

FEBRUARY 2022

Almond

Strategic Investment Plan 2017-2021

PERFORMANCE REPORT



Almond SIP performance report

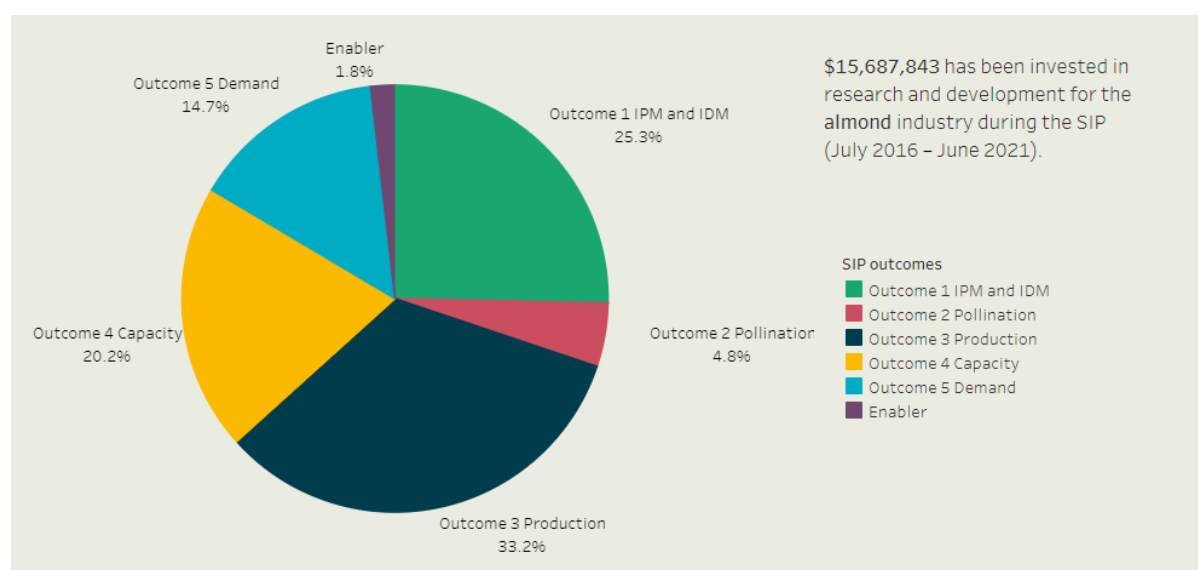
This performance report reviews the performance of levy investments delivered against the almond Strategic Investment Plan (SIP), which was active for the 5-year period from 2016/17 to 2020/21. The SIP was developed to strategically guide research and development (R&D) levy investment in accordance with core industry priorities. The SIP featured five outcome areas, 27 strategies and 25 key performance indicators (KPIs), summarised in Table 1. A total of \$15.7 million was invested into the Almond Fund over the 5-year period of the SIP. The total investment expenditure allocated against each outcome is provided in Figure 1.

Table 1: Almond SIP outcomes

Outcome	Description	Expenditure allocation*
1. IPM and IDM	Pest and disease damage to almonds has been reduced through enhanced IPM and IDM	25.3%
2. Pollination	A major productivity gain in almond pollination by 2022 through a 25% reduction in bee stocking rates with no loss in pollination efficiency (nut set)	4.8%
3. Production	An almond industry crop production system that supports further efficiencies in Horizon 1 orchards and the development of Horizon 3 orchards and has lifted average industry yield from 3 to 4 tonnes per hectare	33.2%
4. Capacity	An informed industry that adopts R&D outcomes and has the capacity to support current and future industry needs	20.2%
5. Demand	Increased domestic consumption from 16,000 tonnes in 2016 to 27,500 tonnes in 2022. Increased export sales from 64,000 tonnes in 2016 to 110,000 tonnes in 2022. European Union inspections reduced from one in 20 containers to one in 100 containers at destination by 2022	14.7%

*Total investment \$15.7 million as of June 2021. Balance of expenditure comprises of enabler investments, which includes expenditure to support the delivery of the SIP including advisory meeting and publication costs.

Figure 1: Almond SIP investment expenditure analysis



SIP performance analysis

This performance report reviews the investment achievements delivered within each outcome area that have generated impact for growers. The overall status of each strategic area, informed through an assessment of KPI performance, is also provided. The evaluation status and criteria were:

Strategic area status	Criteria
Achieved	KPIs for this strategic area were met
In progress	Investment delivery remains ongoing
Not achieved	Investment was not prioritised in this strategic area

The results have been informed from evidence compiled through reviewing investment documentation and engagement with project managers. Outcomes generated through the investments are documented and brief case studies of flagship performance and impact for each outcome area are also provided.

Outcome 1: IPM and IDM – Pest and disease damage to almonds has been reduced through enhanced integrated pest management (IPM) and integrated disease management (IDM)

Pest and disease impacts can be a damaging source of serious defects in harvested almonds. Investment that supports increased resilience of the industry to pest and disease threats is essential to supporting the industry’s future supply and productive capacity.

Summary of strategic area and achievement status:

The strategies in the SIP that were identified to support almond IPM and IDM are listed below. An achievement status is provided based upon internal evaluation of project performances:

Strategic area	Status
Enhanced IPM	In progress
Enhanced IDM with Hull Rot focus	In progress
Support adoption	In progress
Maintain biosecurity preparedness	Achieved

KPI callouts:

- The project *Management of Carpophilus beetle in almonds* (AL15004) contributed to reduced defects by improving industry awareness, knowledge and expertise in management of *Carpophilus* beetle, thereby supporting reduced almonds defects at weighbridge.
- The *Integrated disease management program* (AL16005) and *Integrated pest management program* (AL16009) were tasked with helping growers improve the on-farm management of key almond pests and diseases. The projects will culminate in the development of IDM and IPM guidelines for use in almond production.

Case study — Almond integrated disease management program (AL16005) and Integrated pest management program (AL16009)

The almond SIP 2017-2021 identified newly emerged pests and diseases as having resulted in a major increase in yield loss and serious defects in harvested almonds. This pest and disease pressure had the potential to reduce almond yields or price premiums below the threshold for profitable crops. As a result, pest and disease management was identified as one of the three highest SIP program priorities, and complimentary projects were developed to help growers improve the on-farm management of key almond pests (AL16005) and diseases (AL16009) culminating in the development of IDM and IPM guidelines for use in almond production.

While both projects are ongoing at the end of the SIP, they have achieved key outcomes to further support pest and disease management for almonds.

AL16009 completed a 3-year industry-wide disease survey, finding that shot hole, hull rot, lower limb dieback (LLD) and trunk diseases (which included Phytophthora) were the most prevalent, with bacterial spot, anthracnose, scab, rust and the foamy canker syndrome recorded less frequently. In addition to the survey, ongoing AL16005 trials have investigated factors influencing hull rot disease, LLD and trunk diseases, and have identified several promising products for further investigation. AL16005 has also commenced benchmarking the costs of disease management and developed disease management information and guidelines.

AL16005 developed and trialled a new 'attract and kill' technology for *Carpophilus near dimidiatus* – identified in earlier crop surveys as the *Carpophilus* species responsible for the vast majority of kernel damage. Research into the distribution of kernel damage caused by carob moths within almond trees generated recommendations on where pest control efforts are best targeted.

Through field and laboratory research, the project also generated recommendations on improved nut sampling to estimate pest pressure, reported on biocontrols for pest management, and identified techniques and technologies to increase fungicide and insecticide effectiveness.

Together these complimentary projects supported improved yield and quality outcomes. Through the industry's innovation and adoption program (AL16001), recommendations implemented by the industry successfully reduced insect damage in the 2019 season to between 0-2% of the crop, thereby reducing the estimated cost of damage to less than \$5 million. This outcome contributed to restoring the export trade's confidence in Australian almonds, particularly for the in-shell market.

Outcome 2: Pollination – A major productivity gain in almond pollination by 2022 through a 25 per cent reduction in bee stocking rates with no loss in pollination efficiency (nut set)

A sustained increase in the cost of pollination was identified as the top risk in the almond SIP 2017–2022. This was driven by almonds being heavily reliant on pollination from honey bees, which are vulnerable to pests (*Varroa destructor*) and diseases (American Foulbrood), and is of variable quality and is increasing in cost.

Summary of strategic area and achievement status:

The strategies in the SIP that were identified to support almond pollination efficiency are listed below. An achievement status is provided based upon internal evaluation of project performances:

Strategic area	Status
Honey bee pest and disease management	Achieved
Pollination productivity and efficiency	In progress
Pollination capacity in the almond industry	Achieved

KPI callouts:

- Through the Hort Frontiers Pollination Fund, project *Development of non-invasive methods and systems for the assessment of hive health* (PH17001) provided capacity to help growers quickly diagnose hive health to underpin hive efficiency.
- *Discovery work for international pollination dispersal options for the Australian almond industry* (AL19003) scouted the USA for opportunities to increase pollination efficiency.
- Through the multi-industry project *Enhanced National Bee Pest Surveillance Program* (MT16005) the almond fund delivered a nationally coordinated bee pest surveillance program which supported the early detection, and therefore best opportunity for successful eradication, of high priority pest incursions of the honey bee industry.

Outcome 3: Production – An almond industry crop production system that supports further efficiencies in Horizon 1 orchards and the development of Horizon 3 orchards and has lifted average industry yield from 3 to 4 tonnes per hectare

Through a three horizon strategy, the industry seeks to move the industry from a system based on Californian varieties and technologies to a higher density production system best suited to Australian growing conditions that improves yields and input efficiency whilst reducing risks.

Summary of strategic area and achievement status:

The strategies in the SIP that were identified to support almond production are listed below. An achievement status is provided based upon internal evaluation of project performances:

Strategic area	Status
Variety and rootstock evaluation	In progress
Disease free genetic material	Not achieved
Nursery tree standards and accreditation	In progress
Water use efficiency and understanding irrigation “big picture”	In progress
Improved soil health	Not achieved
Progress to Horizon 3 orchards	In progress
Improved harvesting	Achieved
Improved post-harvest handling	Achieved
Novel technology	In progress

KPI callouts:

- *National almond breeding and evaluation program (AL17005)* gave the industry access to new almond varieties with traits including high-yield, self-fertility, improved disease tolerance, closed shells and desirable visual and eating qualities.
- Water use efficiency was supported by *Almond irrigation best practice management (AL17004)*, which determined that the two most important management factors for good drip irrigation system performance are dripline age and flushing frequency. This culminated in a drip irrigation evaluation tool.
- *Tree architecture and development of new growing systems (AL14007)* worked towards intensifying almond orchard operations across south-east Australia regions. The researchers specifically evaluated a low-cost pruning system to produce almond trees with more light-efficient, narrower canopies that, with minimal additional cost, would increase orchard productivity.
- *Advanced Processing of Almonds (AL12003)* has shown that the move towards shake and catch harvest systems does not decrease yields or quality, and has many advantages when combined with in-field hulling and hull separation. The project has improved post-harvest handling, and demonstrated the multiple cost effective benefits of utilising silo storage, including: elimination of weather and insect damage during storage, control of moisture content for optimum storage and less chips and scratching during shelling.

Case Study — National Almond Breeding and Evaluation Program (AL17005)

The Australian almond industry is largely based on Californian varieties, technologies, and production systems. To improve Australia's productivity relative to global competitors, the almond industry has invested heavily in the identification, breeding, and evaluation of superior varieties for Australian conditions since 1997. While not complete until 2023, AL17005 has built on the previous work in this area to provide industry access to new varieties that are high yielding, with self-fertility, improved disease tolerance, closed shells and desirable visual and eating qualities.

Data from tertiary trials collected at three sites along the River Murray in South Australia and Victoria showed that some of the new self-fertile varieties were producing 60% better than benchmark nonpareil varieties. As a result, in addition to the benefits of reduced honey bee dependence, these varieties generate increased water use efficiency, which is critical for the industry's future productivity and sustainability.

As with previous iterations of the industry's breeding and evaluation program, AL17005 has supported the adoption of superior, higher yielding varieties with improved pollination and product attributes, which as of 2019 accounted for around 10% of all plantings (1,758.52 ha). These new varieties are supporting the industry's Horizon 3 strategy, and thereby contributing to reduced on-farm costs and improved productivity and profitability for growers.

Outcome 4: Capacity – An informed industry that adopts R&D outcomes and has the capacity to support current and future industry needs

The almond SIP 2017-2021 identified the importance of ensuring that industry participants are engaged in adopting new R&D to support current and future needs.

Summary of strategic area and achievement status:

The strategies in the SIP that were identified to support almond industry capacity are listed below. An achievement status is provided based upon internal evaluation of project performances:

Strategic area	Status
Support awareness adoption of R&D	Achieved
Deliver meaningful data	Achieved
Enhance skills and capacity	Achieved
Leverage international nut R&D industry	Achieved

KPI Callouts:

- *Almond Industry Communications Program (AL18001)* provided a broad range of timely information to Australian almond growers and other industry stakeholders, to keep the almond community well informed and in a place to make improved business decisions. Communication channels that were produced and maintained by the program included the *In A Nutshell* quarterly industry newsletter, the industry website and its grower/levy payers' portal, as well as media and social media.
- *Almond Industry Statistics and Data Collection (AL16003)* ran from 2017 to 2019, supporting the almond industry's statistics collection and dissemination processes. The project collated and reported on key industry data to inform stakeholders and support planning. This investment has continued to cover over 90% of industry plantings, reflecting strong levels of industry engagement.
- *Almond Industry Innovation and Adoption Program (AL16001)* delivered field-days, workshops, industry tours and training initiatives from 2017-2019, helped deliver technical advice to almond growers, promoting best practice, facilitating the adoption of R&D, and supporting decision-making within almond businesses and the broader industry.
- *Almond Study Tour (AL16701)* enabled the international network to be maintained and expanded to facilitate the exchange of knowledge and technologies for the three-year period, 2016-2019. The project focused on relationships between Australia and the USA (California), Spain, and Portugal. As a result, the Production, Pollination and Market Development committees of the ABA Board have monitored the project and utilised the learnings to recommend changes to grower practices.

Case Study — Australian almond industry innovation and adoption program (AL16001)

Running from 2017 to early 2020, and working closely with the *Almond Industry Communications Program* (AL18001) the Innovation and Adoption program helped deliver technical advice to almond growers, promoting best practice, facilitating the adoption of R&D, and supporting decision-making within almond businesses and the broader industry.

Adoption of research outcomes was a major focus of extension activities addressing priority areas identified in the industry's strategic plan and responding to industry needs including: orchard hygiene to control pests and disease; maintaining healthy hives and pollination efficiency; developing nursery tree standards and maintaining disease free planting material; evaluating new varieties and rootstocks; improving on-farm water use efficiency and soil health; food safety and quality; biosecurity; and maintaining industry capacity.

The Industry Development staff delivered a program of over 380 extension activities engaging industry stakeholders and supporting the adoption of research and development and new technologies to address strategic priorities. Activities included field days, R&D forums, a national conference, regional meetings and workshops, domestic tours, fact sheets, and best practice videos.

The innovation and adoption program has supported outcomes across the whole almond SIP 2017-2021, with 50% of growers and researchers adopting information on N P K and micronutrients; 42% of growers and researchers applying knowledge gained from on routine flushing; maintaining drip line uniformity; water holding capacity; pest identification; registered chemical use and time of nutrient application; and 67% of growers and advisors increasing their awareness of Australian varieties.

An independent assessment estimated that a net present value of \$3.78 million would be generated over a 30-year period from this investment, with an estimated benefit cost ratio of 3.78:1.¹

¹ <https://www.horticulture.com.au/contentassets/805952cfd9f643759b2c1d5fa1319401/appendix-2.0-almond-innovation-adoption-al16001-impact-assessment-final-report.pdf>

Outcome 5: Demand – Increased domestic consumption from 16,000 tonnes in 2016 to 27,500 tonnes in 2022. Increased export sales from 64,000 tonnes in 2016 to 110,000 tonnes in 2022. EU inspections reduced from one in 20 containers to one in 100 containers at destination by 2022

The almond SIP 2017-2021 identified that domestic almond consumption had shown strong growth, increasing from 674 grams per capita in 2008 to 971 grams in 2015; however, it was also noted that almonds may have reached their maximum 'share of stomach' in Australia. To ensure continued demand growth for Australian almonds, the SIP highlighted the opportunity further research and promote the health benefits of consuming almonds, and drive additional growth in almond exports, with a particular focus on Asia.

Summary of strategic area and achievement status:

The strategies in the SIP that were identified to support almond demand are listed below. An achievement status is provided based upon internal evaluation of project performances:

Strategic area	Status
Support increased domestic consumption	Achieved
Support increased export demand	Achieved
Support reduced EU inspections	Not achieved

KPI callouts:

- *Educating health professionals* (AL16007) focussed on increasing health professional's awareness of the role almonds play in a healthy diet, to position Australian almonds as an important nutritional option for their patients, clients and the wider public.
- Through the multi-industry investment *Consumer behavioural and retail data for fresh produce* (MT17015), the almond industry was provided with consumer behavioural and retail data and insights to support broader domestic demand initiatives. Over the course of the SIP, domestic demand for almonds increased to over 48,000 tonnes (2019/20 kernel volume – fresh market supply) that exceeded the SIP target of 27,500 tonnes and was nearly double the 24,701 tonnes in 2016/17.
- *Market access, maintenance and development program* (AL17008) was a key driver of export market access maintenance and development activities, and ensured the Australian almond industry is represented at key international trade shows.
- Trade development activity also occurred through the ABA export development committee, where export trade data (MT19005) was a key input to track market performance. Through the course of the SIP, exports increased from 66,311 tonnes in 2016/17 to 96,392 tonnes in 2020/21 (+45%) (kernel and in-shell); however, the export target of 110,000 tonnes in 2022 is unlikely given likely production volumes and strong domestic demand.

Case study — Educating health professionals (AL16007)

The almond SIP 2017-2021 identified the opportunity to increase domestic demand for almonds by improving health professionals' awareness of the role almonds play in a healthy diet, and thereby positioning Australian almonds as an important 'nutritional solution' to be recommended to patients and clients.

The three-year project was designed to reach a national audience of general practitioners (GPs), practice nurses, dietitians, and nutritionists through conferences, factsheets, digital clips, social media, webinars, and a two-day orchard tour event. Key content areas included the health benefits of consuming almonds for good health, heart health, diabetes, weight management, gut health and mood and cognition.

The intended end of project outcome was increased capacity of health professionals to recommend almonds to clients as part of a healthy diet. This was underpinned by intermediate outcomes focused on increasing knowledge and awareness among health professionals of the nutritional profile and health benefits of almonds.

At the conclusion of the project, the 83-93% of health professionals reported that their knowledge of the health benefits of almonds increased after accessing the project resources and activities. And as a result, 87% health professionals reported they would be highly likely to recommend almonds to patients and clients as part of a healthy diet, up from 51% before the project began.