

# Avocado

**2015/16**  
Annual Report

**Horticulture**  
**Innovation**  
Australia



# Content

Executive summary 1 Strategic Investment Advisory Panel 2 Marketing report 3  
R&D project list 2015/16 6 R&D report 8 Financial summary 16 Minor use permits 17



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# Executive summary

During 2015/16, Horticulture Innovation (Hort Innovation) was focused on investing the avocado levy and Australian Government contributions into R&D and marketing projects to improve growers' productivity and profitability and ensure the long-term sustainability of the industry.

1



Hort Innovation invested over \$2.4 million in R&D projects aimed at boosting grower returns. Key initiatives included evaluating the commercial development of new disease-resistant rootstock, looking at technologies to reduce fruit bruising at point of purchase and in the home, and assessing ways to improve tree health to optimise yields. Research also looked at improving supply chain function and transparency, and investigating ways to increase uptake of key learnings and improve quality.

A strong focus was placed on communicating with both growers and the broader public. This included engaging and informing foodservice professionals on seasonality, varieties and cooking possibilities to increase use of avocados in the foodservice industry. From a producer perspective, it included ensuring effective measures were in place to inform, educate, engage and consult with industry stakeholders, such as through the Avocados Australia-run Qualicado roadshows and industry study groups.

Other initiatives included attendance at key industry conferences, meetings, international networking events and trade missions to share and gather important information to enhance the Australian avocado industry.

An investment of more than \$2.1 million was made in a range of innovative marketing efforts, with traditional and digital channels used to boost the consumption of avocados. This included strategies to promote the health benefits of avocados and the simple ways they can be integrated into everyday diets. A focus on leveraging social media, celebrity endorsements, and targeted campaigns like 'Mexican Month' proved effective in communicating these messages to consumers.



# Strategic Investment Advisory Panel

Hort Innovation has established Strategic Investment Advisory Panels (SIAPs) to provide advice to help ensure R&D and marketing investment decisions are balanced and prioritised by the current needs of each horticulture levy industry.

2

## About industry SIAPs

The key function of Hort Innovation’s levy-industry SIAPs is to provide transparent and robust advice on potential investment opportunities, helping to guide the way industry levies and Australian Government contributions are put to use. Each SIAP has clearly defined objectives associated with the provision of this strategic investment advice, and is guided by the priorities set out in the Strategic Investment Plan for each levy industry.

During the 2015/16 financial period, 18 SIAPs were formed, with others appointed in the 2016/17 period.

Each industry SIAP is made up of panellists from that industry – most of whom are levy-paying growers – with appointments made based on skills criteria and considering geographic and sectoral diversity.

Each SIAP also has a chair, as listed on the industry grower pages of Hort Innovation’s website. The chair appointments selected by the Hort Innovation Board reflect a broad range of horticulture and agriculture experience, as well as solid foundations in former chairing roles.

## Avocado SIAP panellists

Name	Organisation	Location
Daryl Boardman	Sunnyspot Farms	QLD
Kylie Collins	Blushing Acres	QLD
Jennie Franceschi	Avocado Export Company	WA
Simon Grabbe	Simpson Farms	QLD
Stewart Ipsen	West Pemberton Avocadoes	WA
Xhemal (Jim) Kochi	Tinaroo Falls Avocado Pty Ltd	QLD
Simon Newett	Department of Agriculture and Fisheries Queensland	QLD
Cormac te Kloot	Costa	VIC
Neil Delroy	Jasper Farms	WA
John Walsh	Simpson Farms	QLD

## SIAP meetings

Summary notes from each SIAP meeting will continue to be available on the avocado grower page on Hort Innovation’s website, at [www.horticulture.com.au/grower-focus/avocado](http://www.horticulture.com.au/grower-focus/avocado). Below is a brief overview of the industry’s inaugural SIAP meeting.

### October 20, 2016

Held in the 2016/17 period in Brisbane, Queensland, this meeting addressed governance requirements and the role of the panel, and included an overview of the financial position of the avocado levy program.

A workshop session was held on the development of the industry’s Strategic Investment Plan, while there was also discussion on exports, irregular bearing, quality, and consistent supply, data collation and productivity.

The marketing plan for 2016/17 was presented, including a review of the previous iteration and timeline of activities such as the TV campaign and social media pillars.

# Marketing report

Hort Innovation’s 2015/16 marketing program for the avocado industry focused on consumer education around selection, handling, storage and ripening, as well as promoting the many health benefits the fruit offers. It harnessed the power of television and social media to help boost avocado consumption and sales to benefit growers.

The 2015/16 period was the third year of the Australian avocado industry’s strategic marketing plan. It continued to focus on free-to-air TV advertising supported by online video. It also used ongoing social media and a strong website presence to extend audience reach and engagement.

## Television and celebrity endorsement

Australian Avocados sought to tap into the popularity of celebrity chefs to promote consumption during the 2015/16 period, working with Channel 10 lifestyle show *Ben’s Menu*, hosted by former *Masterchef* contestant Ben Milbourne.

Ben cooked up avocado recipes, spoke about how to select the perfect avocado, and provided tips and hints on how to use the fruit in cooking.

Avocados featured in five episodes between the end of November 2015 and Christmas Eve 2015. Another five avocado-specific episodes were aired at the beginning of 2016.

Some of the recipes featured on the program included avocado and honey ice-cream, avocado smoothies, and smoked salmon and avocado dip.

The shows and recipes were also promoted on Facebook and YouTube as well as on the Avocados Australia website ([www.avocado.org.au](http://www.avocado.org.au)) and in the consumer newsletters.



Avocado industry levy fund

3







Marketing activity focused on engaging television and social media content to drive avocado usage

Social media – Mexican Month

Mexican Month was a social media campaign intended to tap into Australia’s love of avocados using a cuisine in which the fruit is a prominent ingredient.

Launched in May 2016, the campaign delivered a range of Mexican recipes with avocado as a hero ingredient, as well as fun facts around guacamole and plenty of opportunities for Australian Avocados Facebook fans to share their love of avocados as well as their own recipes and ideas. Mexican Month also included competitions, and as a result of campaign activities drawing in a new and engaged audience, there was an increase of 132,000 total engagements to the page, [www.facebook.com/AustralianAvocados](http://www.facebook.com/AustralianAvocados).

Social media – Perfect Match

Another social media promotion, Perfect Match, was a project that showcased the matching of avocados with other foods, such as salmon, chicken, chocolate and haloumi.

Four short films were developed to create an emotional connection with avocado consumers and inspire them to think about matching foods and preparing dishes beyond avocado on toast.

Avocados had ‘first dates’ with other foods in intimate café/ bar and restaurant settings. The scenes included miniature furniture to add to the novelty, while real food was used but characterised by using props such as eyes and clothes to inject some humour.

Dishes included avocado and chocolate mousse, avocado and chicken salad, avocado and haloumi fritters, and avocado and chicken pasta.

The result was social media content that was fun, light-hearted and sharable, and that also provided inspiration for consumers to use more avocados with one of the ‘perfect matches’.



# R&D project list 2015/16

6

PROJECTS CONTRACTED

AV15000	Avocado health professional education and research program
AV15001	Avocado chef training and education program
AV15002	National avocado industry communications program
AV15004	Avocado data management and quality innovation extension program
AV15005	Avocado rootstock SHSR-04 commercialisation
AV15008	Avocado food service benchmark
AV15009	Supply chain quality improvement – technologies and practices to reduce bruising
AV15010	Supply chain quality improvement – cool chain best practice guidelines
AV15702	World Avocado Congress 2015 – building research knowledge and capacity for the Australian avocado industry
MT14052	Essential Market Access Data Packages
MT15032	Monitoring and evaluation framework for the industry Strategic Investment Plan
MT15024	Fruit tracking study



PROJECTS IN PROGRESS

AV13000	RNA silencing based Phytophthora root rot resistant avocado rootstocks – phase 2
AV13003	Australian avocado benchmarking program development rounds II and III
AV14000	Achieving more consistent yields of quality fruit in the Australian avocado industry
AV14007	Continuation of foodservice chef training program
AV14012	Investigating tree mortality during early field establishment
MT12001	SPLAT Cue-Lure based management of Queensland fruit fly
MT12011	National honey bee pest surveillance program
MT14006	Export – Import Market Intelligence Project 2014 – 2016

7



FINAL REPORTS ISSUED

AV10001	Improving yield and quality in avocado through disease management, phase 2
AV10008	Avocado industry communications
AV11015	Avocado industry fruit quality benchmarking
AV11021	An analysis of fruitspotting bug activity in avocado crops from fruit-set to harvest
AV12007	Data collection to facilitate supply chain transparency
AV12012	Coordination of data management and avocado quality improvement and extension program
AV12013	Implementing improvements in the avocado supply chain
AV12700	International networking
AV13018	Avocado rootstock assessment and improvement – interim
MT10049	A multi target approach to fruitspotting bug management*
MT14057	Statistical review and re-design of the National Bee Pest Surveillance Program

VC PROJECTS CARRIED OVER FROM HORTICULTURE AUSTRALIA LIMITED

AV13021	Exploring alternatives for managing Phytophthora root rot in avocado
MT12028	OHMA operational support 2012 to 2015*
MT12049	A model for industry planning and preparedness for an incursion of Varroa mite
MT13002	Protecting pollination for the Australian horticultural industry – stage 3
MT13060	Optimising pollination of macadamia and avocado in Australia
MT13061	Understanding the purchase behaviour of fresh produce consumers
MT14013	Australia Fresh – core export market development program 2014 – 2017
MT14027	Horticultural Market Access Manager 2014 – 2015
MT14055	Driving collaboration in Australian horticultural research

During the 2015/16 financial year, all Australian levy paying horticulture industries also contributed to across-industry projects addressing issues that affect horticulture as a whole.

\* As well as being funded by multiple levy programs, this project involved funding from Hort Innovation's across-industry contribution stream

# R&D report

Take a closer look at some of Hort Innovation's key projects for the avocado industry below. To keep up to date with the latest information on new and ongoing R&D for the industry, visit [www.horticulture.com.au/grower-focus/avocado](http://www.horticulture.com.au/grower-focus/avocado) and keep an eye out for Hort Innovation's quarterly Hortlink publication, also available from the website.

8

## Continuation of foodservice chef training program (AV14007) and Avocado chef training and education program (AV15001)

The avocado industry's chef training program was established to educate chefs about Australian avocado seasonality, varieties, storage, handling and cooking possibilities, with the ultimate goal of keeping the fruit positioned as a consistent hero ingredient on menus and bolstering demand all year round.

The food service sector had been previously identified as an area that lacked innovation and creativity in using the fruit, and one that provided significant, unfulfilled potential for avocados.

Project *Continuation of foodservice chef training program* (AV14007) was responsible for the sixth year of the program, facilitating training masterclasses for apprentices plus middle and upper-tier qualified chefs to showcase innovative usage ideas and menu development.

The key messages presented to participants were that consumers love avocados; that avocados are versatile, healthy and sophisticated; that they can be used in warm dishes; and can add to the bottom line.

In 2015/16, project AV14007 was followed by *Avocado chef training and education program* (AV15001) to streamline and fine-tune the program.

The new program provided practical menu ideas and success stories that could be leveraged to the wider marketplace.

As it evolved, it focussed on meeting the different food-style needs of restaurant chefs, four to five-star hotel chefs, commercial caterers, pub groups, clubs and cookery students.

## Avocado health professional education and research program (AV15000)

This project follows on from previous Avocado Nutrition Program education work with the aim of keeping health professionals informed about the health benefits of avocados. By providing these experts (which include dietitians/sport dietitians, fitness professionals/exercise physiologists and diabetes educators) with up-to-date resources, news and communications strategies, the ultimate goal is to keep avocados front of mind and encourage professionals to recommend the fruit to consumers as part of a healthy diet.

Activities of the project include production and updating of hard copy and digital resources, partnership work with relevant organisations such as the Dietitians Association of Australia, and participation at relevant industry events. The project also maintains 'health professional' content on the Australian Avocados website, has a dedicated e-newsletter and provides content for the @avonutrition avocado health Twitter account.

## Avocado rootstock SHSR-04 commercialisation (AV15005)

This project is supporting the evaluation and commercial development of a new Phytophthora-resistant rootstock so as to reduce the impact of this disease on avocado production and grower returns.

*Phytophthora cinnamomi* is a significant soil-borne disease affecting avocado production. The disease exists across all key avocado production regions of the world, including Australia, and can significantly limit commercial avocado production.

Existing commercial resistant rootstocks such as Dusa have been important in the management of Phytophthora but they are not immune and significant losses can still occur.

This project has selected one specific avocado rootstock line, SHSR-04, from previous avocado rootstock evaluation work for further evaluation and for commercial development. SHSR-04 is being targeted for its commercial level of Phytophthora root-rot resistance and potential to provide an alternative to Dusa. To maintain its genetic resistance, SHSR-04 must be clonally (vegetatively) propagated then grafted to the selected scion variety as it does not grow true-to-type from seed.

## Avocado industry communications (AV10008) and National avocado industry communications program (AV15002)

Strong communication initiatives are essential to ensure the Australian avocado industry remains competitive by being well informed about emerging information, trends and issues in domestic and overseas markets.

From May 2011 to November 2015, the project *Avocado industry communications* (AV10008) was responsible for the delivery of a range of communication tools that aimed to inform, educate, engage and consult with all stakeholders, from growers to suppliers, exporters and importers, wholesalers, retailers, researchers, government officials, media and consumers.

These communication tools included:

- » *Talking Avocados*, a quarterly hard copy publication featuring case studies, grower and industry profiles, R&D and marketing activities, and regional updates. The magazine is sent to approximately 800 stakeholders and also uploaded to the industry website.
- » The Australian Avocado industry website, [www.avocado.org.au](http://www.avocado.org.au), used to house consumer and industry information.
- » Best Practice Resource (BPR), an online portal linked to the industry website which provides useful industry management content developed by experts, including training programs and the Workplace Health and Safety module ([bestpractice.avocado.org.au](http://bestpractice.avocado.org.au)).
- » The *Guacamole* e-newsletter, a fortnightly snapshot of industry information, R&D and news articles.
- » Industry workshops, presentations and forums, including a successful R&D forum in Western Australia to ascertain the region's needs, and assistance to host the 5th New Zealand-Australia Avocado Growers Forum.
- » Qualicado workshops, linked to project *Coordination of data management and avocado quality improvement and extension program* (AV12012). During the project period, 16 Qualicado grower workshops were held across eight major production regions and 10 wholesaler workshops were held in five capital cities.

Following on from project AV10008 is the *National avocado industry communications program* (AV15002), which continues to produce the *Talking Avocados* magazine and *Guacamole* e-newsletter. It also covers work on the Avocados Australia website and social media, as well as media relations. Meanwhile, workshops and other engagement activities are facilitated under separate projects.

9

## Supply chain quality improvement – technologies and practices to reduce bruising (AV15009)

This project will tackle the key issue of avocado bruising at the end of the supply chain, at both the retail and household level, where previous research suggests the majority of bruising occurs. It will:

- » Focus on developing and testing technologies to reduce handling by retailers and consumers, including tools for identifying ripeness
- » Document best-practice handling to prevent fruit bruising at the retail level, producing information materials for use in retail education
- » Investigate any relationship between disease and flesh bruising
- » Review and document contributing factors to fruit susceptibility to bruising.

With bruising affecting consumer decisions to repurchase, the ultimate goal is to improve consumer and retailer satisfaction so as to strengthen consumption of, and demand for, avocados.

## Supply chain quality improvement – cool chain best practice guidelines (AV15010)

This project is designed to bring about practice change across the avocado supply chain that will lead to an improvement in avocado quality and consumer satisfaction. It is focused on cool chain management and will seek to:

- » Ensure all sectors of the avocado supply chain have access to resources on best practice in cool chain management to ensure optimal fruit quality is maintained across the whole supply chain
- » Understand the gaps between current and best practice and the barriers to adoption at each point of the supply chain
- » Understand the factors that predispose avocados to quality defects.

The project will then aim to drive a change program across the supply chain that will ultimately bring about improvements in avocado quality.





Australian researchers shared and gained knowledge to benefit the industry as part of *World Avocado Congress 2015 – building research knowledge and capacity for the Australian avocado industry* (AV15702)

## World Avocado Congress 2015 – building research knowledge and capacity for the Australian avocado industry (AV15702)

This project supported two Australian research plant pathologists to attend the 8th World Avocado Congress (WAC) in Lima, Peru in September 2015, followed by a two-day study tour of avocado orchards near Santiago, Chile.

The aim of the trip was to present recent Australian research outcomes to an international audience. Attendance at the conference also provided the opportunity for knowledge from the international avocado industry to be gathered and shared with the Australian sector so as to build capacity for long-term avocado research leadership.

The University of Queensland's Dr Liz Dann presented research on *Phellinus noxius* from research project *Improving yield and quality in avocado through disease management, phase 2* (AV10001) and rootstock evaluation from previous avocado-industry projects. Student Louisamarie Parkinson also presented results from her PhD study on black root rot pathogens of avocado, which is supported by project *Investigating tree mortality during early field establishment* (AV14012).

The two researchers attended four days of conference presentations that helped build networks and knowledge to benefit the avocado industry in Australia. This included a field tour where they visited two orchards close to Lima. One of these was a 640ha large scale, high density avocado orchard with its own outdoor nursery which will turn out 1.7 million trees this year.

The visit generated significant interest in the Australian rootstock evaluation program and has prompted ideas for new factsheets in Australia including a summary of agrochemicals registered for use in avocados; guidelines for preparing land and planting avocados; and recommendations for managing Fusarium dieback.

## Avocado industry fruit quality benchmarking (AV11015)

This benchmarking project had a number of key aims, including to:

- » Use ongoing retail quality survey results as one of the tools to monitor the quality improvement program being rolled out through other projects
- » Monitor fruit quality over time to measure improvements from specific projects aimed at improving quality
- » Provide time-series data to illustrate fruit quality by growing season, store type and city
- » Report back to members of the supply chain regularly on the level of quality of assessed fruit with an up-to-date analysis of current quality.

The data gathered has been used to inform sectors of the supply chain of the main quality defects being observed at retail level, as well as the incidence of immature fruit in the market.

Findings were used as the foundation for the industry's quality improvement program Qualicado, described in *Coordination of data management and avocado quality improvement and extension program* (AV12012).

## Monitoring and evaluation framework for the industry Strategic Investment Plan (MT15032)

Among other things, this project helps support the monitoring and evaluation of individual industry Strategic Investment Plans (SIPs). SIPs are the roadmaps that help ensure levy investment decisions align with individual industry priorities. They are used to guide decision-making in levy spending, and represent a balanced view of stakeholders in each industry.

## Data collection to facilitate supply chain transparency (AV12007)

This project built on earlier work undertaken to establish the Infocado system – the industry's crop forecasting system designed to collect information on total production and new plantings.

Through Infocado, data is collected from packhouses and individual growers on actual and forecast amounts of fruit marketed in any one week including variety, destination, size and quantities. This information helps provide growers and the supply chain with greater transparency leading to improved efficiency and effectiveness.

This project developed a system to collect and distribute the weekly retail prices for avocados in major metropolitan Australian markets, delivering clearer supply/demand signals back to supply chain stakeholders.

From 2012 to 2015, the avocado industry experienced a growth surge of 16 percent, but growers did not have a retail price reporting system to alert them to over-supply or a surge in demand.

As part of this project, retail prices for the two main varieties, Hass and Shepard, were collected weekly from 64 stores across Brisbane, Sydney, Melbourne and Perth. The data was sent to Infocado contributors and published on the Avocados Australia website.

Additional information was collected including avocado variety, number of in-store displays, pack type, average fruit weights and country of origin. A comments window on the Avocados Australia website also enabled contractors to log their own observations of display and quality issues in stores.

Catalogue specials for the two major supermarkets Coles and Woolworths were also displayed on the website for each capital city. Between them, the two companies are responsible for 50 per cent of avocado sales.

The Infocado system, along with other important industry tools, is now maintained by the project *Avocado data management and quality innovation extension program* (AV15004).

## Coordination of data management and avocado quality improvement and extension program (AV12012)

This program aimed to expand and improve the national avocado quality and information management system to in turn boost the percentage of fruit sold that would meet consumer requirements.

It established and implemented the Qualicado program to improve fruit quality and assessed the price monitoring program, Infocado, and the planting and production program, OrchardInfo.

In total, 16 Qualicado grower workshops were held across eight major production regions and 10 wholesaler workshops were held in five capital cities over the life of the project, attracting a total of 1220 growers and wholesalers/ripeners.

Facility checks (and related report cards and action plans) covering 29 packhouses and 13 ripener/wholesaler facilities provided independent, one-on-one expert reviews of infrastructure and quality management practices, with recommendations for improvements.

The program also involved a sub-project to assess the usefulness of aerial imagery and remote sensing to gain better industry data, which has led to the establishment of project *Multi-scale monitoring tools for managing Australian tree crops: Industry meet innovation* (ST15008).

## Avocado data management and quality innovation extension program (AV15004)

This short project has four key areas:

- » Maintenance of Infocado ([industry.avocado.org.au/growers/infocado.aspx](http://industry.avocado.org.au/growers/infocado.aspx)), with weekly and quarterly reports containing retail pricing produced
- » Maintenance of OrchardInfo, with annual reports reviewed and distributed
- » Maintenance of the industry's Best Practice Resource (BPR), [bestpractice.avocado.org.au](http://bestpractice.avocado.org.au)
- » Facilitation of the adoption of Qualicado, with more information on the initiative available at [industry.avocado.org.au/qualicado.aspx](http://industry.avocado.org.au/qualicado.aspx).





12

## Australian avocado benchmarking program development rounds II and III (AV13003)

This was a continuation of earlier industry benchmarking work. Its goal was to further the development of an industry database and benchmarking process to enable growers to identify and strive for Australian best practice in production, packing and marketing of avocados.

It involved the collection of data from 82 individual grower businesses over four consecutive financial years, analysis of this data, the provision of individual personalised reports to participating growers each year, and the dissemination of aggregated high-level project findings to the industry at large.

Over the four years:

- » Participating growers recorded an average yield of 9.23 tonnes per producing hectare per year, declining by five per cent over the project period (median farm size was 10.5 producing hectares)
- » Mid-sized fruit accounted for 49 per cent of fruit sold, and premium grade fruit represented 70 per cent
- » Labour productivity over the period averaged 52 tonnes produced and sold per full-time employee equivalent (FTE) per year, declining by 24 per cent over the study period
- » Prices paid for fresh market avocados increased by 62 per cent per tray equivalent (5.5kg) sold.

The project outputs enable comparisons between growers based on a combination of location, business size (turnover, volume or tree numbers) and principal varietal type over multiple years – putting growers in a position to identify those areas that impact greatest on their productive and financial performance.

## A multi target approach to fruitspotting bug management (MT10049)

The overarching aim of this project was to allow for improved management of fruitspotting bugs, which are major native pests that affect a large range of fruit and nut crops in Australia.

The goal was to investigate more strategic, long-term and sustainable management approaches than the current single-target approach using broad-spectrum insecticides. Avenues of investigation included insect lifecycles; new and targeted chemical control; monitoring; trap cropping; pheromone traps; biological control; area wide management and more.

The research culminated in the publication of the 40-page *Fruitspotting Bugs 2016* guide, which was published in the 2016/17 period and is available to download from [www.horticulture.com.au/new-fruitspotting-bug-guide-out-now](http://www.horticulture.com.au/new-fruitspotting-bug-guide-out-now).

## Achieving more consistent yields of quality fruit in the Australian avocado industry (AV14000)

This project is aimed at encouraging growers to adopt practices that will result in a more consistent supply to the markets of good-quality avocado fruit from year to year.

The goal is for growers to produce higher and more consistent yields, improve fruit size and quality, and reduce the chances of alternate bearing developing and minimise severity when it does.

The project will involve regular workshops on orchards across the eight major production regions, developed in conjunction with growers.

Other activities will include a recording being prepared and training provided to growers so they can log tree phenology, including flowering times for commercial varieties and potential polliniser varieties.

The data collected will be compiled in a report and made available to growers.

Temperature and humidity information will be gathered in the cooler areas using automatic data loggers, identifying pollination events to help explain fruitset in each year of the project.

A report will also be circulated detailing nutritional practices of leading growers, the outcomes from a nutrition review meeting and updated nutrition guidelines.

## SPLAT Cue-Lure based management of Queensland fruit fly (MT12001)

This project aimed to investigate the efficacy of a type of pheromone technology to assist in controlling Queensland fruit fly (Qfly) and to help protect domestic and international fruit markets.

Early results from this project found that the Specialised Pheromone Lure Application Technology (SPLAT) approach is as effective as current controls in managing Qfly and worth further investigation.

This form of control has appeal as it has a reduced-risk insecticide that poses an even lower risk to humans and the environment and does not require labour-intensive handling and placement.



Pheromone trap with captured adult *A. I. lutescens* as part of *An analysis of fruitspotting bug activity in avocado crops from fruitset to harvest* (AV11021)

## An analysis of fruitspotting bug activity in avocado crops from fruit-set to harvest (AV11021)

This project investigated the ecology and behaviour of banana-spotting bug *Amblypelta lutescens lutescens* in avocado crops and the potential of using pheromone traps to improve pest management. It also looked at the suitability of avocado, lime and papaya crops as host plants for the bug.

The banana-spotting bug is an important insect pest of avocados in Queensland that results in economic loss through control costs, damage to fruit that renders it unmarketable and premature fruit drop.

The pest is currently controlled by regular applications of broad spectrum synthetic pyrethroid and organophosphate insecticides.

The project made several new findings:

- » Avocado is a poor host for *A. I. lutescens*
- » First instar *A. I. lutescens* survival rates are affected by the quality of food provided
- » In avocado crops in Far North Queensland, population densities do not correlate with the presence of fruit on trees and high densities of the pest can remain in avocado orchards after harvest
- » Spatial analysis of *A. I. lutescens* distribution in avocado crops shows that population densities are high in areas close to lime crops, suggesting these might generate source populations that invade avocado crops
- » Pheromone traps can concentrate *A. I. lutescens* populations in trees, providing a specific target for reduced input insecticide control strategies.

Recommendations for pest management are:

- » Begin monitoring for *A. I. lutescens* in October and continue monitoring until the avocado crop has been harvested
- » Distribute pheromone traps on avocado orchards to identify areas with high population densities and to monitor changes in population densities over time
- » Apply insecticides to areas/trees where high numbers of the pest are captured in pheromone traps and when population densities begin to increase
- » Focus monitoring and insecticide applications in areas that are adjacent to other crops favourable for *A. I. lutescens*, including citrus, mango and papaya.

13

## Improving yield and quality in avocado through disease management, phase 2 (AV10001)

This project aimed to optimise avocado yields, fruit quality and tree health by improving the management of diseases affecting fruits, rots and whole trees.

The work included assessment of rootstocks under high Phytophthora root rot pressure; evaluation of improved applications of phosphorous acid; evaluation of improved integrated approaches for managing post-harvest diseases; and investigation of management options for brown root rot.

The researchers found a number of measures that can be incorporated by avocado growers to improve productivity in the medium and long-term. Some of their advice included:

- » Take extreme care when planning and planting orchards, particularly if replanting an old avocado block. Trees are more likely to die if planted into a site soon after removal of declining trees.
- » Significant increases in avocado productivity can be achieved by adoption of Phytophthora root rot tolerant rootstocks, with Dusa currently available and new rootstock SHSR-04 being evaluated by ongoing industry work
- » Growers should review their spray technology and ensure that pesticides and other treatments are delivered as efficiently as possible.
- » Greater productivity from healthier trees can be achieved by more efficient use of phosphonate as a low-volume spray application
- » Industry standard fungicide sprays still provide the best quality fruit. Industry standard copper + late season strobilurin sprays most consistently reduced damage from anthracnose, but stem end rot remains more difficult to control

Full recommendations from the research have been made available to growers through field days, via the media and in printed materials.



## 14 Avocado rootstock assessment and improvement – interim (AV13018)

This short-term project was initiated to continue the work of a series of projects spanning the last decade that seek to evaluate the effect of rootstock on tree growth.

It secured the future of the avocado variety block at Maroochy Research Station, Queensland; captured establishment data from trees planted in 2012 at Waikerie, SA; and undertook detailed analyses of yield data generated from previous rootstock projects.

The key outcomes were:

- » A healthy repository of avocado germplasm at Maroochy, tested to be free of avocado sunblotch viroid (ASBVd)
- » Data on survival, growth and yield for the first three years obtained from the rootstock trial at Waikerie in the tristate area
- » Detailed analyses of rootstock performance across production zones, variability in propagation type and incidence of biennial bearing.

The project also contributed:

- » Estimation of the relative contribution of site factors or environment and genetics on yield of avocado
- » Identification of rootstocks with superior performance (establishment, growth, yield, postharvest quality) in each major growing region, for recommendation to industry
- » Enhanced capacity for rootstock evaluation in Australia (including trial design and complex data analyses).



**Trials at the Maroochy Research Station as part of *Avocado rootstock assessment and improvement – interim (AV13018)***

## Implementing improvements in the avocado supply chain (AV12013)

Over the past 10 years the avocado industry has worked extensively to create easy to use supply chain guides, with the aim of continually improving the quality of avocados available for consumers.

The main aim of this project, and earlier work in this space, was to gather research findings from the range of avocado quality improvement projects and compile them into easy to use reference materials for use by the different supply chain sectors.

Project outcomes included:

- » The engagement of 1531 retail outlets across the country via retailer training in-store. More than 95 per cent of the retailers who were approached participated in the training program. Of these, 52 per cent improved their practices or retained near perfect in-store practices during the life of the project.
- » The creation of an extensive database about retailers and their practices, which allows the industry to track changes over time. Through training, direct relationships were formed with retailers in Brisbane, Sydney, Melbourne and Perth, which were provided with educational and point of sale material as well as access to the industry's online Best Practice Resource (BPR).
- » A reduction of internal quality defects in the retail sector such as bruising, body rots, vascular browning, diffuse flesh discolouration and stem end rot, with a better consistency of ripeness across retail consignments.
- » Improved fruit quality sent to wholesalers and direct to retailers due to an increase in staff training throughout the picking and packing processes of the supply chain.
- » Improved access to best practice information across the supply chain through the BPR. During the life of the project, 11 new modules were added to the BPR training course plus relevant reference materials focusing on how to grow, transport, ripen and handle avocados to improve fruit quality for the consumer.

## National honey bee pest surveillance program (MT12011) and Statistical review and re-design of the National Bee Pest Surveillance Program (MT14057)

The *National honey bee pest surveillance program* (MT12011) provides Australia's agricultural industry with a targeted national surveillance system for the early detection of key pest threats to honey bees, such as Varroa mite.

This project is undertaking surveillance for honey bee pests through activities including the establishment and monitoring of sentinel hives and sweep netting for foraging bees at high risk ports of entry. This program will have benefits for both the honey bee industry and horticulture industries dependent on honey bees for pollination.

The project *Statistical review and re-design of the National Honey Bee Pest Surveillance Program* (MT14057) reviewed the effectiveness of the National Bee Pest Surveillance Program (NBSP) to identify opportunities for improvement in the early detection of high priority pests to safeguard bee health and pollination services in Australia.

This project has proposed and costed a re-design of the NBSP for the future, including enhanced surveillance activities, including surveillance for Asian honey bees, Asian hornets and exotic viruses that are considered high-priority biosecurity threats, broadened use of sentinel hives across Australian ports and more.

## A model for industry planning and preparedness for an incursion of Varroa mite (MT12049)

This project tested the preparedness of Australia's pollination-dependent industries for Varroa mite through a national review and simulation workshop.

Varroa mite is an external parasitic mite that, without intervention including treatment programs and ongoing management, has the ability to kill entire honey bee colonies in two to three years. Australia is the last major honey-producing country in the world to not have Varroa.

This project identified the potential and significant impact the detection of Varroa mite would have on pollination-dependent crop producers.

It also assessed and highlighted improvements to biosecurity planning and preparedness that would allow growers, industry stakeholders and governments to identify gaps and opportunities, and ensure continued growth and stability in the event of Varroa mite in Australia.

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## 15 Investigating tree mortality during early field establishment (AV14012)

This project is looking into fungal rot caused by species of the *Nectriaceae* family, which infect and cause destruction of roots of plants in the nursery.

It will increase understanding of diseases causing tree deaths after outplanting, and provide practical management procedures. The project will ultimately give growers access to a better supply of healthy, pathogen-free trees with vigorous growth and rapid onset of fruit production.

Full details of all completed research can be found in project final reports, which are available to order at [www.horticulture.com.au/about/resources-publications-final-reports](http://www.horticulture.com.au/about/resources-publications-final-reports) (final reports are free to Australian horticulture levy payers, registered Hort Innovation members and industry representative bodies).





# Financial summary

Financial operating statement 2015/16

	MARKETING (\$)	R&D (\$)	TOTAL (\$)
	2015/16 July – June	2015/16 July – June	2015/16 July – June
Opening balance	648,529	304,702	953,231
Levies from growers (net of collection costs)	3,057,993	2,051,627	5,109,621
Commonwealth funds	-	1,361,922	1,361,922
Other income	102,293	25,975	128,269
Total income	3,160,287	3,439,525	6,599,812
Project funding	2,083,742	2,356,600	4,440,342
Consultation with and advice from growers	20,341	53,882	74,223
Service delivery	273,531	313,363	586,893
Total matched expenditure	2,377,613	2,723,845	5,101,458
Levy contribution to across industry activity	-	60,872	60,872
Closing balance	1,431,202	959,511	2,390,713
Levy collection costs	20,009	13,340	33,349
Additional expenditure through VC	-	-	-

# Minor use permits

Pesticides are a valuable tool for the avocado industry. Pesticide companies submit use patterns for registration to the Australian Pesticides and Veterinary Medicines Authority (APVMA) website and the avocado industry is generally provided with significant registrations because of its major crop status. Minor use permits are required in the avocado industry where the market size is considered too small and therefore not considered large enough to generate adequate commercial returns for the research and development investment by the pesticide companies.

Below is a list of all current minor use permits for the avocado industry, as of November 28, 2016.

Permit ID	Permit description (pesticide/crop/pest)	Date issued	Expiry date	Permit holder
PER12450 v6*	Trichlorfon / Specified Fruit crops / Fruit fly	06-Oct-11	31-Jan-21	Growcom
PER14813	Phosphorous acid / Avocados / Phytophthora Root Rot	18-Sep-14	30-Sep-17	Agrichem
PER13158 v8	Dimethoate / Specified Citrus, Tropical Fruit commodities & Hot chilli peppers (post-harvest) / Various Fruit Fly species	06-Oct-11	05-Oct-17	Growcom
PER14597	Methomyl (Lannate L) / Avocado / Ectropis looper. NSW & QLD only	1-Apr-14	31-Mar-19	AAL
PER14618	Abamectin / Avocado / Tea Red Spider Mite All States	9-Feb-15	30-Apr-20	AAL
PER13859	Dimethoate / Orchard cleanup – fruit fly host crops following harvest / Fruit Fly	9-Feb-15	31-Jul-24	Growcom
PER81560*	Chlorantraniliprole (Dupont Altacor Hort Insecticide) / Avocado / Lepidopteran pests including Ectropis looper & Avocado leaf roller	13-May-16	30-Apr-21	AAL

\* During the 2015/16 financial year, renewals for these flagged permits were prepared and submitted to the APVMA.

All efforts have been made to provide the most current, complete and accurate information on these permits, however it's recommended that you confirm all details on the APVMA website, [portal.apvma.gov.au/permits](http://portal.apvma.gov.au/permits). Details of the conditions of use associated with these permits can also be found on the APVMA site.

## Minor use R&D projects active in the 2015/16 period

AV13017	Minor use permits and strategic agrichemical review process for the avocado industry
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