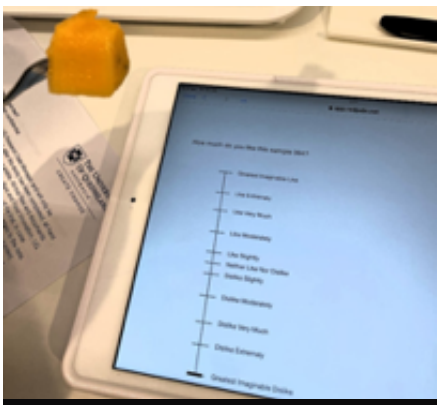
Consumer surveys have been undertaken on Australian and international papaya varieties, including the new breeding lines, to determine which varieties are preferred by domestic consumers.

The surveys were conducted through the '*National Papaya Breeding and Evaluation Program*' (PP18000) and '*Genetics of Fruit Sensory Preferences*' (AS19003) research projects, led by Griffith University and funded through the Hort Innovation Papaya Fund.

The robust tasting surveys were conducted by PhD Researcher, Joshua Lomax, who won the Centre for Planetary Health award through Griffith University to Queensland Alliance for Agriculture and Food Innovation (QAAFI) facility at the University of Queensland, Long Pocket.

With the help of the QAAFI team, led by Heather Smyth and Emma Hassall, 125 participants were recruited to taste nine papaya genotypes, including ABLs and hybrids developed in PP18000, along with common commercial varieties.

"These varieties were selected because they represent distinct flavour profiles (as determined in previous sensory studies) and include red papaya varieties: RB1, T2-6-5.27.12 (red ABL), Hybrid 6 (cross between the red ABL C2-6-5.15.2 and Solo), Sunlight 1 (red ABL registered through PBR Australia), Solo (Hawaiian variety) and Hybrid 1 (cross between the red ABL C2-6-5.9.2 and Solo); and yellow pawpaw varieties: Moonlight 1 (yellow ABL registered through PBR Australia), ML3-3-13 (yellow ABL) and 1B," Mr Lomax said.



Participant undertaking robust tasting survey

"The survey was marketed as a 'tropical fruit tasting', to avoid any bias towards papaya lovers' or 'haters'. Nobody knew they were tasting papaya until they sat down in their tasting booth.

"The survey was designed to be simple and prompted each participant to score the fruit sample on a scale from 0 (greatest imaginable dislike) to 100 (greatest imaginable like).

"The participant group included a mixture of gender and ages, and information about the participants' typical papaya consumption habits was collected.

"Interestingly, the average scores across all the papaya genotypes were greatly affected by the participants papaya consumption habits, finding that people who claimed to never consume papaya consistently scored the fruit samples lower than any other group, and people who rarely eat papaya scored each fruit sample similarly to those that are more frequent consumers (2-4 times a week, once a week and 1-3 times a month).

"This suggested that there are some flavours in the fruit that people may be very sensitive to and that there is a proportion of Australians who don't know that they like papaya fruit. Numerous participants walked out of the tastings pleasantly surprised about some of the samples because they didn't think that they liked papaya beforehand, which is a promising indication of the untapped potential for the papaya industry.

"Coming out on top of the tastiest papaya genotypes were RB1, T2-6-5.27.12, Hybrid 6 and Sunlight 1; Solo and Hybrid 1 were close behind and the yellow varieties scored the lowest. Out of the three yellow varieties Moonlight 1 stood head and shoulders over ML3-3-13 and the current industry standard, 1B, had by far the lowest liking scores.

"The participants were also invited to note down anything that they liked or disliked about each fruit sample and one of the recurring notes that people liked about Moonlight 1 was that it had hints of mango flavours.

"The next step is to find trends in the data and link characteristics which people liked or disliked, to specific chemicals in the fruit. To do this, machine learning techniques approaches will be tested on all combinations of chemical and sensory data to generate the best predictors of fruit flavour and overall liking.

"Our research highlights the positive flavour developments from the '*National Papaya Breeding and Evaluation Program*' (PP18000) and the consumer perceptions that can be used to inform future marketing strategies to boost papaya popularity. This data will be used to determine specific compounds in the fruit that people like and dislike.

"Based on our analysis, future Australian varieties can be selected that appeal to more people, including those who are resistant to papaya flavour."

For more information on the '*Genetics of Fruit Sensory Preferences Program*' *(AS19003)*, contact Josh Lomax at ***josh.lomax@griffithuni.edu.au*** or Dr Ido Bar at ***i.bar@griffith.edu.au***; and on the '*National Papaya Breeding and Evaluation Program*' (PP18000) contact Prof Rebecca Ford at ***rebecca.ford@griffith.edu.au*** or Dr Fawad Ali at ***fawad.ali@griffith.edu.au***.

The 'Genetics of Fruit Sensory Preferences Program' (AS19003) project was funded by Hort Innovation using papaya industry levies and funds from the Australian Government.

CONSUMER BEHAVIOURAL DATA

The '*Consumer behavioural data program*' (MT21004) released its latest set of data in March 2024 which seeks to provide growers and supply chain partners with information and insights to support business decision-making and strategic activities for the wider industry.

Commencing in mid-2021, this multi-industry investment program through Hort Innovation is led by the global information service, NielsenIQ, and is expected to be completed in July 2026.

The program provides regular consumer behaviour data and insight reporting to a range of industries through the Harvest to Home platform (***https://www.harvesttohome.net.au/fruitmushroomnuts/latest-highlights/papaya-papaw***).

Data is updated every 12 months, with the next set of data to be published in mid-2024.

This program is a part of Hort Innovation's Consumer Insights Strategy which focuses on building a detailed understanding of our consumers and the potential market opportunities for the horticulture sector.

For more information on the '*Consumer behavioural data program*' (MT21004), head to: ***https://www.horticulture.com.au/growers/providing-access-to-valuable-data-via-the-harvest-to-home-platform/***

The 'Consumer behavioural data program' (MT21004) project is funded by Hort Innovation using multi-industry strategic levies and contributions from the Australian Government.

Hort Innovation Australia have calculated this information based in part on data reported by NielsenIQ through its Homescan Service for the Papaya industry with data to 27th March 2022, for the Total Australia market, according to the NielsenIQ standard product hierarchy.

SNAPSHOT: 2024 CONSUMER BEHAVIOURAL DATA FIGURES

The most recent round of data was released in March 2024, with key papaya insights including:

MARKETING OVERVIEW

- In the 52 weeks (ending March 2024), papaya/papaw was showing no significant change at 0.6% in terms of dollars ($) and a decline of 8.6% in terms of volume (kg).
- Buying household percentage fell from 12% to 10%, and compared to the prior year, the average spend ($) rose, from $22.82 to $25.90.
- The average weight purchased (kg) rose slightly. Queensland grew the most of all states (4.4%) in dollar sales and declined the least (-6.2%) in volume.
- 23.6% of papaya/papaw volume sales were sold on sold at a reduced cost or with the presence of a feature or display over the past 52 weeks.

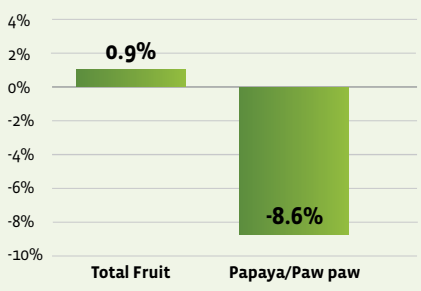
RETAIL OVERVIEW

- Looking at the dollar share of trade, major supermarkets comprised 47.5% of all papaya/papaw. Non-supermarkets comprise 37.0% of dollar share of trade, and dollar sales were relatively stable at -0.6%.
- High income households were the highest contributors for papaya / papaw with 37.6% in terms of dollar sales versus 44.9% for total fruit.

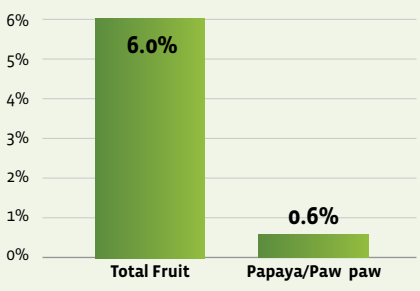
IN SUMMARY

- Recent activity shows that papaya/papaw was relatively flat in terms of dollars ($) and in decline at -8.6% in terms of volume (kg).

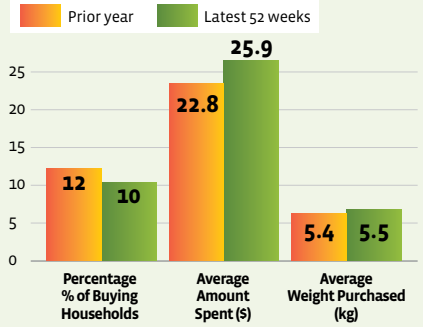
VOLUME (KG) GROWTH VERSUS TOTAL FRUIT



DOLLAR SALES ($) GROWTH VERSUS TOTAL FRUIT



HOUSEHOLD BUYING BEHAVIOUR



SOURCE: *NielsenIQ Homescan for the 52 weeks ending 24/03/2024 for the Australian market.*

HORT INNOVATION UPDATES

Social media and marketing update

Plan to inspire and drive trial at point of purchase

By Lynda Pallone and Joanna Krol-Slocombe, Hort Innovation Marketing

Aiming to increase the number of households purchasing papaya, the Papaya Marketing Plan for FY25 is built on a shared vision endorsed by the Papaya SIAP.

This plan draws from key priorities identified during an industry workshop in April, bringing together insights from Hort Innovation representatives and industry stakeholders.

Incorporating these insights, the FY25 marketing plan seeks to shift consumer behavior by educating them about the taste, uses, and value of papayas. The goal is to change perceptions from 'papayas seem expensive' to 'one papaya can serve up to four people, representing great value for money'.

Spanning two financial years, the marketing plan focuses on three main activity bursts – April-May 2025, September-October 2025, and April-May 2026. The plan is structured around two main pillars: inspiring consumers to try papaya and driving trial at the point of purchase.

Through the inspiration pillar, content will feature the journey from paddock to plate on paid social media. For the trial pillar, in-store sampling will showcase papaya as a healthy snack and a perfect breakfast option, emphasising its health benefits and taste attributes to elevate these meal occasions.

These marketing activities have been funded by Hort Innovation through the papaya marketing levy.

THE STRATEGIC APPROACH is driven by twelve key facts about papaya consumption and market dynamics:

1. **Consumer value perception:** Despite cost-of-living pressures, 78% of consumers view papayas as worth the cost.
2. **Fresh supply dominance:** 99% of papaya production is directed towards fresh supply, compared to 65% for all fruits.
3. **Above average food service share:** Papaya holds a 21% share in food service, above the 14% average for fruits.
4. **Sales decline trends:** While papaya sales are declining, the rate (0.4%) is much lower compared to the 7.1% average for all fruits.
5. **Low household penetration:** Only 10.4% of households purchased papaya in the past year, with 38% buying only once.
6. **Low spontaneous purchase intent:** 54% of consumers have never bought papaya, and less than 1% plan to purchase it in the next week.
7. **Emotional connection barriers:** Price and seasonality are key barriers, indicating room for improving the emotional connection with consumers.
8. **Consumption patterns:** Papaya is primarily consumed fresh and as a snack, highlighting opportunities to increase its use for breakfast and dessert.
9. **Retail trial opportunities:** 64% of consumers intending to buy papaya actually follow through, showing potential for driving trials at retail.
10. **Effective marketing channels:** Limited budgets can be maximised through online content and influencers.
11. **Health and taste perception:** While papaya is seen as healthy and delicious, it needs to stand out more compared to other fruits.
12. **Under-representation in major retailers:** There is potential to grow sales volume through major retailers where papaya is under-represented.

2023/24 Australian-Grown Horticulture Sustainability Framework

Australian Horticulture is embracing a greener future with the 2023/24 Australian-Grown Horticulture Sustainability Framework.

The 2023/24 Australian-Grown Horticulture Sustainability Framework is a comprehensive roadmap for Australian horticulture growers, promoting sustainable, ethical, and safe farming practices, improving their market access by meeting the rising demand for sustainability.

The framework is an important tool for growers to translate their practices, into a language buyers, consumers and the public understand.

The framework is structured around four key pillars:

1. **Nourish & Nurture** – Improving diets, health, and well-being through safe, quality food and greenlife.
2. **People & Enterprise** – Highlighting the connection between the sector's people, enterprises, and economic value.
3. **Planet & Resources** – Emphasising sustainable agricultural practices and resource management.
4. **Climate & Waste** – Focusing on waste reduction and climate resilience.

Hort Innovation invests in $80 million worth of sustainability initiatives, enhancing areas from carbon emissions reduction and water efficiency to waste management and advanced agricultural technology.

The Framework is available on the Hort Innovation website at: ***https://www.horticulture.com.au/contentassets/f629a21ab8514f16882f40764927d09f/2023-horticulture-sustainability-framework-003.pdf***

Appendix 11: Project Risk Register (PP20000)

Project Risk Register: Delivery Partner Portal – [PP20000] – [Papaya Industry Extensions and Communications Project]

The risk	Potential risk causes/sources	Potential risk impacts	Risk controls	Risk likelihood with controls in place	Risk consequence with controls in place	Treated risk assessment	Risk evaluation	Person responsible
Outputs are not produced	*Milestones are not delivered on time.* *Non-availability or loss of key staff, insufficient resource budgeting to deliver outputs.*	*Individual outputs may not be delivered in a timely manner or may not be delivered at all.*	*Outputs are realistic, well-resourced and achievable.*	*Unlikely*	*Minor*	*Low*	*Yes*	*Geoff Dickinson*
Stakeholders do not use or adopt project outputs	*Industry KASA and practices do not change over project timeframe.* *Growers unable or unwilling to attend events, access information or engage in industry events.* *Project outputs and content not relevant; Inappropriate extension strategies for the target audience.*	*Low uptake of new practices; Underachievement of intended project outcomes.*	*Regular extension and communication via the project's 'National Papaya Extension and Communication Strategy' will ensure stakeholders are informed of the project outputs and activities. Seeking regular feedback from industry will ensure that extension methods and content are relevant.*	*Unlikely*	*Moderate*	*Medium*	*Yes*	*Geoff Dickinson*
Environmental and social factors impact the delivery of extension and communication activities	*Covid may continue to cause issues in the delivery of face-to-face extension. Weather events/disasters may affect grower collaboration including in-field demo trials.*	*Delay in delivering project outputs. Grower trials may be delayed, destroyed, or cancelled.*	*Use of electronic means of communications. Ability to undertake trials in a different region or vary project timeframes.*	*Possible*	*Minor*	*Medium*	*Yes*	*Emily Pattison*
Loss of key personnel	*Staff changing jobs, staff being seconded, staff moving within the organisation.*	*Individual outputs may not be delivered in a timely manner or may not be delivered at all.*	*Both organisations have sufficient staff resources to backfill with the loss of key personnel. Back up personnel are kept informed and involved with project outcomes and*	*Unlikely*	*Minor*	*Low*	*Yes*	*Geoff Dickinson*

			comms activities. Replace personnel will be recruited as required.					
Failure due to inter-organisational partnerships not working	*Disagreement on allocated tasks. Inability of project staff to work together effectively.*	*Individual outputs may not be delivered in a timely manner or may not be delivered at all.*	*DAF and Cox Inall have well specified project roles and responsibilities and are highly experienced in the delivery of externally funded projects. An existing project subcontract is in place between DAF and Cox Inall. Regular communication and collaboration between both these professional organisations will ensure project milestones are achieved.*	*Unlikely*	*Major*	*Medium*	*Yes*	*Geoff Dickinson*

ENDS