

Banana

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 that 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 banana growers.

The banana industry SIP

Producers in the banana 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 bananas that are produced in Australia and either sold by the producer or used by the producer in the production of other goods. The levy rate on bananas is 2.94 cents per kilogram from April 1, 2017.

Hort Innovation manages the proportion of banana levy funds that is directed to R&D and marketing investments (1.69 cents per kilogram). Separately, Plant Health Australia (PHA) manages plant health programs (1.25 cents per kilogram). In 2015/16, total banana levy receipts to Hort Innovation were approximately \$6.7 million; \$2.1 million of R&D levies and \$4.6 million of marketing levies.

Hort Innovation has developed this SIP to assist in strategically investing the collected banana levy funds in the priority areas identified and agreed by the banana 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. Due to the nature of biosecurity threats the industry may need to prioritise levy investment to maintain the sustainability of the industry causing an imbalance in investment.

This plan represents the Australian banana 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 banana levy payers through a synthesis of various meetings with key stakeholders and growers to help clarify priorities.

The process to develop this plan is described in **Appendix 1**. The people consulted in the preparation of the plan are listed in **Appendix 2**, and the documents referred to are listed in **Appendix 4**.

The banana 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 banana industry members for both the R&D and marketing SIAP's, please visit Hort Innovation's website at www.horticulture.com.au.

Banana

STRATEGIC INVESTMENT PLAN 2017-2021 AT A GLANCE

POTENTIAL IMPACT OF THIS PLAN



Based on an estimated investment of \$42.93 million over the next five years

OUTCOMES	STRATEGIES
New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity	Conduct research into new disease-resistant varieties that also have consumer appeal
	Collaborate with the international community to accelerate the identification and development of disease-resistant varieties
	Continue research to improve pest and disease management and biosecurity
	Continue research into improving the industry's integrated pest disease management (IPDM) plans to further reduce the industry's impact on the environment
	Continue to research and refine agronomic practices to improve productivity, quality and environmental outcomes

OUTCOMES	STRATEGIES
Increased adoption of the industry's Best Management Practice (BMP) plan that improves industry sustainability, biosecurity and environmental stewardship	Continue to drive adoption of BMP for on-farm biosecurity to ensure biosecurity risks are minimised
	Strategically communicate the industry's biosecurity and environmental BMP to the community
	Strategically communicate the industry's economic and social benefits to the community
	Identify and develop innovative leaders to promote BMP adoption and drive the development and adoption of innovative practices
Increased domestic demand, developed export markets and product diversification that increase grower profitability	Drive domestic banana growth through targeted marketing initiatives
	Develop and maintain grower-led exports to international markets
	Increase consumer awareness and demand for other varieties
Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability	Continue to improve harvest and postharvest knowledge and systems through the investigation and adoption of new or improved practices and technologies
	Continue to build on industry production benchmarking and supply chain data initiatives
	Provide pathways for growers to become aware of, and adopt, continuous improvement methodologies
	Research other use options that minimise waste during periods of peak supply

Banana

STRATEGIC INVESTMENT PLAN

2017-2021 AT A GLANCE

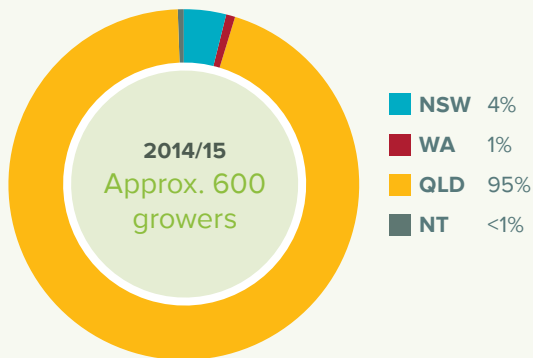
Major opportunities

- R&D into varieties that are resistant to Panama Tropical Race 4 (Panama TR4)
- Geographic growing region diversification to manage disease and weather event risks
- Packaging systems to increase quality and choice at the retail level
- Capitalising on the growing demand for healthy/wellness programs
- Using international research
- Developing export markets (premium Australian brand)
- Value-add uses for by-products and waste
- Accurate production and forecasting volumes and timely pricing information.

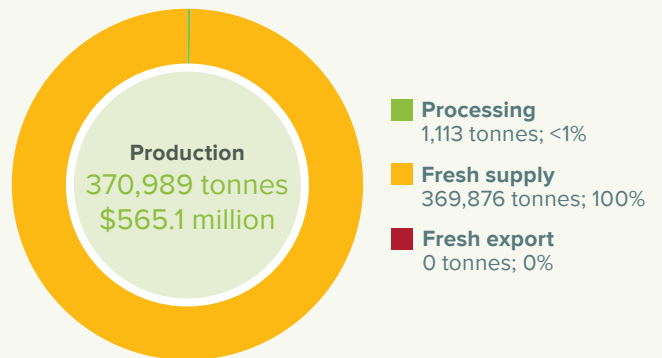
Major challenges

- Biosecurity risks, especially Panama TR4 soil-borne fungal infection (has the potential to wipe out the industry)
- Reliance on a single variety for the majority of production (production risks, limits category diversification)
- High level of on-farm waste
- Supply disruptions due to significant climatic events
- Potential entry to Australian market by low-cost producers
- Increasing cost of production
- A reduction in the number of available chemicals for pest control
- Impact of regulatory requirements imposed to protect the Great Barrier Reef.

Industry size and production distribution



Banana supply chain and value 2014/15





SECTION ONE

Context

The Australian banana industry

Bananas are one of Australia's highest selling supermarket products, with over five million of them eaten daily, all of which are grown in Australia. In 2015, annual banana production was estimated to be 371,000 tonnes, with a farm-gate value of \$565 million, of which 95 per cent of production is the Cavendish variety.

The value of the industry increased by over 34 per cent between 2013 and 2015 to \$565 million. Since 2015, production has increased further still to 396,000 tonnes, but there has been ongoing downward pricing pressure

The discovery of Panama TR4 on a Queensland farm in 2015 has made the adoption of biosecurity BMP one of the highest priorities for the industry. The potential impacts of Panama TR4, and other diseases, would be devastating for the entire industry. In addition to disease containment and prevention, the industry is investing significantly in discovering new resistant varieties. The discovery of such varieties is a global challenge, and the industry must continue to collaborate with international research organisations to ensure it benefits from any discoveries.

Because the banana industry is seen as a leader in environmental management, the development of its Environmental Best Management Practice guide is viewed

positively by environmental agencies. The industry is working hard with government so that adoption of these best practices continues to grow.

Products marketed

The banana industry is one of the largest horticultural industries in Australia. Bananas are available all year-round, with an average of five million eaten each day in Australia^{2,3}. Almost all production (95 per cent) is based on the Cavendish variety. Lady Finger accounts for four per cent, with other varieties including Red Dacca, Goldfinger, Sucrier, Ducasse and plantains accounting for the remainder^{4,5}.

Sales are almost entirely to domestic markets with only limited export sales, often directly exported by growers⁴. Bananas are delivered hard, green and cool to major retailers around Australia and to wholesale markets in Brisbane, Newcastle, Sydney, Melbourne, Adelaide and Perth⁷.

Fruit damage through the supply chain was the focus of a recent R&D project into better packaging methods, the results of which have been positive where scale is present. The desired outcome over coming years is for savings of nearly \$23 million per annum otherwise lost due to fruit damage in the supply chain⁸.

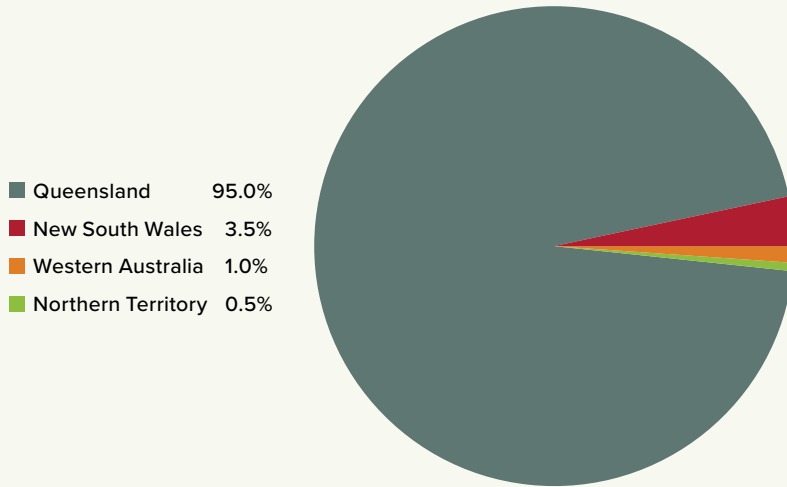
Table 1: Banana varieties and production (Source: Horticulture Innovation Australia 2016, Australian Horticulture Statistics Handbook 2014/15⁴)

Variety	2014/15 tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Cavendish	352,440	High	High	High	High	High	Medium	Medium	Medium	High	High	High	High
Lady Fingers	15,953	Medium	Medium	Medium	Medium	Low	Low	Low	Low	Low	Medium	Medium	Medium
Other	2,597	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low

Availability legend: High (Red), Medium (Yellow), Low (Blue), None (White)

Figure 1: Banana production by state in 2014/15

(Source: Horticulture Innovation Australia 2016, Australian Horticulture Statistics Handbook 2014/15⁴)



Current production

Table 2 : Banana production by state (Source: Horticulture Innovation Australia 2016, Australian Horticulture Statistics Handbook 2014/15⁴)

Variety	2014/15 tonnes	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Queensland	352,440	High	High	High	High	High	Medium	Medium	Medium	High	High	High	High
Western Australia	3,710	High	High	High	High	Medium	Medium	Medium	Medium	High	High	High	High
Northern Territory	1,855	High	Medium	Medium	Low	Low	Low	Low	Low	Low	Medium	Medium	High
New South Wales	12,985	Low	Low	Medium	Medium	Medium	Medium	Medium	High	High	High	Medium	Low

Availability legend: High (Red), Medium (Yellow), Low (Blue), None (White)

Figure 1 shows that Queensland accounts for 95 per cent of Australia’s production, with most in North Queensland’s Tully, Innisfail, Mareeba, Lakeland and Kennedy regions south of Cairns. Production regions are diversifying to mitigate supply risks against cyclones. The Atherton Tablelands, further north around Mossman, and Hopevale near Cooktown are also regions that are increasing production. Production also occurs in New South Wales, and the Northern Territory with production in New South Wales declining slightly in recent years.

When Cyclone Yasi hit the Tully and Innisfail region in 2011, domestic supply was cut significantly. Since the cyclone, growers have started to increase the geographical diversity of their farms for two reasons: as a risk mitigation strategy; and as an opportunity to relieve price-spike pressure if another cyclone were to hit. In the tropics, banana plants take about 10 months to recover and produce a new crop. However, in the subtropics, they take considerably longer.

On-farm wastage is increasing as market prices are, at times, below cost of production and transportation.

Queensland accounts for 95 per cent of Australia’s production, with most in North Queensland’s Tully, Innisfail, Mareeba, Lakeland and Kennedy regions south of Cairns.

Figure 2: Banana growing regions (Source: ABGC, Growing regions (2016))

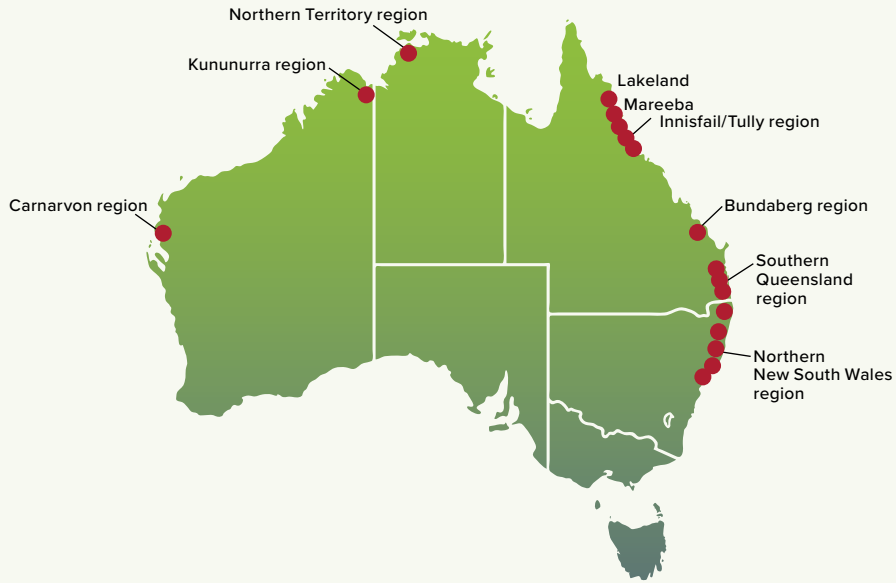


Figure 3: Banana production and value by financial year, 2013 to 2016 (Source: University of Queensland 2016)

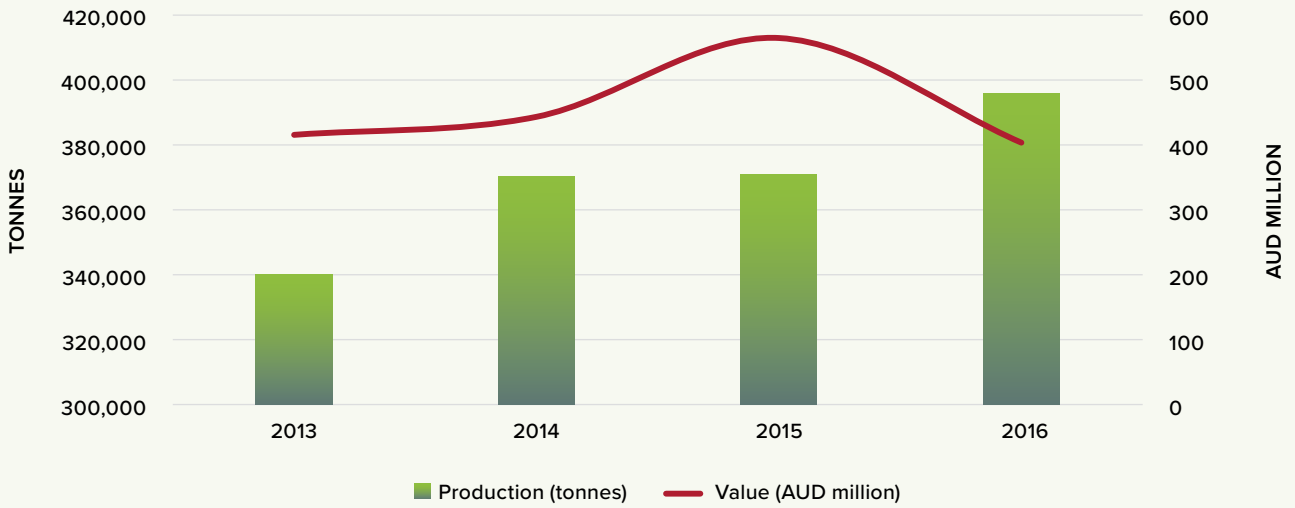
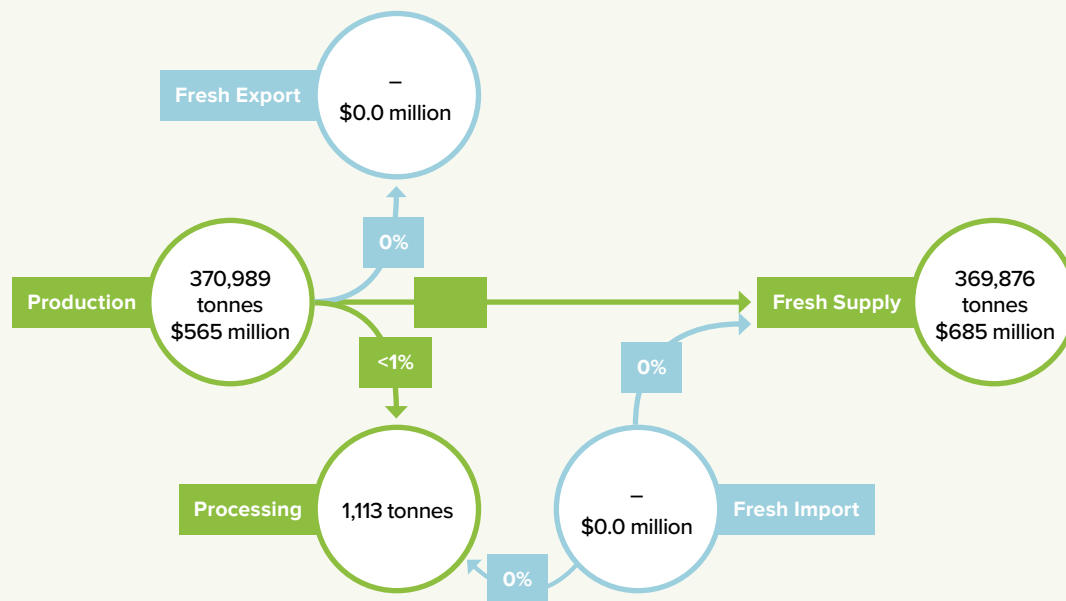


Figure 4: Fresh banana supply chain, year ending June 2015

(Source: Horticulture Innovation Australia 2016, Australian Horticulture Statistics Handbook 2014/15⁴)



Industry’s supply chain

The banana industry has developed a robust national supply chain focused on fresh product because it has a higher value than processed product. Processed imports are very difficult to compete with due to set up, labour and marketing costs. Also, processing would distract producers from their main markets. However, the current high on-farm wastage could prompt growers to look for other ways to capture value from banana production. Due to high transportation costs, such value-add activities may need to be done on-farm to minimise other costs.

The development of viable export opportunities could also be considered. While Australia may not be able to compete with other exporters on price, Australian food security and provenance makes our produce and foods very competitive where they are highly valued, such as in Asian markets. Growers have expressed an interest in understanding what is needed to develop supply chain protocols to ensure high-quality product is exported directly to new markets.

Global context

Globally, Australia is a small player in the world banana market, with less than 0.3 per cent of production, and negligible exports. Almost the entire global crop is grown in developing or emerging economies where labour is cheap.

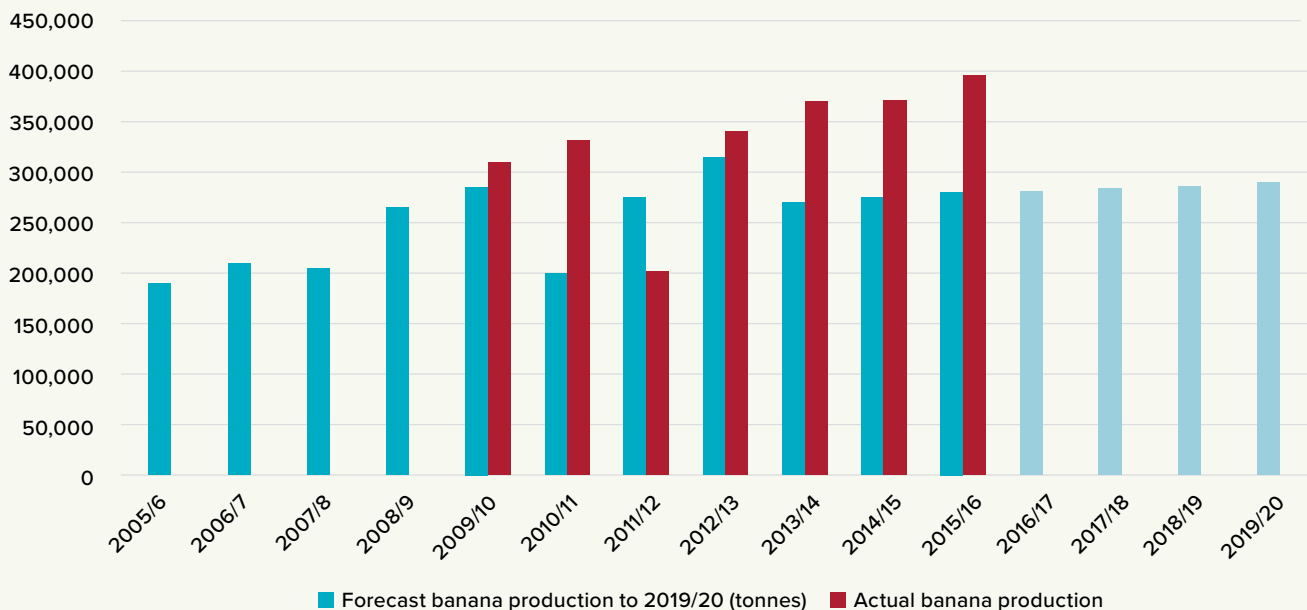
Varietal diversity beyond Cavendish is a means of potentially adding value by introducing a new variety for export that is also more tolerant of Panama TR4 than Cavendish. Although this will be difficult to achieve, the germplasm for over 400 varieties of bananas held by the Queensland Department of

Agriculture and Fisheries (QDAF) could offer opportunities for new niche varieties. Achieving yield with new varieties in bananas is significantly faster than in other horticultural crops such as avocados and mangoes. While QDAF has its extensive inventory of germplasm, the cost of trialling and marketing these lines for their consumer appeal is high. This may be where opportunities exist in the future, but rigorous testing of candidate varieties – from agronomy, to on-farm productivity, transportability, shelf-life, taste, colour, general attractiveness, switching costs and price elasticity of consumers – would have to be carried out for each.

Forecast production

Strategies for future growth of the banana industry have to reflect the path the industry has been on in recent years. While disease issues are important, they do not distract from the growers’ focus on growth. Domestic demand limitations and supply constraints from growing regions, relocation of crops, and production region diversity are all considerations in growth strategies.

Access to accurate and timely data underpins good strategy. **Figure 5** highlights the significant differences between analyst forecasts (in blue) and actual production numbers (in red). This problem affects many horticulture industries too. Such variation makes it difficult to develop effective strategies at industry and grower level, and can lead to lower returns throughout the value chain.

Figure 5: Banana production – actual vs forecast*(Source: ABARES forecast and ABARES projection and volumes, University of Queensland analysis)*

Consumers and consumer research

Consumers consider Australian bananas with great affection. Bananas are in themselves an uplifting fruit, and there is also a real sense of nostalgia for Australian bananas as part of an active, healthy and happy childhood. The classic Australian Banana jingle resonates in consumers' minds. They are considered a staple food that people have grown up with. Their consumption is almost universal – 93 per cent of Australians eat bananas each year – and bananas are part of the weekly grocery shop.

Australian bananas are mainly eaten at breakfast, during mid-morning and to a lesser degree at mid-afternoon breaks. They are perceived as good for school lunches and after sport. While consumers are generally aware of how versatile Australian bananas are, such as in smoothies, toppings for toast, in baking, as a dessert and even as ice lollies, most people eat them raw as a snack.

On a broader level, key consumer trends show that consumers are increasingly:

- Looking for relevant nutritional benefits in the food they eat
- Looking for ways to improve overall wellness, energy and vitality
- Snacking more, eating on the go, and choosing healthier food options to snack with
- Seeking more transparency in how their food is produced
- Looking for foods that are convenient to eat and easily accessible.

Australian bananas are well placed to capitalise on these trends. Research conducted in 2015 and 2017 found that the

benefits of bananas that drive consumption are:

- Freshness and pureness
- Energy providing (long-lasting and quick boosts)
- Hunger filling
- Convenience.

Demographic trends indicate that over the next 15 to 20 years, the population will skew further towards older and non-child households. The number of single- and double-income households with no kids (SINKs and DINKs) and empty nester households will grow, and the number of families (particularly those with young children) will decrease. Appreciation of these demographic changes is key to the development of optimal strategic direction for the industry.

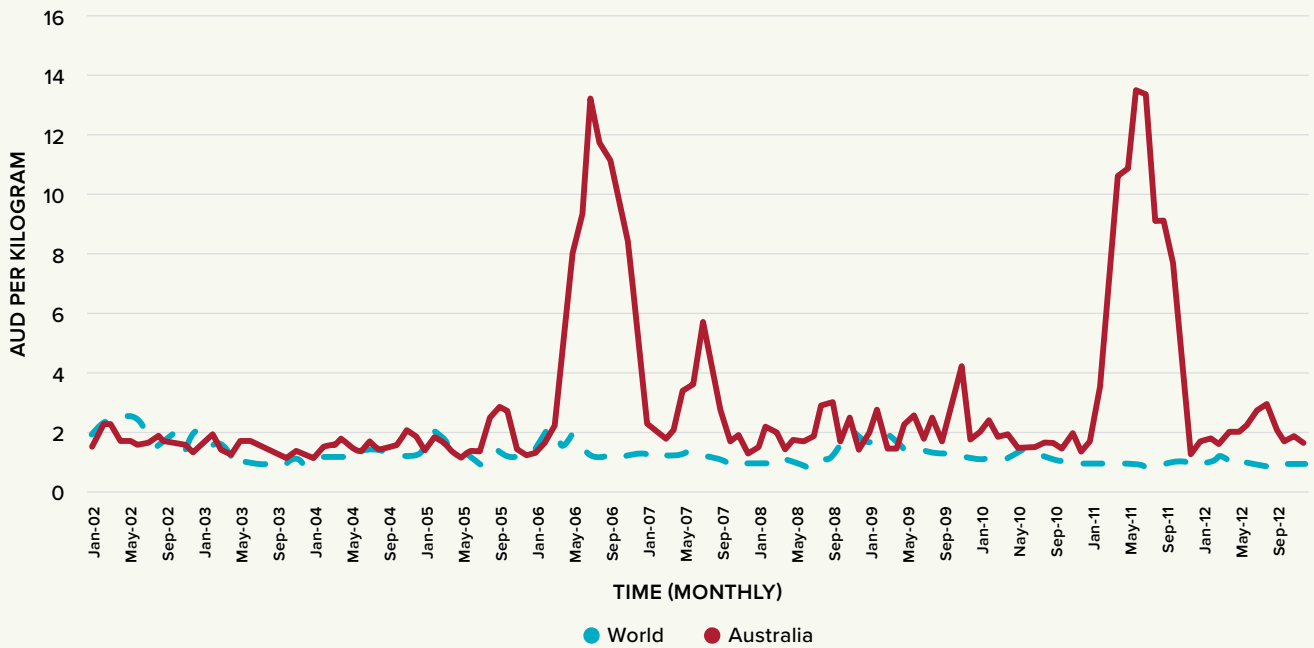
Consumption – domestic demand and prices

Bananas and strawberries are two key fresh horticulture products sourced domestically for sale all year-round in the two main supermarket chains, Coles and Woolworths.

National banana production and consumption figures have been affected by barriers to purchase, such as reduced supply, for example, after Cyclone Yasi. After natural disasters, high price becomes a major disincentive. For example, prices in the Brisbane market have reached \$15 per kilogram, compared to the normal price between \$1.00 and \$3.99 per kilogram.

Figure 6 shows extreme price variability, due to cyclones impacting production, based on ABS consumer price index data. The figure indicates two other features: Australia's banana prices are generally stable; and not trending upward.

Figure 6: Banana price fluctuations, 2002 to 2012 (Source: Ko and Frijters, 2014)



Consumption – international demand and prices

Australia does not import fresh bananas for biosecurity reasons, and exports are currently low. However, it is important to gain a sense of the market in Australia compared to the rest of the world. **Figure 7** shows that banana sales as a percentage of total fruit sales points to limited growth in volume in Australia. This may show supply constraints for bananas, but does indicate that other fruits are gaining slightly over time.

Figure 7: Proportion of banana sales vs total fruit sales by country: 2010, 2015 and 2020 projection

(Source: Euromonitor International, Fruits in US, Japan, China, India, UK, Germany and Australia (2016))

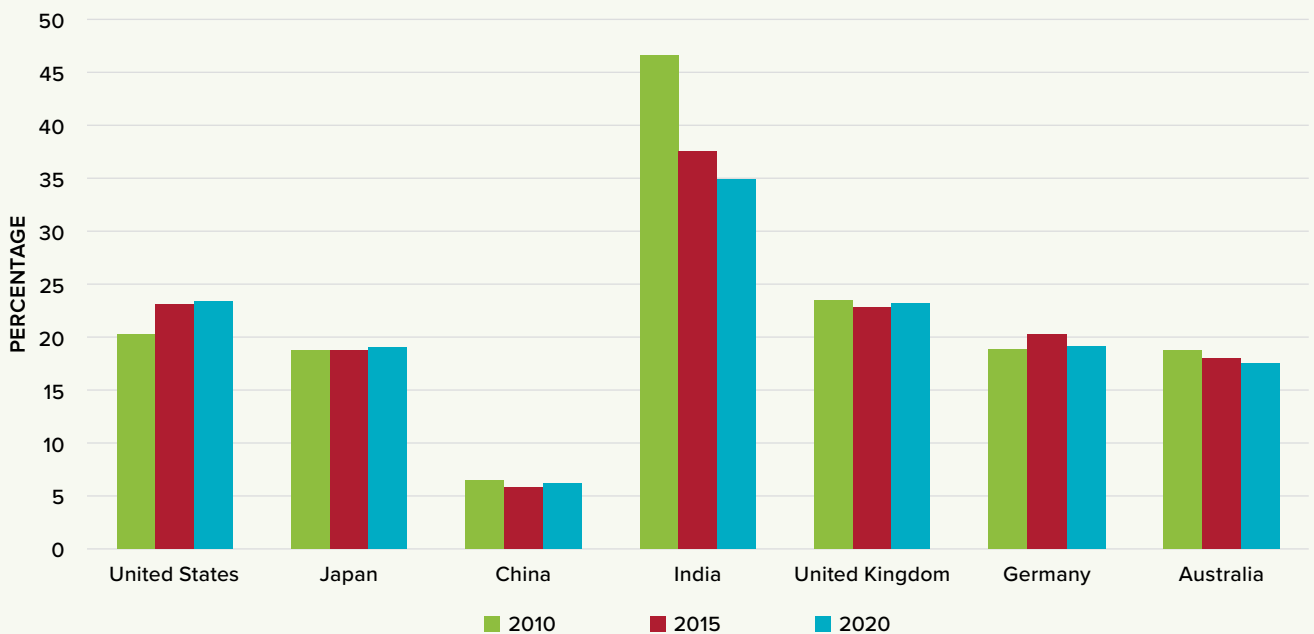


Figure 8: Average annual import prices for bananas, 2002 to 2013

(Source: FAO, Banana market review and banana statistics 2012–2013 (2014)⁽¹⁾)

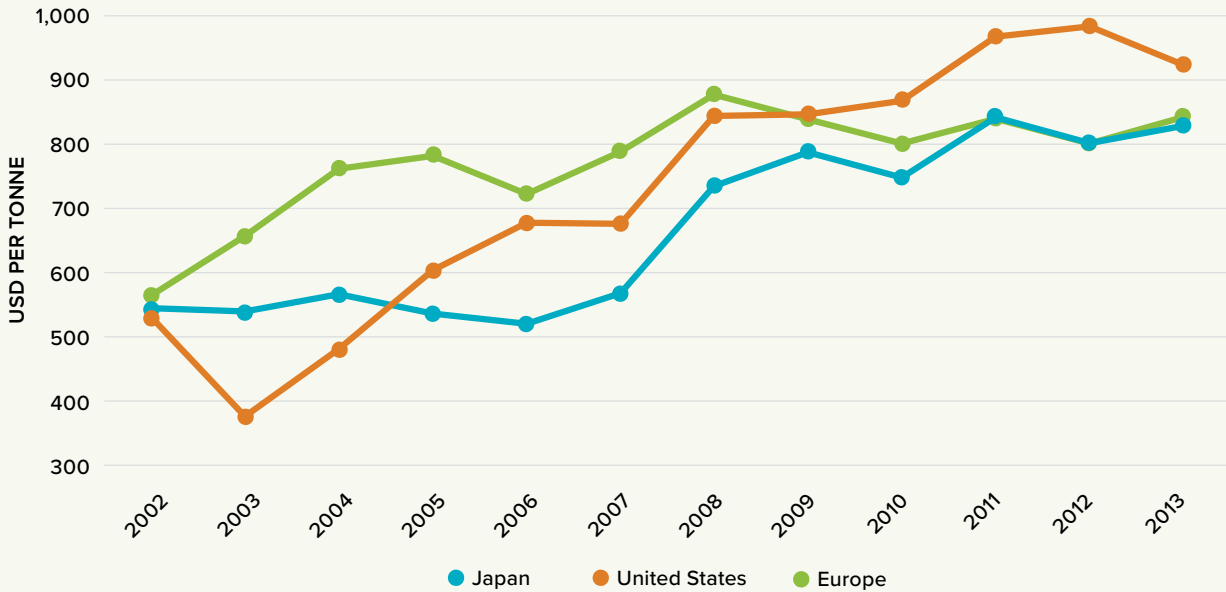
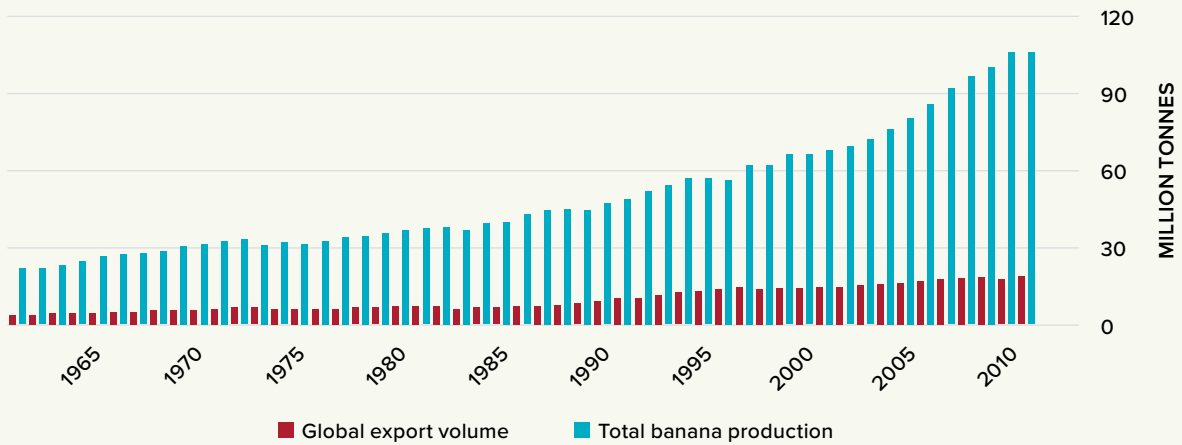


Figure 9: Global export volumes and global banana production (Source: United Nations Food and Agriculture Organization)



The comparison of banana prices in key global markets (Figure 8) indicates that average annual import prices from 2006 to 2013 (in USD per tonne) increased by over 30 per cent to over USD \$800 per tonne.

Panama TR4 disease has affected production in many banana-producing and -exporting countries. According to the FAO, in the Philippines, one of the world’s largest producers, five per cent of the planted area had been abandoned by 2014, with another 10 per cent infested. China, the world’s second-largest banana producer, has abandoned 40,000 hectares of plantations (industry statistics have 12,800 ha in production for Australia). India is expecting infestations in the near future (FAO, 2014). If Panama TR4 continues to decimate production in countries with substandard biosecurity

management practices, Australian producers could take advantage of export opportunities.

The greatest effect on banana industries is on exports, as concerns about the spread of disease bring national and international responses. This is not an issue in Australia and provides reassurance of its rigorous border protection policy.

Figure 9 shows the dramatic rise in global banana consumption. The growth has been largely driven by China and almost all growth is being met by Chinese production. However, like elsewhere, there are early signs that with poor biosecurity management, China’s banana crop has not remained immune to Panama TR4, which could cut production significantly. If that happens, Australia is well positioned to provide a ‘clean’ food in a premium market.

Panama TR4

Soon after Panama TR4 was first detected in Queensland in March 2015, the industry enacted short-, medium- and long-term management strategies to contain the disease. In the short-term, strategies were: effectiveness of disinfectants; establishment of effective destruction protocols for infested plants to reduce spore production; assessment of the corrosiveness of disinfectants and sanitisers on farm metals; assessment of the ability of commercially-available test kits to accurately determine concentration of sanitisers and disinfectants in decontamination solutions, for example, wash downs and foot baths. A major on-farm biosecurity initiative was undertaken with ABGC coordinating and implementing BMP with education of growers. ABGC also purchased the infected farm and destroyed all of the host plants to contain the disease – an historical first in the world.

Medium-term efforts involve research to determine whether weeds are a potential host for Panama TR4, as well as the development of DNA-based tools to identify the level of Panama TR4 spores in considerable amounts of soil as well as the use of cover crops and soil ecological suppression studies. In the long-term, more investment in mutation breeding is planned to help increase the chances of developing a banana variety tolerant of Panama TR4. Field trials are also underway to assess the establishment of a screening method to test imported banana cultivars against Panama TR4. Other plans involve adopting mobile technology to help growers keep track of on-farm biosecurity practices¹².

In the long-term, researchers are working to identify disease-resistant and tolerant varieties that also appeal to consumers. Although the timeframe is beyond the next five years, our researchers must work with international researchers so that the Australian banana industry can benefit from new discoveries.

The banana industry's current IPDM and biosecurity protocols are essential for dealing with multiple problems, sequentially or simultaneously. Ongoing adoption and refinement to the BMP guides is needed to ensure that the industry has a viable future and that growers can economically produce bananas while complying with biosecurity best practices.

Leadership in horticulture and growth aspirations

The banana industry, through the extensive funding and support of QDAF, Hort Innovation and by the ABGC, has achieved a leadership role across horticulture in a number of areas. One key success has been the implementation of the *Banana Best Management Practices Environmental Guideline (Banana BMP Environmental Guideline)*. This national guide encourages adoption of best environmental management practices throughout the banana industry.

A comprehensive document, *Banana BMP Environmental Guideline* outlines production and environmental considerations for the banana grower^{13,15}, and includes an IPDM. By following the guidelines, the industry has been endorsed by the Australia Government's Reef Extension Program that is designed to reduce the impact of agriculture and development on the Great Barrier Reef^{16,17}. This is a major marketing boost for the industry, and one that other industries will look to and learn from.

Continued efforts to encourage the banana industry to adopt these practices by the ABGC⁶ is highlighted by the 2015 outbreak of Panama TR4 and other diseases. It has also highlighted the need to further develop its biosecurity BMPs. To achieve this, the industry is developing a separate biosecurity BMP guide.

Complete industry-wide adoption of *Banana BMP Environmental Guideline* is proving challenging for two key reasons – capital outlay, especially on non-contiguous farms, and time. The industry has the innovative and capable leaders needed to develop pathways to overcome these issues to ensure that disease outbreaks remain contained and effectively managed.

Operating systems

Production systems and processes

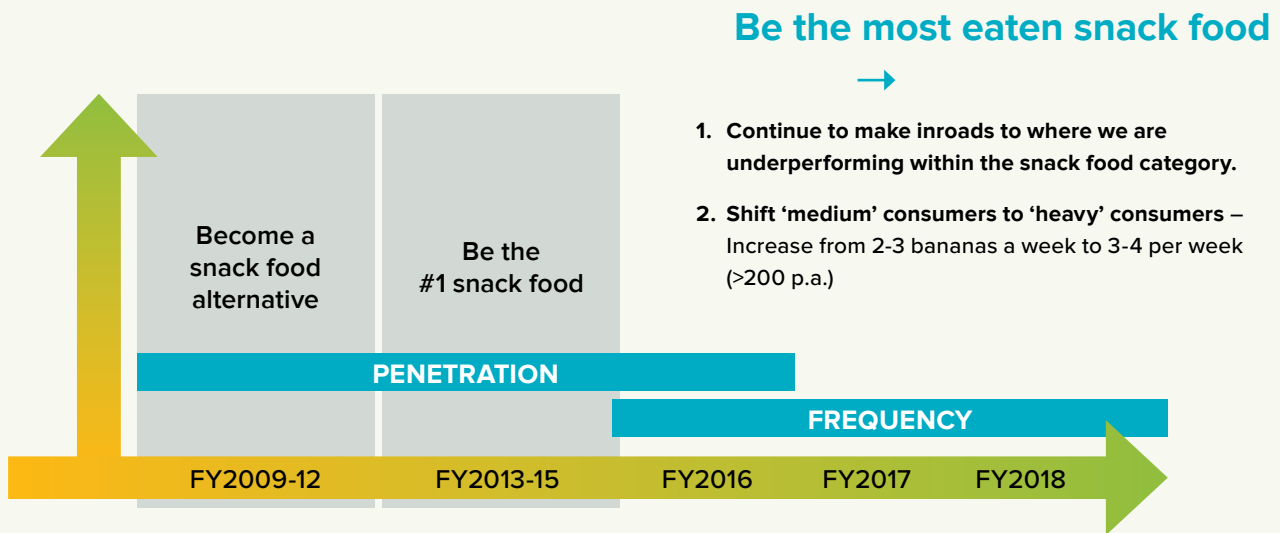
Banana production systems are still labour intensive although some of the larger growers have started to adopt robotic technology in their pack houses. With current low prices, growers need to adopt cost-reduction strategies to ensure their sustainability.

Industry-wide benchmarking has helped growers identify areas where they could improve productivity. They would like benchmarking to continue to help them identify new productivity methods. Continuous improvement programs developed some years ago had good success but they were one-off initiatives. To continue to drive productivity, improvements incorporated into the *Banana BMP Environmental Guideline* would become continuous.

NatureLab, Agtrix and TRAP Services together created a database to monitor and forecast production and hold industry information. Key growers have recognised that up-to-date mapping of production areas could play a role in identifying longer-term trends in production and would also be a valuable asset in any response the industry takes to biosecurity threats or natural disasters¹⁵.

Apart from current biosecurity issues, pest and disease management is a constant challenge for the industry. This means that research into IPDM strategies requires ongoing investment.

Figure 10: 2015 to 2018 Banana marketing strategy



Marketing systems and structures

Clusters of green banana fingers are sold by cartons ranging in size from eight which is industry standard to 15 kilograms. Cartons are packed on pallets and put in cool rooms to reduce the temperature of the bananas to 14 to 16°C, which optimal for transportation to the market⁷. To allow for ripening, the bananas are transported within seven days.

Other packing options or pricing strategies present an opportunity for the industry. For example, the avocado industry has succeeded at selling by unit. Growers are keen to find new ways to sell bananas to increase the value captured at the grower level because they are not getting a fair percentage of the retail price at 40 per cent or less. It will be challenging for growers to shift this ratio. Innovation and effective engagement with the supply chain and retailers will be needed to change normal practices.

Fruit damage through the supply chain is a problem. Wastage in retail stores is estimated at five to eight per cent, which is up to four times higher than the international standard of two per cent, but is being addressed. R&D into better packaging methods has shown that a new 15 kilogram carton, compared to the current 13 kilogram carton, is of optimum design and construction. Using the new carton may save \$22.79 million, based on 2014/15 data⁸. Automated packing and palletisation also helps to reduce fruit damage.

Promotion and market development

Over \$4 million per year of marketing levies is invested on marketing initiatives across a wide range of media and engagement platforms. The 2015 to 2018 marketing strategy builds on the previous marketing strategies to become the

No. 1 snack food, and leverages its positioning as ‘nature’s energy snack’. The main aim of the strategy is to grow the frequency of consumption amongst its target audience.

Over the three years of the marketing strategy, media activity aims to build on snacking moments by establishing the benefits of ‘purposeful energy’ in the target audience’s current lifestyle, build in occasionality in mid-mornings and mid-afternoons for purposeful energy, grow usage opportunities, and increase Australian bananas’ share as the No. 1 snack food. The approach aims to deliver a more consistent media presence to improve attitudes towards Australian bananas. The activity will speak primarily to the new target market of families with a child aged 12 years or under and people aged 25 to 39 years.

The marketing initiatives have a range of Key Performance Indicators (KPIs) that are tracked and reviewed regularly to assess their effectiveness.

The 2015 to 2018 marketing strategy builds on the previous marketing strategies to become the No. 1 snack food, and leverages its positioning as ‘nature’s energy snack’.

Operating environment

The banana industry	
Strengths	<ul style="list-style-type: none"> • Identified as nutritionally valuable and healthy to align with the healthy food options trend • Strong product awareness and support for bananas in the marketplace • Strong marketing campaign having success in increasing bananas as an alternative snack product • Strong representative body in the ABGC • Positive environmental credentials • Industry-wide IPDM and biosecurity plans • Strong commitment to effective biosecurity management.
Weaknesses	<ul style="list-style-type: none"> • Reliance on a single variety for the majority of its production represents a significant risk from pest and disease, and limits category diversification • Limited R&D funds available to address exposure to a single variety • High level of on-farm waste (between five and 30 per cent, and as high as 50 per cent recently) • At point of sale, limited offer of size and ripeness • Inaccurate/conflicting data around production and forecasting volumes • Limited access to timely pricing information to estimate market value.
Opportunities	<ul style="list-style-type: none"> • R&D into Panama TR4-resistant varieties • Diversify disease and weather event risk by increasing production in other regions • Introduce other packaging systems to increase quality and choice at the retail level • Growing demand for healthy/wellness programs, which fits the attributes of bananas • Use significant international research • Develop export opportunities as premium Australian (food secure) brand • Develop other value-add uses for byproducts and waste.
Threats	<ul style="list-style-type: none"> • Biosecurity risk, especially Panama TR4 soil-borne fungal infection, has the potential to wipe out the industry • Supply disruption due to significant climatic events – cyclone and storm damage • Entry by low-cost exporters into Australian domestic market (retail price of \$1.00 per kilogram) • Increasing cost of production from new biosecurity measures, cost of labour, fertilisers and transport • Reduction in available pest control chemicals • Impact of regulatory requirements imposed to protect the Great Barrier Reef.

2

SECTION TWO

Banana industry outcomes

Industry outcomes

OUTCOME 1

New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity

With the outbreak of Panama TR4, the industry recognises its dependence and risk associated with growing a single variety. The banana levy has increased to help implement appropriate biosecurity containment measures, and has also allocated a significant amount of the industry's research budget to find new varieties that are disease-resistant and have consumer appeal.

There is a significant international opportunity if Australia identifies and develops new varieties that could replace the Cavendish variety. However, it is unlikely that Australia will achieve this alone in the next five years. International collaboration could accelerate the development and ensure that Australian growers are not disadvantaged if an international solution were to be found and Panama TR4 becomes endemic in Australia.

The 2015 Panama TR4 outbreak, while potentially very damaging, is not the only disease threat to the sustainability of the industry. Ongoing research to improve pest and disease management and biosecurity is required and incorporated into the industry's BMP guide.

OUTCOME 2

Increased adoption of the industry's BMP plan that improves industry sustainability, biosecurity and environmental stewardship

The industry's comprehensive environmental BMP plan has been endorsed for its practices by the Australia Government's Reef Extension Program. The industry is seen as a leader for environmental stewardship within agriculture. To ensure that the BMPs are effective, the industry aims to have 80 per cent of Queensland's production operating under the environmental BMPs by 2021.

Effective biosecurity is essential to contain and manage pests and disease that threaten the industry. The industry has recently developed a Biosecurity Best Management Plan that, if widely adopted, will help to ensure sustainability. By 2021, the industry would like 50 per cent of farms to have adopted the biosecurity BMPs.

The industry must continue to communicate its leadership and commitment to the environment and biosecurity to all stakeholders in the community. The industry needs to have the resources to be able work in partnership with the community to ensure that as regulations are developed, they are likely to achieve desired results.

OUTCOME 3

Increased domestic demand, developed export markets and product diversification that increase grower profitability

Bananas are one of the largest horticulture crops in Australia, with a production value of \$565 million in 2014/15 (Hort Innovation, 2016. *Australian Horticulture Statistics Handbook 2014/15*). Some growers want to reach an industry value of \$1 billion by 2022. However, current forecasts and performance indicate this would be difficult to achieve without significant domestic or international disruption (**Appendix 6**).

Significant marketing investment and efforts to increase demand are working to make bananas the healthy mid-morning and mid-afternoon snack. The current marketing strategy aims to increase the frequency (not the way) bananas are eaten. To capture value from excess production, future marketing initiatives may need to look at the way bananas are eaten.

Current low retail prices for Cavendish bananas make it difficult for growers, supply chain stakeholders and retailers to make reasonable returns. If low retail prices become the new norm, growers and supply chain stakeholders will struggle to remain viable.

Compared to Cavendish, the demand for other varieties comes from a very low base, though it is increasing as consumers become aware of uses for other varieties. Smaller growers have an opportunity to develop viable niche products. Because other horticulture industries have succeeded when offering more varieties, some growers could use this potential pathway to increase the value capture of banana production.

Exports of Australian bananas are very low compared to domestic consumption. With high labour and production costs, Australia is perceived as unable to compete against developing and emerging countries. However, other Australian food industries are successfully exploiting food safety concerns in Asia to extract a premium above domestic pricing. The banana industry could use this approach to offset high production costs. Market research into the development of a premium product for selected export markets could help to diversify demand and increase profitability for growers.

OUTCOME 4

Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability

By volume, the banana industry is the largest of the fruit industries. Consistent downward pressure on retail prices increases the need for growers to improve productivity, so that they can continue to operate at low prices. To date, some automation technology and continuous improvement techniques have been applied ad hoc, but growers who have embraced these approaches have significantly lifted productivity and quality. All growers would benefit from having the BMP guides amended to help them adopt regular continuous improvement techniques supported by training and education programs.

Research and adoption of automation technology is important because the industry relies heavily on scarce high-cost labour during the growing, harvest and packing processes. While this problem remains, Australian growers will struggle to compete globally against banana-growing countries with significantly lower labour costs.

Depending on production volumes, on-farm waste ranges between five per cent and 30 per cent. Changing weather conditions may help growers to consistently increase yields beyond what the domestic market can absorb. If production levels remain high, the industry will need to find other uses during supply peaks with value-added and processed products.

3

SECTION THREE

Banana industry priorities

Industry investment priorities

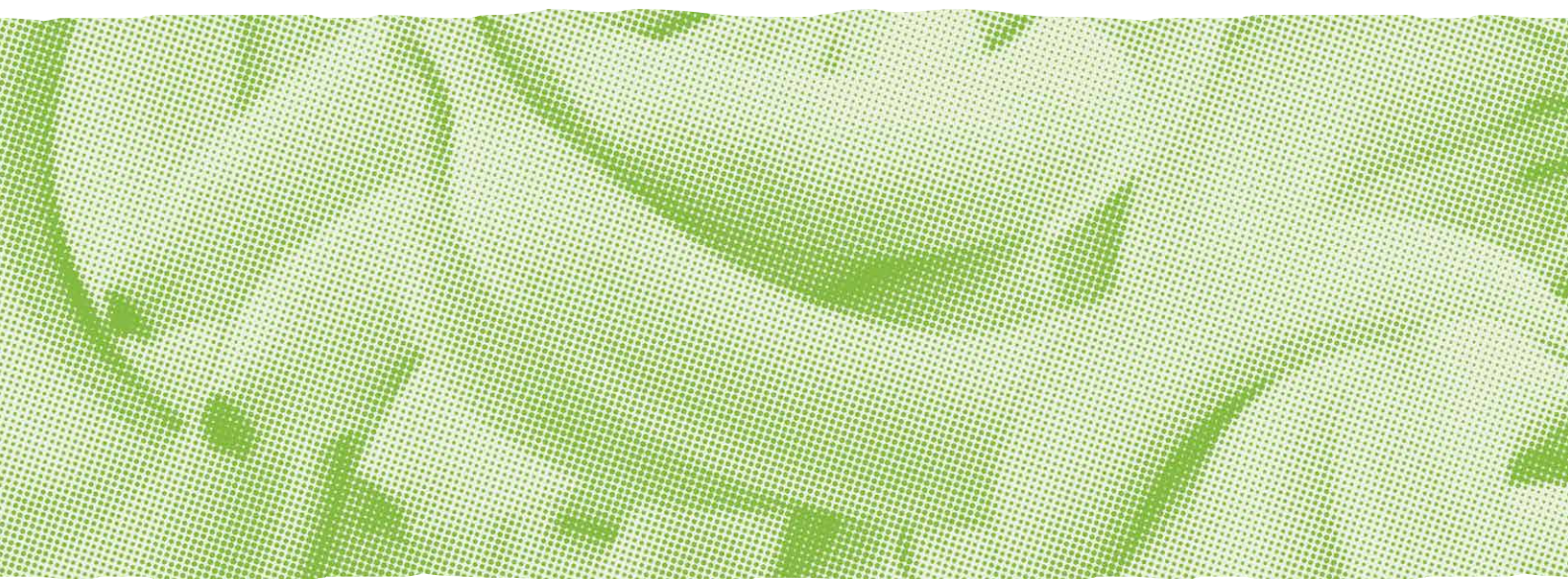
The information below describes the outcomes, strategies and possible deliverables that will be the initial priorities of this plan. The ability to deliver on all the articulated strategies (and investments) will be determined by the ability of the statutory levy to provide the resources to do so. These priorities 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.

This plan recognises a number of biosecurity threats to the industry and is sympathetic to the need to prioritise investment into this area. It is likely an imbalanced portfolio may be a result of the need to minimise the impact of these threats.

OUTCOME 1 – New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity	
STRATEGIES	POSSIBLE DELIVERABLES
1.1 Collaborate with the international community to accelerate the identification and development of disease-resistant varieties	<ul style="list-style-type: none"> • Effective international research relationships are established and maintained • Intellectual property is adequately protected to ensure the best possible outcome for the Australian industry
1.2 Conduct research into new disease-resistant varieties that also have consumer appeal	<ul style="list-style-type: none"> • Disease-resistant varieties are identified • Consumer preferences, market research and functional food properties help guide the focus of new variety development
1.3 Continue research to improve pest and disease management and biosecurity	<ul style="list-style-type: none"> • The industry can effectively contain endemic diseases such as Race 1 and BBTV • Review and apply lessons learned from NT Freckle and Panama TR4 outbreaks to use in future biosecurity planning • The industry has access to clean planting material from abroad and within Australia • The industry has access to improved diagnostics for endemic and exotic diseases • The industry has revised and updated biosecurity measures in the BMP guides

OUTCOME 1 (continued)	
STRATEGIES	POSSIBLE DELIVERABLES
1.4 Continue research into improving the industry's IPDM plans to further reduce the industry's impact on the environment	<ul style="list-style-type: none"> • Soft (non-chemicals) options are researched • IPDM and BMP guides are regularly updated, with latest advances in the non-chemical treatments that are pursued by industry • The industry has continued access to existing chemicals by ensuring they are registered for bananas in all states • Research and access into new chemicals for industry is undertaken
1.5 Continue to research and refine agronomic practices to improve productivity, quality and environmental outcomes	<ul style="list-style-type: none"> • Research into improved soil, nutrition, water and plant management has been conducted and adopted by industry

OUTCOME 2 – Increased adoption of the industry's BMP plan that improves industry sustainability, biosecurity and environmental stewardship	
STRATEGIES	POSSIBLE DELIVERABLES
2.1 Continue to drive adoption of BMP for on-farm biosecurity to ensure biosecurity risks are minimised	<ul style="list-style-type: none"> • Identify and address grower barriers for adoption • Continue to refine communication, develop education tools, provide continuous training and support for growers to adopt environmental and biosecurity BMPs • Continue to drive adoption of on-farm biosecurity measures by service providers, such as transport companies
2.2 Strategically communicate the industry's biosecurity and environmental BMPs to the community	<ul style="list-style-type: none"> • Communication and engagement with community and the media to demonstrate the industry's ability to effectively manage environmental issues
2.3 Strategically communicate the industry's economic and social benefits to the community	<ul style="list-style-type: none"> • Continue to support community and regional events
2.4 Identify and develop innovative leaders to promote BMP adoption and drive the development and adoption of innovative practices	<ul style="list-style-type: none"> • Identify and maintain management and leadership programs to help growers improve farm and business management practices • Establish leadership identification processes



OUTCOME 3 – Increased domestic demand, developed export markets and product diversification that increase grower profitability	
STRATEGIES	POSSIBLE DELIVERABLES
3.1 Drive domestic banana growth through targeted marketing initiatives	<ul style="list-style-type: none"> Continue to build high-reaching insight-driven marketing activities Demonstrate the effectiveness of marketing channels on stimulating demand vs expenditure Conduct in-depth consumer research, including preferences about taste and texture, that helps guide development and production of varieties Use functional food benefits to increase demand
3.2 Develop and maintain grower-led exports to international markets	<ul style="list-style-type: none"> Conduct market research to identify the value proposition for Australian bananas, and prioritise markets that will pay a premium Create export market development plans Develop minimum export standards to ensure highest quality product is exported and meets stringent biosecurity regulations Establish an ongoing commitment from growers to supply to export markets
3.3 Increase consumer awareness and demand for other varieties	<ul style="list-style-type: none"> Develop deeper understanding of how ethnic communities use other varieties of bananas Explore and understand the market potential of other varieties apart from Cavendish Engage the supply chain and retailers to promote consumer uptake of other varieties

OUTCOME 4 – Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability	
STRATEGIES	POSSIBLE DELIVERABLES
4.1 Continue to improve harvest and postharvest knowledge and systems through the investigation and adoption of new or improved practices and technologies	<ul style="list-style-type: none"> Investigate the use of robotics and other automation technologies in other industries Improve harvest efficiencies by researching bunch emergence timing Improve postharvest efficiencies to deflower fruit Automation opportunities are adopted through industry engagement and training
4.2 Continue to build on industry production benchmarking and supply chain data initiatives	<ul style="list-style-type: none"> Industry-wide benchmarking is conducted regularly to help identify opportunities for improvement Industry benchmarking also includes non-financial indicators Reliable and accurate production and pricing information is available to growers and industry stakeholders
4.3 Provide pathways for growers to become aware of, and adopt, continuous improvement methodologies	<ul style="list-style-type: none"> Integrate continuous improvement systems and processes into BMP libraries Conduct on-farm and postharvest tours to highlight how BMP is implemented and opportunities for improvement
4.4 Research other use options that minimise waste during periods of peak supply	<ul style="list-style-type: none"> Develop and promote other value-add products from excess production Investigate value-add opportunities from banana byproducts Research opportunities that increase value capture by growers, such as low-impact or organic bananas

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 11**. **Figure 11** also shows how each cross-sectoral investment theme relates to the five investment priorities.

Figure 11: Hort Innovation’s investment priorities



The alignment of the banana 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 3**.

Table 3: Alignment of banana SIP outcomes to the Hort Innovation investment priorities

Hort Innovation investment priorities	Banana SIP outcomes
Support industry efficiency and sustainability	New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity
	Increased adoption of the industry’s BMP plan that improves industry sustainability and environmental stewardship
Improve productivity of the supply chain	Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability
Grow the horticulture value chain capacity	
Drive long-term domestic and export growth	Increased domestic demand, export market development and product diversification that increase grower profitability
Lead strategically to enhance the development of the Australian horticulture industry through operational excellence	Enabler



4

SECTION FOUR

Banana industry monitoring and evaluation

Banana SIP monitoring, evaluation and reporting

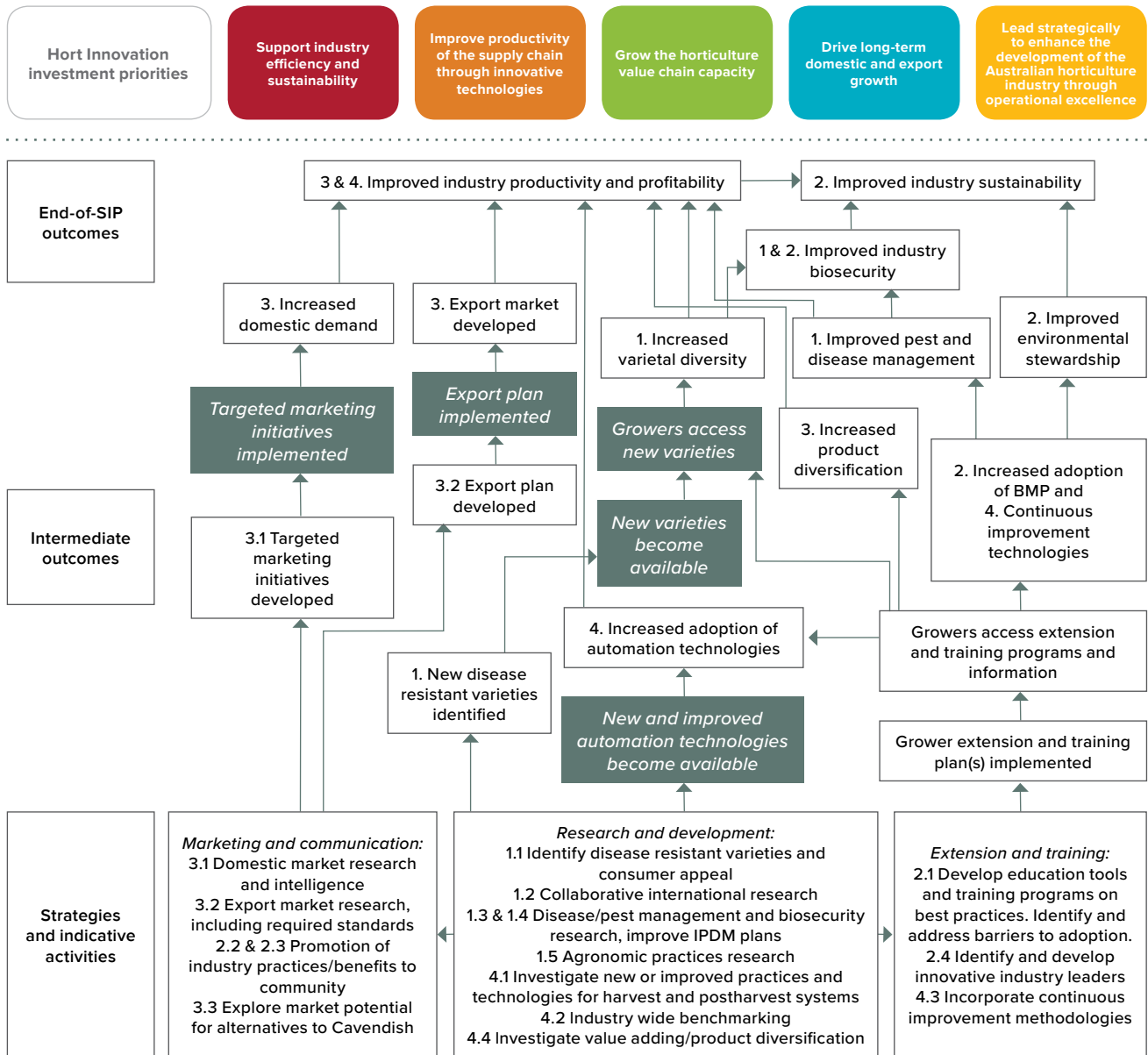
A SIP program logic and monitoring and evaluation (M&E) plan have been developed for the banana SIP. These are informed by the Hort Innovation Organisational Evaluation Framework. The logic maps a series of expected consequences of SIP investment. The M&E plan shows the performance measures to demonstrate 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.

Banana SIP logic

An indicative banana SIP program logic is shown below in **Figure 12**. The logic is based on the Hort Innovation SIP logic hierarchy (**Appendix 3**). The shaded boxes are not fully explicit in the SIP but necessary conditions for the achievement of expected outcomes.

Figure 12: Banana SIP logic



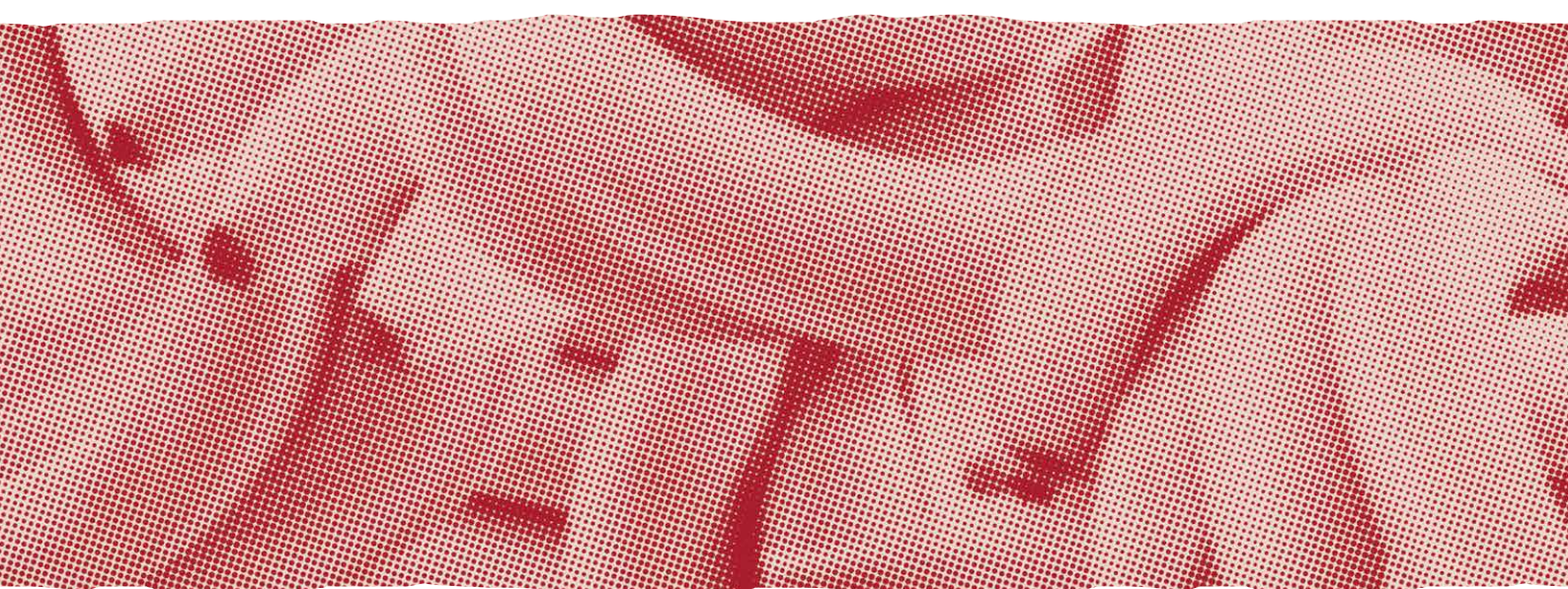
Banana SIP M&E plan

The banana monitoring and evaluation (M&E) plan is shown in **Table 4**. The table includes KPIs and data-collection methods both at a macro/industry (trend) level and at more specific SIP level/s.

Table 4: Monitoring and evaluation plan for the banana SIP

Outcome	Strategies	KPIs	Data collection methods and sources
OUTCOME 1: New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity	1.1 Collaborate with the international community to accelerate the identification and development of disease-resistant varieties	<ul style="list-style-type: none"> New disease-resistant varieties have been identified 	<ul style="list-style-type: none"> Agreement of industry representatives on varieties Monitor of varieties sold through capital city wholesale markets Annual survey of retail waste and consumer satisfaction Grower/industry survey
	1.2 Conduct research into new disease resistant varieties that also have consumer appeal	<ul style="list-style-type: none"> Evidence of growers accessing new varieties Number of Minor Use Permits maintained 	
	1.3 Continue research to improve pest and disease management and biosecurity	<ul style="list-style-type: none"> International research agreements or evidence of collaboration with the international research community 	
	1.4 Continue research into improving the industry's IPDM plans to further reduce the industry's impact on the environment	<ul style="list-style-type: none"> Updated BMP guide with any revised IPDM information Updated IPDM plans Evidence of uptake of IPDM information and recommendations 	
	1.5 Continue to research and refine agronomic practices to improve productivity, quality and environmental outcomes	<ul style="list-style-type: none"> New and improved diagnostic tests for endemic and exotic diseases Research on agronomic practices incorporated into grower extension and training programs 	
OUTCOME 2: Increased adoption of the industry's BMP plan that improves industry sustainability, biosecurity and environmental stewardship	2.1 Continue to drive adoption of BMP for on-farm biosecurity to ensure biosecurity risks are minimised	<ul style="list-style-type: none"> Extension and training plan for biosecurity and environmental BMP projects 	<ul style="list-style-type: none"> R&D project records Extension project records Industry benchmarking Grower surveys and extension/training event feedback Community reputation feedback (if available)
	2.2 Strategically communicate the industry's biosecurity and environmental BMPs to the community	<ul style="list-style-type: none"> Evidence of grower participation in training programs 	
	2.3 Strategically communicate the industry's economic and social benefits to the community	<ul style="list-style-type: none"> Evidence of adoption of environmental and biosecurity BMPs; target of 80 per cent of Queensland production implementing environmental BMPs, and 70 per cent of production implementing biosecurity BMPs 	
	2.4 Identify and develop innovative leaders to promote BMP adoption and drive the development and adoption of innovative practices	<ul style="list-style-type: none"> Increased involvement in forums that support future innovators and leaders of industry 	

Outcome	Strategies	KPIs	Data collection methods and sources
OUTCOME 3: Increased domestic demand, developed export markets and product diversification that increase grower profitability	3.1 Drive domestic banana growth through targeted marketing initiatives	<ul style="list-style-type: none"> Uptake of consumer research Targeted domestic marketing plans 	<ul style="list-style-type: none"> Consumer and market research records Retail data ABS data Trade data Wholesale price data
	3.2 Develop and maintain grower-led exports to international markets	<ul style="list-style-type: none"> Export market development plan Australian bananas remain No. 1 snack food 	
	3.3 Increase consumer awareness and demand for other varieties	<ul style="list-style-type: none"> Grower-led exports increased Evidence of new varieties/ product diversification in the market 	
OUTCOME 4: Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability	4.1 Continue to improve harvest and postharvest knowledge and systems through the investigation and adoption of new or improved practices and technologies	<ul style="list-style-type: none"> Extension plan for new R&D and technology Evidence of continuous improvement methodologies incorporated into grower extension and training programs 	<ul style="list-style-type: none"> R&D project records Industry benchmarking Grower surveys
	4.2 Continue to build on industry production benchmarking and supply chain data initiatives	<ul style="list-style-type: none"> Evidence of adoption of new and improved practices and automation technologies 	
	4.3 Provide pathways for growers to become aware of, and adopt, continuous improvement methodologies	<ul style="list-style-type: none"> Evidence of a reduction in on-farm waste Industry benchmark reports on production and postharvest costs 	
	4.4 Research other use options that minimise waste during periods of peak supply	<ul style="list-style-type: none"> Growers have more access to reliable and accurate production and pricing information New value-add products identified and incorporated into extension and training programs 	

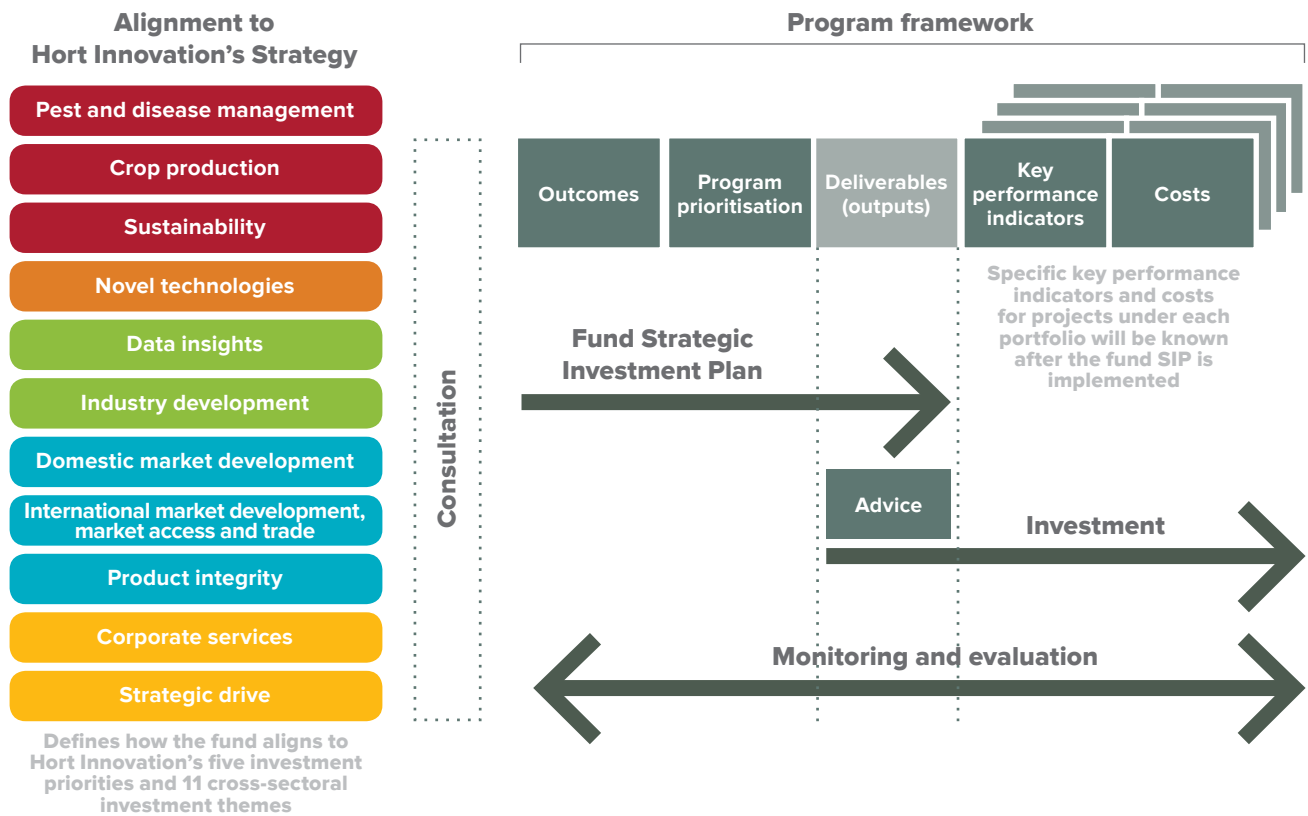


Reporting

The Program Framework in **Figure 13** 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, 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 13: Hort Innovation’s program framework

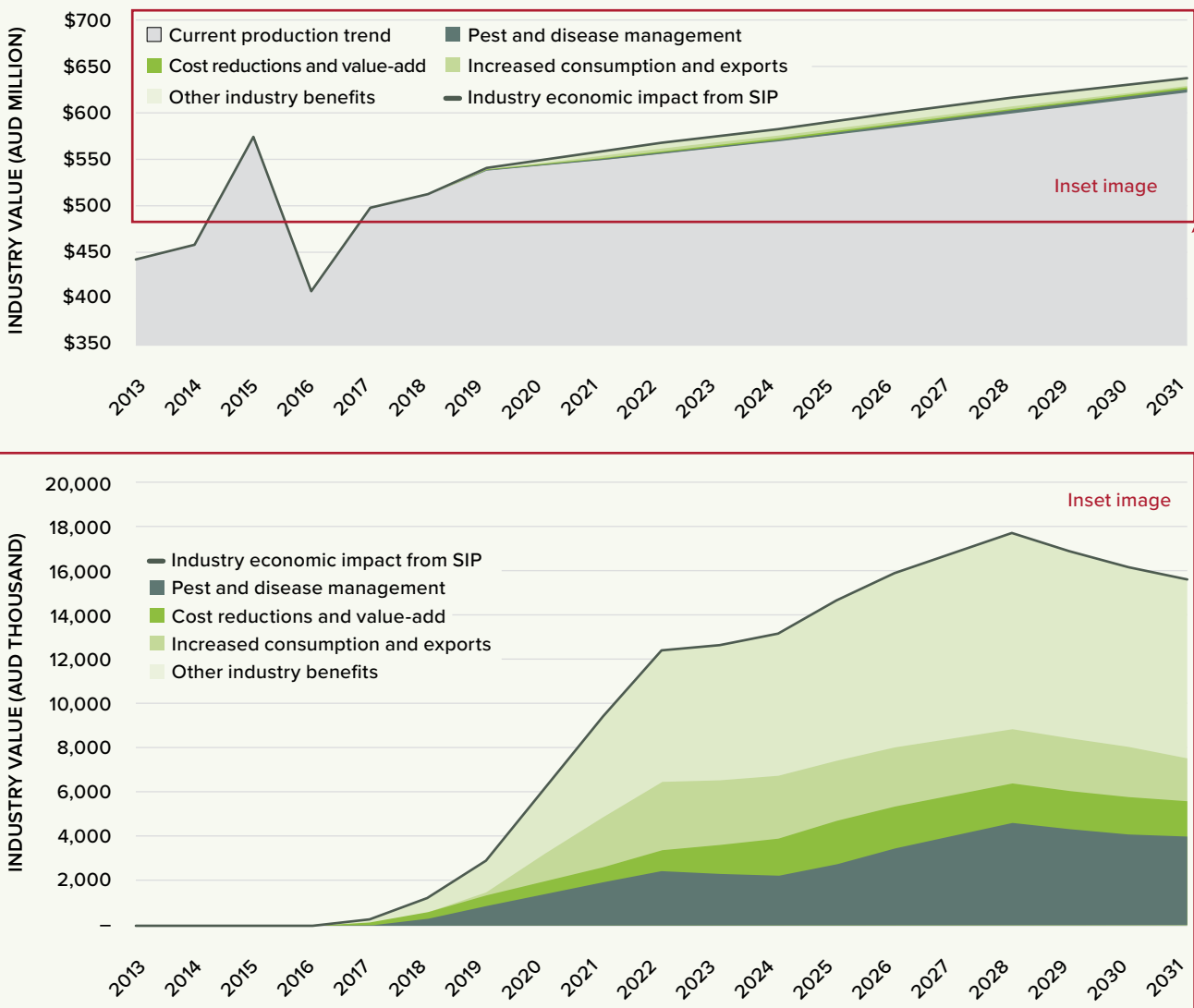


5

SECTION FIVE

Impact assessment

Figure 14: Economic benefit from investment in the SIP



An independent assessment of the potential economic impacts from investment into the banana SIP indicated a positive return on investment for the industry (Figure 14). The anticipated investment of \$42.93 million over the next five years in R&D, extension and marketing activities is expected to generate \$172.37 million in net benefits for the industry, representing a benefit cost ratio of 4.02 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 5 provides a summary of the impacts assessed for the SIP, their corresponding outcomes, net economic benefits and benefit cost ratio.

Table 5: Overview of impacts assessed and alignment with SIP outcomes

Outcome	Impacts	Anticipated SIP investment (over five years)	Net benefits (over 15 years)	Benefit cost ratio
<p>OUTCOME 1: New varieties introduced and improved pest and disease management that improve varietal diversity and biosecurity.</p> <p>OUTCOME 2: Increased adoption of the industry’s BMP plan that improves industry sustainability, biosecurity and environmental stewardship</p>	<p>Risk reduction for the potential incursion and/or spread of diseases due to BMP development and adoption:</p> <ul style="list-style-type: none"> • Panama TR4 spread • BBTV spread through and beyond New South Wales • Fusarium Wilt TR1 impact on Lady Finger production • Black Sigatoka reincursion 	\$10,395,147	\$54,770,275	7.26
	Integrated pest management to control endemic pest and disease		\$16,337,626	
	Residual risk, despite BMP, attenuated through adoption of resistant varieties developed locally or internationally, with contribution from local research.		\$1,767,829	
<p>OUTCOME 2: Increased adoption of the industry’s BMP plan that improves industry sustainability, biosecurity and environmental stewardship</p>	Nuffield Scholarships to drive business improvement for top tier industry performers		\$2,619,750	
<p>OUTCOME 3: Increased domestic demand, developed export markets and product diversification that increase grower profitability.</p>	Increase in fresh supply value through increased in purchase frequency improving consumption per capita	\$22,137,815	\$48,678,386	2.66
	Increase in industry production value due to increased share of higher value. lower volume varieties		\$9,849,088	
	Initiation of exports to accessible markets (United Arab Emirates, Singapore)		\$305,640	
<p>OUTCOME 4: Increased adoption of continuous improvement and automation technology that improve industry productivity and profitability</p>	Reduced costs due to adoption of alternative packing materials	\$10,395,147	\$18,000,817	3.66
	Reduced costs due to mechanisation of labour		\$11,484,767	
	Potential value added product development		\$8,552,189	
All impacts		\$42,928,110	\$172,366,367	4.02

Outcomes 1 and 2 were largely examined together as they are directed towards achieving common impacts:

- A reduction in the risk of disease having a negative impact on Australian production. Risk reductions were based on expected spread of diseases with particular significance to the banana industry. SIP activities including BMP are expected to delay the incursion and spread of diseases by two years and reduce the risk of impact by a conservative two per cent. The total potential value of respective yield losses, destruction and control costs were adjusted for risk of disease spread.
- Cost reductions due to IPM or more sophisticated pest control. The adoption of alternative control measures was valued based on a reduction in chemical control costs, offset by a usage cost applied to implementation of alternative measures.
- Elimination of the residual risk was considered as a result of introduction of disease resistant varieties. The probability of delivery of necessary outputs to achieve this disease risk elimination was assumed to be very low, as it is reliant on long term breeding and biotechnology research.

A specific R&D and extension activity line of Outcome 2 was

- The Nuffield Scholarships' benefit to business owners; valued as a 20 per cent increase in gross returns due to implementation of research findings and leveraging of business networks built during scholarship activities.

The impact of Outcome 3 was quantified based on:

- An increase in fresh supply value due to increased consumption per capita. The increase in consumption was valued based on the increase in industry value due to an additional purchase frequency of three occasions, while maintaining current average weight of purchase.
- Increased industry production value due to promotion of existing alternative varieties was calculated based on an increase in the percentage of production attributable to higher value varieties from one to 1.5 per cent during the SIP period, with high value varieties worth approximately 3.3 times the value of the remaining Cavendish and Lady Finger production.
- The initiation of exports was modelled based on two countries with which Australia has existing market access — Singapore and the United Arab Emirates. The trends in net banana import volumes were estimated based on FAO statistics. The impact was calculated based on Australia supplying 20 per cent of net imports, and that growers will not export unless price at a minimum matches domestic farm gate value.

The impact of Outcome 4 was quantified based on:

- Cost and waste reductions due to continued extension of larger packing formats and development and extension of alternative packing materials. This was valued based on driving continued adoption of larger 15 kilogram packing materials with associated reduced wasted damaged fresh supply, as well as industry adoption of alternatives to traditional cartons, such as reusable plastic crates, with associated reductions in overall costs of packing.
- Labour cost reductions due to implementation of automated systems for picking and packing. Labour costs for picking and packing were estimated as a share of overall labour costs, using data gathered from a prior benchmarking study, and applied as a percentage of farm gate production value. Capital costs of implementing automated technologies was assumed as initially high, gradually decreasing due to technology advancement.
- Development of value added products using banana waste products. Estimates of on-farm banana waste were estimated at approximately 12 per cent based on reported findings. The value of conversion of this waste into exemplar value added goods, biofuels and banana flour, were calculated with a conservative adoption, offset by an opportunity cost to use this waste product as fertiliser material.



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, which 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 risks with successful implementation of the SIP include:

- Significant outbreak of known or unknown biosecurity threat
- Impact of tropical storm or cyclone on production
- Change in market dynamics due to static prices.

**APPENDIX 1:
Process to develop this plan**

The process to develop the SIP was as follows:

1. Vision and task identification exercises were held with the Research and Marketing SIAP members on November 1 and 2, 2016
2. The context was developed through desktop research and engagement with growers and researchers between October and December, 2016
3. The draft outcomes and strategies were validated with one-on-one phone calls to key growers and SIAP members in December, 2016
4. The monitoring and evaluation analysis was conducted by Clear Horizons in December, 2016
5. The impact assessment analysis was conducted by CIS
6. Information from the recently completed (2015) comprehensive strategic planning process was incorporated into the plan.

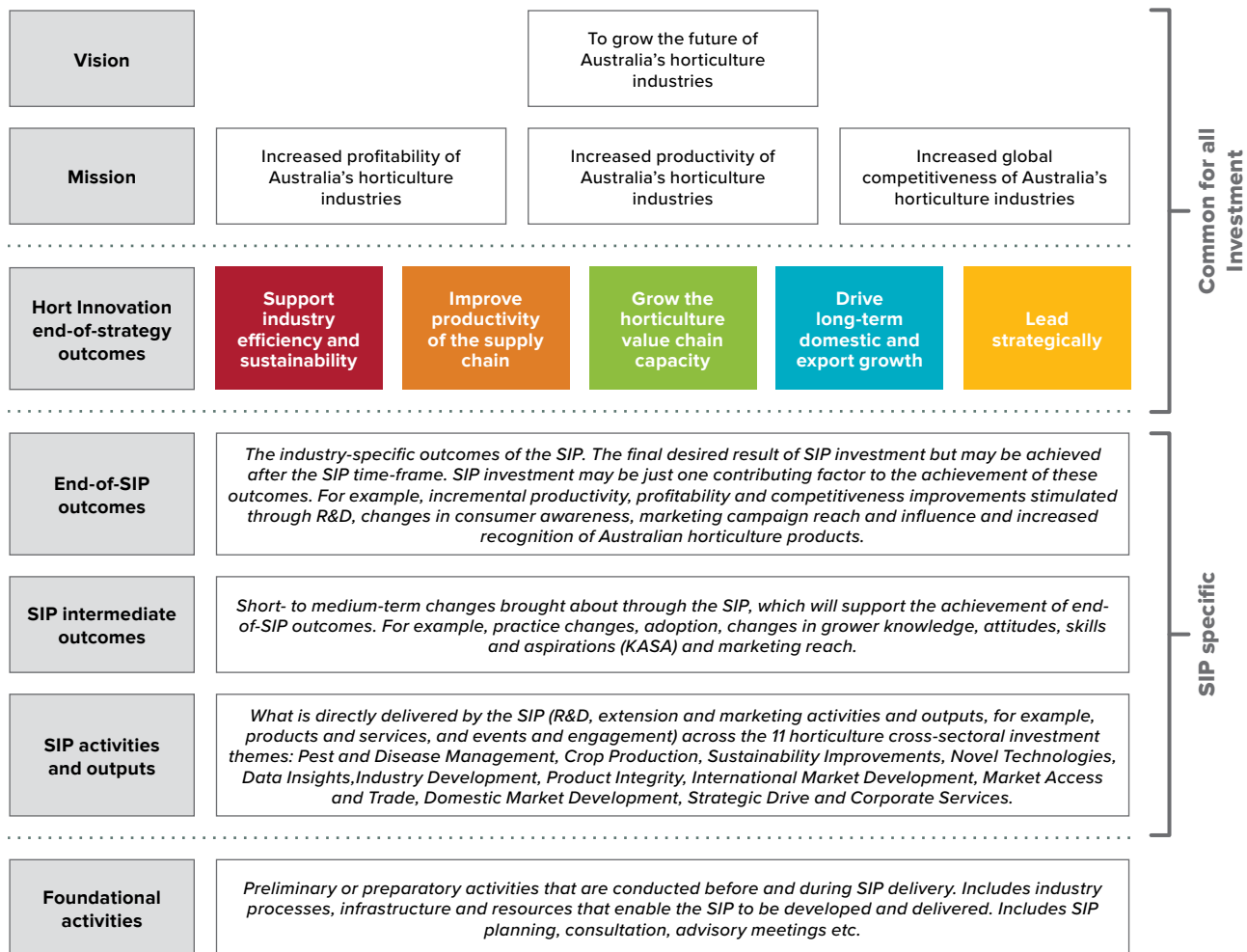
**APPENDIX 2:
Consultation and validation**

The following individuals contributed to the development of the banana SIP, and their contribution is greatly appreciated:

Name	Industry role
Andre Drenth	University of Queensland
Steward Lindsay	QDAF
Cameron Mackay	Mackays Bananas
Doug Phillips	Johnston River Produce
Stephen Spear	SN Spear
David Tate	Dave's Bananas
Matt Abbott	Barama Investments
Rosie Godwin	ABGC
Jim Pekin	ABGC
Irene Kernot	QDAF
Gary Fattore	Costa Group
Paul Inderbitzin	Kureen Farming
Daniel Mackay	Mackays Bananas
Peter Molenaar	P & A Molenaar
Andrew Serra	Serra Farming
Tegan Kukulies	QDAF
Elisa King	Hort Innovation
Astrid Hughes	Hort Innovation
Tim Archibald	Hort Innovation



APPENDIX 3:
Logic hierarchy



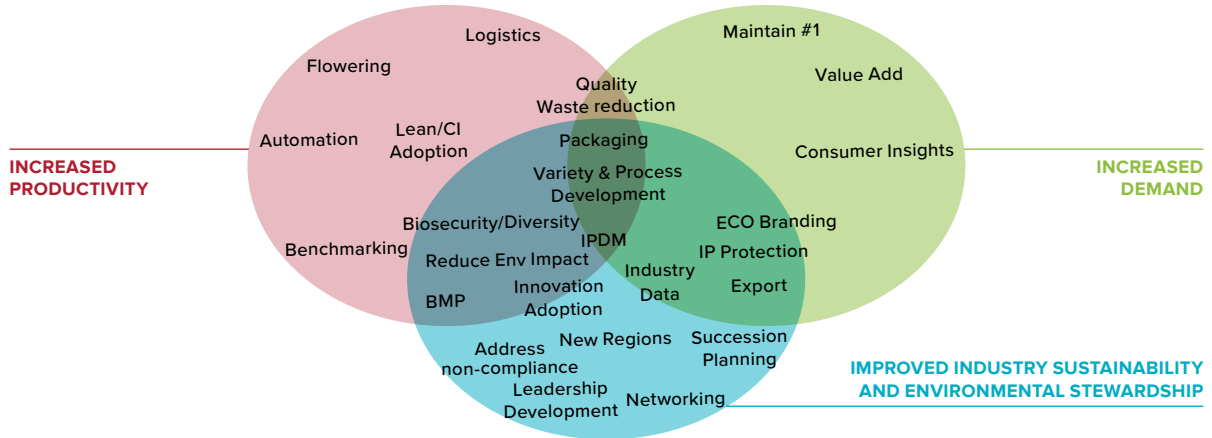
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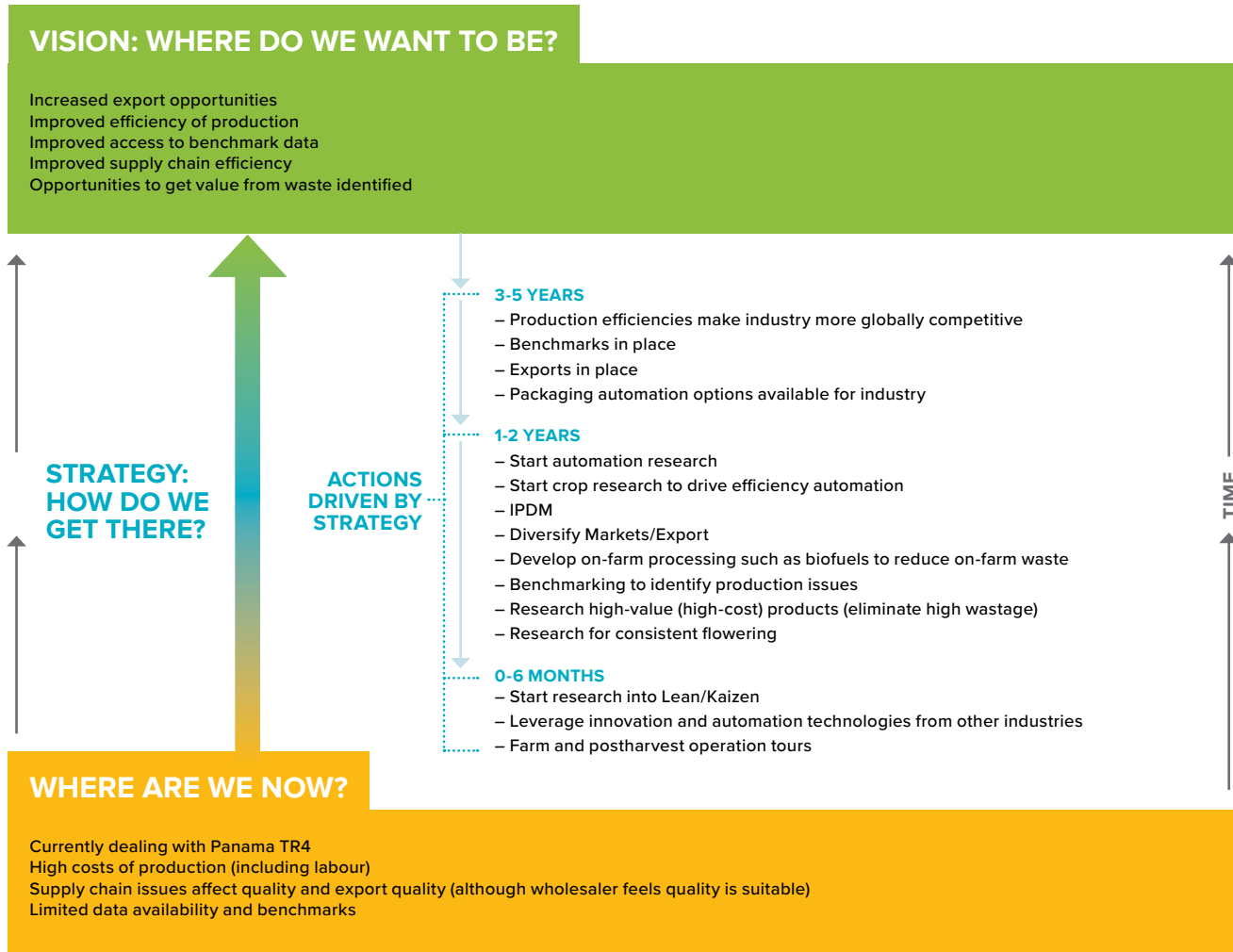
APPENDIX 5: Outputs from engagements

Industry priorities – R&D SIAP

The diagrams below are outputs from the SIAP strategy session held on November 1, 2016. The discussions in the morning focused on priorities that excluded Panama TR4, which was discussed in detail in the afternoon. The session was facilitated through vision of success exercises and ABCD analysis discussions.



ABCD analysis – production and supply chain



ABCD analysis – best practice, innovation



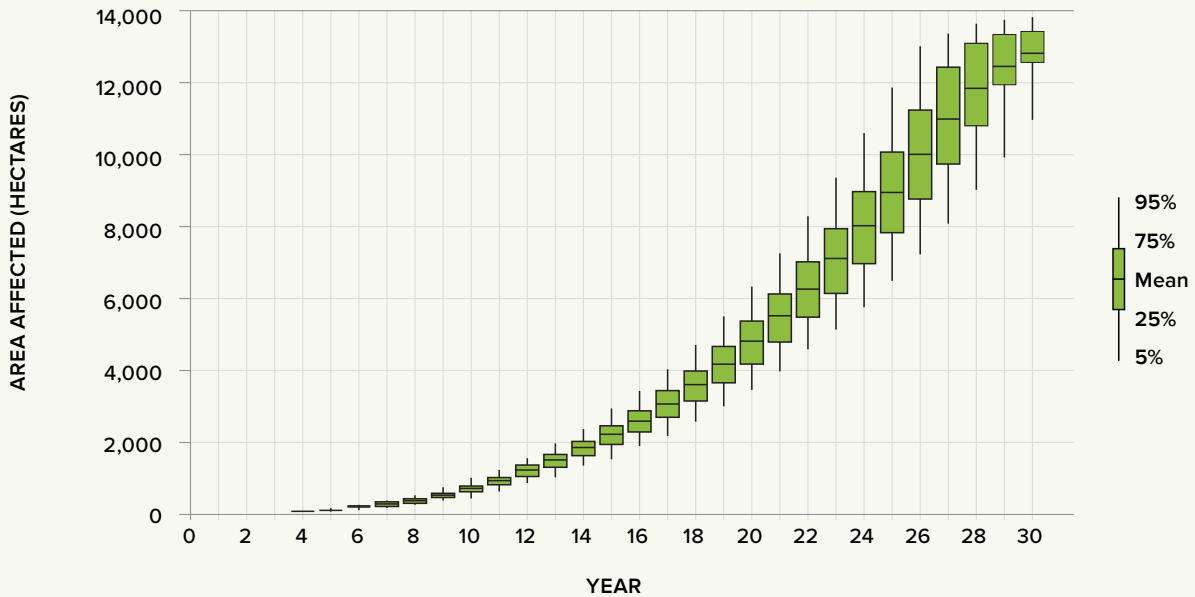
ABCD analysis – marketing SIAP

A session with the marketing SIAP was also held on November 2, 2016. As with the R&D SIAP, vision of success and ABCD analysis exercises were conducted. The key theme was that the industry wanted to become a \$1 billion industry by 2022, led by a production increase (30 per cent) and improved value capture. Industry also needed to start making progress on exports.



APPENDIX 6: Impact of pests and diseases on production, and industry capacity to keep pace with demand

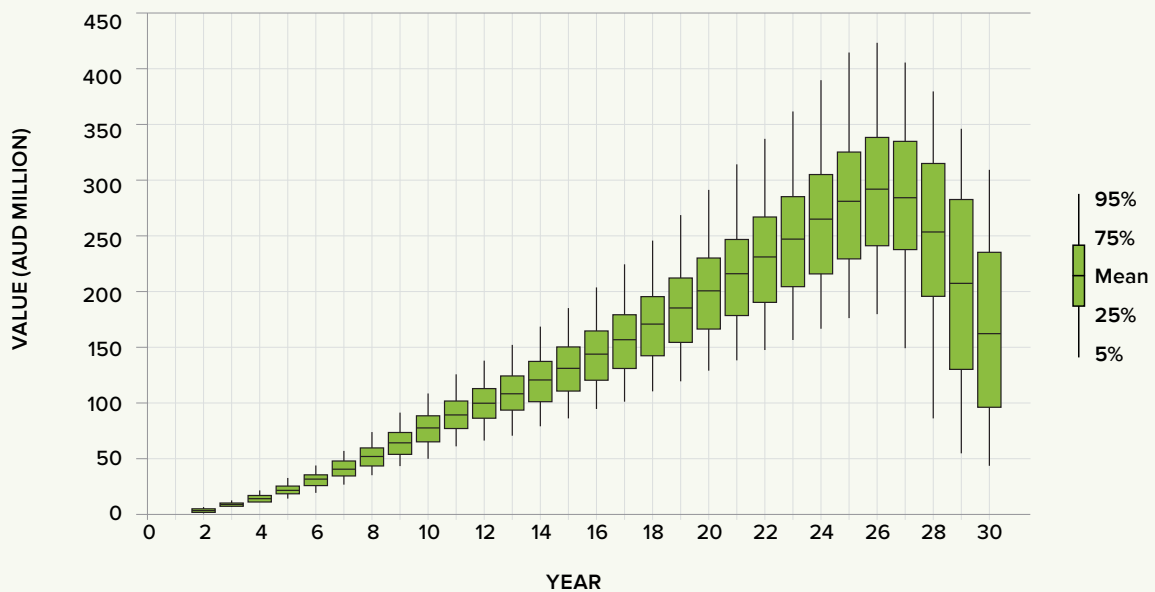
The data presented below, based on the work of Professor Andre Drenth and his team (Cook, Taylor, Meldrum and Drenth, 2015), on the likely impact of key diseases such as Panama TR4 on industry sales and volume provide a reality check on growth aspirations. Potentially, the current entire area banana plantations affected over a 30-year period. It would take Panama TR4 50 years to wipe out the previous global monocrop in bananas, the Gros Michel.



(Source: Cook, Taylor, Meldrum and Drenth, 2015)

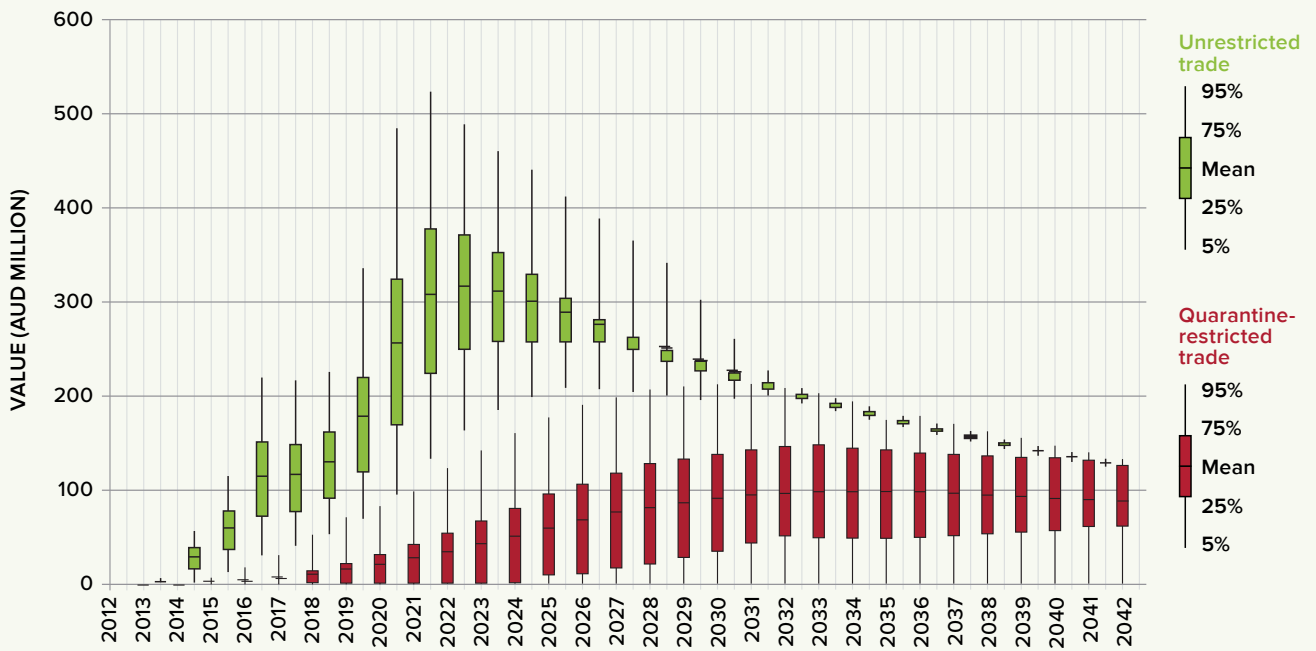
The potential economic impact is striking.

The fall in value in later years is largely the result of the very limited supply remaining. On this basis, aspirations of growth at the rate the industry anticipates would remain firmly out of reach.



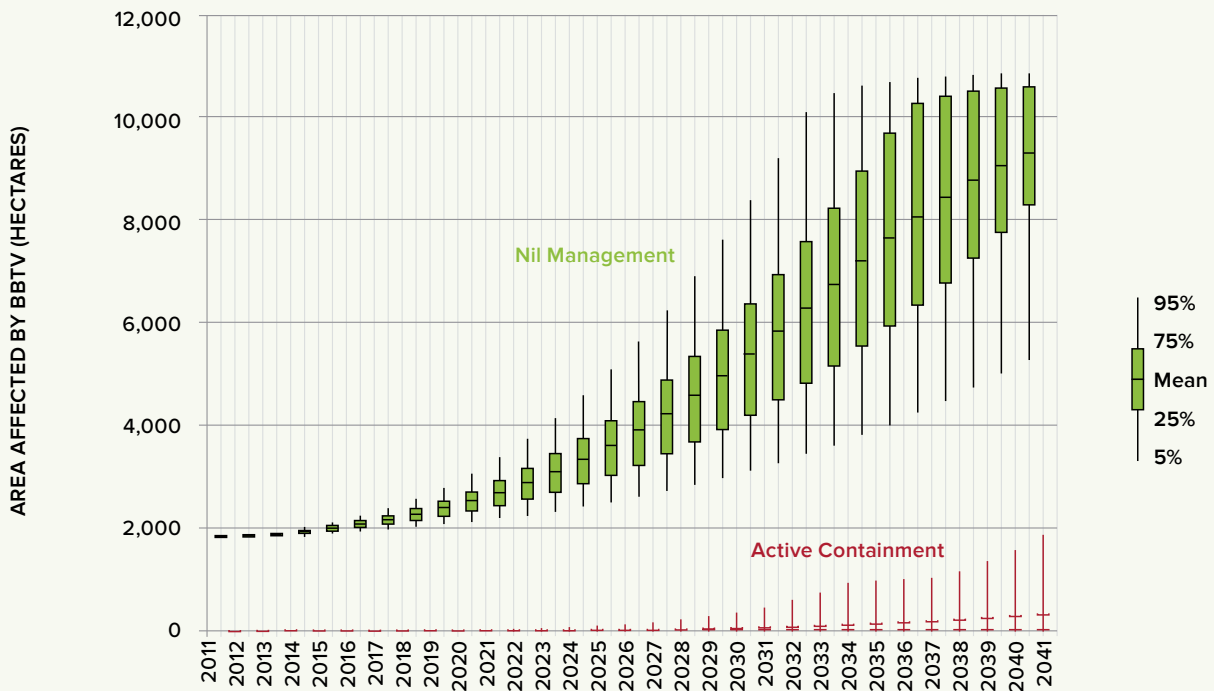
(Source: Cook, Taylor, Meldrum and Drenth, 2015)

Professor Drenth's team produced a similar scenario for black Sigatoka:



(Source: Cook, Liu, Edwards, Villalta, Aurambout, Krticios, Drenth and De Barro, 2013)

While the identification and commercialisation of a variety resistant to Panama TR4 is likely to take more than five years, the economic boost from containment through effective biosecurity management is demonstrated by the graph below on containing diseases such as BBTv. Effectively, the difference is that the industry is fully affected, versus a negligible effect on production.



(Source: Cook, Liu, Edwards, Villalta, Aurambout, Krticios, Drenth and De Barro, 2012)

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