

Mango

STRATEGIC INVESTMENT PLAN

2017-2021



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Introduction

This Strategic Investment Plan (SIP) is the roadmap that helps guide Hort Innovation's oversight and management of individual levy industry investment programs. The SIP lays the foundation for decision making in levy investments and represents the balanced interest of the particular industry from which the levy is collected. The very important function of the SIP is to make sure that levy investment decisions align with industry priorities.

Hort Innovation is the not-for-profit, grower-owned research and development (R&D) and marketing company for Australia's \$9 billion horticulture industry.

As part of the role Hort Innovation plays as the industry services body for Australian horticulture, the organisation is tasked by the Australian Government with working alongside industry to produce a strategic plan for investment of levies in industry R&D and marketing activities.

Each individual levy industry investment strategy also speaks to the future growth and sustainability of the Australian horticulture industry as a whole. The SIPs are produced under the umbrella of the Hort Innovation Strategic Plan, which takes a whole-of-industry view in setting its direction, as it considers broader agriculture government priorities for the advancement of Australian horticulture.

The process in preparing each SIP was managed by Hort Innovation and facilitated in partnership with Industry Representative Bodies and Strategic Investment Advisory Panels (SIAP). Independent consultants were engaged to run the consultation process, to gather the advice from stakeholders impartially and produce a plan against which each levy-paying industry can be confident of its strategic intent.

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

The mango SIP

Producers in the mango industry pay levies to the Department of Agriculture and Water Resources (DAWR), 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 mangoes that are produced in Australia and sold by the producer. The levy rate on domestic and export mangoes is 1.893 cents per kilogram.

Hort Innovation manages the proportion of mango levy funds that is directed to R&D and marketing investments (1.75 cents per kilogram). Separately, Plant Health Australia (PHA) manages plant health programs (0.143 cents per kilogram). In 2015/16, total mango levy receipts were approximately \$1.13 million; \$495,000 of R&D levies and \$640,000 of marketing levies.

Hort Innovation has developed this SIP to assist in strategically investing the collected mango levy funds in the priority areas identified and agreed by the mango industry. The ability to effectively deliver on all the articulated strategies (and investments) will be determined by the ability of the statutory levy to provide the resources to do so.

This plan represents the Australian mango industry's collective view of its R&D and marketing needs over the next five years (2017 to 2021). This plan has been developed in consultation with Australian mango levy payers through direct consultations with growers and other industry stakeholders at a workshop in Brisbane on February 28 and March 1, 2017, and a workshop with Hort Innovation's mango SIAP. The people consulted in the preparation of the plan are listed in **Appendix 1**, and the documents referred to in this report are listed in **Appendix 3**.

The mango SIAP has responsibility for providing strategic investment advice to Hort Innovation. Both Hort Innovation and the panel will be guided by the strategic investment priorities identified within this plan. For more information on the mango industry SIAP constituency, please visit Hort Innovation's website at www.horticulture.com.au.

Mango

STRATEGIC INVESTMENT PLAN 2017-2021 AT A GLANCE

OUTCOMES	STRATEGIES
Increased industry productivity through increased yields and reduced costs per hectare	Adopt new high-yielding mango varieties more quickly
	Value add: 100 per cent use of fruit, trees, and resources such as water
	Increase skilled labour and improve labour efficiency
	Reduce on-farm costs, including labour, crop protection and postharvest management through greater use of new scanning/postharvest treatment/automation/robotics/IT systems
	Develop and implement best practices on-farm
Increased grower profitability through increased consumer demand for Australian mangoes	Communicate changes to best practice recommendations within industry
	Develop new export markets to increase demand through analysis of performance data, and an effective marketing strategy backed by appropriate resources for implementation
	Develop and implement the mango marketing/market development plan
	Achieve a consistent supply of quality mangoes by accurately forecasting the volume of production of different varieties, the quality of the fruit, and the timing of when fruit will be sent to market
	Engage retailers so they understand the various varieties of fruit, the way to handle and display them, are confident of volume and quantity information for mango supply, and are aware of the way mangoes attract customers into their store
Analyse supply/value chain to identify best practice, such as for greater consistency in practice across farms, for handling and transport of mangoes, and for retailer specifications	

POTENTIAL IMPACT OF THIS PLAN



Based on an estimated investment of \$7.27 million over the next five years

OUTCOMES	STRATEGIES
Increased R&D and extension capacity and resources supporting industry development	Establish effective extension and industry development services to support the adoption of R&D outputs and industry capacity building
	Identify and document R&D and extension issues
	Identify other funding sources to support R&D and extension aimed at increasing industry profitability
	Develop industry and research-provider capacity
	Partner with other organisations, industries, enterprises, and overseas co-contributor aid programs
Improved industry sustainability and management of risks	Develop strong engagement and communication skills across the supply chain
	Participate in providing more accurate, timely data to benchmark industry sustainability and industry credentials, including return on investment
	Undertake more R&D into environmental sustainability, biosecurity, and resource management
	Lead the industry (people) to become a unified group
Review world-recognised environmental awareness programs	

Mango

STRATEGIC INVESTMENT PLAN

2017-2021 AT A GLANCE

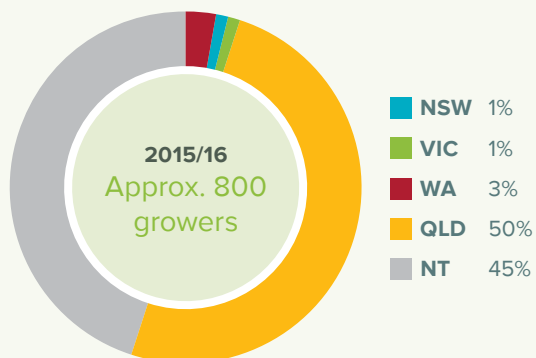
Major opportunities

- Export expansion
- Increased domestic consumption
- Increased understanding of consumer preferences and use for branding and market segmentation
- Advanced technology such as robotics and real-time measures of crop forecasting
- Varietal improvements for climate adaption and quality
- Value-add for waste
- Tapping into innovative R&D of other countries and industries
- Supply chain management.

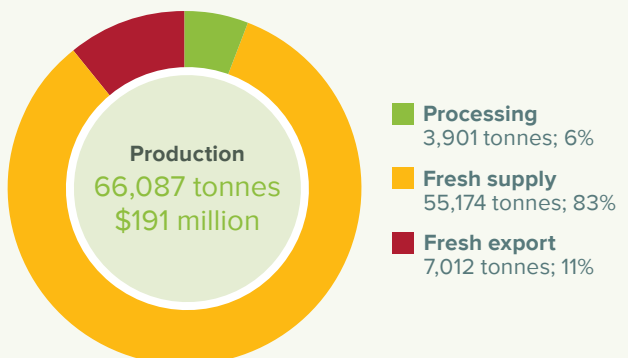
Major challenges

- Access to skilled labour and seasonal pickers for harvest
- Market displacement and biosecurity risks brought about by imports
- Domestic oversupply and resulting downward pressure on prices
- High production costs
- Environmental issues and regulation
- Climate variability and weather impact on production and marketing cycle
- Ageing industry
- Small harvest window
- Poor quality of fruit at times
- Lack of preparedness for exotic pest incursions
- Access to, and reliance on chemicals.

Industry size and production distribution



Mango supply chain and value 2015





SECTION ONE

Context

The Australian mango industry

Production and growth

The Australian mango industry has grown substantially in the last decade and, over the next five years, despite seasonal variations, the industry is expected to continue its growth path as newly planted trees come into production.

Figure 1: Industry production and forecast growth, financial year ending June 2022

(Source: AMIA, Australian Horticulture Statistics Handbook 2014/15, Strategic Investment Plan 2014 (University of Queensland analysis))

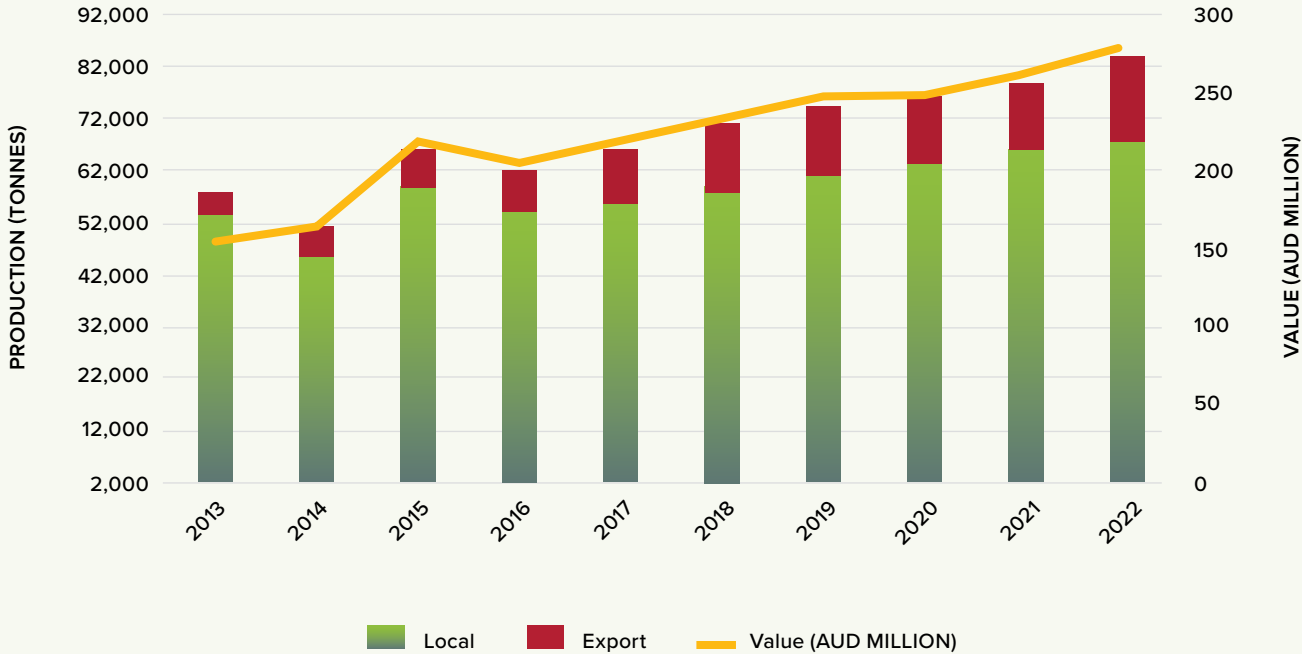
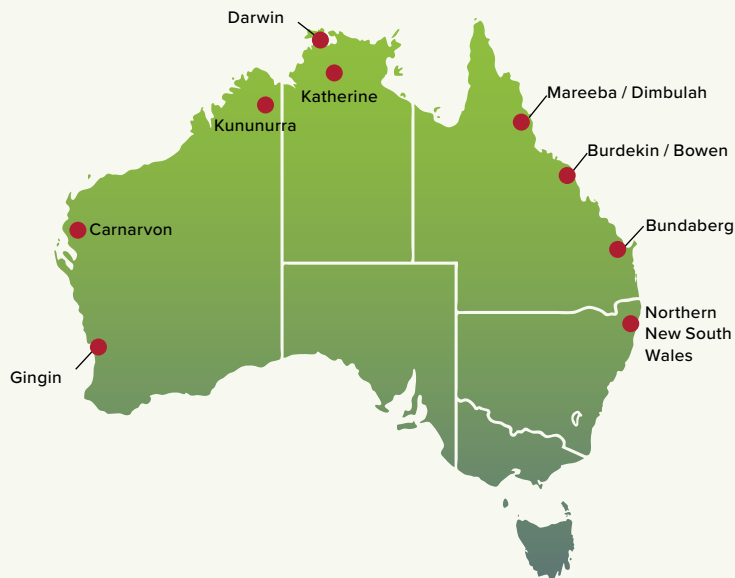


Figure 2: Australia’s major mango production regions (Source: Australian Mango Industry Association)



The value of mango production is forecast to be nearly \$280 million by June 2022, a significant increase from \$153 million in 2013 (Figure 1). This is a healthy growth projection. However, to achieve this growth, certain fundamentals have to be secured, including profitability of all participants in the supply chain. Growers, in particular, face rising risks and cost of production, including adapting to climate change, accessing appropriate labour, biosecurity risks, sustainable disease and pest management, and logistical issues such as timely transport of mangoes at the appropriate temperature. For some markets, there is a lack of facilities to treat mangoes, for example, through Vapour Heat Treatment (VHT), to meet trade requirements for export. There is also competition from producers in countries where mangoes can be produced more cost effectively.

Major mango production areas

Mangoes are produced mainly in northern Australia. The major producing areas include Darwin, Katherine and Mataranka in the Northern Territory, and Mareeba, Dimbulah, Bowen, Ayr and Bundaberg in Queensland. They are also produced in Western Australia and northern New South Wales, with small volumes coming from Victoria and South Australia.

Through current capacity-building initiatives, production is forecast to grow at four per cent per year over the next five years, and beyond, as new trees reach maturity.

Table 1: Mango production by state/territory and month

(Source: Australian Mango Industry Association and Australian Horticulture Statistics Handbook 2014/15)

State	2015/16 tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
New South Wales	1%							Low	Medium				
Victoria	1%							Low	Medium				
Queensland	50%				Medium	High	High	High	Medium	Low			
Western Australia	3%				Medium	Medium	Medium	Low	Low				
Northern Territory	45%		Low	Low	High	High	High						
South Australia	less than 1%					Low	Low	Low					
Availability legend		High			Medium			Low					None

Table 2: Mango production by variety and month (Source: AMIA and Australian Horticulture Statistics Handbook 2014/15)

Variety	2015/16 tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Kensington Pride	37,770			High	Medium	Medium	Low	Low	Medium	High			
Calypso	10,301			High	High	Medium	Low	Medium	Medium	High			
R2E2	3,746					High	Low	Medium	High				
Honey Gold	2,497					High	Medium	Medium	Medium	High			
Processing	3,792				High	High	High	High	High	High			
Other	4,032							High	Medium	Medium	High		
Availability legend		Low	High		Medium			High	Low				None

Products

Originating in South Asia, the mango is known the world over as a flavourful fruit with many nutritional qualities. It is a popular commercial crop throughout the world because it is sweet, refreshing and aromatic. In Australia, the colour, shape and taste of locally cultivated varieties are a direct response to consumer demand and purchasing patterns.

In Australia, mangoes are seen as the quintessential summer fruit. Because Australian mangoes are predominantly eaten fresh, marketing activity is focused on increasing consumption of fresh whole mangoes through its positive emotional associations with summer.

In Australia, nine varieties of mango are in commercial production, with Kensington Pride and Calypso dominating. R2E2 is popular in export markets due to its size and colour, that is, high blush. Calypso is also popular due to its high blush colour. Honey Gold has a golden apricot-yellow skin, and sweet, aromatic flavour. Keitts, Brooks, Palmers, Kents and Pearls are late-season varieties that currently account for less than five per cent of production.

Internationally, about 160 varieties of mangoes are cultivated in more than 90 countries. Worldwide commercialisation is focusing on the Keitt, Kent and Tommy Atkins varieties which are in greatest demand by the major markets of the European Union and the United States. Global production has grown in recent years. In 2013, a total of 43,300,000 tonnes were produced, which is a 24 per cent increase on figures from 2009. Australia’s production, at 54,090 tonnes for the same year, represented just 0.1 per cent of global production.

Domestic consumption and drivers of demand

Between 2012/13 and 2014/15, per capita consumption of mangoes (based on the volume supplied) had increased in Australia by nearly 10 per cent; up to 2.4 kilograms per year per person (Australian Horticulture Statistics Handbook 2014/15). Most mangoes (80 per cent) are eaten fresh by Australian consumers. Other mango purchasers consume the fruit as an ingredient in cooked food, salad, drinks, frozen, dehydrated, jellies/jams, and incorporated into desserts. The younger demographic (18 to 24 years) are more likely to eat mangoes in these other forms, such as smoothies and drinks.

Tracking studies to understand consumer purchasing habits and drivers have been in place since 2009. Recent research by Sprout Research for Hort Innovation (2017) shows that:

- 76 per cent of the population are buying mangoes compared to 66 per cent in 2014
- More people are buying mangoes in supermarkets than any time in the period 2011 to 2017 (70 per cent in 2017 vs 65 per cent in 2014 vs 62 per cent in 2011), while incidence of buying from greengrocers has remained more stable (25 per cent in 2011 vs 21 per cent in 2017)
- 82 per cent of mangoes are brought on impulse, with quality and price (value) remaining the main drivers of purchase
- Purchases outside of the supermarket are driven by recommendations by family and friends, recipes and catalogues
- Use of mangoes in the home has widened significantly, with more people using them in smoothies and with yoghurt.

Export markets

World demand for mangoes is on the rise and is expected to continue increasing, especially in markets such as the United States, Canada, the European Union, China and other Asian markets.

The Australian mango industry has strengthened its international reputation as a high-quality mango producer, and so strong demand for high-quality fresh mangoes worldwide presents a growing opportunity.

International consumer research has also found that as part of the global megatrend with organics and sustainability, there is a small but rapidly growing demand for organic or sustainably sourced mangoes. This demand offers a potential niche of high-value product in selected markets.

Australia is a net exporter of fresh mango, with exports growing in recent years. The Australian industry exported just over 10 per cent of production, 7,012 tonnes, with a value of \$25 million in 2014/15 (*IHS Global Trade Atlas*). In 2015, at \$3,565 per tonne, export values per tonne were 23 per cent higher than farm-gate production values. Australia's key export markets are currently Hong Kong, New Zealand, Singapore, and the United Arab Emirates.

Table 3: Mango production and export, 2013 to 2015

(Source: *Horticulture Innovation Australia 2016, Australian Horticulture Statistics Handbook 2014/15*)

Year ending June	2013		2014		2015	
	Value	Value	% YoY	Value	% YoY	
Production (t)	54,090	51,069	-6%	66,087	+29%	
Production value (\$m)	138	146	+6%	190	+30%	
Fresh export volume (t)	4,604	5,275	+15%	7,012	+33%	
Fresh export value (\$m)	16	20	+26%	25	+26%	

The United States is the world's largest importer of mangoes. With an average annual growth rate (AAGR) of 10.2 per cent, the United States accounts for approximately 30 per cent of all mango imports. Despite Australian production peaking in the middle of the United States winter, their demand for Australian mangoes is still significant.

The quality of Australian mangoes, supported by efficient growing, harvesting, packing and cold chain practices, have opened potential opportunities for exports. However, the lead time needed to gain access to new markets can be hard to predict and must be taken into account when trying to gain access into these new markets.

The Australian mango industry has been conducting a three-year trial to secure market access to the United States. To date, only small quantities have been exported, and the industry is working with growers and supply chain stakeholders from both industries to ensure the trial is a success and that permanent market access is secured.

Quality and productivity

Harvest and postharvest handling of a mango crop is labour intensive and complex because of the fragile nature of the fruit leading to losses from disease and blemishes. Careful postharvest handling throughout the supply chain is critical to maintaining fruit quality.

The mango industry has increased its focus on quality such that it is a key component underpinning its marketing strategy, commonly known as the Wheel of Velocity and Momentum. Quality standards have been established, including dry matter content measured using non-invasive technologies, such as near infrared (NIR) technology calibrated to each variety. While there have been some challenges with NIR calibrations for mango quality, increasingly quality parameters are being measured on-farm and throughout the supply chain and are being reported weekly during the season.

The industry has also developed a forecasting process to facilitate effective engagement with supply chain and retailer stakeholders. Although season-to-season variability is high, forecasts updated weekly during the season enable the industry to work with stakeholders to develop promotions to coincide with predicted supply peaks when increased volume is demanded.

Operating environment

The mango industry	
Strengths	<ul style="list-style-type: none"> • Good product, unique flavour, versatile, healthy; consumers have an emotional tie • Diversity of varieties; diverse product that can be used in many different ways • Seasonality/long season and long production window; countercyclical season to competitors; confined season makes the mangoes special – they 'own' summer • High demand (both domestic and export) • Australian varieties are unique in international markets as they are novel in nature • Stable production base; (have) good idea of who is producing mangoes across Australia; consolidation of producer enterprises.
Weaknesses	<ul style="list-style-type: none"> • Small harvest window; assets being used at capacity for only a short time creates other issues, such as access to sufficient and appropriate labour for harvest • Impact of seasonality within a year and between years; weather impact on production and marketing cycle • Limited funds available for R&D and marketing requirements of the industry • Extension services insufficient to cover the whole of the industry, particularly given large geographical territory, and to enhance the uptake of new practices and technology • Communications (from industry groups to growers and departments to growers) would be more effective to target producers about localised issues • Difficulties in accessing reliable distribution networks; export and domestic supply chain coordination; logistics; unreliable temperature control during transit • Quality/waste: high level of waste at retail; poor quality of fruit at times resulting from supply chain management • Export: fragmented market and lack of coherent branding in export markets. High costs and regulatory challenges faced for Australian mango industry to export • Biosecurity: lack of preparedness for exotic incursions; incursion management at industry level and biosecurity on-farm and biosecurity in other countries; lack of information on the status of exotic diseases in neighbouring countries • Access to and reliance on chemicals.
Opportunities	<ul style="list-style-type: none"> • Export expansion includes seeking high-value, fast-growing niche markets • Increase frequency of purchase and number of mangoes per purchase • Branding/market segmentation/consumer understanding of mango varieties and demographics: continue to understand consumer preferences and insights • Improved extension, including use of technology and adoption • Access to labour, including skilled labour and seasonal pickers for harvest • Advanced technology: robotics and real-time measures of crop forecasting • Variety improvement (climate adaption, territory expansion, quality) • Value-add opportunities for waste • Tap into innovative R&D in other industries and overseas • Speed up new productions systems through rootstocks, high density orchards and novel genetics • Improve industry alignment and cohesiveness.

Threats	<ul style="list-style-type: none">• Imports: market displacement and biosecurity• Competition from other fruit available during mango season• Domestic oversupply and subsequent price impacts• Other industries competing for investment and researchers• Chemical residues, market access, chemical regulation changes, access to new chemicals• Climate variability• Ageing industry (demographics)• Production costs, including labour• High turnover of staff, including retail• Difficulties in attracting labour and accessing skilled labour• Environmental issues with water, regulation on land management; regionally based threats.
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SECTION TWO

Mango industry outcomes

Industry outcomes

The overarching strategic intent of this SIP is to grow the total value of the Australian mango industry as well as the value of each mango.

The specific outcomes to be achieved through this SIP are:

OUTCOME 1

Increased industry productivity through increased yields and reduced costs per hectare

The strategic intent is to increase on-farm productivity through increased yield, that is, the volume of fruit produced, and reduced costs per hectare. Stabilising production will contribute by reducing risk and better matching use of capital, labour and resources to produce the volume and quality of fruit to meet demand. Intermediate outcomes are:

- Improve on-farm yields to 15 per cent by 2021
- 30 per cent automation on-farm by 2030
- Reduce production costs; less waste in the system; increased application of technology
- Improve production efficiency on-farm
- Extend the mango production window; lengthen seasonality by geography and by variety
- Link and ensure widespread use of industry productivity benchmarks and performance measures.

OUTCOME 2

Increased grower profitability through increased consumer demand for Australian mangoes

The strategic intent is increase grower profitability through increased consumer demand for Australian mangoes, by continuing to implement successful marketing initiatives that link consumer insights to the unique characteristics of Australian mangoes, including the exquisite eating experience, seasonal availability, value for money, emotional attributes, and health benefits. The desired outcome is to increase domestic demand while maximising the value of mangoes. Steps to achieving this include:

- Consistently deliver fresh, quality mangoes through more accurate crop forecasts of varietal volumes and flow across the season
- Improve product quality by implementing industry best practice certification for critical supply chain processes, that is, growing, picking, packing, transporting, and ripening
- Engage retailers in the industry marketing plan to ensure: quality standards are aligned; retailer marketing plans are implemented in line with crop forecast; mangoes dominate the point of purchase; and produce teams are appropriately educated on varietal differences, storage, handling, and display practices. Implement a highly effective consumer demand plan that is appropriately resourced to increase demand in domestic and international markets
- Continue to measure and evaluate success through appropriate market research, for example, Sprout tracking study and Nielsen Homescan data
- Deliver to consumers a high-quality, consistent and 'value for money' mango via the visual and eating experience.

OUTCOME 3

Increased R&D and extension capacity and resources supporting industry development

The strategic intent is to build a powerful and responsive industry that is aligned to implement this strategic plan effectively. It requires capability and high engagement levels to identify and prioritise R&D and extension needs, and to build the required stock of information, new knowledge and technologies. It requires strong leadership to develop rapid industry responses through capacity building, communication and extension programs.

Because Industry Development Officers (IDOs) are key to this process, the intent is to engage highly capable IDOs to service the mango industry at the desired level. Intermediate outcomes are:

- A more united mango industry
- Effective engagement of industry decision makers, and all mango growers
- Improved communication and extension programs on the ground, tailored to the needs of growers in all regions
- Facilitated two-way information flow between growers and Hort Innovation to maximise engagement in R&D and uptake of R&D results, and build industry resilience.

OUTCOME 4

Improved industry sustainability and management of risks

The strategic intent is to build a powerful and responsive capability for collection, analysis and rapid flows of timely information that is used to inform business decisions, including mitigating risk, securing profit levels and appropriate rates of return on investment (ROI). Achieving sustainability also includes addressing the issues while relying on current approaches to managing pests and diseases. Desired intermediate outcomes are:

- Consolidating industry sustainability measures, including an increased focus on ROI
- Benchmarking mango industry performance against other top-performing industries
- Achieving complete, accurate and timely flow of information from all parts of the supply chain
- Achieving recognition that supports efficiency and quality, that is, real-time metrics on-farm and throughout the supply chain
- Building on-farm biosecurity as part of the whole-of-industry biosecurity program
- Reducing chemical pesticide use, and increasing biological control of pests and diseases.

SECTION THREE

Mango industry priorities



The table below describes the outcomes, strategies and possible deliverables that will be the initial priorities of this plan. The ability to deliver on all the articulated strategies (and investments) will be determined by the ability of the statutory levy to provide the resources to do so. The highest priority investments will lay the foundation for future investment and the implementation of this plan will require a balanced approach to ensure the industry has a high likelihood of success over the short-, medium- and long-term. Support will be sought from partners with aligned priorities to co-invest in deliverables identified that require outside funds available within the levy.

Industry investment priorities

OUTCOME 1 – Increased industry productivity through increased yields and reduced costs per hectare	
STRATEGIES	POSSIBLE DELIVERABLES
Adopt new high-yielding mango varieties more quickly	Plantation root stock, tree manipulation, and genetics approaches used to improve productivity Mango season extended by geography, and by mango variety More trees with higher yields and/or disease resistance brought into production Extension activities to foster uptake of new technologies New genetics and varieties
Value-add: 100 per cent use of fruit, trees, and resources such as water	More value-add options developed for mango processing Extension of product range from mango plantations, such as timber, seed Improved water recycling
Increase skilled labour and improve labour efficiency	Mango industry to attract skilled participants Training and retention programs delivered New high density production orchard systems More efficient production and harvesting per kilo of fruit
Reduce on-farm costs, including labour, crop protection and postharvest management through greater use of new scanning/postharvest treatment/automation/robotics/IT systems	Potential on-farm automation opportunities identified, recommendations for further research, and promotion of adoption on-farm Greater use of irrigation systems, NIR, satellite imagery, grading lines, warehouse management systems at wholesale and retail levels, transport/distribution management (for example, with better temperature control and GPS tracking) to get more product to market New technologies implemented to help with more cost-effective postharvest treatments Protocols reviewed regularly
Develop and implement best practices on-farm	Industry productivity benchmarks and performance measures Industry-wide grading standards Integrated pest management (IPM): programs, roadshows, best practice guides, and engagement for the whole supply chain
Communicate changes to best practice recommendations within industry	Field days and streamed delivery of information about industry developments and new technology

OUTCOME 2 – Increased grower profitability through increased consumer demand for Australian mangoes	
STRATEGIES	POSSIBLE DELIVERABLES
<p>Develop new export markets to increase demand through analysis of performance data, and an effective marketing strategy backed by appropriate resources for implementation</p> <p>Develop and implement the mango marketing/market development plan</p>	<p>Effective mango promotion activities, such as public relations, events, social media, point of sale, collateral (images, varietal shots, recipes, varietal knowledge)</p>
<p>Achieve a consistent supply of quality mangoes by accurately forecasting the volume of production of different varieties, the quality of the fruit, and the timing of when fruit will be sent to market</p>	<p>Current supply chain performance and consumer experience are benchmarked in key domestic and export markets (check existing data)</p>
<p>Engage retailers so they understand the various varieties of fruit, the way to handle and display them, are confident of volume and quantity information for mango supply, and are aware of the way mangoes attract customers into their store</p>	<p>Retailers display mangoes front of store</p> <p>Retailers spend disproportionate amount of their marketing funds on mangoes</p> <p>Sales incentives developed and implemented</p> <p>Collateral developed and distributed</p> <p>Retailer/staff training delivered</p>
<p>Analyse supply/value chain to identify best practice, such as for greater consistency in practice across farms, for handling and transport of mangoes, and for retailer specifications</p>	<p>Supply chain recommendations and best practice are extended to supply chain partners through:</p> <p>a) User-friendly best practice guides developed and delivered through:</p> <ul style="list-style-type: none"> » Guides » Videos » Apps » People – focused on areas through the supply chain, from growers right through to retailers <p>b) Extension programs delivered to industry, including through field events</p>

OUTCOME 3 – Increased R&D and extension capacity and resources supporting industry development	
STRATEGIES	POSSIBLE DELIVERABLES
Establish effective extension and industry development services to support the adoption of R&D outputs and industry capacity building	Implementation of extension and industry development services for the mango industry to support knowledge increase and adoption of R&D/best practices and business skills, such as succession planning
Identify and document R&D and extension issues	R&D operational plan developed
Identify other funding sources to support R&D and extension aimed at increasing industry profitability	New sources of R&D and extension identified Investors forum to review industry strategic plans in light of their planned mango R&D and extension
Develop industry and research-provider capacity	Improved capacity Right people and resources to undertake appropriate R&D and extension
Partner with other organisations, industries, enterprises, and overseas co-contributor aid programs	Programs for which mango levy investment has been leveraged and, in doing so, is generating scale and expertise in R&D and extension applicable to the mango industry

OUTCOME 4 – Improved industry sustainability and management of risks	
STRATEGIES	POSSIBLE DELIVERABLES
Participate in providing more accurate, timely data to benchmark industry sustainability and industry credentials, including return on investment	Consider industry sustainability benchmarks and performance measures that relate to industry sustainability Better yield and production forecast capability and industry data leading to better decisions, distribution and planning for marketing
Undertake more R&D into environmental sustainability, biosecurity, and resource management	Better pest management (IPM systems), with less use of chemical pesticides and more use of biological control of pests and diseases Better water, soil and noise testing and management
Lead the industry (people) to become a unified group	Training, workshops, conferences and other networking approaches are used to bring together the industry
Review world-recognised environmental awareness programs	Existing research reviewed Extension material briefs and templates developed

Aligning to Hort Innovation investment priorities

In establishing investment priorities, Hort Innovation analysed both historical and current levy and co-investment portfolios and priorities. From this analysis we identified 11 cross-sectoral investment themes. We consolidated these themes further and considered their alignment with the Australian Government’s Rural RD&E Priorities and National Science and Research Priorities, to arrive at five investment priorities outlined in **Figure 3**. **Figure 3** also shows how each cross-sectoral investment theme relates to the five investment priorities.

Figure 3: Hort Innovation’s investment priorities



The alignment of the mango SIP outcomes to the Hort Innovation investment priorities, and consequently, the Australian Government’s Rural RD&E Priorities and National Science and Research Priorities are shown in **Table 4**.

Table 4: Alignment of mango SIP outcomes to the Hort Innovation investment priorities

Hort Innovation investment priorities	Mango SIP outcomes
Support industry efficiency and sustainability	Increased industry productivity through increased yields and reduced costs per hectare
Improve productivity of the supply chain	
Grow the horticulture value chain capacity	Increased grower profitability through increased consumer demand for Australian mango
Drive long-term domestic and export growth	Increased R&D and extension capacity and resources supporting industry development Improved industry sustainability and management of risks
Lead strategically to enhance the development of the Australian horticulture industry through operational excellence	Enabler



4

SECTION FOUR

Mango industry monitoring and evaluation

Mango SIP monitoring, evaluation and reporting

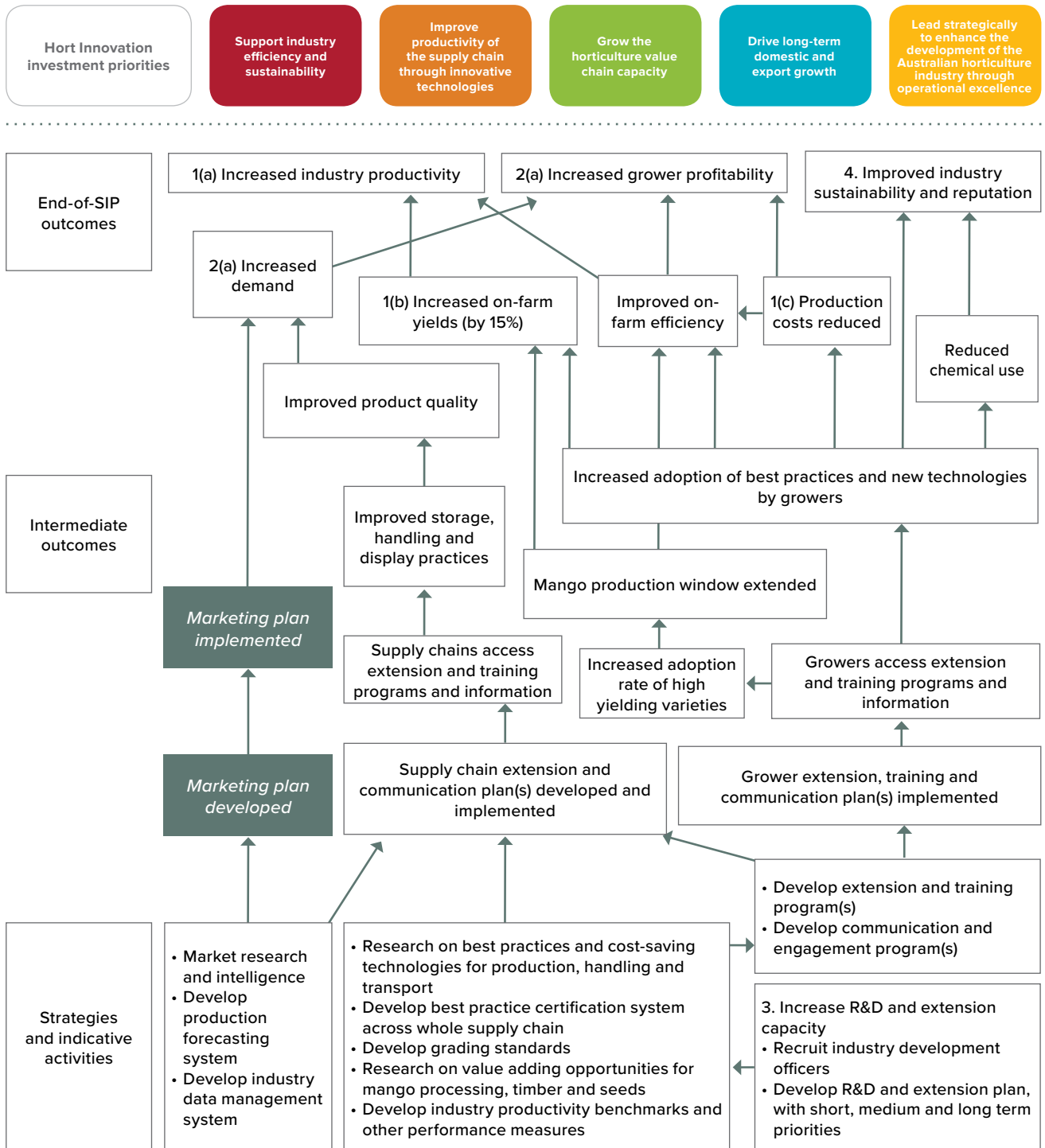
An SIP program logic and monitoring and evaluation (M&E) plan has been developed for the mango SIP. These are informed by the Hort Innovation Organisational Evaluation Framework. The logic maps a series of expected consequences of SIP investment. The M&E plan shows the performance measures to demonstrate progress against the SIP and what data will be collected. Progress against the SIP will be reported in Hort Innovation publications and at industry SIAP meetings.

The SIP outcomes and strategies will be used to inform investments in individual projects to deliver on the SIP. The results of M&E will be used to reflect on the results of investments and in decision making. Hort Innovation will facilitate the regular review of SIPs to ensure they remain relevant to industry.

Mango SIP logic

An indicative mango SIP program logic is shown in **Figure 4**. The logic is based on the Hort Innovation SIP logic hierarchy (**Appendix 2**). The shaded boxes are not fully explicit in the SIP but necessary conditions for the achievement of expected outcomes.

Figure 4: Mango SIP logic

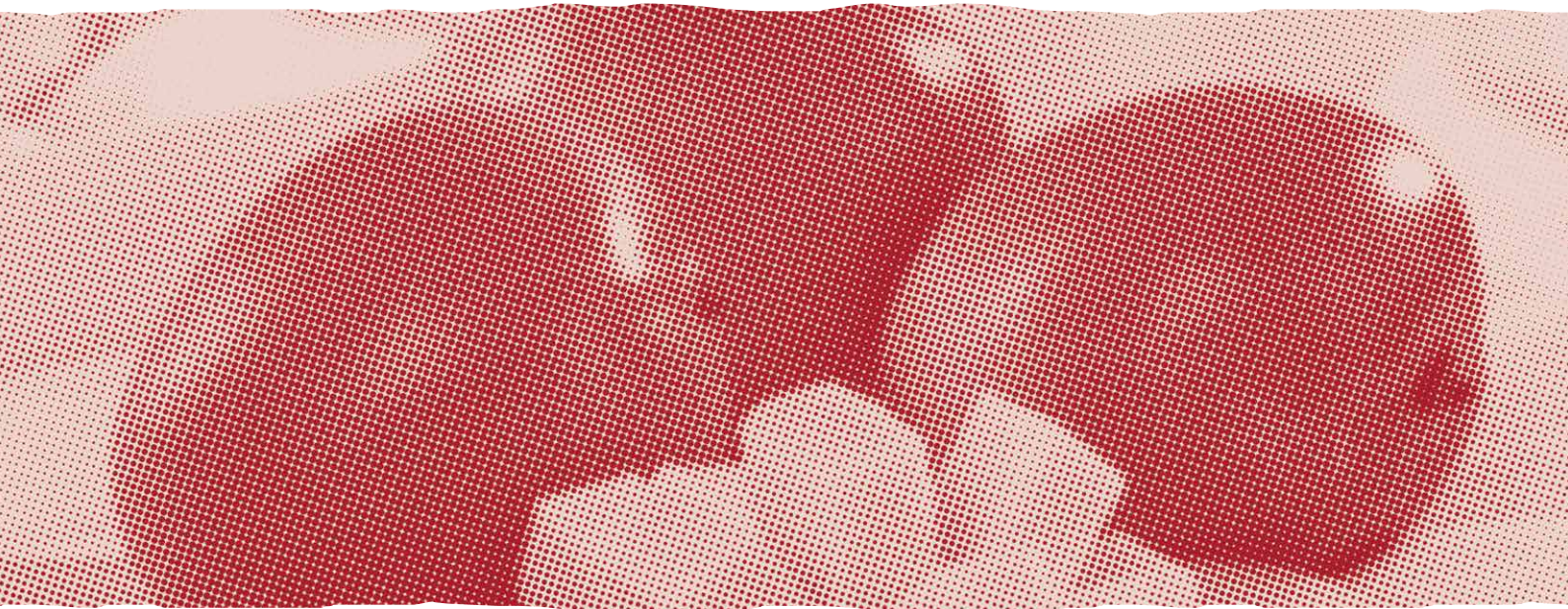


Mango SIP M&E plan

The mango monitoring and evaluation (M&E) plan is shown in **Table 5**. The table includes key performance indicators (KPIs) and data collection methods both at a macro/industry (trend) level and at more specific SIP level/s.

Table 5: Monitoring and evaluation plan for the mango SIP

Outcomes	Strategies	KPIs	Data collection methods and sources
OUTCOME 1: Increased industry productivity through increased yields and reduced costs per hectare	Adopt new high-yielding mango varieties more quickly	<ul style="list-style-type: none"> On-farm yields increased by 15 per cent Extension program developed for growers Extension program implemented 	<ul style="list-style-type: none"> Grower surveys R&D project records Production data (for example, ABS and Hort Stats) Benchmarking data Extension event feedback Communication metrics and feedback
	Value-add: 100 per cent use of fruit, trees, and resources such as water	<ul style="list-style-type: none"> Increased adoption rate of high-yielding mango varieties Evidence of more efficient use of resources by growers 	
	Increase skilled labour and improve labour efficiency	<ul style="list-style-type: none"> One new value-adding activity (for example, use of timber and seeds) commenced 	
	Reduce on-farm costs including labour, crop protection and postharvest management through greater use of new scanning/postharvest treatment/automation/robotics/IT systems	<ul style="list-style-type: none"> Increased in adoption of best practices and cost saving technologies by growers (percentage of growers and production base) Industry productivity benchmarks developed and reported 	
	Develop and implement best practices on-farm	<ul style="list-style-type: none"> Communication plan developed Communication plan implemented 	
	Communicate changes to best practice recommendations within industry		



Outcomes	Strategies	KPIs	Data collection methods and sources
<p>OUTCOME 2: Increased grower profitability through increased consumer demand for Australian mangoes</p>	<p>Develop new export markets to increase demand through analysis of performance data, and an effective marketing strategy backed with appropriate resources for implementation</p>	<ul style="list-style-type: none"> Marketing strategy developed Marketing strategy implemented Domestic consumer demand has increased by 10 per cent Proportion of production exported increased Two new export markets identified 	<ul style="list-style-type: none"> R&D and marketing project records Forecast data Grower and supply chain surveys Consumer and retail data Trade data
	<p>Develop and implement the mango marketing/market development plan</p>	<ul style="list-style-type: none"> Production forecasting system developed and implemented Retailer extension plan developed and implemented 	
	<p>Achieve a consistent supply of quality mangoes by accurately forecasting the volume of production of different varieties, the quality of the fruit, and the timing of when fruit will be sent to market</p>	<ul style="list-style-type: none"> Analysis of best practices reported Best practice guidelines reviewed and developed Best practice guidelines incorporated into extension program 	
	<p>Engage retailers so they understand the various varieties of fruit, the way to handle and display them, are confident of volume and quantity information for mango supply, and are aware of how mangoes attract customers into their store</p>	<ul style="list-style-type: none"> Evidence of grower engagement in extension program 	
	<p>Undertake supply/value chain analysis to identify best practice, for example, for greater consistency in practice across farms, for handling and transport of mangoes, and for retailer specifications</p>		

Outcomes	Strategies	KPIs	Data collection methods and sources
OUTCOME 3: Increased R&D and extension capacity and resources supporting industry development	Establish effective extension and industry development services to support the adoption of R&D outputs and industry capacity building	<ul style="list-style-type: none"> • Extension program developed for growers • Extension program implemented • Evidence of communication along the supply chain and sharing of knowledge and data • New R&D issues identified and documented • Two research funding sources identified in addition to R&D levies • Evidence of development of industry and research provider capacity • Three new partnerships identified 	<ul style="list-style-type: none"> • R&D project records • Growers and supply chain surveys • Extension event feedback • Project funding sources data • Project concept data
	Identify and document R&D and extension issues		
	Identify other funding sources to support R&D and extension aimed at increasing industry profitability		
	Develop industry and research provider capacity		
	Partner with other organisations, industries, enterprises, overseas co-contributor aid programs		
OUTCOME 4: Improved industry sustainability and management of risks	Participate in providing more accurate and timely data to benchmark industry sustainability and industry credentials, including return on investment	<ul style="list-style-type: none"> • Industry sustainability measures benchmarked • Evidence of best practices (environmental sustainability, biosecurity and resource management) incorporated into extension and communication activities • Increased industry networking and collaboration • Research into international environmental awareness programs identified 	<ul style="list-style-type: none"> • R&D project records • Benchmarking data • Industry feedback and surveys • International R&D project records
	Undertake more R&D into environmental sustainability, biosecurity and resource management		
	Lead the industry (people) to become a unified group		
	Review world-recognised environmental awareness programs		

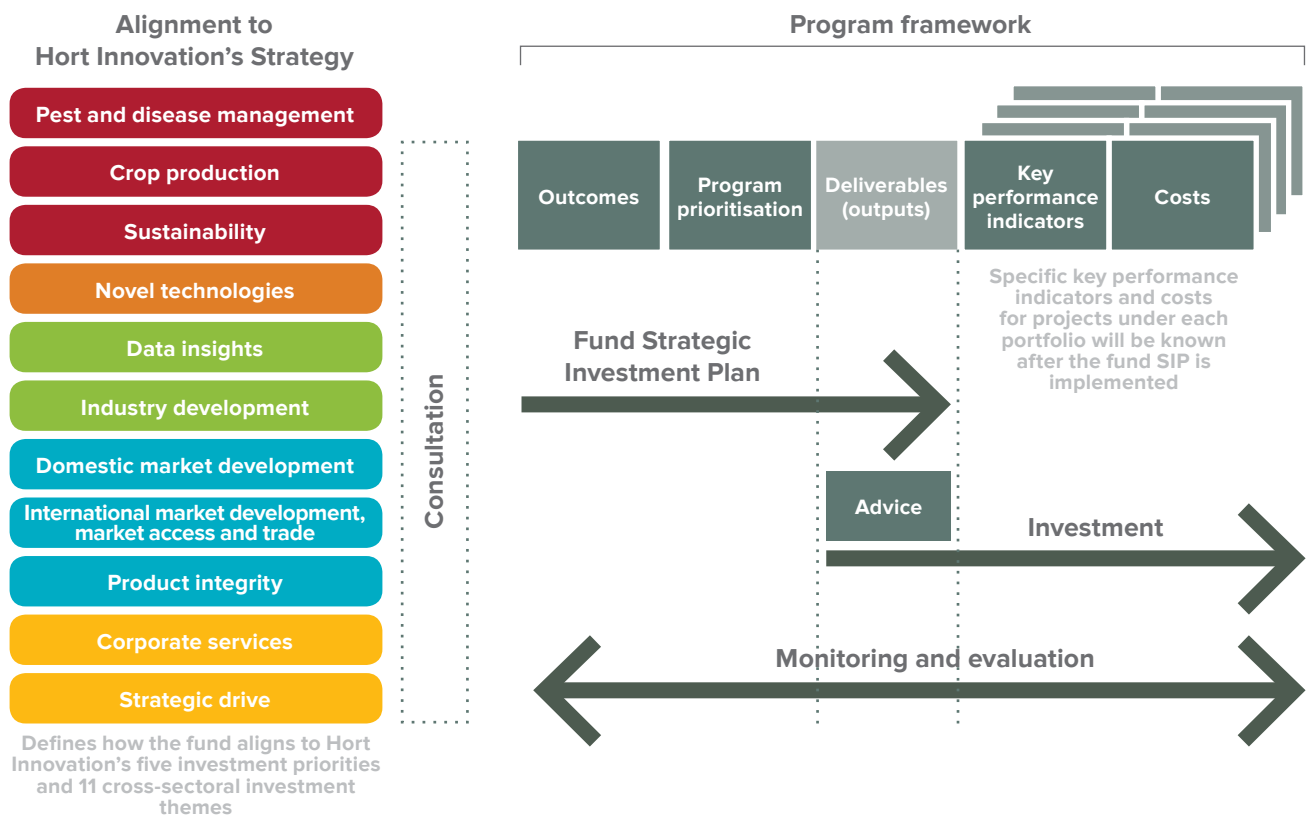


Reporting

The Program Framework (*Figure 5*) is the mechanism that links Hort Innovation’s strategy and investment priorities to the investment process through the industry SIP. SIPs assist Hort Innovation to prioritise and implement the specific industry R&D and extension and marketing programs.

Hort Innovation will use dynamic reporting against our monitoring and evaluation framework to report on investment progress. The contribution of investments to each industry outcome will be reported regularly, including through industry Annual Reports, Hort Innovation’s Annual Report and Hort Innovation’s Annual Operating Plan.

Figure 5: Hort Innovation’s program framework

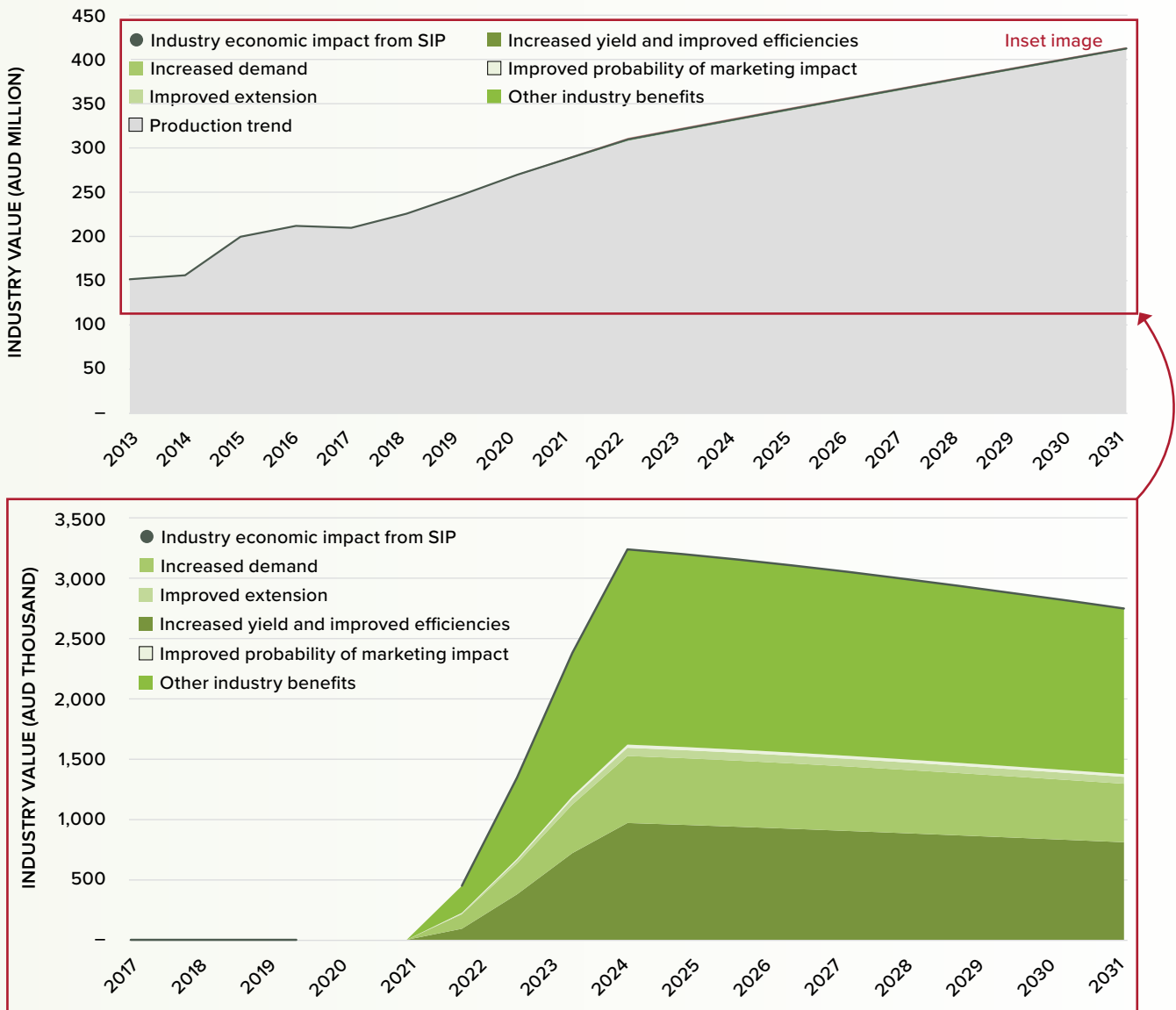


SECTION FIVE

Impact assessment



Figure 6: Economic benefit from investment in the SIP



An independent assessment of the potential economic impacts from investment into the mango SIP indicated a positive return on investment for the industry (Figure 6). The anticipated investment of \$7.27 million over the next five years in R&D, extension and marketing activities is expected to generate \$31.83 million in net benefits for the industry, representing a benefit cost ratio of 4.38 times to growers and service providers along the value chain.

The assessment draws from a wide range of available data sources, and projects economic impacts over a 15-year period starting from 2016/17. A five per cent discount rate has been applied and all values are adjusted for inflation and presented in 2016/17 dollar terms. The assessment takes a highly conservative approach and the presented figures have been adjusted to account for risks associated with achieving research outputs, expected adoption and impacts.

Table 6 provides a summary of the impacts assessed for the SIP, their corresponding outcomes, net economic benefits and benefit cost ratio.

Table 6: Overview of impacts assessed and alignment with SIP outcomes

Outcome	Expected deliverables	Anticipated SIP investment (over five years)	Net benefits (over 15 years)	Benefit cost ratio
OUTCOME 1: Increased industry productivity through increased yields and reduced costs per hectare	Increased marketable yield; and reduced per unit costs	\$4,191,283	\$19,916,180	4.75
OUTCOME 2: Increased consumer demand for Australian mangoes to maximise grower profitability	Increased consumption per capita of mangoes	\$3,079,610	\$11,915,124	3.87
OUTCOME 3: Increased R&D and extension capacity and resources supporting industry development	Increased probability of adoption of R&D project outputs.	N/A	Directly supports the benefits from Outcomes 1 and 2	N/A
OUTCOME 4: Improved industry sustainability and management of risks	Increased probability of impact of R&D and marketing outputs	N/A	Directly supports the benefits from Outcomes 1 and 2	N/A
All impacts		\$7,270,893	\$31,831,304	4.38

The impact of Outcome 1 was quantified using:

- An increase in average yields of 15 per cent by FY2022
- A reduction in input costs per kilogram of produce of five per cent by FY2022

This increase in industry value is expected to result from an increase in the development and uptake of automation across the industry, a widening of the production window, improved on-farm efficiency, a reduction in waste, and effective benchmarking.

The impact of Outcome 2 was quantified using:

- A 10 per cent increase in per capita consumption of mangoes over a baseline trend

Outcome 2 will add to industry value through improved consistency and reliability of supply, development and extension of best practice for supply chain processes, engagement with retailers to best appeal to customers, as well as promotion of the product.

The impact of Outcome 3 contributes to Outcome 1 through:

- Supporting the success of R&D projects

This outcome will underpin the impacts of R&D projects undertaken as part of other outcomes through engaging the industry with improved communication and extension activities, fostering unity, resilience and a culture of innovation.

The impact of Outcome 4 contributes to Outcome 2 through:

- Supporting the success of market development projects

Improving and communicating the sustainability of the industry for improved social license will contribute to industry value through improved consumer perception, supporting the efficiencies and marketing under Outcome 1.

6

SECTION SIX

Risk management

The purpose of this risk section is to highlight any unique or specific risks that qualify the SIP. This is not intended to be an exhaustive risk review of the industry risks that are, in part, considered in the SWOT. This is also not reflective of the general investment risks that will be considered in the project investment process.

The main risk with successful implementation of the mango SIP is the limited resources available for both R&D and marketing through the current levy to influence the successful implementation of this SIP.

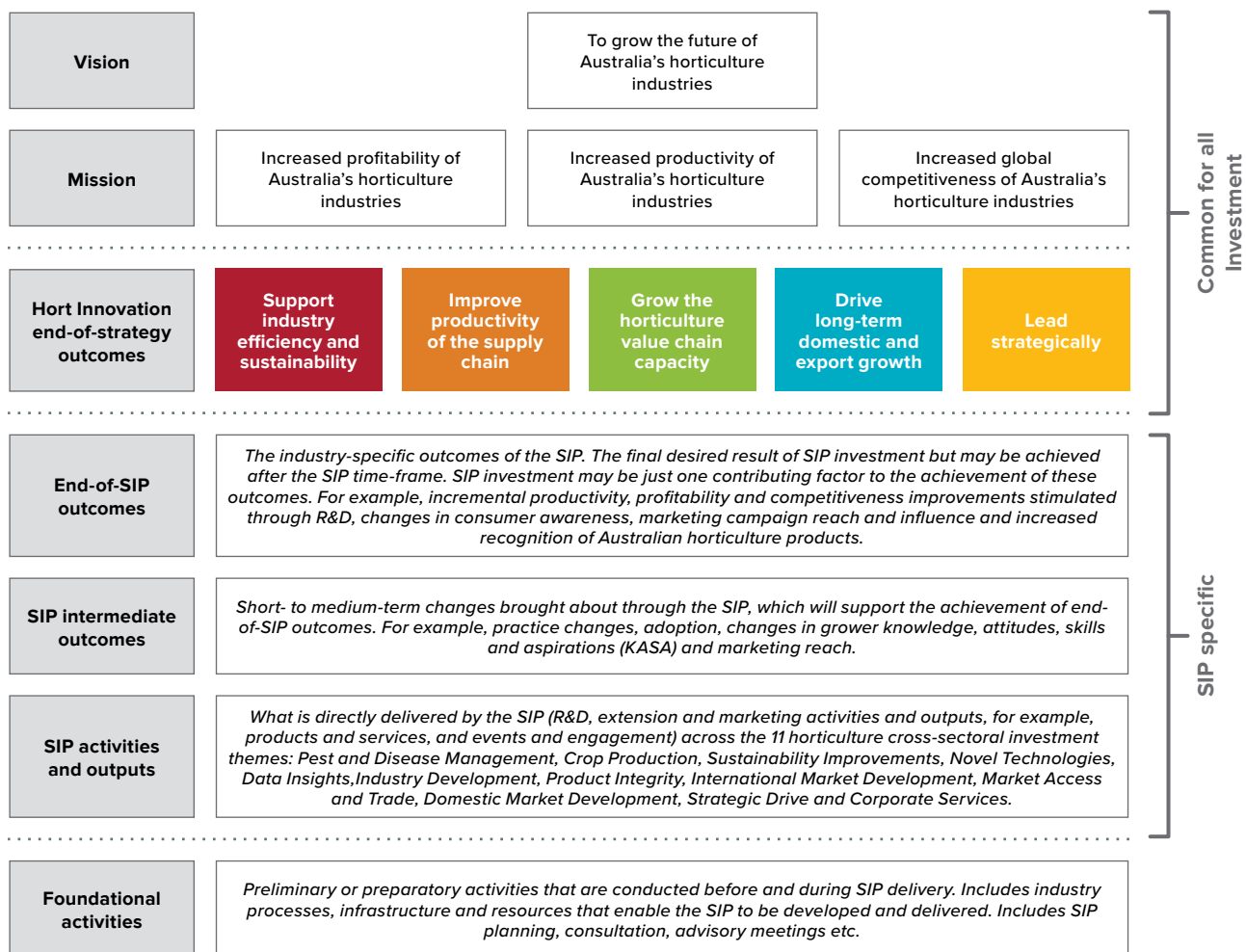
APPENDIX 1:
People consulted

The following people are acknowledged for their contribution to the Australian mango industry SIP preparation process.

Name	Industry role
Ann Louise O'Brien	Perfection Fresh
Astrid Hughes	Hort Innovation
Ben Martin	Grower, AMIA Director
Bob Williams	Ex-head of NT DPI Plant Industries
Cameron McConchie	Researcher
Dale Williams	Grower, SIAP member
Dominic Jenkins, AHEA	CEO, Exporters Association
Elisa King	Hort Innovation
Eoin Wallis	SIAP Chair
Frank Frappa	Exporter/wholesaler
Gavin Scurr	Grower, AMIA Director, SIAP member
Geoff Dickinson	QDAF
Geoff Warnock	Grower, AMIA Director
Greg McMahon	Grower, AMIA Chair
Greg Owens	NT Farmers
Han Siah	Grower, AMIA Director
Ian Bally	Researcher, QDAF
Ian Groves	Grower, SIAP member
Jessica Mitchell	AMIA

Name	Industry role
Jill Wilson	Grower, SIAP member
John Nardi, Favco	Wholesaler/export
John Nucifora	Grower, AMIA Director
John Trimboli	Wholesaler/export
Leo Skliros	Grower, NT Mango Industry Association Chair
Marie Piccone	Grower, SIAP member
Martina Matzner	Grower
Michael Daysh	NT DPI
Noel Ainsworth	QDAF
Robert Gray	AMIA CEO, SIAP member
Rodd Dyer	ACIAR
Tim Archibald	Hort Innovation
Tou Ruchkaew	Grower
Treena Welch	Marketing Manager
Trevor Dunmall	AMIA

**APPENDIX 2:
Logic hierarchy**



APPENDIX 3: Reference documents

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