

Papaya

Strategic Investment Plan

2022-2026



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EXECUTIVE SUMMARY

The overarching strategic intent of this Strategic Investment Plan (SIP) is to drive profitability by supporting best management practices (BMPs) and supply chain improvements, innovating for varietal improvement with superior agronomic performance and consistent product quality to drive increases in domestic consumer demand.

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

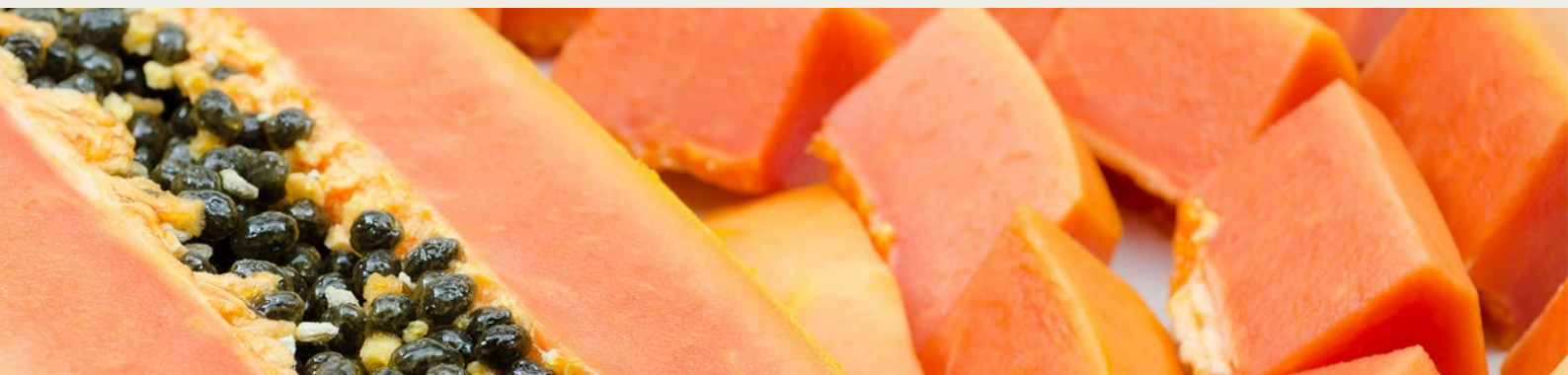
The Australian papaya industry situation in 2019/20 is described on **page 4** with further information provided in **Appendix 1**. The industry has continued to grow steadily year on year from a volume of 12,704 tonnes in 2012/13 to 19,648 tonnes in 2019/20. Production volume is expected to continue to grow at this rate over the next five years. Red papaya and yellow pawpaw are predominantly produced in the northern Australian states, with major producing areas in Mareeba and Tully, Queensland.

The strategic intent of the papaya SIP provides a summary of how the papaya industry will drive change over the life of the SIP, which will ultimately come about by growers having access to the tools and knowledge required to improve their management practices. This specifically relates to postharvest management and access to superior varieties with improved agronomic performance and product quality, attributing to meeting the demand of consumers.

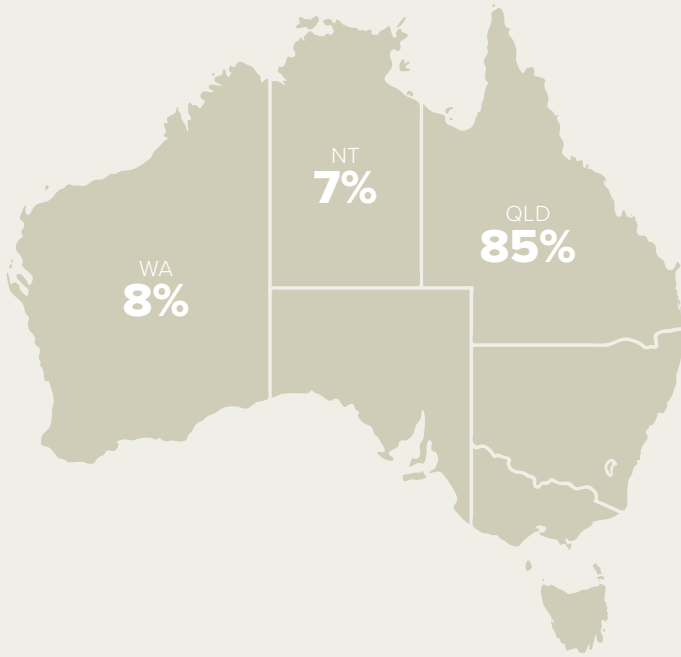
The financial estimates give an indicative overview of the funding availability for the period of FY2022-FY2026. Currently the papaya research and development (R&D) fund has capacity to invest in new projects from FY2022. Careful prioritisation of future investment needs is required over the next five years.

The four outcome areas of this SIP cover significant themes under which programs and investments will be focused. These are listed in priority order for the Australian papaya industry. Demand creation continues to be a focus for the industry, particularly improving awareness of papaya varieties, health benefits and influencing purchase intent throughout the season. Under the outcome of industry supply, productivity and sustainability, the priorities are access to new superior varieties, focus on consistent product quality and productivity through BMPs and supply chain improvements. Extension and communication of information, particularly of priority areas, is key to driving industry success.

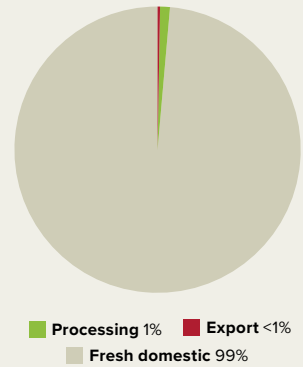
The key performance indicators (KPIs) detail how we measure the impact of each strategy, for example, increased awareness of the health benefits of Australian papaya, access to superior varieties, new knowledge, tools and technical support for best practice in agronomics practice and supply chains.



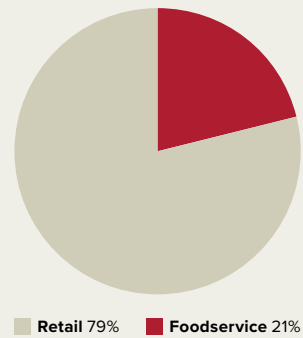
PRODUCTION REGIONS:



EXPORT/FRESH DOMESTIC/
PROCESSING:



RETAIL VS FOODSERVICE:



PRODUCTION WINDOW:



Year-round

NUMBER OF GROWERS:



Approx. 130

VARIETIES:



Red papaya 85%
Yellow pawpaw 15%

PRODUCTION VOLUMES:



19,648 tonnes

in 2019/20

FARMGATE VALUE OF PRODUCT:



\$31.8 million

in 2019/20

PER CAPITA CONSUMPTION:

0.75 kg

in 2019/20



GROWTH TRENDS:



SINCE 2012/13...

VALUE
+\$11.9 million
+63%



Value increase of \$11.8 million (63%) since 2012/13, with volumes remaining steady.

THE PAPAYA STRATEGIC INVESTMENT PLAN

The papaya SIP is the roadmap that will guide Hort Innovation's oversight and management of the papaya industry's investment programs. It lays the foundation for decision-making in investments and represents the balanced interest of the whole industry. The important function of this SIP is to ensure that the investment decisions align with papaya industry priorities.

Hort Innovation has led the process for preparing the refresh of the papaya SIP, listening and engaging with levy payers and key stakeholders including Industry Representative Bodies (IRBs) and expertise available through advisory mechanisms and delivery partners. The refresh process involved consultation with and input from a wide range of levy payers, objective analysis of performance and learning from the previous SIP, as well as environmental scanning to identify emergent trends and issues that could impact on future industry profitability and sustainability.

Hort Innovation has valued the support, advice, time, and commitment of all stakeholders that contributed to producing this SIP, especially papaya growers.

The whole-of-company approach taken by Hort Innovation to produce this SIP has harnessed existing external and internal knowledge, learning, partnerships and relationships. The output is a tailored plan with which the papaya industry can be confident of its strategic intent, including visibility on how investment impacts will be identified. Specific investments to address the SIP strategies and align with industry strategic priorities will be outlined in detail via the papaya Annual Investment Plan (AIP). The AIP will be published each year over the lifespan of the SIP and detail the investments that will be prioritised based on potential industry impact, as well as the availability of levy funds. Hort Innovation will advise industry stakeholders when the AIP has been published via established communication channels each year. The AIP will be developed with input from the papaya Strategic Investment Advisory Panel (SIAP), IRBs and other key stakeholders.

Producers in the papaya industry pay levies to the Department of Agriculture, Water and the Environment, which is responsible for the collection, administration and disbursement of levies and charges on behalf of Australian agricultural industries.

Agricultural levies and charges are imposed on primary producers by government at the request of industry to collectively fund R&D, marketing, biosecurity, and residue testing programs.

Levy is payable on papayas that are produced in Australia and either sold by the producer or used by the producer in the production of other goods. The R&D levy rate on fresh papaya is set at 1 cent per kilogram and 0.25 cents per kilogram for processing papaya. The marketing levy is set at 1 cent per kilogram.

Hort Innovation has developed this SIP for the papaya industry to strategically invest the collected papaya levy funds into the priority areas identified and agreed by the papaya industry.

This SIP represents the Australian papaya industry's collective view of its R&D and marketing needs over the next five years (2022-2026). 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. **Appendix 3** acknowledges the people who were consulted in the preparation and validation of this SIP. Statistics and data within this publication are sourced from the Australian Horticulture Statistic Handbook 2019/20 and other documents unless stated otherwise and are listed in **Appendix 4**. A list of acronyms used within the document is available in **Appendix 5**.

Financial estimates

The annual revenue from levy income and Australian Government contributions for eligible R&D set the overall budget parameters for the papaya SIP. Importantly, a portion of these funds is already committed, as the industry has current multi-year projects for R&D and marketing activities. In addition, the levy income from year to year will vary due to changes in seasonal and market conditions.

The financial estimates used for the purpose of developing this SIP are presented in **Table 1** below and are indicative. The intention of the table is to offer a strategic overview of the industry fund at a specific point in time, and the figures will be regularly reviewed to reflect the latest information for the industry and any changes in investment priority. Further details will be available within the AIP each year.

TABLE 1. Indicative financial estimates for the papaya SIP over the life of the SIP

	2022 \$	2023 \$	2024 \$	2025 \$	2026 \$
R&D					
Balance end FY2021	497,873				
Estimated levy funds (growers)	172,000	172,000	169,000	169,000	169,000
Australian Government contribution	152,934	171,127	176,115	162,383	132,101
Current investments	250,600	266,600	300,100	126,700	45,100
New investments	10,000	25,000	–	150,000	180,000
Total project investments	260,600	291,600	300,100	276,700	225,100
CCR	45,269	50,654	52,130	48,065	39,102
Projected end balance	519,700	528,100	532,700	557,900	611,000
MARKETING					
Balance end FY2021	134,696				
Estimated levy funds (growers)	175,000	170,000	170,000	170,000	170,000
Current investments	140,000	–	–	–	–
New investments	–	125,000	125,000	125,000	125,000
Total project investments	140,000	125,000	125,000	125,000	125,000
CCR	30,524	27,253	27,253	27,253	27,253
Projected end balance	138,470	154,820	172,670	190,500	208,300

Disclaimer: All figures are indicative only and may change depending on actual income and expenditure.

Balance end FY2021 – The closing balance of the fund as at 30 June 2021

Estimated levy funds – Net levy income/revenue that is generated and collected by levy revenue services (LRS)

Australian Government contribution – Amount of contribution from the Australian Government on R&D levy-funded expenditure

Current investments – Current estimated value of contracted projects

New investments – The estimated dollar value that is available for potential new investments for industry subject to industry advice

CCR – Corporate cost recovery: the cost to implement and manage R&D and marketing investment programs for each industry

Projected end balance – Forecast of the anticipated final position of the fund

PAPAYA INDUSTRY OUTCOMES



The overarching strategic intent of this SIP is to drive profitability by supporting BMPs and supply chain improvements, innovating for varietal improvement with superior agronomic performance and consistent product quality to drive increases in domestic consumer demand.

Industry outcomes

Outcome statements identified and prioritised by the papaya industry have been prepared under four key outcome areas of: demand creation; industry supply, productivity and sustainability; extension and capability; and business insights.

OUTCOME 1: Demand creation

Contribute to improving consumer knowledge, attitudes and purchase intent to drive volume growth.

Demand creation will support industry to develop existing and future domestic markets. This will contribute to improved consumer knowledge and attitudes, in addition to encouraging purchase intent to drive category volume growth.

The strategic intent of this outcome is to maintain and strengthen consumer demand, as the foundation for sustainable expansion of production and consumption in domestic markets. It means the industry is investing to:

- Broaden consumer awareness so that papaya is more top of mind and purchased more often
- Support product positioning with consistent quality, evidence of beneficial product health attributes, and responsible industry production practices
- Develop strong relationships across the supply chain with a shared goal to grow the category.

OUTCOME 2: Industry supply, productivity and sustainability

Improve industry productivity (inputs/outputs) to maintain competitiveness, viability and sustainability of supply.

Supply and productivity will be supported through improvements to production efficiencies which will drive profitability outcomes, while ensuring long-term sustainability outcomes.

The strategic intent of this outcome is to accelerate the application of production practices that optimise returns and reduce risk to growers. The strategic intent of this outcome is to accelerate the application of production practices that optimise returns and reduce risk to growers. Achieving the outcome will involve:

- Practical demonstration of effective postharvest protocols and guidelines as well as sustainable BMPs for papaya production
- Development of new red and yellow flesh varieties
- Proactively monitoring potential crop protection regulatory threats and having access to a broader suite of effective, socially acceptable and environmentally sound crop protection solutions.

OUTCOME 3: Extension and capability

Build capability and innovative culture.

Building capability and an innovative culture will support industry cohesion and increase knowledge, attitudes, skills and aspirations (KASA) to use investment outputs across the supply and demand initiatives to better manage risk and create positive change.

The strategic intent of this outcome is to manage knowledge, relationships, systems and processes required to communicate effectively with internal and external stakeholders. Achieving the outcome will involve:

- A change in KASA and practice for grower/industry profitability and sustainability through use of best practice and innovating
- Growers, supply chain, media and governments being well informed on industry initiatives and achievements as a vital part of regional communities and networks
- Improved networks and cross-industry collaboration to increase on-farm use of R&D outputs and build a stronger more resilient industry
- Proactive strategic and evidence-based decision-making in businesses and for industry on investment, priorities and risk management.

OUTCOME 4: Business insights

Measure industry supply (production) and demand (consumer behaviour) data and insights to inform decision-making.

Business insights will support the industry to remain aware of market and industry trends to drive informed decision-making.

The strategic intent of this outcome is to deliver data and insights which is foundational to achieving success in the other three outcome areas of demand creation; supply, productivity and sustainability; and extension and capability.

Achieving the outcome will involve reliable baseline data and analysis to provide insights and understand current and emerging trends. Key investments will support the provision of consumer knowledge and tracking, production statistics and forecasting to enable better decision-making process by industry and individual businesses.

These investments underpin and are complementary to delivery of the other outcome areas.

“The important function of this SIP is to ensure that the investment decisions align with papaya industry priorities.”

PAPAYA INDUSTRY STRATEGIES



Strategies to address industry investment priorities

The strategies and identified impacts for each of the key outcome areas are described in the tables below. The highest priority investments lay the foundation for the SIP, and its implementation will require a balanced approach to ensure the industry has a high likelihood of success over the short term (0-3 years), medium term (3-5 years) and long term (5-10 years).

The ability to deliver on these strategies (and subsequent investments) will be determined by the ability of the statutory levy to provide adequate or sufficient resources. Further resources and efficiencies may become available through alternative funding sources such as Hort Frontiers strategic partnership initiative, external grants and/or cross-industry initiatives.

OUTCOME 1: Demand creation

Demand creation supports the Australian papaya industry to develop existing and future domestic markets.

STRATEGIES	POTENTIAL BENEFIT OR IMPACT
1. Increase domestic consumer demand for fresh, quality Australian papayas through knowledge, attitudes and purchase intent	<ul style="list-style-type: none"> Increased consumer demand for Australian papayas Increased awareness of health benefits of papaya

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.

STRATEGIES	POTENTIAL BENEFIT OR IMPACT
1. Complete the development of new red and yellow varieties with superior agronomic performance, product quality, and disease resistance	<ul style="list-style-type: none"> Increased consumer satisfaction with higher quality product and superior genetics Improved grower profitability with superior genetics
2. Refine agronomic practices to improve productivity, quality and environmental outcomes	<ul style="list-style-type: none"> Increased yields with better environmental outcomes
3. Review current postharvest protocols and guidelines to identify opportunities for practical demonstration, extension and future investment	<ul style="list-style-type: none"> Review undertaken for papaya postharvest program for R&D gaps and highlighting of areas for further extension
4. Improve industry preparedness and resilience to biosecurity threats	<ul style="list-style-type: none"> Improved industry biosecurity preparedness reducing the risk of an incursion
5. Prioritise the major crop protection gaps through a Strategic Agrichemical Review Process (SARP)*	<ul style="list-style-type: none"> Available registered or permitted pesticides are evaluated for overall suitability against major disease, insect pests and weed threats. The SARP aims to identify potential future solutions where tools are unavailable or unsuitable
6. Support and co-ordinate crop protection regulatory activities with the potential to impact plant protection product access, both in Australia and internationally*	<ul style="list-style-type: none"> Regulatory Risk Assessments have informed proactive strategic priority setting to avoid pest management gaps in the event access or use is negatively impacted

Continued >>

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.

STRATEGIES	POTENTIAL BENEFIT OR IMPACT
7. Generate residue, efficacy and crop safety data to support applications to the Australian Pesticides and Veterinary Medicines Authority (APVMA) that seeks to gain, maintain or broaden access to priority uses for label registrations and/or minor use permits for crop protection needs*	<ul style="list-style-type: none"> • Crop protection solutions meet industry priority needs as identified in the industry SARP or biosecurity plan

OUTCOME 3: Extension and capability

Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.

STRATEGIES	POTENTIAL BENEFIT OR IMPACT
1. Deliver extension and communication capability to support positive change in the areas of varietal development, postharvest management and biosecurity	<ul style="list-style-type: none"> • A change/progression in awareness, knowledge and attitudes for grower profitability and sustainability which support the adoption of best practice and innovations
2. Provide opportunity for engagement between and across industry members and relevant stakeholders	<ul style="list-style-type: none"> • Improved networks and cross-industry collaboration to increase resilience, efficiencies and use of R&D outputs
3. Develop a targeted skills training, leadership development and career pathway program for the papaya industry	<ul style="list-style-type: none"> • Availability of skilled staff for the papaya industry

OUTCOME 4: Business insights

The Australian papaya industry is more profitable through informed decision-making using consumer knowledge and tracking, production statistics and benchmarking and independent reviews.

STRATEGIES	POTENTIAL BENEFIT OR IMPACT
1. Increase industry alignment with quality and brand-positioning opportunities driven by consumer insights*	<ul style="list-style-type: none"> • Business insights provided to deliver against demand, supply and extension outcomes
2. Use production forecasts to inform long-term and/or in-season market planning and supply strategies	<ul style="list-style-type: none"> • Increased industry capacity
3. Use industry benchmarking activity to measure and track industry productivity and profitability, identifying areas for ongoing priority	<ul style="list-style-type: none"> • Improved data on cost of production across enterprises of different scale • Opportunities for costs reduction

* Foundational investments provide data and information that underpin the delivery of other SIP outcome areas and will be aligned to this strategy. Foundational investment areas include:

- Consumer behavioural data
- Consumer usage and attitudes, and brand health tracking data
- Impact assessments
- Trade data
- Crop protectant data.





PAPAYA SIP MONITORING AND EVALUATION

The papaya SIP Monitoring and Evaluation (M&E) Framework development has been informed by Hort Innovation’s Organisational Evaluation Framework.

Progress against the SIP will be reported in Hort Innovation publications and through industry communication channels. The SIP outcomes and strategies are used to inform KPIs that in turn drive the investments and individual projects to deliver on the SIP. Projects responsible for delivering the strategy aligned with each KPI will collect the data.

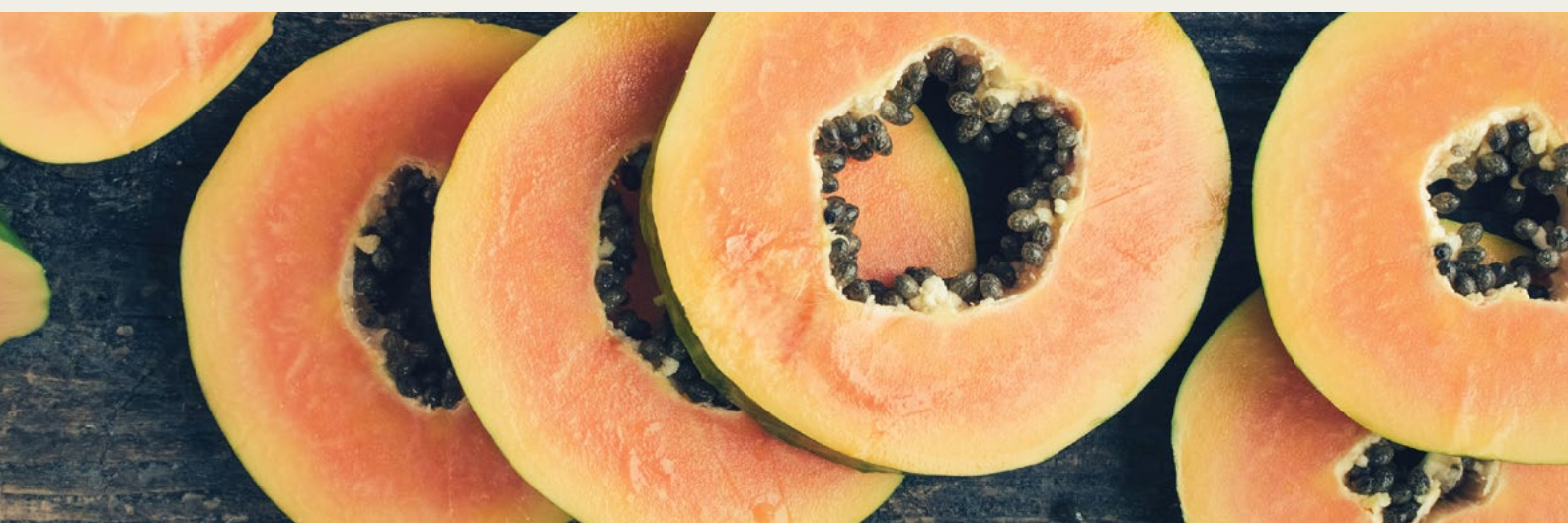
An M&E and reporting framework is shown below. The framework shows what will be measured to demonstrate progress against the plan and how metrics will be tracked. Reporting on KPIs will be processed through various formal channels to inform industry and government investors of progress, performance, and impact. Data sources to support M&E will be identified and collected as part of the requirements for each levy investment.

Hort Innovation will facilitate the regular review of the SIP to ensure they remain relevant to industry.

Papaya SIP Monitoring and Evaluation Framework

The papaya SIP M&E Framework is shown below. It includes KPIs and data collection methods both at a macro/industry (trend) level and at more specific SIP strategic level/s.

OUTCOME	STRATEGIES	KPIs
Demand creation		
<p>Outcome 1: Demand creation supports the Australian papaya industry to develop existing and future domestic markets.</p>	<p>1. Increase domestic consumer demand for fresh, quality Australian papayas through knowledge, attitudes and purchase intent</p>	<ul style="list-style-type: none"> • Positive influence on consumer preference • Positive shifts in brand tracking • Use of nutritional information to support consumer demand



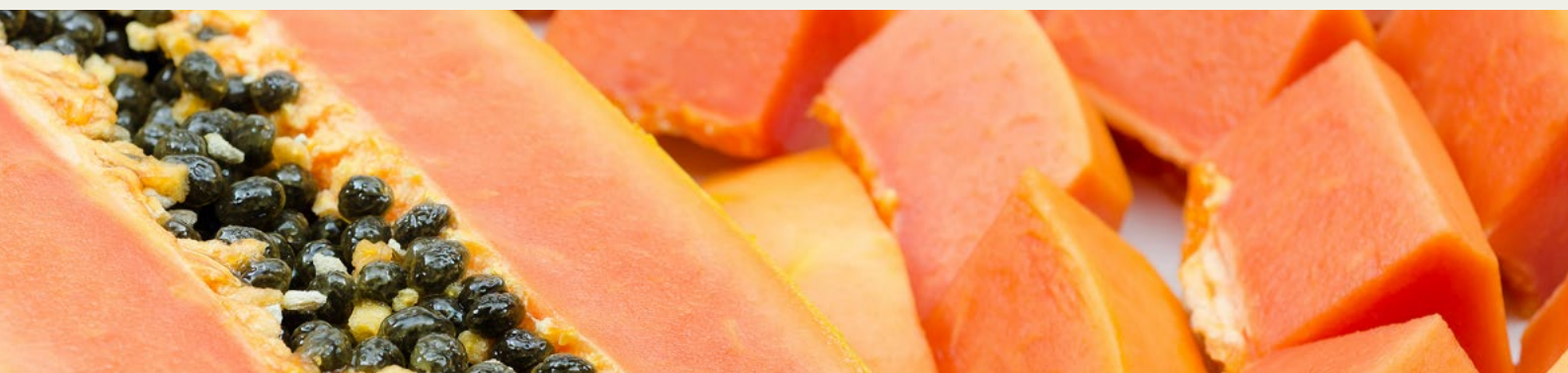
OUTCOME	STRATEGIES	KPIs
Industry supply, productivity and sustainability		
<p>Outcome 2: The Australian papaya industry has increased profitability, efficiency and sustainability through innovative R&D, sustainable BMPs and varieties.</p>	<p>1. Complete the development of new red and yellow varieties with superior agronomic performance, product quality, and disease resistance</p>	<ul style="list-style-type: none"> • Availability and access to superior varieties with improved agronomic performance and product quality attributes developed for Australian conditions • New knowledge on the performance of superior F1 hybrids • Grower-led trial sites in major papaya and pawpaw growing regions
	<p>2. Refine agronomic practices to improve productivity, quality and environmental outcomes</p>	<ul style="list-style-type: none"> • New agronomic knowledge available for sustainable papaya production
	<p>3. Review current postharvest protocols and guidelines to identify opportunities for practical demonstration, extension and future investment</p>	<ul style="list-style-type: none"> • Desktop review and identification of knowledge gaps in pest and disease management (e.g., hot water treatment and fungicides), harvest guidelines, cold chain technology, optimum handling and storage
	<p>4. Improve industry preparedness and resilience to biosecurity threats</p>	<ul style="list-style-type: none"> • Maintenance/tracking of the implementation of an industry biosecurity plan • Development of risk analyses of high priority pests including entry pathways, establishment and spread potential
	<p>5. Prioritise the major crop protection gaps through a SARP*</p>	<ul style="list-style-type: none"> • Coordinated industry priority setting with a clear outlook of gaps and risks in existing pest control options • Industry priority needs published and shared with stakeholders, including registrants
	<p>6. Support and co-ordinate crop protection regulatory activities with the potential to impact plant protection product access, both in Australia and internationally*</p>	<ul style="list-style-type: none"> • Regulatory Risk Assessments maintained
	<p>7. Generate residue, efficacy and crop safety data to support applications to the APVMA that seeks to gain, maintain or broaden access to priority uses for label registrations and/or minor use permits for crop protection needs*</p>	<ul style="list-style-type: none"> • Data to support applications to the APVMA and the establishment of Maximum Residue Limits (MRLs)



OUTCOME	STRATEGIES	KPIs
Extension and capability		
Outcome 3: Improved capability and an innovative culture in the Australian papaya industry maximises investments in productivity and demand.	1. Deliver extension and communication capability to support positive change in the areas of varietal development, postharvest management and biosecurity	<ul style="list-style-type: none"> Establishment of a baseline and then increased share of the industry with positive change in KASA, and practice and implementation concerning targeted high priority areas
	2. Provide opportunity engagement between and across industry members and relevant stakeholders	<ul style="list-style-type: none"> Demonstrated growth in cooperation within industry and across industries leading to business and industry innovations (e.g., case studies)
	3. Develop a targeted skills training, leadership development and career pathway program for the papaya industry	<ul style="list-style-type: none"> Increased capacity in leadership initiatives
Business insights		
Outcome 4: The Australian papaya industry is more profitable through informed decision-making using consumer knowledge and tracking, production statistics and benchmarking and independent reviews.	1. Increase industry alignment with quality and brand-positioning opportunities driven by consumer insights*	<ul style="list-style-type: none"> Delivery of consumer insights strategy Evidence that consumer insights inform strategic market engagement New consumer knowledge available for growers
	2. Use production forecasts to inform long-term and/or in-season market planning and supply strategies	<ul style="list-style-type: none"> Production data is available Evidence that production data support marketing and production decisions
	3. Use benchmarking activity to measure and track industry productivity and profitability	<ul style="list-style-type: none"> Data available to support extension activities and individual grower decision-making Evidence of data used to support industry-level decision-making and grower practice change

* Foundational investments provide data and information that underpin the delivery of other SIP outcome areas and will be aligned to this strategy. Foundational investment areas include:

- Consumer behavioural data
- Consumer usage and attitudes, and brand health tracking data
- Impact assessments
- Trade data
- Crop protectant data.



Reporting framework

Hort Innovation will use dynamic reporting aligned to the Organisational Evaluation Framework to report regularly on progress and performance. Reporting will be processed through formal channels to inform industry and government investors.

A review of investment performance against the respective industry outcome and/or strategy-level KPIs for the papaya SIP will be completed annually as the primary reporting mechanism. The SIP performance report will provide:

- Evidence of progress towards achieving the industry-specific outcomes and strategies through an assessment of the KPIs identified in the SIP
- Evidence of progress towards cross-industry investment strategies and outcomes. This will involve Hort Innovation's whole-of-horticulture reporting obligations and corporate plan, annual reports and Hort Innovation's Annual Operating Plan.

SIP performance reports will also inform the Australian Government of progress towards achieving government priorities. In particular, reporting will support Hort Innovation to meet the Performance Principles and requirements contained in the [Deed of Agreement 2020-2030](#).





COLLABORATION AND CROSS-INDUSTRY INVESTMENT

Based on advice from industry throughout the engagement process, Hort Innovation understands that Australian horticulture industries have common issues, and in turn have identified prospective areas for collaboration and cross-industry or regional investment.

These opportunities have been included as strategies across multiple industry SIPs where relevant and required. By delivering more multi-industry collaboration in research, development and extension (RD&E), marketing and international trade, Hort Innovation aims to support more effective and efficient outcomes for growers and the wider horticulture sector. This includes driving investment through the Hort Frontiers strategic partnership initiative. Importantly, while this approach acknowledges there is value in solving issues across industries and regions, it does not reduce the importance of industry-specific initiatives.

Cross-industry/regional R&D opportunities identified for the papaya industry include:

- Biosecurity preparedness programs
- Leadership initiatives.

Cross-industry areas of collaboration for demand-driving outcomes provide the opportunity to advance the prosperity of the sector through gaining efficiencies in the delivery of the program and contributing to stronger overall outcomes. By collaborating as one sector to win the hearts and minds of the consumers, in addition to individual demand-driving programs, there is the potential to enhance the total category value proposition, contributing to driving returns for Australian growers.

Areas of consideration for collaboration for demand-driving outcomes across the lifespan of the 2022-2026 SIP include:

- All-of-horticulture consumer marketing campaigns designed to drive awareness, consideration, and purchase behaviour change
- Communications to bring horticulture to top of mind (saliency) and reposition the benefits they provide to Australian and international consumers

- Retail partnerships to advance total category and shopper demand-driving programs
- A global brand platform to reinforce the unique selling proposition of Australian-grown horticultural produce and drive preference with international consumers.

Strategic science and research focus

Collaboration across the agriculture research community is essential, including with IRBs and organisations such as the CSIRO, universities, private enterprise and state government agencies. Hort Innovation is a member of the National Horticulture Research Network (NHRN) together with other senior horticultural R&D representatives from state and Australian Government agricultural agencies. The NHRN is responsible for the development and implementation of the broader Horticulture RD&E Strategy under the National Primary Industries RD&E Framework.

During the engagement process, key delivery partners were contacted including lead agencies within the NHRN Framework as well as specific delivery partners for each industry. The lead agency involved with the papaya industry investment program, Department of Agriculture and Fisheries, Queensland (DAFQ) was engaged during the development of this SIP to ensure consideration and strategically aligned priorities for the papaya industry. In addition, strategic priorities and opportunities identified by papaya Australia have been considered in the development of the papaya SIP where applicable.

TABLE 2. Government and key agency priorities

Papaya Australia priorities	DAFQ priorities	Rural RD&E for Profit priorities	Australian Government Science and Research priorities
Supplying Australian consumers with high quality papaya Profitable papaya industry Environmentally sustainable production systems	Inspire talent, investment and ideas to drive industry development Anticipate and respond to the emerging needs of the economy and environment Support sustainable and responsible industry	Advanced technology Biosecurity Soil, water and managing natural resources Adoption of R&D	Food Soil and water Advanced manufacturing Environmental change Health

This SIP has been developed alongside the government and key agency priorities listed in **Table 2**, with consideration of issues faced by the papaya industry. These strategic areas further emphasise the opportunity and importance of cross-industry and regional collaboration. All the priority areas are of importance to Australian horticulture, and these will play a role in driving the efficiency and effectiveness of investment across the sector.

Annual investment planning

Specific investments to address the SIP strategies and align with industry strategic priorities will be outlined in detail each year via the papaya AIP. Investment decisions are guided by the SIP and prioritised based on potential industry impact, as well as the availability of levy funds each year. The AIP will be developed with input from the papaya SIAP, which is made up of growers and other industry representatives as well as IRBs and other key stakeholders. Wherever possible, investments will be aligned to form multi-industry projects to increase the efficiency of funding availability. Details of the SIAP can be found on the Hort Innovation website [here](#), and the AIP will be published on the same page each year.

Investment opportunities through Hort Frontiers

Innovation is key to the future success of Australian horticulture. The next evolution of the long-range, higher risk and transformational R&D that has the potential to make a significant impact will be possible through Hort Innovation's Hort Frontiers strategic partnership initiative.

Hort Frontiers is a strategic partnership initiative that facilitates collaborative, cross-industry investments focused on the longer term and more complex themes identified as critical for Australian horticulture by 2030. The partnership framework is currently being established and will include a number of key investment themes for potential investment to guide the initiative and drive transformational R&D across horticulture. Key investment themes will include:

- Environmental sustainability (water, soil and climate)
- Pollination
- Green cities
- Biosecurity
- Health, nutrition and food safety
- Advanced production systems
- International markets
- Leadership
- Novel food and alternate uses (waste reduction).

The development of these areas for investment will benefit all of horticulture, with support from partners with aligned priorities to co-invest in deliverables identified that require alternative funds available outside the levy. Hort Frontiers is being developed to align with the Australian-grown Horticulture Sustainability Framework to invest in specific impact areas to drive innovation and sustainability initiatives.

The papaya industry views a number of these investment areas as opportunities for success into the future, including:

- Environmental sustainability (water, soil and climate)
- Biosecurity
- Leadership.

Partnering with Hort Frontiers on these areas would provide the papaya industry with opportunities for access to world-class research, specialised project management teams and large-scale R&D.

Australian-grown Horticulture Sustainability Framework

Hort Innovation has developed the Australian-grown Horticulture Sustainability Framework, aiming to strengthen the horticulture industry’s sustainability to meet the changing expectations and needs of growers, consumers, the community, investors and governments. The framework applies across the whole of Australian horticulture, including fruits, vegetables, nuts, nursery stock and turf. Through widespread consultation with industry and external groups, proposed sustainability goals and indicators were identified and are detailed within the framework. The framework is aligned to the UN Sustainable Development Goals.

Four key pillars were identified in the framework (*Figure 1*).



The framework should be cross-referenced when undertaking prioritisation of investments. At the time of publication, Hort Innovation is working with industry groups regarding the overall responsibility for the framework, setting and reporting progress against the framework targets and performance measures.

View the Australian-grown Horticulture Sustainability Framework on the Hort Innovation website [here](#).

Table 3 provides examples of papaya SIP strategies that illustrate how the industry is already aligning to the framework.

TABLE 3. Papaya SIP strategy examples showing how the industry is already aligning to the Australian-grown Horticulture Sustainability Framework

Strategy	Potential benefit or impact	Sustainability goal
Increase domestic consumer demand for fresh, quality Australian papayas through knowledge, attitudes and purchase intent	<ul style="list-style-type: none"> Increased consumer demand for Australian papayas Increased awareness of health benefits of papaya 	Nourish & Nurture
Improve industry preparedness and resilience to biosecurity threats	<ul style="list-style-type: none"> Improved industry biosecurity preparedness reducing the risk of an incursion 	Planet & Resources
Deliver extension and communication capability to support positive change in the areas of varietal development, postharvest management and biosecurity	<ul style="list-style-type: none"> A change/progression in KASA for grower/industry profitability and sustainability which supports the adoption of postharvest best practice and innovations 	People & Enterprise
Complete the development of new red and yellow varieties with superior agronomic performance, product quality, and disease resistance	<ul style="list-style-type: none"> Increased consumer satisfaction with higher quality product and superior genetics Improved grower profitability with superior genetics 	Planet & Resources
Refine agronomic practices to improve productivity, quality and environmental outcomes	<ul style="list-style-type: none"> Increased yields with better environmental outcomes 	Planet & Resources



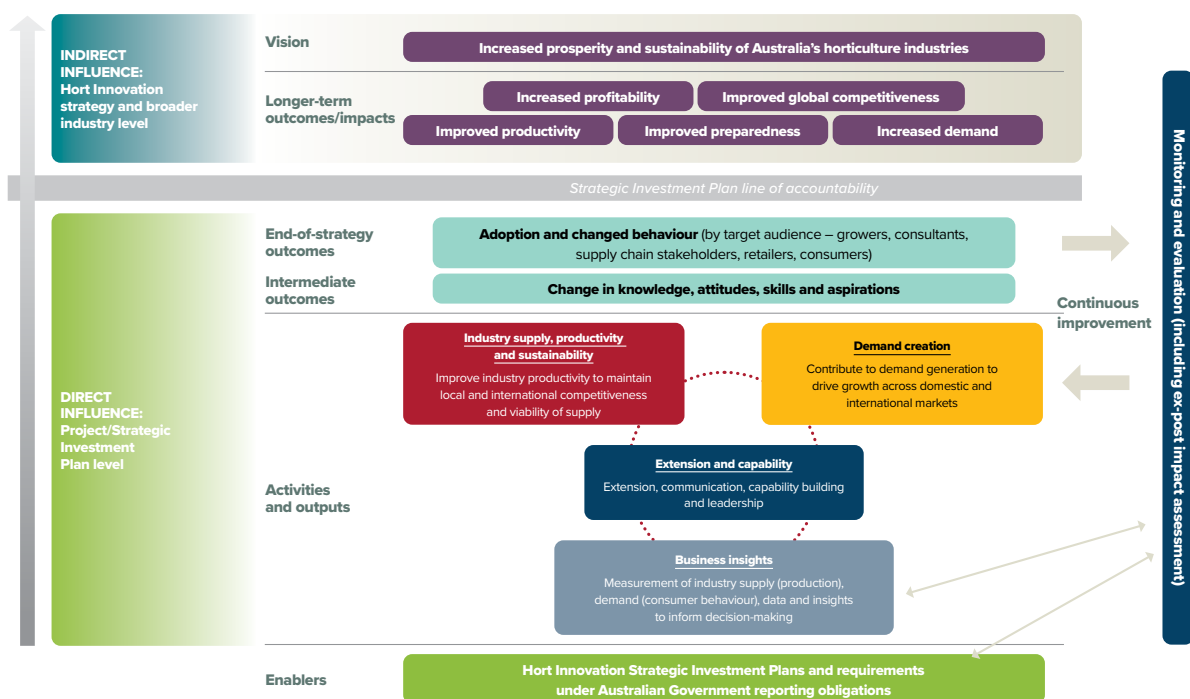
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Strategic Investment Plan logic

The SIP logic (**Figure 2**) identifies how investment activities and outputs (delivered through each SIP outcome area) will support changes in industry KASA, which drive adoption and behaviour change. Beyond the SIP, investment will contribute to driving longer-term impacts for the sector like increased preparedness, demand, productivity, global competitiveness and profitability. Realising these impacts will support Hort Innovation’s vision of increased prosperity and sustainability of Australia’s horticulture industries.

FIGURE 2. Strategic Investment Plan logic



Aligning to Hort Innovation investment priorities

Hort Innovation is committed to sustainable growth in horticulture, with the overarching aim of increasing the sector’s value to \$20 billion by 2030. We will do this through implementing the SIP and investments against the three core pillars, committed to:

1. Drive knowledge and innovation into horticulture industries
2. Deliver the highest value R&D, marketing and international trade investments across industries now and into the future
3. Enable activities that drive all strategic imperatives.

Hort Innovation is governed by a Deed of Agreement with the Australian Government, which allows for the transfer

and investment of levies and Australian Government contributions. As an RDC, Hort Innovation is able to leverage industry levy investments in RD&E with Australian Government contributions up to a value of 0.5% of the industry’s gross value of production. All investments made by Hort Innovation are thoroughly considered to ensure they contribute to the guiding performance principles:

- Productivity
- Profitability
- Preparedness for future opportunities and challenges
- Competitiveness
- Demand: demonstrates how productivity, preparedness and demand lead to profitability and competitiveness and sustainability.



APPENDICES

APPENDIX 1: Industry context

Industry supply chain

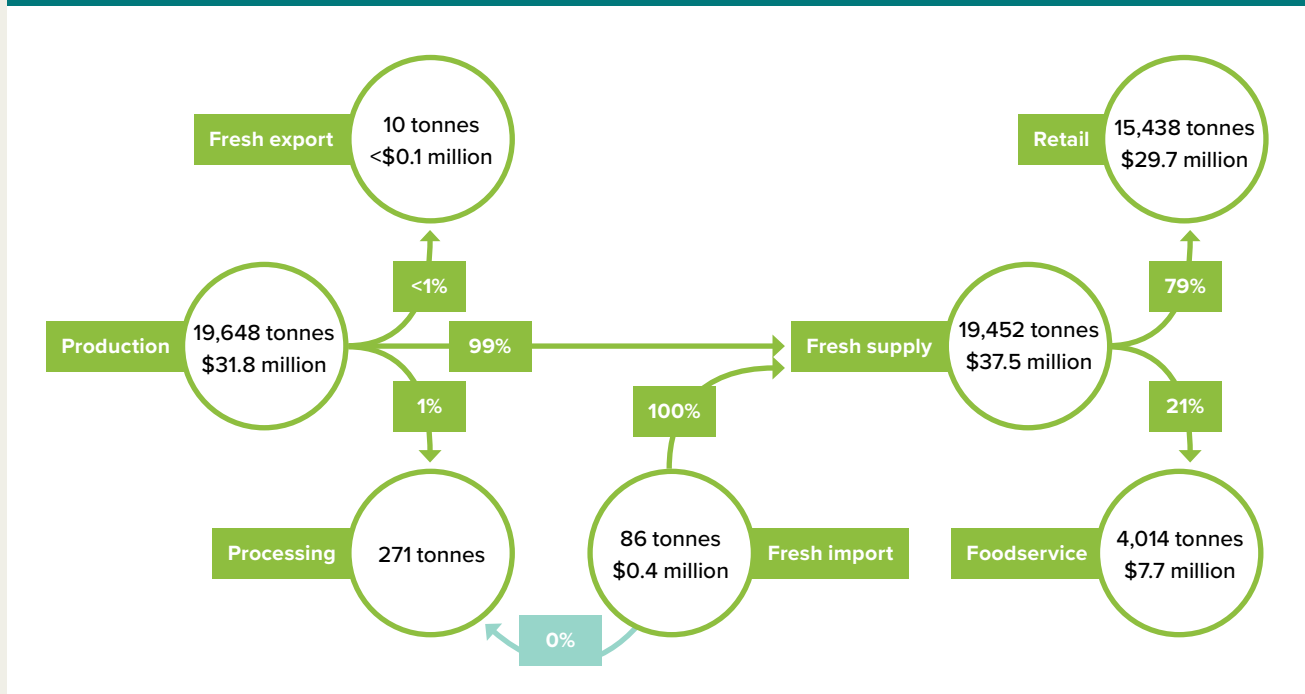
Around 85% of papaya production comes from Queensland with growers spread between Bundaberg and Lakeland, located in the Shire of Cook. The product has either yellow flesh, referred to as pawpaw, or red flesh, known as papaya. Papaya grows year-round and because of this the industry has the capacity to provide consistent supply of fruit to consumers and year-round income to growers.

The terms papaya and pawpaw differentiate the product in the papaya industry. Red papayas and yellow pawpaws are predominately grown in the warmer tropical climate areas of Tully, Mareeba, and Innisfail to Mosman in Far North Queensland. There are new plantings in Lakeland, North Queensland as well as in Darwin, Northern Territory and Kununurra, Western Australia. Both are available year-round with increased supply during spring and autumn.

Papayas grown in Queensland can be transported to all Australian states and territories except Western Australia. Western Australia currently prohibits entry of Queensland papayas for pest and disease quarantine reasons. Fruit consigned to Tasmania, Victoria, South Australia and certain areas within New South Wales must be produced and treated under specific Interstate Certification Assurance (ICA) schemes.

Transportation is through refrigerated road transport to wholesale markets. Wholesale transportation to retail is predominantly through unrefrigerated road transport. The supply of premium quality product to distant interstate markets continues to be a challenge.

FIGURE 3. Papaya supply chain, 2019/20



Source: Australian Horticulture Statistics Handbook (2019/20)

The papaya industry is like other fruit industries including the banana and nashi industries, in that production is almost exclusively for the domestic market (99.9% is sent to the domestic market), with very small amounts exported or sent for processing. Unlike these other industries, however, foodservice is a significant market with 21% of fresh supply in 2019/20, one of the highest for fruit industries (Figure 3).

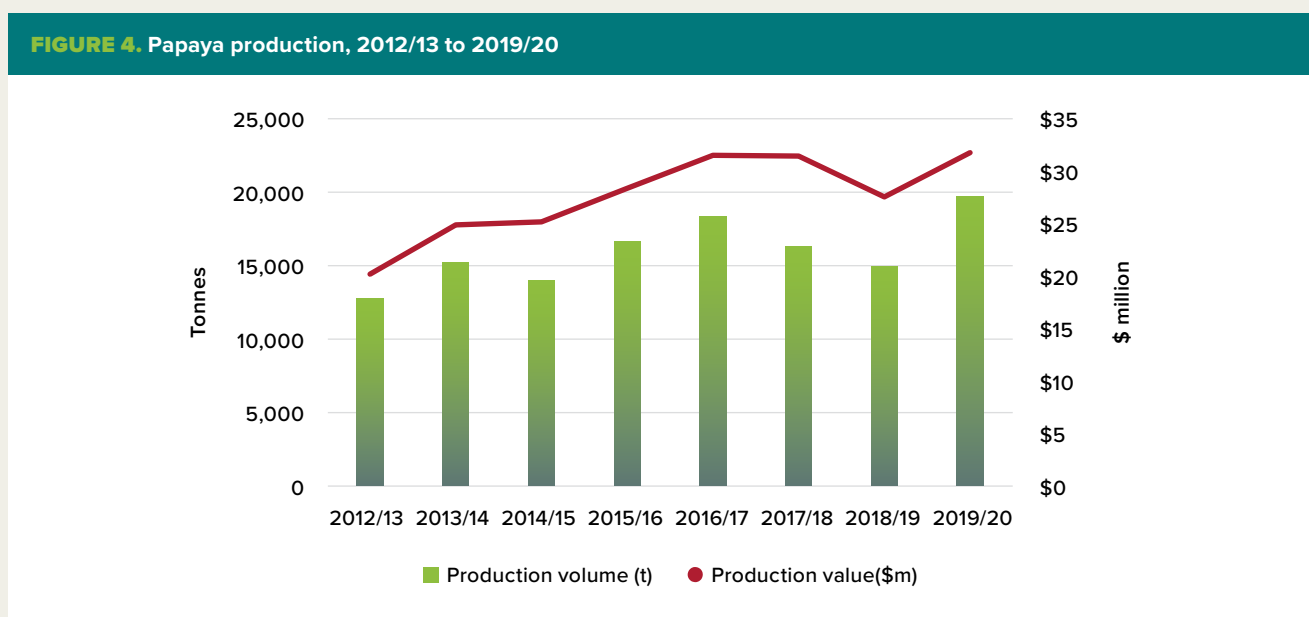
Domestic consumers and drivers of demand

The papaya industry is underpinned by opportunities to significantly expand supply to the domestic market. To do this the industry needs to develop a consistent product so the retailers and consumers have confidence in the ongoing quality and supply.

Supply chain management research conducted by Agri-Science Queensland (DEEDI) with funding from the Australian Centre for International Agricultural Research (ACIAR) is currently looking at the interaction of fruit maturity at harvest, postharvest fungicide application and ripening and transport temperature on the out-turn of fruit.

Industry production

Papaya production is a labour-intensive crop that requires harvesting and packing at least once a week year-round. In North Queensland, harvesting and packing is required twice a week across most of the year. Production systems have minimal mechanisation due to the delicate nature of the product. The industry has exposure to risks from pests and extreme weather events such as cyclones creating a situation where continuity of supply is an ongoing risk for the industry.



Source: Australian Horticulture Statistics Handbook (2019/20)

Papaya production has followed a general growth trend, reaching a peak in both production volume and production value in 2019/20 of 19,648 tonnes and \$32 million respectively (Figure 4).

The industry has invested heavily in breeding projects, such as the Hort Innovation projects *National papaya breeding and evaluation program* (PP18000) and *New genetic targets to improve quality in papaya* (PP15000). The research team is focused on delivering new elite, genetically stable cultivars that meet the needs of growers and the preferences of consumers, and that are adapted to key growing areas in North Queensland.

TABLE 4. Fresh papaya seasonality by state

STATE	19/20 TONNES	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Queensland	16,700	High	High	High	Medium	Medium	Medium	Medium	Medium	Low	Low	None	None
Western Australia	1,572	High	None	None	None	None	None	None	None	None	None	None	None
Northern Territory	1,375	High	None	None	None	None	None	None	None	None	None	None	None
Imported	86	High	High	High	High	High	High	High	High	High	High	High	High
Availability legend		High			Medium			Low				None	

Source: Australian Horticulture Statistics Handbook (2019/20)

APPENDIX 2: Papaya industry situation analysis

At the time of refreshing the SIP in 2021, the global coronavirus (COVID-19) pandemic continues to affect horticulture industries to varying degrees. The outcome and ultimate impact of the pandemic are unknown. Investment areas that may be influenced over the period of this SIP include export and trade relationships, domestic and international demand, logistics and supply chain, labour supply – all have potential impacts on grower profitability.

Environmental, economic and social sustainability are vitally important to Australian horticultural growers and industries. Customers, consumers, and investors also seek information about the sustainability and ethics of how their food is produced. Sustainability is particularly crucial as topics such as climate variability, health and ethics continue to shape the social, environmental, and political landscape for agricultural industries. The impact of these issues may have influence on a whole range of investment areas for horticulture from production practices and land management, demand and reputation of products, quality expectations and cultural/community engagement.

Strengths, weaknesses, opportunities and threats

Table 5 has been used to analyse the papaya industry’s strengths, weaknesses, opportunities, and threats (SWOT). The SWOT tool assists the industry to build on what works, observe what is lacking, minimise risks, and take the greatest possible advantage of chances for success.

TABLE 5. Papaya SWOT analysis

The papaya industry	
Strengths	<ul style="list-style-type: none"> • Papaya is available year-round • Papaya has tremendous nutritional benefits • Low cost of entry for growers • Established, albeit a small levy program with federal support for use in R&D and marketing • Still have pawpaws – diversity is a strength as it underpins resilience and provides variety for consumers
Weaknesses	<ul style="list-style-type: none"> • Lack of consumer awareness of the health benefits • Supply chain and cold chain issues affecting quality of a fragile product • Labour intensive harvesting practices, escalated when picking platforms are needed • No industry standard product for supply into main retail market and inconsistent quality • Messy and complicated consumption experience • Lack of a strong and innovative industry culture and cohesiveness • Industry leadership succession and mentoring deficits



The papaya industry	
Opportunities	<ul style="list-style-type: none"> • Increase domestic consumption • Improved industry information and data sharing to advance production methods, supply chain forecasting, handling techniques and biosecurity defences • Links to and use of the research conducted in Fiji by ACIAR • Co-operative marketing campaign to raise awareness of the health benefits of papaya with other categories – cross-category promotion • Identify products that can be supplied consistently to target major retail markets • Branding differentiation and names that are evident of a progressive industry • Industry’s aspiration to be seen as a clean product • Several cross-industry opportunities • Consumer insights into usage and attitude of papaya • Development of value added products
Threats	<ul style="list-style-type: none"> • Regulatory changes such as the ‘backpacker tax’ and compliance with The Reef Water Quality Program • Extreme weather events such as cyclones and low rainfall • Competition from other exotic tropical fruits • Biosecurity breaches and the subsequent cost of quarantining against endemic and imported pests, especially papaya ringspot and fruit fly • Increasing costs of supply chain with transportation being one of the major impacts on profitability



APPENDIX 3: People consulted

The following people are acknowledged for their contribution to the papaya SIP development process.

NAME	INDUSTRY ROLE	REGION
Gerard Kath	Chair, Papaya Australia; Papaya SIAP member	Mareeba
Paul Fagg	Papaya SIAP member	Mareeba
Cameron Mackay and Tayla Mackay	Papaya SIAP member	Tully
Joe Zappala	Director, Papaya Australia; Papaya SIAP member	South Johnstone
Hayden and Will Darveniza	Grower	South Johnstone
Leo, Debbie and Garrick Ruddell	Grower	Innisfail
Chris Maizel	Grower	Dimbulah
Michael and Claudia	Grower	Innisfail
Mick and Maris Grima	Grower	South Johnstone
Chris and Joe Cini	Grower	South Johnstone
Rose Fisher	Grower	South Johnstone
Carlo Guereura	Grower	South Johnstone
Mathew Lizzio	Grower	South Johnstone
Stephen and Kelly Sciacca	Grower	South Johnstone
Chris Robinson	Grower	Kununurra
Dave Doolan	Agronomist	Innisfail/Tully
James Dunn	Agronomist	Innisfail
Aaron Myrteza	Agronomist	Mareeba
Yan Diczbalis	Papaya SIAP member; RD&E service provider	South Johnstone
Geoff Dickinson	RD&E service provider	Mareeba
Chat Kanchana-Unomkan	RD&E service provider; Plant breeder	Mareeba

APPENDIX 4: Reference material

Horticulture Innovation Australia Limited, 2012, Papaya Strategic Investment Plan 2012-17

Horticulture Innovation Australia Limited, 2019, Growing into the Future: Strategy 2019-2023

Horticulture Innovation Australia Limited, 2020, Australian Horticulture Statistics Handbook 2019/20

Horticulture Innovation Australia Limited, 2021, Australian-grown Horticulture Sustainability Framework

Papaya Australia, 2021, <https://australianpapaya.com.au/>

APPENDIX 5: List of acronyms

ACIAR	Australian Centre for International Agricultural Research
AIP	Annual Investment Plan
APVMA	Australian Pesticides and Veterinary Medicines Authority
BMP	best management practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FY	financial year
ICA	Interstate Certification Assurance
IRB	Industry Representative Body
KASA	knowledge, attitudes, skills and aspirations
KPI	key performance indicator
M&E	monitoring and evaluation
MRL	Maximum Residue Limit
NHRN	National Horticulture Research Network
R&D	research and development
RDC	Research and Development Corporation
RD&E	research, development and extension
SARP	Strategic Agrichemical Review Process
SIAP	Strategic Investment Advisory Panel
SIP	Strategic Investment Plan
SWOT	strengths, weaknesses, opportunities, and threats



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