

# Avocado

**INDUSTRY ADVISORY COMMITTEE  
ANNUAL REPORT 2012/13**



*Horticulture Australia*



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The projects in this report have been funded by HAL using the avocado industry levy and/or voluntary contributions from industry with matched funding from the Australian Government for all R&D activity.

The Australian avocado industry's growers extend along the Queensland coast, north and central coasts of New South Wales, Western Australia, South Australia and the TriState region.

With approximately 850 Australian growers contributing to the diversity of avocado varieties available on the market today, industry has experienced significant growth in supply and demand. The 12 months leading up to March 2013 show Singapore, Thailand and Malaysia accounted for 79 per cent of all avocado annual exports.

Australian avocado growers and members of the supply chain can now access the Australian Avocado Best Practice Resource (BPR). This free resource was launched in 2012/13 and provides a central repository for the industry's supply chain to draw from. Growers, packers, wholesalers, ripeners, distributors, retailers and exporters can now access useful technical information, training and recommendations that will assist them in producing a high-quality product to consumers. This resource will be updated over time as new information becomes available.

With a new levy-funded promotional campaign set to launch, the use of social media, the Australian Avocado website and magazine advertising will continue to advance the industry's key messages.

### Levy investment

The 2012/13 levy income received was \$4,282,215. The current levy is 7.5c per kg. A total of \$5,105,336 was invested into research and development (R&D) projects, and \$2,767,443 towards marketing projects. The Australian Government provided \$2,498,147 of matched funding to support 73 R&D projects in the R&D levy program.

In addition to levy funds, \$184,845 of voluntary contributions (VC) was provided to the industry for supplementing levy-funded projects and/or solely funding VC-only projects in the R&D and marketing programs. VC funds were matched by the Australian Government for all R&D activity. VC funds are matched by the Australian Government, who provided \$90,519 of matched funding in the 2012/13 year.

Horticulture Australia Limited (HAL) is responsible for managing these funds and takes advice as to how to invest the funds from the Avocado Industry Advisory Committee (IAC). Consultation with the IAC is essential in determining the most critical investment priorities for the industry. This consultation also includes regular input by Avocados Australia Limited (AAL) into planning the R&D and marketing programs, and their development and evaluation.

The Avocado IAC was restructured in 2012/13 and is a committee of HAL. The operations of the committee are guided by requirements set by the Department of Agriculture, Fisheries and Forestry (DAFF). In the past, all AAL Directors have been members of the Avocado IAC, however, the new structure allows up to five AAL Directors. Several models for the structure and processes of the Avocado IAC were put forward and considered by AAL and HAL. The new IAC held its first meeting in February 2013.

In addition to ongoing priorities, new R&D priorities for 2012/13 included improving farm disease management and industry capacity building.

The industry contributed two per cent levy and/or voluntary contributions (matched to four per cent) to an across industry program that addresses issues that affect all of horticulture, such as water availability, climate change, biosecurity and market access.

AAL acted as the service provider on seven projects in 2012/13.

### Strategic objectives

The process for determining the industry's priorities began with the development of the *Avocado Industry Strategic Investment Plan 2011-15* (SIP), which guides future R&D and marketing investment over a five-year period. Activities in the 2012/13 period were therefore guided by the SIP, which can be found at [www.horticulture.com.au/industries/avocado](http://www.horticulture.com.au/industries/avocado).

This plan was developed to reflect the industry's priorities, the Australian Government's rural R&D priorities and is reviewed regularly. The industry's objectives, as outlined in the strategic plan are:

1. To build a sustainable and competitive supply of Australian avocados to meet consumer needs.
2. To increase demand for Australian avocados.
3. To ensure appropriate organisation, resourcing and management of the affairs of the Australian avocado industry to support the development of the industry on an ongoing basis.



Lentil and avocado salad

## R&D program

Key research areas accompany the avocado industry's major priorities and long-term investments. While ensuring it balances supply and demand and provides consumers with a consistent, high-quality product at retail level, the industry strives to maintain a dynamic and progressive R&D program.

In achieving the goals of the SIP, the industry undertook 73 levy funded projects, three joint levy and VC funded-projects and three VC-only projects in 2012/13.

The main R&D investments included improving yield and quality in avocados through disease management for fruit diseases *Phytophthora* root rot (PRR) and brown rot. PRR is the most serious and widely-distributed disease of avocado worldwide, and all areas in Australia that produce avocados are affected by this disease. The project aims to deliver economic benefits to the avocado industry, which loses huge amounts annually as a result of PRR.

Significant work has occurred in establishing a national avocado quality and information management system. Over the past five years, a structured plan to implement and monitor retail fruit quality improvement has

occurred. This has delivered a new program of supply chain activities to improve quality, with a major achievement being a 38 per cent improvement in the retail quality of Hass since 2008.

To ensure the delivery of a robust R&D program, major new R&D commitments were made in 2012/13. These consisted of a benchmarking program and the development of a cryopreservation system for storing avocado germplasm.

## Marketing program

The 2012/13 year was the last year of the industry's *Avocado Industry Strategic Marketing Plan 2010-13*. Marketing activity maintained a focus on encouraging target consumers to 'Add an Avo Everyday' to increase their purchase frequency and continued to build on the previous two year's results.

Over the last 12 months, media investment continued an 'always on' strategy using a combination of digital and pay TV, national magazine and online advertising ensuring Australian Avocados were seen more often by more consumers. Social media played a role in driving the daily avocado conversation with Facebook fans and a tactical retail activity over the spring months

helped to address the anticipated bumper crop.

Channel development strategies continued in the foodservice sector through the masterclass format of educating chefs and apprentices on fresh avocado usage. The health and nutrition program focused on educating health professionals, and a further 600 early childhood centres benefited from the *Eating my Colourful Vegetables and Fruit* resource kit plus a complimentary tray of avocados.

Following the external marketing review in April 2012, an extensive consumer research program (Project Avocado Accelerator) was completed underpinning the development and recommendation of the *Avocado Industry Strategic Marketing Plan 2013-16*.

## Conclusion

This report provides a snapshot of project activities in the 2012/13 year. The report's sections are divided by the industry's objectives to reflect the activities being undertaken that address these industry issues.

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**Women's wonder fruit.**

Just one avocado gives a busy mum about half of her daily folate requirement.

For something delicious that's a bit different, why not give chilled avo soup a try.

Or, add avo with your favourite feta and lentil salad to create a fabulous folate fix.

**ADD AN AVO EVERY DAY**

For more quick ideas and recipes, visit [avocado.org.au](http://avocado.org.au) and [facebook.com/AustralianAvocados](https://www.facebook.com/AustralianAvocados)

Australian Avocados



**Unlock the goodness of your veggies.**

Avos can help us to absorb the benefits and nutrients of other fruits and vegetables we eat.

A couple of avocados blended with pea and zucchini soup is a tough combo to beat.

Or, try avocado with cabbage, mint and coriander to create an alternative and nutritious coleslaw treat.

**ADD AN AVO EVERY DAY**

For more quick ideas and recipes, visit [avocado.org.au](http://avocado.org.au) and [facebook.com/AustralianAvocados](https://www.facebook.com/AustralianAvocados)

Australian Avocados

## OBJECTIVE 1

To build a sustainable and competitive supply of Australian avocados to meet consumer needs

# Rootstock improvement for the Australian avocado industry – phase III

This project was developed to ensure the long-term sustainability of avocado production. To achieve this, the following key questions were addressed:

1. Are clonally propagated rootstocks superior (higher yields and improved fruit quality) to seedling rootstocks, which have been historically used by the Australian industry?
2. Do rootstocks from different horticultural races impact differently on crop performance when grafted to either Hass or Shepard varieties?
3. Will rootstocks perform differently across the range of environments where avocados are grown in Australia?
4. Can significant PRR resistance be located in rootstocks used by the Australian avocado industry?

To address these issues, rootstock experiments using both cloned and seedling material grafted to Hass and Shepard varieties were planted in each significant production region, and their agronomic and postharvest fruit performance monitored for three to six years.

Additionally, rootstocks identified with potential PRR resistance were cloned and evaluated in soils providing intense disease pressure.

This research created grower awareness of the importance of the selection of rootstocks when establishing a new orchard. Empowerment through knowledge led to a significant improvement in rootstock choices from the nurseries servicing the avocado industry.

From both agronomic and postharvest perspectives, cloned rootstocks did not improve orchard or postharvest fruit performance, with seedling rootstocks largely being equal to or in some cases better than their cloned genetic pair. Regarding productivity, there was no single rootstock that had superiority across all production regions.

However, the highest yielding rootstocks overwhelmingly came from the Guatemalan

and West Indian horticultural races (eg. A8, Nabal, Plowman, Reed, SHSR-02, V1 and Velvick). Hybrids with Mexican and Guatemalan race genes were in the second most successful group (eg. A10, Shepard, SHSR-03 and Zutano), while Mexican race rootstocks were overall the least represented group in the high-performance echelon (eg. Barr Duke, Parida and Thomas).

Although the influence of rootstocks on fruit quality varied according to growing location and year of assessment, a number of trends could be identified. In some experiments there were no significant effects of rootstock on fruit quality, but in other trials there were a number of differences. Some rootstocks (e.g. A10, SHSR-03, and Velvick) frequently had a positive influence on Hass and Shepard fruit quality (i.e. reduced flesh disorders after storage and the incidence of postharvest rots) compared to others (e.g. Barr Duke and Duke 7 in Hass, or Thomas and Duke 7 in Shepard).

Fruit with the highest postharvest quality often had the lowest N and highest Ca skin concentrations. This was supported by positive correlations between fruit quality and skin nutrient ratios of N/Ca, and negative correlations between fruit quality and skin nutrient ratios of Ca+Mg/K. These may be a useful diagnostic tool for predicting postharvest fruit performance.

The project also developed a new rootstock (SHSR-04) with high PRR resistance, although some strategic chemical support will still be required to maintain good tree health under high disease pressure with trees in heavy crop.

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## Optimising phosphonate use for *Phytophthora* root rot management in Shepard avocados

PRR of avocados is the major constraint for avocado production in the seasonally wet climate of North Queensland, where many orchards are established on poor soils with poor or impeded drainage.

The disease is managed with phosphonate trunk injections or foliar sprays, however with increasing labour costs, many growers have moved to foliar spray applications. Optimum foliar application timing and phenological cycles of Shepard in North Queensland are poorly understood.

Three Shepard avocado orchards in Far North Queensland—representing the range of local growing environments—were treated with monthly foliar sprays and monitored from May 2012 to May 2013.

Two orchards which were only injected were also monitored.

Foliar applied phosphonate effectively increased root phosphonate levels in healthy avocado trees. Replacing phosphonate injection with foliar phosphonate sprays can simplify phosphonate application, reduce costs and improve the effectiveness of PRR management in Shepard avocados in North Queensland.

### Project AV11011

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# Evaluating sustainable and cost-effective orchard management practices

This project aimed to identify sustainable orchard management practices that could be used by avocado growers across Australia to:

- Conduct trials to evaluate the effectiveness of some of these strategies.
- Provide recommendations to the wider industry on the most promising practices.

Several orchard management practices and products are being used by avocado growers including mulching, natural mineral fertilisers, fish and kelp concentrates, compost teas and other brewed microbes, molasses and branch scoring.

The effect of different mulches on tree growth, yield and fruit quality was investigated in Central Queensland over three consecutive years. Trees were mulched with filter press (a sugar industry by-product), cane tops and avocado woodchip at flowering during September

each year. Mulching trees with avocado woodchip, and to a lesser extent cane tops, increased cumulative yield compared with trees receiving minimal mulch. The increase in yield may be due to the tendency for increased root growth observed in these mulched trees.

Trials investigating the effect of a range of soil and foliar treatments were also conducted. Foliar application of pyroligneous acid (Panda) an organic liquid derived from heating bamboo to 250–350°C, in combination with a copper fungicide treatment, can increase fruit quality with a reduction in the incidence of fruit rots and disorders. Soil and foliar applications of microbial products (TwinN and BB5) can increase root growth in avocado. This increase in root growth and possible nutrient uptake may be responsible for improvements in shoot growth, tree health and fruit quality observed at some of the experimental sites.

The effect of branch scoring on fruit size and yield was investigated at several sites across Australia. Scoring involves cutting a groove no more than three mm wide around the branch to sever the phloem using a knife or pruning saw. Results indicate that branch scoring may provide a non-chemical approach for increasing cropping in vigorous avocado trees, particularly in southern growing regions. However, this technique is still experimental and may not work under all growing conditions.

Although results of this work demonstrate some improvements in tree growth, yield and fruit quality, further discriminatory testing on these sustainable management practices is necessary before grower recommendations can be made.

## Project AV08020

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## Supply chain education materials

Phases one and two of the *Avocado supply chain education materials* projects (AV08017 and AV10006) produced a range of hardcopy educational materials to assist all sectors of the supply chain improve their quality management practices.

The goal of these programs was to identify and fill knowledge gaps within the supply chain to improve avocado handling practices and quality.

In an effort to make the materials more accessible and easily updated, an online BPR was developed to be a one-stop shop for all sectors of the supply chain.

AV12013: *Implementing improvements in the avocado supply chain* is a continuation of project AV10006. The primary goal of this project is to build on the materials and systems established in phases one and two, with the overarching goal of improving the quality of Australian

avocados in the market place. This will be achieved by:

- Continued promotion of the existing supply chain education materials and programs developed in projects AV08017 and AV10006.
- Continuing the rollout of a retailer training program established in project AV10006 aimed at educating retail staff on how best to handle and store avocados, and improve or maintain fruit quality.
- Tools to assist retailers in consistently and accurately identifying ripe fruit will also be investigated.
- Ongoing maintenance and promotion of the BPR, which includes development of interactive learning modules and BPR reference materials.
- Addition of new modules to the BPR as new information becomes available.

In the six months since its release, over 140 separate businesses have registered to use the BPR.

Over 2,342 retail training sessions have been conducted through the retailer training program since it began. A state by state breakdown is included below.

State	Number of retail training sessions
Queensland	444
Western Australia	446
New South Wales	798
Victoria	654
Total	2,342

## Project AV10006 and AV12013

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# Understanding, managing and reducing flesh bruising and skin spotting in Hass avocado

## Assessing damage from the ripener to retail shelf

Up to 80 per cent of Hass avocados on the retail shelf have defects which can reduce consumer repeat purchasing. Project AV10019: *Reducing flesh bruising and skin spotting in Hass avocado* aims to understand and reduce flesh bruising in Queensland Hass avocado fruit supply chains and to provide a preliminary assessment of the importance of skin spotting.

In a series of laboratory experiments, relationships between bruise expression and fruit firmness, time after impact, and post-impact holding temperature were characterised for a range of controlled impact energy levels. Flesh bruise severity in ripening fruit increased with greater impact energies in softer fruit and under ambient versus low temperature conditions. Additionally, observations suggested that impact damage can enhance decay as well as cause bruising.

Magnetic resonance imaging (MRI) was used for non-destructive assessment of bruise development. Both non-destructive MRI and confirmatory destructive fruit assessments revealed progressive post-impact growth in bruise volume. Moreover, MRI visualised that unlike for ripening fruit, green-mature fruit can recover from impact injury so as to not express bruising.

In tray-drop experiments, fruit-to-fruit impact damage of softening fruit was discerned. Experimentation into the potential influences on bruise susceptibility of fruit dry matter and pre-ripening holding durations is ongoing, as is confirmatory experimentation of the relationship between holding temperature and bruise expression.

A series of supply chain studies involving both random and tracked serial sampling of fruit from the ripener to retailers were undertaken over two successive years. The data consistently showed that the incidence and severity of flesh bruising

was highest at the final retail shelf sampling point.

As decision aid tools, three commercially available means of recording impact were assessed through the supply chains. They were a tri-axial Shock Logger, an instrumented sphere impact recording device, and poly-axial Shockwatch g-force tags. The two first-mentioned electronic devices discerned impact events, with the instrumented sphere being relatively more sensitive.

Due to comparative insensitivity of the tags, lower g-force activation energy Shockwatch clips were sourced and are being tested.

Skin spotting data for Hass avocado fruit is being collected from retail stores and collated over time. Surveys of wholesaler, retailer and consumer attitudes to skin spotting are also ongoing.

A YouTube video is available on this project at [www.youtube.com/watch?v=yDn-4YbV9BE](http://www.youtube.com/watch?v=yDn-4YbV9BE).

## Assessing damage from the retail shelf to consumers' home

Project AV12009: *Understanding and managing avocado flesh bruising* aims to develop an accurate understanding of where and how bruising occurs. Based on this insight, approaches at retail and

home levels will be devised to reduce the incidence and severity of flesh bruising experienced by consumers.

The potential contributions of retail store staff and shoppers, and subsequently consumers to unsightly flesh bruising on the retail shelf in ripe fruit is currently being examined by observation from arrival at retailer to the consumer's home.

This research aims to examine the proposition that repeated squeezing by hand is the primary cause of the flesh bruising perceived by consumers. Strain gauges and pressure sensors are being employed.

Project findings in the 2012/13 Queensland Hass avocado fruit season should provide proof as to the location the physical damage and unsightly bruising occurs, and establish with a degree of accuracy the (hand) forces involved.

Based on this new understanding, targeted decision aid tools and training, or education strategies to avoid and minimise mechanical injury of the fruit through retail to home will be devised and evaluation in the 2012/13 Queensland Hass avocado season.

### Project AV10019 and AV12009

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# Data management, quality improvement and extension

Project AV09001: *National avocado quality and information management system* was responsible for several activities including:

1. Ongoing maintenance of Infocado, the avocado industry's crop forecasting system, and OrchardInfo, a system collecting production and productivity information. These two systems provide industry and individual businesses with accurate production, sales and productivity data on which to make future R&D and marketing and promotion decisions.
2. Coordination of a suite of supply chain projects that provide industry with valuable information relating to issues such as fruit quality, fruit maturity and supply chain education to improve handling. This information has enabled industry to identify and begin to rectify issues relating to fruit quality and irregular supply into the market.

3. Scoping of a quality management system (QMS) for the industry. Industry consultation indicated a lack of support for an industry-wide QMS, but was in favour of a nationwide quality improvement and extension program.

Following the completion of project AV09001, project AV12012: *Coordination of data management and avocado quality improvement and extension program* commenced in March 2013 and will continue to manage points one and two above.

## Qualicado

A nationwide quality improvement and extension program is being established called Qualicado. Through Qualicado, support and monitoring systems are being developed to empower industry members to review their practices, plan improvements and track their progress in improving quality for the end consumer.

For growers, the program will facilitate individual self assessments against documented industry best practice. For packers, wholesalers and ripeners, the program will facilitate system reviews against documented industry best practice with an industry expert who can offer advice and suggestions for improving practices to achieve better quality results.

Industry members will be able to attend workshops in the coming 12 months to participate in Qualicado. Guest speakers on a range of quality-related topics will be invited to attend the workshops. Information will also be available through the online BPR.

## Project AV09001 and AV12012

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## RNA silencing for *Phytophthora*-resistant avocado rootstocks

PRR is the most serious and widely-distributed disease of avocado worldwide. The causal agent, *Phytophthora cinnamomi* is a primary constraint on avocado productivity in Australia.

All areas in Australia producing avocados are affected by this disease, and growers are estimated to spend approx \$10 million per year on chemical prevention and other cultural practices.

This project aims to deliver potential economic benefit to avocado industry, which loses approximately \$40 million annually in production and management costs due to PRR.

The project employs a novel strategy which uses RNA silencing technology to obtain avocado rootstocks which are tolerant to PRR. These rootstocks will be used for grafting commercial scions to produce avocado trees for field plantings.

The scions which are grafted onto these rootstocks will be free of any modifications.

Constructs targeting essential genes in *P. cinnamomi* have been designed, engineered and tested for their efficiency to arrest the growth of *P. cinnamomi* in culture media, as well as in model plants (*Arabidopsis*) carrying these constructs. These transgenic plants showed resistance to PRR when grown in soil heavily infested with *P. cinnamomi*.

Gene silencing constructs have been successfully introduced in the cv. Reed, which is one of the rootstocks commonly used by nurseries and growers. These Reed plants have been analysed via gene screening techniques in the laboratory. Clonal propagation, molecular analysis and resistance screening of these plants is an ongoing progressive activity.

An application to progress this work to the field trial stage has been submitted to HAL.

## Project AV08002

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# Improving yield and quality in avocado through disease management – phase II

This project focusses on the management of soilborne and fruit diseases which limit productivity of avocado. It is important to evaluate and improve the disease management practices currently employed, and to assess new approaches in an environment demanding cost-effective methods of production acceptable to local and international markets.

A significant element of this project involves responding to field and nursery disease issues as they arise, participating in grower field days and contributing to internet and printed material for growers on disease management practices.

PRR has maintained its position as the most significant disease affecting avocado production, particularly with the recent wet summers experienced in the eastern states. Long-term field trials have identified rootstocks which are able to withstand very high PRR pressure, even in the absence of phosphorous acid treatments.

Fruit yield data demonstrates higher productivity and lower variability within rootstock variety if:

1. The rootstock has been clonally propagated, or
2. If rootstock seed is sourced from a population of trees which is isolated from other flowering avocados, thus reducing the likelihood of outcrossing which introduces genetic variability.

It is important for industry to continue to evaluate rootstock material for improved productivity (greater yields and quality) as well as resistance to PRR. As PRR-resistant rootstocks are not yet widely available in Australia, growers need to use cultural and chemical (phosphonate) options for managing this devastating disease. Trials investigating improved phosphonate application are underway.

Fruit bruising and postharvest diseases such as anthracnose and stem-end rot

represent a significant barrier to achieving premium quality and consumer acceptance. The fungi causing these diseases (mostly *Colletotrichum spp.* and *Botryosphaeria spp.*) infect throughout the fruit development phase, but do not express symptoms until fruit ripens.

Growers need to manage these diseases in the field. The project is evaluating several non-traditional fungicides as well as non-fungicidal products for their efficacy in reducing disease incidence and severity. Such treatments could complement industry standard practices and reduce reliance on copper fungicides.

## Project AV10001

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## Mechanisms of cultivar and race-based disease resistance in avocados

PRR is a significant constraint on avocado production in Australia and elsewhere around the world. The implementation of integrated control strategies and the use of tolerant rootstocks provide some control, however the mechanisms of resistance to the disease are poorly understood.

This is an industry-funded PhD project in its second year. The objective of the project is to identify and quantify the mechanisms of resistance to PRR of avocado rootstock varieties that span the three ecological races of avocado and vary in susceptibility to *P. cinnamomi*. Techniques to measure root regenerative ability and zoospore attraction to roots have been optimised.

Preliminary tests of root regenerative ability across six seedling varieties have

shown that varieties Velvick and A8 have high root regenerative ability.

A larger-scale test across ten rootstock varieties is currently in preparation. Data obtained in 2012/13 on root regeneration and zoospore encystment will indicate future directions for biochemical and molecular studies across a subset of these varieties.

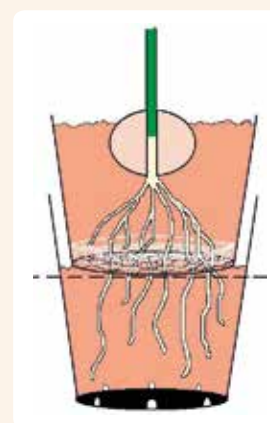
## Project AV09024

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A representation of the two-pot system for non-destructive root sampling. The potting mix in both pots is vermiculite. The base of the top pot has been replaced with chicken wire, and a layer of cheesecloth laid on top. Roots grow through the cheesecloth and can be harvested from the bottom pot

# A multi-target approach to fruit-spotting bug management

Fruit-spotting bug (FSB) is a major native pest in a number of subtropical and tropical horticultural crops in Australia. Using broad-spectrum insecticides has been the only management option for growers, however this approach is not sustainable in the long term.

This long-term project is investigating the following seven management strategies:

1. Collating research and practices of fruitspotting bug management, related insects and technologies.
2. Evaluating integrated pest management (IPM) compatible insecticides.
3. A monitoring and trap-cropping program (including trap hedges and pheromone traps).
4. Biological control (mass rearing and evaluation).
5. IPM case studies.
6. Area wide management.
7. Industry adoption.

Results for two chemicals to replace endosulfan are potentially useful in a rotation of chemicals. Small trials have been conducted at the Centre for Tropical Horticulture (CTH), Alstonville and on commercial farms. Both of the new chemicals have a shorter residual time than endosulfan. After the data collection and analysis for the current season is completed, results will be discussed with chemical industries to progress registration.

Pheromone lures (as in the actual chemical composition) for the banana-spotting bug *Amblypelta lutescens lutescens* are fully optimised and have shown very promising results on commercial farms in Far North Queensland. The trap design itself still needs improvement. First tests with lures for *Amblypelta nitida* have commenced in the laboratory and field.

The egg parasitoid *Anastatus* sp. has been released for the first season on over 20 case study farms.

Recapture trials have been conducted and baseline damage data at selected release sites has been collected.

A strategy to measure the impact of the egg parasitoid still needs to be further developed and tested. At this early stage, indications are that the *Anastatus* releases are having a useful impact on bug damage at some sites

Trap hedges are being monitored and increasing numbers of hedges on commercial farms are starting to fruit and provide data. At CTH, movements across different host plants during the season can be demonstrated.

On two occasions, large numbers of fruitspotting bugs were collected from *Murraya paniculata* on commercial farms. Monitoring a trap hedge consisting of *Murraya paniculata*, *Macadamia ternifolia* and longan helped to reduce insecticide input down to one spray on a custard apple farm in the Northern Rivers region in New South Wales, which also had the egg parasitoid *Anastatus* sp. released.

The research project is now in its third year of a five-year program. Preliminary results have been provided to Horticulture Australia Limited and to industry journals, but all components of the project need further work.

## Project MT10049

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## Analysing fruit-spotting bug activity from fruit set to harvest

The banana-spotting bug (BSB) is a serious pest of avocados, however many aspects of its biology and ecology are poorly understood. Current control centres on synthetic insecticides, but those available are inefficient. The development of a synthetic pheromone has created exciting opportunities to study the biology, behaviour, and chemical ecology of BSB and will assist in developing new control strategies.

This project examines the suitability of avocado as a host, the feeding behaviours of adult and immature bugs and potential economic injury at different crop stages. In field studies, pheromone traps will be used to investigate bug population structures, their spatial distributions, and movement patterns. In complementary laboratory studies, bug aggregation behaviours will be studied.

In the first year of this PhD study, experimental methodologies have been developed and tested. Experiments to investigate aggregation behaviour, host-plant suitability, and field population structures will be conducted in the upcoming field season.

## Project AV11021

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BSB on avocado

# Avocado industry fruit quality benchmarking

Consumer sensory testing has shown that 85 per cent of consumers prefer to buy avocados at a level of ripeness between ripe to soft ripe which they can eat that night. Additionally, internal quality defects of more than 10 per cent impact negatively on future purchase intent. Maturity levels at harvest also affect eating quality, and based on this sensory research, the industry standard for maturity (dry matter per cent) for Hass is 23 per cent and Shepard is 21 per cent at the time of harvesting.

Research showed that consumer acceptance of the quality of Hass avocados declined from around 95 to 70 per cent if the dry matter is below 23 per cent, and that around 70 per cent of consumers would choose Hass avocados with a harvest dry matter of 26 per cent over 22 per cent dry matter.

In order to benchmark the industry's performance against these standards, two programs were developed. Firstly, monthly fruit quality surveys are conducted in 16 stores each in Perth, Brisbane, Sydney and Melbourne. A random sample of avocados (up to 240) each month are purchased to assess internal quality defects including bruising, internal rots, vascular browning, diffuse flesh colour and stem end rot.

In order to assess how well the current level of quality at the retail level matches up with consumer preferences, statistical analysis of the data up until December 2012 has been completed by the New Zealand Institute for Plant & Food Research Limited (Plant & Food Research). These findings are available to view via the AAL website. The results show that the level of internal defects in Hass has declined by 38 per cent since 2008. This is a significant improvement, and is the result of concentrated industry efforts to improve fruit quality.

Secondly, random dry matter testing is conducted each month from fruit sampled from the Sydney markets to measure fruit maturity. Up to 220 individual avocados are sampled each month and the aggregated results of these tests are reported on the AAL website. Results for individual growers or packers are also sent to those businesses.

This information helps industry to build an understanding of its performance against its targets.

## Project AV11015

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## Assessing the potential of reduced cold treatments for Shepard avocado

This project undertook large-scale confirmatory trials against Queensland Fruit Fly (QFF) using treatments of  $3\pm0.5^{\circ}\text{C}$  for seven and nine days.

Trial fruit in this project were artificially infested with two life stages (eggs and first instar) of QFF and fruit were hard-mature at the time of infestation. As such, the treatments conducted were an evaluation of the efficacy of a cold treatment plus the poor host status of hard-mature Shepard avocado.

No survivors were recorded from 56,535 and 35,035 treated eggs and first instar larvae respectively. Data generated in this project will be used to develop market access submissions for the domestic and international markets recommending a treatment of  $3\pm0.5^{\circ}\text{C}$  for seven days as an alternative to the current treatment of  $1^{\circ}\text{C}$  for 16 days.

## Project AV12010

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*Asian noodle salad with avocado*



# Scoping study for avocado alternate bearing research

A survey was conducted between July and October 2012 to ascertain the magnitude of alternate bearing in the Australian avocado industry.

All the major avocado growing regions (North Queensland, Central Queensland, Sunshine Coast, West Moreton, Northern and mid-coast New South Wales, Tristate Western Australia) were visited, and 54 growers, consultants, extension officers and packshed managers were interviewed using a pre-prepared format.

Yield data (over six contiguous years where possible) from 85 different blocks of avocados was collected together with associated weather, orchard management practices and environmental properties that contributed to these yields. The data from each orchard was compiled and presented in the form of yield graphs. Summarised notes were sent to the members of an expert assessment panel, which met in mid-October to discuss the information.

The panel concluded that Australia currently only has a minor problem with alternate bearing, but does have a significant problem with irregular bearing. Twenty five per cent of orchards had some degree of alternate bearing, but the other 75 per cent displayed varying levels of irregular bearing. Only four orchards out of the 51 surveyed displayed significant alternate bearing.

Where alternate bearing was identified, it was invariably associated with late harvesting. It was found that most growers were already adopting orchard management practices (such as earlier harvesting, better irrigation and nutrition practices, better PRR control, better canopy management techniques and the use of better rootstocks) to minimise the occurrence of alternate bearing.

The most frequent causes of irregular bearing were identified as low temperatures at flowering, low humidity at flowering, more attractive pollen and/or nectar sources nearby, insufficient pollinators, and the absence of pollinisers in the more marginal production regions.

The main recommendation from the study was that the Australian avocado industry should direct research and extension resources towards addressing irregular bearing rather than alternate bearing.

## Project AV12028

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## Data collection to facilitate supply chain transparency

It is well documented that fruit build up in the supply chain can lead to loss of fruit quality as fruit ages. With increased volumes of fruit in the marketplace, it is important that fruit moves through the system quickly, and for fluctuations in supply of fruit minimised to ensure consistent fruit quality and value.

To provide growers with a better understanding of retail prices and market forces, each week avocado prices from 16 separate retail outlets each in Perth, Melbourne, Sydney and Brisbane are collected and uploaded onto the AAL website. This information is also distributed with the weekly Infocado report to industry members who contribute to the program.

The retail price data provided through this program demonstrates the

relationship between the volume of fruit being supplied to a particular market and the retail price. With access to this information industry has been able to anticipate and respond quickly to changes in the market.

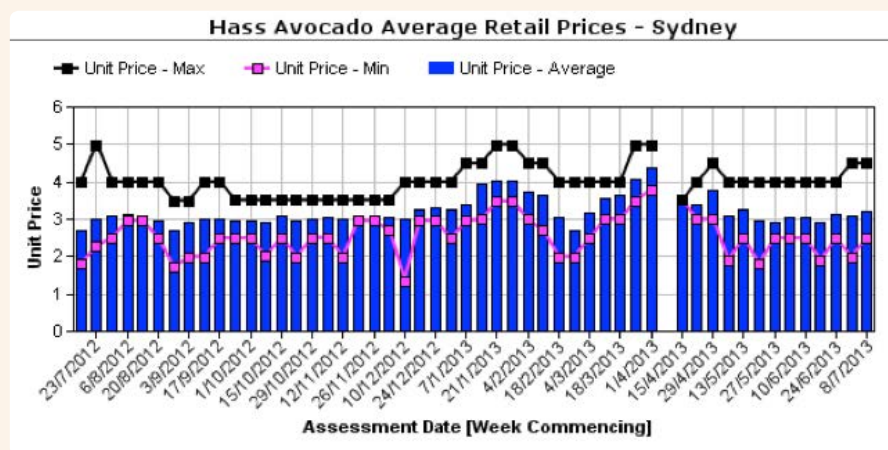
## Project AV12007

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Hass retail prices in Sydney for the 52 weeks from July 2012

# Protecting pollination

The Pollination Program manages a number of research projects, with the aim of securing the future of Australia's horticultural and agricultural crop pollination on a sustainable and profitable basis. The program is a jointly funded partnership with the Rural Industries Research and Development Corporation (RIRDC), Horticulture Australia Limited (HAL) and the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF).

The impact of an exotic pest or disease incursion is considered to be the most significant risk to the beekeeping industry, and in turn, the industries reliant on pollination. One of the key threats is Varroa mite, and much of the activity in the years the program has been running has focused on this pest. If Varroa mite, or similar bee pests reach Australian shores and becomes entrenched, it is expected to cost between \$21 million and \$50 million per year over 30 years. The loss of pollination by both managed and wild European honeybees has the potential to impact a range of fruits, vegetables and pastures.

Achievements of the program to date include:

- The release of the report *Future Surveillance Needs for Honeybee Biosecurity*, which confirmed exotic bee pests to have the potential to reach Australia onboard ships and their cargoes.
- A simulation exercise which tested the likely impact of Varroa mite. After participating in the exercise, regulators confirmed how difficult Varroa mite would be to eradicate and acknowledged the flow-on impact to horticultural and other plant industries.
- The launch of the report *Pollination Aware* in August 2010, which highlighted the risks associated with Australia's reliance on incidental pollination, and the benefits to yield and quality if plants are pollinated at optimal levels.
- A gathering of industry experts in Canberra to investigate both chemical and non-chemical options for the control of Varroa mite and provide a perspective on the experiences of other countries in the management and mismanagement of Varroa.

- Development of a pollination manual to provide practical advice for Australian and New Zealand beekeepers and the many growers reliant on them for crop production. The manual will provide straightforward information that readers can readily apply to optimise pollination.

Throughout 2012/13, several projects are continuing their work to raise awareness of the importance of pollination and the need to plan and prepare for Varroa mite:

- In recognition of the importance of ports in detecting bee pests, the Bee Force trial has been set up around the ports of Melbourne, Geelong and Avalon, giving a number of urban beekeepers a role in providing surveillance of exotic pests.
- Applications are being prepared, seeking permits from the Australian Pesticides and Veterinary Medicines Authority (APVMA) to allow the use of three Varroa mite control products currently available in New Zealand. These approvals will be held in 'reserve', for use in the event of an incursion.
- Consultation with a wide variety of stakeholders to assess the level of interest in a Cooperative Research Centres (CRC) bid for the honeybee and pollination industries.
- Communication, including pollination education, extension and capacity building.

For more information, visit [www.rircd.gov.au/pollination](http://www.rircd.gov.au/pollination).

**Project MT09026**

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## Biosecurity implementation

Through this project, a Honey Bee Industry Biosecurity Plan, a *Biosecurity Manual for the Honey Bee Industry*, four pest-specific contingency plans and a Biosecurity Online Training module have been made available.

The development of these documents was a collaborative effort between the Australian Honey Bee Industry Council (AHBIC) and PHA. The Industry Biosecurity Group, which consists of experts from government agencies and industry, provided valuable input while these documents were under review.

The documents and the pre-emptive planning process boosted the honey bee and pollinator-reliant plant industries' capacity to deal with the threat of new pests. It places these industries on the front foot in identifying and minimising risks, and heightens the capacity to respond quickly and effectively to emergency plant pest incursions.



*Biosecurity Manual for the Honey Bee Industry – 2,000 manuals were posted to every registered beekeeper in Australia*

### National bee pest surveillance workshop

This two-day workshop brought together the AHBIC, DAFF, RIRDC, HAL and representatives from every state and territory government, as well as honey bee scientists and pollinator-reliant industries to determine what the National Bee Pest Surveillance Program should contain, and how it could be funded. This workshop benefited both the honey bee industry and plant industries dependent on honey bees for pollination.

The workshop effectively delivered a continued-funding model for the program post-June 2013, and widened the scope of the surveillance strategy to target bee pests and pest bees. This will increase the chance of early detection of bee pests and pest bees, thus increasing the chances of mounting an effective eradication program.

### National honey bee pest surveillance program

For the past 11 years, a national program of surveillance for bee pests operated around key ports of entry through the deployment of sentinel hives. Funding and support for the program over this period was been provided by DAFF, with in-kind support provided by state government jurisdictions and beekeepers. DAFF indicated a withdrawal of funding in 2011, leaving a gap in surveillance activities at a national level.

Given the benefits for pollination-responsive industries and the honeybee industry, this project aims to assist affected industries maintain and improve surveillance activities at high-risk ports of entry. It also improves the chances of early detection of Varroa mites and other bee pests.

Freedom from bee pests provides pollination-reliant plant industries with continued access to managed pollination services and wild honey bee populations that contribute a significant amount of incidental or 'free' pollination.

#### Project MT10058, MT11034 and MT12011

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### Surveillance of Asian honey bees

Traditional surveillance of exotic bee pests is costly, and in some cases may not be as effective as we might expect. One solution is to develop and deploy auto-reporting devices for bee detection that are cheap and efficient, require little maintenance, report detections in real-time around the clock, and can be located in great numbers throughout the entry pathways for exotic bees. This project will design and build prototypes for two different remote sensing devices for monitoring bees and reporting the data via satellite. These devices are to be ground tested as a proof of concept.

Two prototypes have been constructed and lab tested. One is designed to be placed on cargo vessels to attract and trap bees. Sensors in the trap will detect the bee and send an alert via satellite to a monitoring website. The vessel can then be intercepted prior to entering the local port.

The second prototype is a bee feeding station equipped with sensors that will monitor bee species that visit the feeding station and transmit data via satellite to a central monitoring website. Bees will not be trapped in this device. Instead audio signals and images will be captured to verify species identification. This remote sensing



*Manipulation of a swarm of bees into a bait box instrumented with sensors*



*Controlled swarm inside the bait box*

feeding station will be deployed on land, in high-risk entry pathways and following an incursion to monitor the spread and colonisation patterns of the exotic bees.

The project is currently in the field testing and evaluation phase, with both prototypes being deployed for the first stages of field testing. Further testing and refinement of the design and construction will follow until the project end date on 30 June 2013.

#### Project MT11033

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### Remote sensing of beehives to improve surveillance

Conventionally, bait boxes installed at Australian ports for the purpose of attracting and intercepting pest bees have been inspected manually by apiary officers. Honeybee biosecurity would be greatly enhanced by automatic surveillance of bait boxes.

This project developed a proof-of-concept image analysis-based remote sensing system that automatically detects when a swarm of bees has entered a bait box. Image analysis has been demonstrated to reliably indicate the presence of a swarm inside a bait box during controlled testing. A low-cost smartphone inside the bait box acts as the remote camera surveillance platform that autonomously performs image capture, analysis and remote notification.

Prototype bait boxes with remote camera surveillance and solar power have been installed in Brisbane and Cairns ports, and have been operating reliably and without human intervention throughout 2012/13.

A follow on project is recommended for further refinement and provisional deployment of multiple bait boxes, prior to large-scale deployment of the system.

#### Project MT10063

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*Bees emptied out of the bait box to retrieve sensor data at the end of a controlled test*



*NCEA technician, Victor Skowronski and Cabarlah beekeeper, Rodney Ruge with the bait box during a controlled test*

## Developing of a cryobank for avocado germplasm

Avocado genetic resources are currently maintained globally in the form of field repositories at great cost and risk of natural calamities, pest and diseases. Avocado seeds are 'recalcitrant', meaning they do not survive drying and freezing. Also, avocado adopts a unique breeding system, termed protogynous dichogamy (female and male flowers open at different times) producing heterozygous seeds resulting in not true-to-type seedlings.

A complimentary method of conservation of germplasm using cryopreservation is an option that is safe, cost-effective and long term. The process involves

storage of living cells and tissues at ultra-low temperatures (-196°C) in liquid nitrogen. This project used somatic embryos and shoot tips as the plant material for cryopreservation of avocado germplasm. Cryopreservation of somatic embryos is attractive as it is readily retrievable for genetic improvement research, whereas cryopreservation of shoot tips in case of avocado is ideal to ensure conservation of clonal germplasm.

The project has been successful in recovering 67–87 per cent viability of cryopreserved somatic embryos in three avocado cultivars tested. It was established the regeneration conditions for regrowth from shoot tips as small as 1–3 mm,

and the project is working towards optimisation of cryopreservation.

The long-term aim is to create Australia's first cryo-repository of avocado germplasm, a move which will position the Australian avocado industry as world leaders in development of a cryobank solution for avocado germplasm conservation.

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# OHMA Market Access Manager 2012–15

The Office of Horticultural Market Access (OHMA) is an industry-based committee of Horticulture Australia Limited (HAL) that provides advice to government agencies for the negotiation of quarantine and non-quarantine market access. OHMA aims to maximise the opportunities for Australian horticultural market access through involvement under the following three key pillars:

- Raise the profile of Australian horticulture by developing target market relationships with an industry focus as commercial market access drivers.
- Provide strong support to official access negotiations.
- Identify, support and guide R&D into market access.

The role, which is funded by this project, aims to work with industry to identify and set priorities and strategies for market access, to develop and maintain close working relationships with relevant government bodies involved in market access negotiations in order to effectively represent horticulture industry views to government, and communicate market access issues and outcomes back to industry.

In the 2012/13 financial year, Chris Langley was appointed as the new OHMA Market Access Manager. Since taking up the role in October 2012, he has worked to develop relationships with key exporting industries and government departments involved in the market access process. Langley has represented horticulture at trade briefings in Canberra, at the bilateral agricultural working group with Indonesia and at Free Trade Agreement (FTA) negotiations for the Trans Pacific Partnership.

The OHMA Committee itself will meet three times during this reporting period, during which time it works closely with the Department of Agriculture, Fisheries and Forestry to progress priority access applications, assess new market access requests and provide industry input into priorities for FTA negotiations and other issues such as the proposed a fruit fly workshop with China.

## Project MT12029

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## OHMA operational support 2012–15

This three-year project supports the activities of the Office of Horticulture Market Access (OHMA) Committee to improve market access and export growth for Australian horticulture into markets which are closed or inhibited by quarantine or tariff barriers.

It supports the operational activities of OHMA, including travel of members to and from meetings, printing of meeting papers, fees payable to independent chair, and overseas travel related to the OHMA chair and other committee members as approved by Horticulture Australia Limited (HAL).

The project commenced in-line with the first OHMA meeting, held Canberra on 27 February 2013. Two or three more OHMA meeting are expected to occur throughout 2013.

## Project MT12028

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## OBJECTIVE 2

To increase demand for Australian avocados

# Australia Fresh core program 2012/13

Australia Fresh core program is an export trade development initiative funded by the apple and pear, avocado, cherry, summerfruit and table grape industries.

The program strategy addresses significant export issues raised by Australian horticulture industry bodies, including the development of cost effective export market initiatives and improving Australia's export competitiveness and market presence in overseas markets.

The core program unifies industries' export priorities and aims to build greater export efficiencies and capability by successfully facilitating industries and stakeholders to share their resources. The program facilitates knowledge and expertise transfer by employing a 'Team Australia' approach in export markets, in turn delivering added value and incremental benefits to participants through the core program as well as other add on export activities.

The program aims to:

- Provide stronger market intelligence to identify and secure new opportunities so member industries, growers and exporters can compete and succeed in foreign markets.
- Enhance and strengthen business links between Australia and overseas markets

by establishing the profile of Australian horticulture industries, and increase awareness of industry capability in these international markets.

- Develop and implement programs to address member industry priorities, including international trade shows, training seminars, online and offline promotions, and in-market consumer promotions.
- Leverage the resources of each participating industry, trade organisations (e.g. Australian Horticultural Exporters Association and Austrade) and commercial exporters in raising the profile of Australian horticulture to effectively expand commercial pathways to trade.

To date, a number of key activities have been completed in this fiscal year, as a direct result of the coordination and organisation through the Australia Fresh core program, including:

- Tradeshow participation at Asia Fruit Logistica (Hong Kong) and China FVF (Beijing).
- Two trade missions and briefings in China (Beijing) and Taiwan (Taipei).
- Export market intelligence and trade analysis for members on key export markets.

- Organisation of the annual horticulture export symposium (Sydney).
- Redevelopment and maintenance of the Australia Fresh Website, available at [www.australiafresh.com.au](http://www.australiafresh.com.au).
- Regular E-Newsletters and trade communication to industry and export stakeholders.

A third trade mission has been organised with Australian member industries and exporters focussed on the ASEAN region in late June 2013. These activities compliment the core program member priorities and objectives, and maximises the unified approach to building a greater international presence for Australian horticulture.

A complete final report will be made available to each of the participating industries in the coming months once all activities are completed.

### Project MT12032

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## Understanding the purchase behaviour of fresh produce consumers

Reliable information on consumer purchase patterns helps the avocado industry to gain a better understanding of shopping behaviour and empowers better demand and promotion planning throughout the year.

Nielsen's Homescan Consumer Panel has been designed to monitor and understand household purchasing of packaged grocery and fresh produce. With 10,000 demographically representative households, their Australian panel is now the second largest panel per capita in the world, providing household level data on a continuous basis.

In the analysis prepared for the avocado industry, this vital market information is being used to track performance and demographic consumption, and to help define strategies to improve the industry's sales performance.

In the latest 52-week ending period, six out of 10 Australian households purchased avocados, and the average household is now buying avocados eight times per year. In addition, established couples and senior couples are the most important lifestage buyer groups from a value sales contribution perspective.

### Project MT12010

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# Marketing program

## Consumer program

The 2012/13 marketing program took the avocado industry into its last year of the 2010–13 strategic marketing plan activities.

The primary objective of these activities over the last three years has been to shift the target audience's perception of avocados from being a versatile product ingredient in the kitchen to an indispensable ally—a 'must have'.

The campaign line has evolved to 'Add an Avo Everyday', with the aim of bringing about a shift in the buying behaviour of the target audience from infrequent to more regular purchase.

The 2012/13 marketing campaign aimed to build on the foundations established in the previous years and continue to drive everyday consumption. An added dimension to the plan was tactical retail activity over the spring months to address the anticipated bumper crop.

Advertising aimed to broaden the reach and frequency of the Australian Avocado messages. Using a combination of TV, national magazine and online advertising, coupled with competitions and store-level sampling provided a great opportunity for Australian Avocados to be seen more often by more consumers.

## TV advertising

The schedule used a combination of free-to-air digital channels such as GEM & GO, and targeted pay TV such as the Lifestyle Channel.

The role of TV in the media strategy was to deliver the message to the widest possible audience in the most cost-effective way. It provided a call to action for everyday consumption and served to build the brand.

## Magazines

Similarly, magazines provided cost-effective access to the target audience.

With a focus on female grocery buyers between the ages of 25–49 years with older kids, Australian Avocados messages of versatility and health helped drive awareness and purchase consideration.



An example of avocado advertising

Alternating full-page placement with a new one-third page format maintained continuity cost effectively through both weekly and monthly magazines such as *Australian Good Taste*, *Sunday Magazine*, *Recipes +*, *Australian Woman's Weekly* and *Woman's Day*.

## Online advertising

Online banner advertising played an important role in supporting and aligning the campaign with the more traditional media channels. This included sponsorship of websites such as taste.com and the new taste.com mobile phone application, which is recognised by many consumers as 'the go to resource' for recipes and food ideas.

## Social media

Facebook is the key platform in the social media strategy, which aimed to engage in weekly, if not daily conversations with avocado lovers.

On average, two to three posts per week have been delivered to the Australian Avocados Facebook page with topical, relevant and timely content. Content was

supported with targeted media and specific Facebook promotions such as 'Avo-tar' and 'Summer Salad Days'. In 2012/13, the Australian Avocados Facebook fan base grew from 14,282 to 69,358.

## Website

The Australian Avocados website maintained a high level of activity, reaching out to the database with weekly blog posts about recipes, health and nutrition information and lifestyle tips.

Google search continues to be the largest driver of traffic to the website, supported by investment in a broad base of keywords. Australian visitors to the website grew from a total of 221,998 to 309,926, with 78 per cent visiting the site for the first time.

## In-store sampling

This was a key tactical activity to build awareness and immediate in-store sales. In partnership with the major retailers, a national sampling covered more than 800 supermarkets across the months of September and November 2012.



Examples of Facebook updates, which engaged avocado lovers through targeted promotions

In addition to the consumer marketing program, the following education and market development programs continued throughout 2012/13.

### **Educating early childhood educators—AV12023**

The key objective of this program for 2012/13 was to provide a fourth round of learning resources and avocado fruit samples to preschool children aged three to five.

On 17 October 2012, Australian Avocados delivered 600 trays of avocados to the early childhood centres that had pre-registered to be involved with the program. These centres had received the 'Eating My Colourful Vegies and Fruit' resource kit in August 2012. This fourth round of the program reached approximately 35,000 children.

The program delivery was supported by social media, and a strategic PR campaign to drive increased community awareness and highlight the important role it is playing in providing toddlers with a healthy start to life.

A primary school pilot study was also completed in October 2012 and resulted in positive feedback from primary school teachers as a potential learning resource.

### **Foodservice program—AV12501**

The Australian Avocados foodservice program has been developed to educate chefs about the handling and usage of fresh Australian avocados. In 2012/13, the program continued its masterclass training format targeted at both chefs and apprentices across the range of food service sectors including restaurants, international hotels, clubs and TAFE's.

The masterclasses, targeted at restaurant chefs, featured menu demonstrations and usage innovation by a regarded chef in Sydney, Brisbane and Melbourne. The hotel masterclass format focussed on how avocados can be used across the range of hotel outlets from café menus, through to fine dining, functions, banqueting and room service.

In partnership with Clubs NSW, masterclasses focussed on how clubs can provide quality and varied food offerings to improve profitability. Hands-on, demonstration-style masterclasses were conducted with commercial catering groups



*Lauren Murdoch of the Three Weeds Restaurant, Sydney preparing a dish featuring avocado*

and TAFE apprentices to continue to educate the emerging generation of young chefs.

Masterclass exit and follow-up surveys indicated that the calibre of the presenters, along with new recipe ideas and handling and storage tips were the three top benefits of attending each masterclass.

### **Health professional education and research program—AV12016**

The strategic objective of the Australian avocado health professional education and research program is to identify and claim key nutritional values that will be synonymous with avocados and build consumption growth. To this end, healthy fats and folate are avocado's two 'hero' nutritional characteristics, with claims backed by significant scientific evidence.

During the 2012/13 year, the program targeted the key audiences of GPs, dietitians and fitness trainers with the key messages of 'Healthy fats for healthy hearts' and 'Folate for healthy mums and babies'.

To reach GPs, Australian Avocados exhibited at two major GP conferences in October 2012 and May 2013, reaching more than 3,000 doctors and practice nurses. The health message of avocados was also communicated to GP registrars through a sponsorship of their peak body, General Practice Registrars Australia (GPRA).

Dietitians are considered the thought leaders for nutrition in Australia, and are very influential in shaping the media's recommendations around food and diet.

Accordingly, dietitians and nutritionists were targeted via articles and blogs written by Lisa Yates, the consulting dietitian.

The Australian Avocados nutrition message was also presented at the annual conference of the Dietitians Association of Australia in May 2013.

Fitness professionals (FPs) were targeted via a live webinar Nutrient Rich Eating for Weight Management, with guest speaker Matt O'Neill, sports dietitian and weight loss expert. Over 160 FPs attended the live webinar and 235 viewed the webinar recording. Pre and post-evaluation surveys were conducted indicating an increase in FPs recommendation of avocados in a weight management diet.

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## **Fruit and nut tracking study 2011–13**

Sprout Research have been commissioned by HAL to track and report key metrics.

The goal of this project is to ensure there is continuity from previous studies, and that value is gained from the current project by tracking key metrics on brand health, advertising awareness and consumer behaviour.

As an outcome to the project, Sprout Research will monitor changes within the industry, which will be presented and delivered in reports to industry throughout 2012/13. These reports will help influence future strategy, and will be used as a tool to facilitate key decision making.

#### **Project MT11028**

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## OBJECTIVE 3

To ensure appropriate organisation, resourcing and management of the affairs of the Australian avocado industry to support the development of the industry on an ongoing basis

# Avocado industry communications

This project provides industry with timely and relevant communications. The communications activities are designed to engage the industry as a whole—from growers, input suppliers, exporters and importers, wholesalers and retailers, to state and federal government representatives, the media and the general public.

The project delivers a mix of communication tools/activities, with the objective of sharing explicit industry-related information, and as a result, fosters the ongoing opportunity to grow and improve the business prospects of Australian avocado levy payers.

The project has been developed to meet the objectives and strategies contained in the *Australian Avocado Industry's Strategic Plan 2011–15*.

AAL commissioned an independent review of the project in March–April 2013, which included an online survey targeting all key industry stakeholders. It found that 82 per cent of stakeholders are very satisfied or satisfied with AAL's communication with industry.

The review also confirmed stakeholders' preferred communications methods, along with other recommendations, which are now being implemented to further improve the project. The review also found that email updates, the industry e-newsletter and the magazine *Talking Avocados* are the main information channels that industry rely on. The independent review provided AAL with evidence that this project is both necessary and an ongoing requirement.



AAL's Peter Annand was among the speakers at the Sunshine Coast Field Day in Bellthorpe, Qld.

Communication tools produced by this project over the 2012/13 period include:

- *Talking Avocados*, the industry's quarterly magazine.
- Extensive email communication in the form of industry and grower updates and the regular e-newsletter, *Guacamole*.
- Media releases.
- The industry website, [www.industry.avocado.org.au/home.aspx](http://www.industry.avocado.org.au/home.aspx), including its online reports centre.
- National and regional stakeholder engagement activities such as regional grower teleconferences and regional events.

The project also conducted primary research to identify growers' preferences for face-to-

face initiatives. AAL is using these findings to inform its event planning. Recent events that this project successfully delivered to benefit growers include:

- Sunshine Coast Field Day (15 March, Bellthorpe, Qld)
- Central Queensland Soils & Fruit-spotting Bug Workshop (20 June, Childers, Qld)
- Tamborine/Northern Rivers Field Day (28 June, Alstonville).

### Project AV10008

**For more information contact:**

**Anna Petrou, AAL**

**T 07 3846 6566**

**E [co@avocado.org.au](mailto:co@avocado.org.au)**



Mt Tamborine & Northern NSW growers ask researchers about *Phytophthora* and soil nutrition at Summerland Farm House, Alstonville NSW.



*Talking Avocados* magazine, email and the web are among the Australian avocado industry's most preferred communications channels.



# Best management practices and internet-based information delivery

Many of the information resources for growing avocados in Australia are no longer available or require updating.

The objective of this project is to provide up-to-date information and deliver it in new ways.

The *Avocado Problem Solver Field Guide* was published as a 'ute guide and distributed to levy-paying growers, research and extension staff, market agents and ripeners. Seven hundred and ninety copies have been distributed to date and feedback indicates good use.

The project is developing the Growing section of the industry's online BPR. Information is now available in the BPR on important topics including PRR and anthracnose management, FSB control, nutrition, irrigation and mulching.

This section consists of illustrated articles, regional orchard management calendars and a YouTube video on tree injection, with more content to be added to the site.

New guidelines are being developed for irrigation practices and checklists will be

created for growers to self assess their growing practices.

## Project AV10002

**For more information contact:**

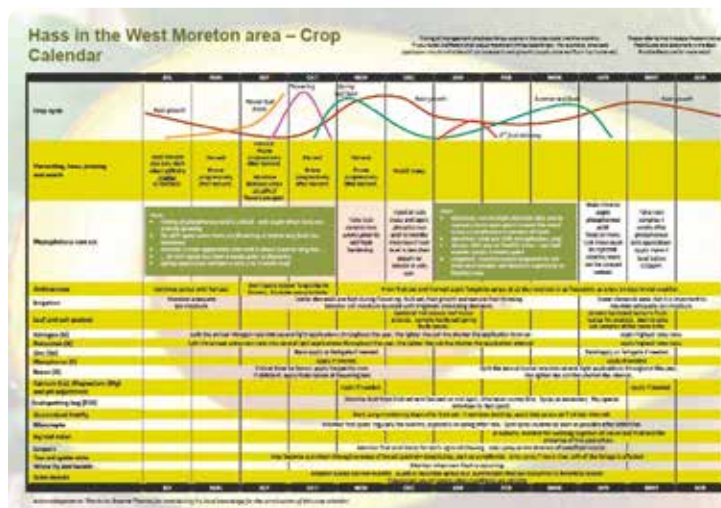
**Simon Newett, DAFF Qld**

**T 07 5453 5926**

**E [simon.newett@daff.qld.gov.au](mailto:simon.newett@daff.qld.gov.au)**



The BPR, where a dedicated YouTube video on injecting trees can be viewed



An example in the online BPR of a regional crop management calendar

## Leadership development plan for the avocado industry

This project identified the leadership needs of growers and developed a Leadership Development Plan to address those needs. Existing leadership programs in Australian horticulture and other rural industries have been reviewed and case studies of rural leadership program graduates have been compiled.

Research has been conducted in the avocado industry with surveys and individual interviews of growers, and the respondent group included a broad demographic of the industry along with current and past leaders.

Research indicates that avocado industry leadership should establish a network of industry leaders who can share creative

ideas and promote industry partnerships through regular communication back to industry. Leadership development should also include emerging leaders as well as the current leadership team.

To achieve this outcome with reasonable investment of industry funds, the plan recommended that the avocado industry encourage and assist young growers to access current funding scholarships for Nuffield Farming Scholarships and the Produce Executive Program. It also recommended that the industry invest in a joint regional/national leadership program for industry to meet leadership, succession and communication needs identified in the surveys.

The outcomes of the leadership strategy will be to energise new and existing leaders to expand their ability to stimulate the avocado industry, and provide succession planning for the industry leadership.

## Project AV12001

**For more information contact:**

**Dianne Fullelove, Dianne Fullelove & Associates Pty Ltd**

**T 07 3374 0453**

**E [diannefullelove@optusnet.com.au](mailto:diannefullelove@optusnet.com.au)**

# Export and import market intelligence 2012–14

Export development is a primary objective for the avocado industry. Timely and accurate market information is important for understanding the current performance of the industry as it moves towards meeting its export goals.

Accurate information on Australian and competing foreign exports enables AAL to prepare reports for government and stakeholders with a strong understanding of the market.

By researching trade information from various trade databases, which is collated into a usable report with tables, graphs and commentary, industry leaders and growers are provided with the latest information on the export performance of the avocado industry.

This project provides regular updates for exports by total volume, value, prices per kilogram in key markets for the season to date, and moving annual totals for long-term five and 10-year trends, plus market shares in key export markets. The project also gathers market intelligence on issues affecting export market trade through membership of the Southern Hemisphere Association of Fresh Fruit Exporters (SHAFFE).

In 12 months to June 2013, the avocado industry exported 1,976 tonnes of avocados, with a value of \$8.06 million. The results were 24 per cent lower than 2012 for volume and no change by value,

which meant that prices per kilogram increased significantly.

Singapore, Thailand, United Arab Emirates and Hong Kong were the leading avocado destinations for Australian avocados. While Australia accounted for up to 95 per cent of the total avocados imported by Thailand and 55 per cent by Singapore, these markets have smaller demand compared to Japan which imported 65,000 tonnes in 2012 mostly from Mexico. Australia does not have access to the Japan market.

During July to June 2013 Australia imported 5,377 tonnes of avocados from New Zealand which was 68 per cent less than the 16,877 tonnes imported the previous year.

To date, four quarterly reports—September, December, March and June have been provided, with a further four quarterly monitoring reports to follow in 2013/14.

The project also provides essential information for industry presentations in China, to support market access submissions, and prepare fact sheets for exporters and industry meetings.

## **Project MT12009**

### **For more information contact:**

**Wayne Prowse, Fresh Intelligence Consulting**

**T 0408 164 966**

**E [wayne.prowse@bigpond.com](mailto:wayne.prowse@bigpond.com)**

## **Australian avocado benchmarking program development**

In 2012/13, the first round of a benchmarking study was undertaken in which 55 Australian avocado producers provided data about their operational and financial performance in 2011/12.

The average gross revenue per producing hectare and average yield achieved was measured, with a view to establishing Australian best practice and identifying how the industry performs globally.

The project aimed to provide a mechanism through which AAL and R&D organisations could identify where future R&D investment is most needed, and whereby growers would benefit from a new tool aiding this investment.

Collection and analysis of a broader data set, across multiple years has been recommended to take into account industry variations to enable sound conclusions to be made in the future.

## **Project AV11026**

### **For more information contact:**

**Howard Hall, CDI Pinnacle Management**

**T 07 3217 6466**

**E [hhall@pinnaclemanagement.com.au](mailto:hhall@pinnaclemanagement.com.au)**



# Biosecurity capacity building for the Australian avocado industry

Laurel wilt disease, a disease ravaging plant relatives of the avocado in the United States, is a serious biosecurity threat to the Australian avocado industry. This project, which is now completed, aimed to develop diagnostic tests for the pathogen that causes laurel wilt, *Raffaelea lauricola*, and its ambrosia beetle vector, *Xyleborus glabratus*, which could be used in the event that these organisms enter Australia.

A major output of this project was the development of a nationally-accredited diagnostic protocol for *R. lauricola* and *X. glabratus*, which is published on the Plant Biosecurity Toolbox, available at [www.padil.gov.au](http://www.padil.gov.au), which is freely available to all interested parties in Australia and overseas.

In this diagnostic protocol, newly-developed molecular diagnostic assays are described for the first time, which have been validated under local conditions and shown to be specific for the target organisms. Additional information on disease aetiology and epidemiology is also provided.

A comprehensive set of disease images has been published on the PADIL website,

at [www.padil.gov.au/pests-and-diseases/Pest/Main/141003](http://www.padil.gov.au/pests-and-diseases/Pest/Main/141003), which can be used by avocado growers to assist with disease recognition.

An unforeseen output of this project was the discovery of a new ambrosia beetle *Euwallacea sp. aff. fonicatus*, in avocado trees on the Sunshine Coast and also on the Atherton Tablelands of Queensland. This beetle possibly poses a greater threat to the Australian avocado industry than *X. glabratus*, as it is more of a habitat generalist and therefore has a much greater invasion potential.

Infestations of *E. sp. aff. fonicatus* were associated with avocado canopy thinning and inoculation experiments with potted avocados showed that the *Fusarium* fungus carried by this beetle caused branch dieback.

## Project AV10004

**For more information contact:**

**Dr Andrew Geering, DAFF Qld**

**T 07 3255 4389**

**E [a.geering@uq.edu.au](mailto:a.geering@uq.edu.au)**

## Communicating project outcomes through video

This project investigated whether video is an effective tool for communicating the results of HAL-funded R&D for training purposes. Three videos using results from successful HAL projects have been produced and evaluated for their impact and usefulness:

### **The case of the bruised avocados:**

Available at [www.youtube.com/watch?v=yDn-4YbV9BE](http://www.youtube.com/watch?v=yDn-4YbV9BE).

**Avocado harvesting:** the picker's guide: Available at [www.youtube.com/watch?v=v-wmGGuy\\_lw](http://www.youtube.com/watch?v=v-wmGGuy_lw).

**Reject bin analysis:** Available at [nxfgnwww.youtube.com/watch?v=tDfkGvVTB4](http://nxfgnwww.youtube.com/watch?v=tDfkGvVTB4).

Important research outputs are produced from HAL-funded projects by skilled research providers, and it is essential to ensure project outcomes are extended to levy payers in a timely, informative and engaging way.

### **Project AV12005**

**For more information contact:**

**Gordon Rogers, Applied Horticultural Research**

**T 02 9527 0826**

**E [gordon@ahr.com.au](mailto:gordon@ahr.com.au)**





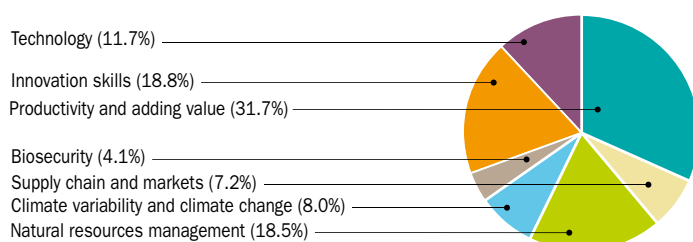
# Australian Government priorities

As part of the Australian Government's commitment to rural research and development (R&D), horticulture industries can access matching Commonwealth funding through Horticulture Australia Limited (HAL) for all R&D activities.

The Australian Government's Rural R&D Priorities aim to foster innovation and guide R&D effort in the face of continuing economic, environmental and social change.

HAL's operations are closely aligned with these priorities.

This chart shows the percentage of expenditure in HAL's avocado industry R&D program against each of the Australian Government priorities for rural R&D. Full details of expenditure across all industries is available in HAL's annual report at [www.horticulture.com.au](http://www.horticulture.com.au).



### Productivity and adding value

Improve the productivity and profitability of existing industries and support the development of viable new industries.

### Supply chain and markets

Better understand and respond to domestic and international markets and consumer requirements and improve the flow of such information through the whole supply chain, including to consumers.

### Natural resource management

Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable.

### Climate variability and climate change

Build resilience to climate variability and adapt to and investigate the effects of climate change.

### Biosecurity

Protect Australia's community, primary industries and environment from biosecurity threats.

### Innovation skills

Improve the skills to undertake research and apply its findings.

### Technology

Promote the development of new and existing technologies.

# Consultation funding

The consultation agreement between AAL and HAL sets out the tasks each organisation will perform to enable the other to discharge its responsibilities related to levy payers and industry services.

Consultation agreement activities are funded by HAL using the avocado industry's R&D levy and matched funds from the Australian Government.

These funds enable AAL to undertake the Annual Levy Payers' Meeting, conduct IAC meetings, attend HAL Industry Forums, HAL/AAL Executive Board to Board consultation meetings, and other formal and informal consultation between personnel of AAL and HAL.

The full year consultation funding expenditure for AAL in 2012/13 was \$323,425. This represents 4.1 per cent of the total annual levy expenditure. Consultation funding in respect of R&D represents 3.9 per cent of the investment in R&D expenditure and consultation funding in respect of marketing represents 4.5 per cent of the investment in marketing expenditure.

Unspent funds from 2012/13 will be refunded and reported on in 2013/14.

### Project AV12910

#### For more information contact:

John Tyas, AAL

T 07 3846 6566

E [ceo@avocado.org.au](mailto:ceo@avocado.org.au)

# HAL's roles and relationships

Horticulture Australia Limited (HAL) is a not-for-profit industry owned company. Its role is to manage the expenditure of funds collected by the Australian Government on behalf of horticulture industries. In 2012/13 HAL invested more than \$100 million in projects to benefit horticulture industries.









































An Industry Advisory Committee (IAC) is established for each industry with a statutory levy and annual income exceeding \$150,000.

The Prescribed Industry Body (PIB) for an industry is responsible for recommending to HAL the establishment of, and any changes to, statutory levies. The PIB for an industry with a statutory levy recommends membership of the IAC to HAL and must demonstrate how the skills required on an IAC are met by the persons they recommend for appointment to the committee.


















































For more information please visit [www.horticulture.com.au](http://www.horticulture.com.au).

## ACROSS INDUSTRY PROGRAM








The avocado industry contributes funding towards an across industry program that addresses issues affecting all of horticulture. Details of the current program are listed below. A full report of the program can be found at [www.horticulture.com.au/industries/across\\_industry\\_program.asp](http://www.horticulture.com.au/industries/across_industry_program.asp).

Project no.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
<b>Objective 1: To enhance the efficiency, transparency, responsiveness and integrity of the supply chain</b>									
AH12009		Partnering fresh produce with retail: quality assurance harmonisation – phase I	Levy	1/08/12	31/05/13	\$143,500	\$143,500	Kitchener Partners	Tristan Kitchener 0407 827 738
AH12010		Partnering fresh produce with retail: joint working groups	Levy	1/08/12	30/10/13	\$274,475	\$229,199	Kitchener Partners	Tristan Kitchener 0407 827 738
AH12016		Partnering fresh produce with retail: quality assurance harmonisation – phase II	Levy	15/05/13	30/06/15	\$307,271	\$97,461	Kitchener Partners	Tristan Kitchener 0407 827 738
VG11019	  	Hortstats database: maintenance	Levy	1/01/12	31/05/13	\$30,000	\$10,000	Australian Bureau of Agricultural and Resource Economics	Matthew Miller 02 6272 3527
<b>Objective 2: Maximise the health benefits of horticultural products</b>									
AH11016		Partnership Program with Dieticians Association of Australia	Levy	1/10/11	30/06/13	\$180,000	\$90,000	Dieticians Association of Australia	Jodie McHenry 02 4954 4964
<b>Objective 3: Position horticulture to compete in a globalised environment</b>									
AH09021		Office of Horticulture Market Access – operations support	Levy	1/09/09	30/09/12	\$266,399	\$21,414	Horticulture Australia Limited	Kim James 08 6488 2209
AH09027	 	Investing in Youth Scholarship	Levy	31/05/10	31/03/15	\$80,000	\$15,000	Rural Industries Research and Development Corporation	Margo Andrae 02 6271 4132
AH10008	     	Future Focus: ongoing activities	Levy	7/03/11	24/10/12	\$109,000	\$29,000	Centre for International Economics	Derek Quirke 02 6245 7800
AH11009	  	Autonomous perception systems for horticulture tree crops	Levy	1/05/12	27/11/15	\$599,500	\$180,000	University of Sydney	Dr Salah Sukkarieh 02 9351 8154
AH11014	 	Leadership training: industry development for professionals	Levy	1/04/12	31/12/12	\$6,586	\$3,989	Horticulture Australia Limited	Peter Melville 02 8295 2317
AH11036	 	Industry Development Forum 2012	Levy	1/04/12	31/10/12	\$35,591	\$34,773	Horticulture Australia Limited	Dr Alison Anderson 02 8295 2316
AH11039		Horticulture Leaders – Across Horticulture Leadership Training	Levy/VC	15/05/12	29/01/13	\$136,250	\$81,751	Strategic Business Development Pty Ltd	Russell Cummings 0414 929 585
AH12012	  	Technical, secretarial and operational services for the NWPPA desktop study	Levy	22/08/12	31/05/13	\$11,000	\$11,000	Plant Health Australia	Nicholas Woods 02 6215 7704
AH12015		Food Innovation Hub	Levy	8/05/13	31/08/13	\$28,166	\$22,533	Food Innovation Partners	Russel Rankin 07 3289 4591
AH12017		Feasibility study: all-of-horticulture peak representative body	Levy	1/05/13	30/06/14	\$15,000	\$20,077	Horticulture Australia Limited	Dr Alison Anderson 02 8295 2316
MT12029		Horticultural Market Access Manager 2012–2015	Levy/VC	1/10/12	30/09/15	\$613,500	\$92,070	Langley Consulting	Chris Langley 0498 723 103
<b>Objective 4: Achieve long term viability and sustainability for Australian horticulture</b>									
AH09003	 	Plant protection: regulatory support and coordination	Levy	1/07/09	30/05/14	\$995,061	\$187,800	AKC Consulting Pty Ltd	Kevin Bodnaruk 02 9499 3833
AH09014		Across industry climate RD&E activities	Levy	13/04/10	29/11/13	\$75,126	\$11,647	Horticulture Australia Limited	Peter Melville 02 8295 2317
AH10003	  	Horticulture component of the National Climate Change Research Strategy for Primary Industries	Levy	30/11/11	3/05/16	\$225,000	\$45,000	Horticulture Australia Limited	Peter Melville 02 8295 2317
AH10006		Pesticide spray drift in horticulture: a response to new guidelines from the APVMA	Levy	1/07/10	31/05/13	\$20,000	\$1,966	Horticulture Australia Limited	Jodie Pedrana 0404 314 751
AH11005		Horticulture Environmental Desk Audit	Levy	30/11/11	10/12/12	\$50,000	\$10,000	Growcom	Jane Muller 07 3213 2483
AH11006	 	Carbon amelioration in horticulture	Levy	1/12/11	31/08/12	\$78,010	\$36,510	Department of Primary Industries	Justine Cox 0438 770 187

## ACROSS INDUSTRY PROGRAM

Project no.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
AH11007	   	Developing a LCI database for Australian agriculture	Levy	2/01/12	1/10/13	\$20,000	\$0	Rural Industries Research and Development Corporation	Peter Melville 02 8295 2317
AH11008	 	Horticulture response to APVMA spray drift regulations	Levy	20/12/11	30/05/13	\$70,000	\$0	Joint RDC collaboration	Jodie Pedrana 0404 314 751
AH11010		Biotechnology awareness in horticulture	Levy	10/10/11	31/05/13	\$130,000	\$38,858	Horticulture Australia Limited	Dr Alok Kumar 0418 322 070
AH11011	 	Horticulture funding of the CRC for plant biosecurity	Levy	30/06/12	30/05/18	\$3,000,000	\$500,000	CRC For National Plant Biosecurity	Dr Simon McKirdy 02 6201 2882
AH11029	 	Provision of independent technical and secretarial services to the NWPPA	Levy	20/12/11	31/05/13	\$50,000	\$25,000	Plant Health Australia	Nicholas Woods 02 6215 7704
AH12008		Australian Horticulture Export Symposia 2012	Levy	1/07/12	30/05/13	\$40,000	\$39,570	Horticulture Australia Limited	David Chenu 02 8295 2381
AH12017		Feasibility study: all-of-horticulture peak representative body	Levy	1/05/13	30/06/14	\$30,000	\$20,077	Horticulture Australia Limited	Dr Alison Anderson 02 8295 2316
MT10029	 	Managing pesticide access in horticulture	Levy	1/07/10	2/07/15	\$1,674,450	\$219,500	AgAware Consulting Pty Ltd	Peter Dal Santo 03 5439 5916
MT10049	  	A multi-target approach to fruitspotting bug management	Levy	1/03/11	1/04/16	\$1,310,000	\$38,333	Department of Primary Industries	Dr Ruth Huwer 02 6626 1196
MT10066	  	Project coordination for MT10049	Levy	14/03/11	31/05/13	\$40,000	\$1,663	RCR Agri Pty Ltd	Chaseley Ross 0409 707 806
<b>Objective 5: Other</b>									
AH11003	      	AIC: support function	Levy	15/09/11	30/08/13	\$84,187	\$23,400	Horticulture Australia Limited	Warwick Scherf 02 8295 2323
AH11017		Sponsorship of Appetite for Excellence Awards	Levy	1/07/11	22/06/14	\$75,000	\$19,000	Horticulture Australia Limited	Melissa Smith 02 8295 2340
AH11023		Graham Gregory Award and Function	Levy	1/07/11	30/06/16	\$150,000	\$31,436	Horticulture Australia Limited	Melissa Smith 02 8295 2340
AH11024	 	Across industry program communications plan	Levy	31/07/11	31/07/13	\$20,000	\$0	Horticulture Australia Limited	Melissa Smith 02 8295 2340
AH11026	      	Across industry program administration	Levy	1/07/11	30/06/13	\$25,000	\$12,071	Horticulture Australia Limited	Warwick Scherf 02 8295 2323
AH11028	 	Statistical Handbook for Horticulture: revision	Levy	1/12/11	28/11/12	\$49,500	\$10,000	Oliver and Doam	Agnes Barnard 02 8011 4743
AH12800	      	Across Industry Annual Report 2011/12	Levy	1/07/12	31/06/13	\$6,000	\$1,885	Horticulture Australia Limited	Amanda Lucas 02 8295 2318
MT12028		OHMA Operational Support 2012-2015	Levy/VC	1/10/12	31/05/15	\$91,500	\$10,337	Horticulture Australia Limited	Kim James 08 6488 2209

**Australian Government Rural R&D Priorities:**

 Productivity and adding value
  Supply chain and markets
  Natural resource management
  Climate change and climate variability
  Biosecurity
  Innovation skills
  Technology

## CLIMATE CHANGE RD&E



















































Throughout 2012/13 the Australian horticulture industry invested in a diverse array of climate change and climate variability projects to mitigate risk and explore potential opportunities. Targeted projects delivered against a range of objectives pertinent to either a particular industry, or the horticulture industry as a whole.

Horticulture Australia Limited (HAL) invested in cross-collaborative programs, such as the Climate Change Research Strategy for Primary Industries (CCRSPI) and Agricultural Lifecycle Inventory (AusAgLCI), and specific projects and programs on crop phenology, nitrogen management, regulated deficit irrigation, carbon and soil, and urban forest projects.





















HAL's RD&E investment is obtained through industry levies, voluntary contributions and matched by the Australian Government.



## AVOCADO PROGRAM

Project no.	Industry obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
Levy program										
AV07023	2	 	Avocado retail price surveys	Levy	25/06/08	30/08/12	\$341,896	-\$105,678	Avocados Australia Limited	John Tyas 07 3846 6566
AV08000	1	   	Rootstock improvement for the Australian avocado industry – phase III	Levy	1/01/09	1/03/13	\$1,340,830	\$268,932	Sunshine Horticultural Services Pty Ltd	Dr Anthony Whiley 07 5441 5441
AV08002	1	   	RNA silencing for <i>Phytophthora</i> -resistant avocado rootstocks	Levy	28/11/08	31/05/13	\$716,932	\$167,158	The University of Queensland	Neena Mitter 07 3346 6513
AV08020	1	   	Evaluating sustainable and cost-effective orchard management practices	Levy	30/01/09	21/12/12	\$533,730	\$139,733	Avocados Australia Limited	Dr John Leonardi 07 3846 6566
AV09001	1	  	National avocado quality and information management system	Levy	1/03/10	1/03/13	\$681,808	\$357,283	Avocados Australia Limited	Julie Petty 07 3846 6566
AV09024	1	     	Mechanisms of cultivar and race-based disease resistance in avocados	Levy	30/08/10	1/07/14	\$122,500	\$35,000	The University of Queensland	A/Prof Andre Drenth 07 3255 4391
AV10001	1	 	Improving yield and quality in avocado through disease management – phase II	Levy/VC	31/12/10	31/12/14	\$829,470	\$185,312	The University of Queensland	Dr Elizabeth Dann 07 3255 4352
AV10002	3	   	Best management practices and internet-based information delivery	Levy	1/11/10	31/05/14	\$211,642	\$81,945	The Department of Agriculture, Fisheries and Forestry, Qld	Simon Newett 07 5453 5926
AV10004	3		Biosecurity capacity building for the Australian avocado industry	Levy	1/10/10	31/01/13	\$256,961	\$89,598	The Department of Agriculture, Fisheries and Forestry, Qld	Dr Andrew Geering 07 3255 4389
AV10006	1	 	Avocado supply chain education materials – phase II	Levy	5/10/10	30/11/12	\$250,000	\$100,000	Avocados Australia Limited	Julie Petty 07 3846 6566
AV10008	3	  	Avocado industry communications	Levy	1/05/11	1/10/14	\$760,691	\$383,970	Avocados Australia Limited	Anna Petrou 07 3846 6566
AV10019	1	 	Reducing flesh bruising and skin spotting in Hass avocado	Levy	1/07/11	28/11/14	\$155,152	\$10,326	The Department of Agriculture, Fisheries and Forestry, Qld	Dr Daryl Joyce 07 3255 4368
AV11013	3	  	Integrated industry and market data	Levy	15/02/12	31/07/12	\$27,010	\$5,410	p2p business solutions Pty Ltd	Jenny Margetts 0418215276
AV11015	1	 	Avocado industry fruit quality benchmarking	Levy	7/03/12	26/02/16	\$581,990	\$129,330	Avocados Australia Limited	Julie Petty 07 3846 6566
AV11018	2		Educating early childhood educators	Levy	1/07/11	31/08/12	\$138,670	\$10,316	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV11019	2		Avocado nutrition research 2011/12	Levy	1/10/11	30/06/12	\$150,000	\$30,000	Consumer Insights	Joseph Ebbage 0407 543 340
AV11021	1	 	Analysing fruit-spotting bug activity from fruit set to harvest	Levy	24/01/12	31/01/16	\$122,500	\$35,000	The Department of Agriculture, Fisheries and Forestry, Qld	Dr Ian Newton 07 4048 4665
AV11023	2		Avocado marketing strategy review	Levy	23/04/12	23/07/12	\$55,000	\$15,000	Review Partners	Paul Costantoura 0415 097 400
AV11024	2		Avocado chef training classes in export markets	Levy	2/04/12	30/06/12	\$85,797	\$17,159	Team Strategy Concept Sdn Bhd	Rose Yong 03 9057 3733
AV11025	1	 	Developing of a cryobank for avocado germplasm	Levy	28/06/12	30/05/14	\$273,853	\$113,276	The University of Queensland	Neena Mitter 07 3346 6513

Project no.	Industry obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
AV11026	3		Australian avocado benchmarking program development	Levy	28/06/12	5/07/13	\$185,559	\$185,559	CDI Pinnacle Management Pty Ltd	Howard Hall 07 3217 6466
AV11500	2		Avocado industry marketing program 2011/12	Levy	1/07/11	30/06/12	\$1,565,000	\$239	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV12001	3		Leadership development plan for the avocado industry	Levy	1/08/12	31/05/13	\$54,690	\$54,690	Dianne Fullelove & Associates Pty Ltd	Dianne Fullelove 07 3374 0453
AV12005	3		Communicating project outcomes through video	Levy/VC	1/07/12	30/09/13	\$75,450	\$45,360	Applied Horticultural Research	Gordon Rogers 02 9527 0826
AV12007	1		Data collection to facilitate supply chain transparency	Levy	1/09/12	31/08/15	\$386,812	\$96,703	Avocados Australia Limited	John Tyas 07 3846 6566
AV12009	1		Understanding and managing avocado flesh bruising	Levy	6/12/12	30/12/14	\$240,753	\$88,932	The Department of Agriculture, Fisheries and Forestry, Qld	Dr Daryl Joyce 07 3255 4368
AV12010	1		Assessing the potential of reduced cold treatments for Shepard avocado	Levy	1/12/12	31/10/13	\$223,822	\$167,867	The Department of Agriculture, Fisheries and Forestry, Qld	Peter Leach 07 4057 3679
AV12012	1		Coordination of data management and avocado quality improvement and extension program	Levy	2/03/13	31/03/16	\$1,301,485	\$148,744	Avocados Australia Limited	Julie Petty 07 3846 6566
AV12013	1		Implementing improvements in the avocado supply chain	Levy	20/12/12	30/11/15	\$954,896	\$173,541	Avocados Australia Limited	Julie Petty 07 3846 6566
AV12016	2		Health professional education and research program 2012/13	Levy	2/07/12	29/06/13	\$301,720	\$260,030	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV12018	1		Dimethoate preharvest residue trials in avocados	Levy	30/07/12	29/11/13	\$57,450	\$48,000	AKC Consulting Pty Ltd	Kevin Bodnaruk 02 9499 3833
AV12023	2		Educating early childhood educators 2012/13	Levy	2/07/12	29/06/13	\$244,791	\$239,347	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV12025	2		Economic analysis of ROI from domestic market development and import replacement v's export market development	Levy	1/06/13	30/11/13	\$70,000	\$0	Oliver and Doam	Agnes Barnard 02 8011 4743
AV12028	1		Scoping study for alternate bearing research	Levy	16/07/12	31/10/12	\$36,153	\$21,723	The Department of Agriculture, Fisheries and Forestry, Qld	Simon Newett 07 5453 5800
AV12030	1		Literature review and gap analysis for the development of research plan into irregular bearing	Levy	1/04/13	28/05/13	\$35,800	\$0	Sunshine Horticultural Services Pty Ltd	Dr Anthony Whiley 07 5441 5441
AV12032	3		Review of the R&D and marketing program to identify technical or advisory requirements to support the IAC	Levy	24/06/13	19/07/13	\$9,900	\$3,640	Scott Williams Consulting Pty Ltd	Scott Williams 03 9018 7557
AV12035	2		Avocado consumer education research	Levy	7/06/13	30/09/13	\$61,521	\$28,710	BDRC Jones Donald Pty Limited	Tony Jones 02 9267 6444
AV12500	2		Avocado industry marketing program 2012/13	Levy	1/07/12	30/06/13	\$2,632,000	\$2,377,898	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376

Project no.	Industry obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
AV12501	2		Avocado foodservice marketing program 2012/13	Levy	1/07/12	30/06/13	\$392,551	\$378,800	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV12700	3		International networking	Levy	14/06/13	29/05/15	\$70,000	\$10,000	Avocados Australia Limited	John Tyas 07 3846 6566
AV12800	3		Avocado Industry Annual Report 2011/12	Levy	1/07/12	30/06/13	\$12,080	\$6,986	Horticulture Australia Limited	Amanda Lucas 02 8295 2318
AV12910	3		Avocado Consultation Funding Agreement 2012/13	Levy/VC	1/07/12	10/08/13	\$324,437	\$323,425	Avocados Australia Limited	John Tyas 07 3846 6566
MT09086	1		Bee Force – improving surveillance and sentinel hive traps	Levy/VC	14/06/10	30/05/12	\$160,928	\$2,542	Rural Industries R&D Corporation	David Alden 02 6271 4128
MT09087	1		Bee Force – Developing the model for other regions	Levy/VC	14/06/10	30/05/12	\$99,000	\$861	Rural Industries R&D Corporation	David Alden 02 6271 4128
MT09090	1		Developing a honeybee and pollination CRC bid	Levy/VC	14/06/10	30/03/12	\$30,000	\$261	Rural Industries R&D Corporation	David Alden 02 6271 4128
MT10021	1		Determination of cold tolerance in immature stages of Australian pest fruit fly species	Levy	1/11/10	31/05/14	\$896,348	\$51,902	The Department of Agriculture, Fisheries and Forestry, Qld	Peter Leach 07 4057 3679
MT10049	1		A multi-target approach to fruitspotting bug management	Levy	1/03/11	1/04/16	\$1,322,000	\$76,667	Department of Primary Industries, NSW	Dr Ruth Huwer 02 6626 1196
MT10058	1		Biosecurity implementation to strengthen Australia's honey bee and pollination responsive industries	Levy/VC	15/07/11	17/06/13	\$45,000	\$1,175	Plant Health Australia	Rodney Turner 02 6215 7720
MT10063	1		Remote sensing of beehives to improve surveillance	Levy/VC	1/08/11	17/06/13	\$152,000	\$3,197	National Centre for Engineering in Agriculture	Cheryl McCarthy 07 4631 2297
MT10066	1		Project Coordination for MT10049	Levy	14/03/11	31/05/13	\$40,000	\$3,326	RCR Agri Pty Ltd	Chaseley Ross 0409 707 806
MT11028	2		Fruit and nut tracking study 2011-13	Levy	15/03/12	30/06/13	\$37,520	\$5,141	Sprout Research	Heath Adams 07 3635 8802
MT11033	1		Surveillance of Asian honey bees	Levy/VC	1/07/12	17/06/13	\$100,000	\$4,350	CRC For National Plant Biosecurity	Gary Kong 0423 024 118
MT11034	1		National bee pest surveillance workshop	Levy/VC	1/07/12	1/10/12	\$28,000	\$1,218	Plant Health Australia	Rodney Turner 02 6215 7720
MT12001	1		SPLAT Cue-Lure based management of Queensland fruit fly	Levy	1/05/13	29/02/16	\$443,140	\$0	South Australia Research & Development Institute	Dr Peter Crisp 08 8303 9371
MT12009	3		Export and import market intelligence 2012-14	Levy	15/07/12	30/06/14	\$140,122	\$5,689	Fresh Intelligence Consulting	Wayne Prowse 0408 164 966
MT12010	2		Understanding the purchase behaviour of fresh produce consumers	Levy/VC	1/07/12	30/06/14	\$1,023,359	\$99,350	The Nielsen Company	Sandeep Chahal 0414 671 417
MT12011	1		National honey bee pest surveillance program	Levy/VC	15/05/13	30/04/15	\$146,372	\$0	Plant Health Australia	Rodney Turner 02 6215 7720
MT12028	1		OHMA operational support 2012-2015	Levy/VC	1/10/12	31/05/15	\$91,500	\$486	Horticulture Australia Limited	Kim James 08 6488 2209



Project no.	Industry obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Life of project value	2012/13 expenditure	Organisation	Contact
MT12029	1	☑	Horticultural Market Access Manager 2012–15	Levy/VC	1/10/12	30/09/15	\$613,500	\$4,428	Langley Consulting	Chris Langley 0498 723 103
MT12031	1	🔒	Market access audit by Thai officials of Australian avocado and strawberry growing and packing conditions	Levy/VC	1/08/12	30/09/12	\$11,856	\$8,400	Horticulture Australia Limited	Kim James 08 6488 2209
MT12032	2	🔗	Australia Fresh core program for export development 2012/13	Levy/VC	1/07/12	30/06/13	\$79,500	\$13,963	Horticulture Australia Limited	David Chenu 02 8295 2381
The avocado VC program operates in addition to the levy investment program										
AV11011	1	☑	Optimising phosphonate use for <i>Phytophthora</i> root rot management in Shepard avocados	VC	1/12/11	30/09/13	\$31,588	\$0	The Department of Agriculture, Fisheries and Forestry, Qld	Matthew Weinert 07 4048 4651

**Australian Government Rural R&D Priorities:**

- ☑ Productivity and adding value  
 🔗 Supply chain and markets  
 🌿 Natural resource management  
 ☀ Climate change and climate variability  
 🔒 Biosecurity  
 💡 Innovation skills  
 💻 Technology



# AVOCADO LEVY INVESTMENT SUMMARY

Year ended 30 June 2013	Marketing 2012/13 \$	R&D 2012/13 \$	Combined 2012/13 \$
<b>Funds available 1 July 2012</b>	<b>898,550</b>	<b>1,341,769</b>	<b>2,240,319</b>
<b>Income</b>			
Levies received	2,561,762	1,720,454	4,282,216
Commonwealth contributions		2,498,147	2,498,147
Other income	32,181	53,173	85,354
<b>Total income</b>	<b>2,593,943</b>	<b>4,271,774</b>	<b>6,865,717</b>
<i>Budget</i>	3,093,732	4,818,811	7,912,543
<i>Variance to budget</i>	(499,789)	(547,037)	(1,046,826)
<b>Program investment</b>			
Levy programs	2,449,229	4,422,047	6,871,276
Service delivery programs by HAL	299,624	574,247	873,871
Across industry contribution		90,135	90,135
Levy collection costs	18,590	18,907	37,497
<b>Total investment</b>	<b>2,767,443</b>	<b>5,105,336</b>	<b>7,872,779</b>
<i>Budget</i>	3,355,871	5,634,582	8,990,453
<i>Variance to budget</i>	588,428	529,246	1,117,674
Annual surplus/deficit	(173,500)	(833,562)	(1,007,062)
<b>Closing balance 30 June 2013</b>	<b>725,050</b>	<b>508,207</b>	<b>1,233,257</b>

## Avocado Industry Advisory Committee (IAC)

Bob Granger (Chair)  
Jack Archer  
Barry Avery  
Daryl Boardman  
Lachlan Donovan  
Wayne Franceschi  
Christine Hawkins  
Jim Kochi  
Simon Newett  
Anthony Walsh  
John Walsh  
Neva Law (Ex-Officio)  
John Tyas (Ex-Officio)



## For more information contact:



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