

Avocado

INDUSTRY ANNUAL REPORT
2011/12



Horticulture Australia

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

CLIMATE CHANGE RD&E

Australian horticultural industries remain committed to exploring the impacts and opportunities arising from climate change. Horticulture climate R&D investment encompasses a diverse range of objectives and in 2011/12 these include: cross-collaborative programs such as the Climate Change Research Strategy for Primary Industries (CCRSPI); carbon footprinting and lifecycle assessment; nitrous oxide research; evaluation of the carbon price mechanism and the Carbon Farming Initiative; adaptation management to reduce the on-farm risk of climate change; and water use efficiency.

These programs aim to empower horticulture to evolve under a changing climate through sound science and communication channels. HAL's RD&E investment in climate is obtained through industry levies, voluntary contributions and matched by the Australian Government.



Overview

The year continued on from 2010/11 with above average rainfall for most of mainland Australia from October 2011 until March 2012. Several records were set with the second wettest November and spring on record for Western Australia, and second wettest March on record for New South Wales.

2011/12 saw demand for Australian avocados continue to grow, with the marketing program maintaining demand, which was easily met by growing production levels.

Australian avocado exports increased 35% to a record 2,638 tonnes in 12 months to June 2012. The main markets accounting for 99% of annual avocado exports are Singapore, the Middle East, Thailand, Malaysia and Hong Kong.

A highlight of the year was the VII World Avocado Congress at the innovative Cairns Convention Centre. In attendance were 828 avocado producers, wholesalers, food service providers, market traders, retailers and government representatives from 23 countries around the world. Peru will be the host for the next Congress to be held in 2015.

Levy investment

In 2011/12 the total levy income received was \$3,935,387. The current levy is 7.5 cents/kg. A total of \$3,369,883 was invested in to research and development (R&D) projects and \$2,170,998 towards marketing projects. The Australian Government provided \$1,642,670 of matched funding to support the R&D projects in the R&D levy program.

In addition to levy funds, \$286,074 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 programs.

VC funds are matched by the Australian Government and \$342,957 of matched funding was provided in the 2011/12 year.

Horticulture Australia Limited (HAL) is responsible for managing these funds and takes advice on how to invest the funds from the Industry Advisory Committee (IAC). Consultation with the IAC is essential in determining the most critical investment priorities for the industry.

In addition to ongoing priorities, new R&D priorities set by the IAC for 2011/12 include

improving farm disease management, and industry capacity building.

The industry also contributes 2% of levy and/or voluntary contributions (matched to 4%) to an across industry program that addresses issues that affect all of horticulture, such as water availability, climate change, biosecurity and market access.

Strategic objectives

The avocado industry's activities in the 2011/12 period were guided by the *Avocado Industry Strategic Investment Plan 2011-2015*, which can be found at www.horticulture.com.au/industries/avocado. These plans were developed to reflect both the industry's priorities and the Australian Government's rural R&D priorities.

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.

R&D program

Improving disease management such as Phytophthora Root Rot, and soil borne and fruit quality issues were a focus of the program this year.

In order to ensure consumers receive consistent, high-quality product, another key focus of the program examined the flow of avocado through the supply chain. With the aim of providing handlers and ripeners with a reliable resource, a comprehensive *Avocado Ripening Manual* was released at the VII International Avocado Congress held in Cairns in September 2011. The manual is available to avocado ripeners from Avocados Australia.

Work continued with research trials into sustainable orchard management strategies. The communications projects through the website, the e-newsletter *Guacamole* and the quarterly publication, *Talking Avocados* provided the industry with up-to-date information through a

variety of tools.

R&D levy funds also contributed towards research into the affect of imported processed product on the fresh avocado market. Consistent supply of high quality and ripe fresh avocado is the best strategy to retain and grow a loyal consumer base.

Management of fruitspotting bug is being tackled with a large multifaceted R&D project initiated in 2010/11 and funded by five industries.

Marketing program

The marketing program for 2011/12 achieved excellent results, with more households increasing frequency of purchase and amount spent. The campaign evolved to 'Add an Avo Everyday', with the 'buy Australian' message incorporated.

Digital technology continues to be a key aspect of the program, and is incorporated through all components of the campaign. The main areas of investment are with TV and print magazines, however there is also significant work being done with early childhood educators, and nutrition and health professionals. The early childhood program reached over 31,000 day care and preschool children, and will be rolled out to primary children in 2012/13.

On the export front, the HAL multi-industry export program, Australia Fresh, showed a marked shift in priorities with the focus moving away from Europe and the Middle East towards the Asian region. As a result, Australian avocados were showcased at two important trade shows: Asia Fruit Logistica in Hong Kong, and the China Fruit and Vegetable Trade Fair in Nanning, China.

An external review of the current avocado marketing strategy was undertaken in 2011/12 and findings will be incorporated into the new *Avocado Industry Strategic Marketing Plan 2013-2016*.

Conclusion

This report provides a snapshot of project activities in the 2011/12 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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To build a sustainable and competitive supply of Australian avocados to meet consumer needs

Rootstock improvement for the Australian avocado industry

The avocado rootstock improvement project, now in its 10th year, has most recently been evaluating avocado rootstocks selected from the three botanical races within this species for their suitability to meet the requirements of the diverse production regions of Australia.

The difference between seedling versus clonally propagated rootstocks is also being evaluated, and production and postharvest performance of Hass and Shepard trees propagated to these different rootstocks have been evaluated and results reported when available in *Talking Avocados*, industry and international conferences and at two research and development (R&D) road shows.



One of the major objectives of the rootstock project was to evaluate the comparative performance of cloned (vegetatively propagated) rootstocks against the traditional seedling stock used by the Australian industry. Cloned rootstocks bring genetic uniformity into an orchard, as each tree has identical genetic makeup. The Californian and South African avocado industries are big users of cloned rootstocks, and both have access to cheap labour inputs that keep the cost of nursery trees relatively low. However in Australia, the price of cloned rootstock trees can be double that of their seedling rootstock counterparts - \$35 compared to \$17.50. Hence orchard establishment costs are considerably higher.

Analysis of five years of consecutive yield data demonstrates that in most cases with the varietal rootstock population used, there was either no improvement in production using cloned rootstocks, or seedling rootstocks out-performed their genetic clone. The exception was with two rootstocks, where the seedling population was highly variable and the genetic clone

consistently produced higher yields.

The 2012 yield data has to be added to the cumulative yields before final conclusions can be drawn, however it is unlikely that the current scenario will change. Apart from the obvious advantages of stabilising traits, like *Phytophthora* root rot (PRR) resistance using cloned rootstocks, there is no strong evidence to suggest that propagating to cloned rootstocks will give superior yield performance over seedling rootstocks.

Due to the high cost of nursery trees grown on cloned rootstocks in Australia, it is difficult to justify the use of cloned rootstocks, unless there is significant PRR pressure, where rootstocks such as SHSR-04 (cloned) should be used. Where disease pressure is low (new ground or well-drained soils) seedling rootstocks such as Velvick will continue to service the industry well.

Project AV08000

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RNA silencing based PRR resistant avocado rootstocks for improved production of GM free fruit

Phytophthora root rot (PRR) is the most serious and important disease of avocado worldwide. The causal agent, *Phytophthora cinnamomi*, has over 1,000 hosts and is a primary constraint on avocado productivity in Australia. Growers are estimated to spend approx \$10 million per year on chemical prevention practices and other cultural practices. This project aims to deliver potential economic benefit to the avocado industry, which loses approximately \$40 million annually in production and management costs due to PRR.

The project employs the innovative strategy of RNA silencing to engineer avocado rootstocks for resistance to

PRR without any modification in the scion. 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 Arabidopsis plants carrying these constructs. The transgenic Arabidopsis plants showed resistance to PRR when grown in soil heavily infested with *P.cinnamomi*.

The gene silencing constructs in avocado Reed rootstock for potential resistance to the pathogen have also been successfully introduced. Molecular analysis and multiplication of these putative transgenic plants is an ongoing progressive activity. Resistance screening of the transformed plants will begin in the coming months.

This work has generated international attention. Dr Neena Mitter was invited to participate in an avocado workshop funded by California Avocado Commission at University of California Riverside, United States in January 2012. Discussions are likely to lead to future collaborations in the area of avocado transformation to introduce desirable traits.

Project AV08002

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Development of best-practice guidelines for avocado ripening

Australian avocado handlers have a new resource for managing avocado ripening with the release of a comprehensive *Avocado Ripening Manual* at the VII International Avocado Congress, held in Cairns in September 2011.

A team of Queensland Department of Employment and Economic Development and Innovation (DEEDI) staff developed the manual as part of a two-year project to improve avocado ripening and handling practices.

Throughout the project, the team found that the system used to ripen avocados is a critical point in the supply chain, which must be managed effectively to achieve optimum fruit quality on the retail shelf.

To understand the issues involved with ripening avocados, the team followed a number of commercially packed consignments from South East Queensland to the different ripening facilities in Australian capital cities. They monitored conditions throughout the chain and spoke with all the handlers to understand the information they need to improve avocado handling. A number of research and development (R&D) trials were undertaken to refine ripening recommendations. The team also looked at the ripening facilities to see how they can be improved.

The team developed decision support for ripeners to use in determining the correct ripening and storage conditions for

different loads and requirements. All these findings have been incorporated into the avocado ripening manual, which is available to avocado ripeners from Avocados Australia.

The DEEDI project team would like to acknowledge the support from Horticulture Australia Limited (HAL), Costas Exchange and Avocados Australia in undertaking this

work. The work of a former DEEDI staff member and senior author of the manual, Scott Ledger and Avocado Australia's Julie Petty is gratefully acknowledged.

Project AV08018

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Avocado Ripening Manual

Mechanisms of cultivar and race-based disease resistance in avocados

Phytophthora root rot (PRR) is a significant limiting factor affecting avocado production in Australia and many other avocado producing countries. As yet, there is no complete resistance to the disease, and little is understood about the reasons why some rootstocks are tolerant/partially resistant.

This project aims to determine the mechanisms of resistance of avocado germplasm used as rootstocks, which vary in susceptibility to *Phytophthora cinnamomi*. Ten rootstocks across the three ecological races will be assessed for different components of resistance.

Subsequently, several rootstocks will be selected for gene expression analysis in order to identify putative selectable marker genes. Such marker genes may enable improved selection for resistance in rootstocks.

This was an industry funded PhD scholarship during the project's first year. Inoculation and glasshouse procedures will be further refined and preliminary data across seedling rootstocks obtained on the ability of roots to regenerate, and assess histological and enzyme defenses in these different rootstocks. Techniques are being optimised in readiness for the attainment

of larger numbers of clonal rootstocks for replicated experiments in November 2012.

Project AV09024

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Developing sustainable orchard management practices

This project aimed to identify sustainable orchard management practices used by avocado growers across Australia, and to conduct trials to evaluate the effectiveness of these strategies and provide recommendations on the most promising practices.

Evaluate orchard management sites

Twenty five sites were selected as case studies from the major production areas across Australia. A range of orchard management practices and products were being used, including mulching, natural mineral fertilisers, brewed microbes, fish and kelp concentrates, molasses and branch scoring. Information on the timing and cost of these strategies, as well as the effect on fruit quality and yield collected from these sites in the past three years, will be collated for the final report.

Orchard management trials

Several trials were established to test the effect of a range of orchard management strategies on tree growth, fruit quality, and yield, compared with current industry practices. The following orchard management strategies have been tested:

1. Mulching trials

Filter-press, avocado woodchip and

cane-tops were reapplied to 4½ year old Hass trees in Central Queensland in September 2011. A grower treatment (inter-row slashings with a thin layer of filter-press) was included for comparison. Trees were harvested in June 2012. Cumulative yields for the past three years were significantly increased in trees mulched with avocado woodchip, with 167.6 kg/tree compared with 137.9kg in the grower treated trees. Mulching with avocado woodchip also tended to reduce the incidence and severity of fruit rots and disorders.

Additional mulching trials were established in North Queensland in September 2011. A composted product (derived from vegetation waste), Rhodes grass hay, and a combination of the two products were applied to 2½ year old Shepard and Hass trees. A grower treatment (inter-row slashings) was included for comparison. Although there was no significant effect of treatment on yield, fruit size tended to be larger in trees receiving the higher rate of compost and the combined Rhodes grass hay and compost treatments.

2. Soil and foliar treatments

In 2011, foliar treatments of pyroligneous acid (PandaA®) - an organic liquid derived from bamboo - in combination with a copper fungicide program, tended to reduce the incidence and severity of fruit rots and disorders compared with the

copper treatment alone. This trial was repeated in the 2011/12 cropping season. The effect of treatment on fruit quality and yield will be determined in July 2012.

Application of the nitrogen fixing microbial product (TwinN®) as a soil drench tended to reduce the incidence and severity of fruit rots and disorders. Treatments were reapplied during the 2011/12 cropping season in October 2011 and March 2012. The effect of treatment on fruit quality and yield will be determined in July 2012.

3. Branch scoring trials

The effect of branch scoring on fruit size and yield was investigated at several sites across Australia. Branch scoring can increase cropping in vigorous trees, and may be a useful strategy to get regrowth in stag-horned trees back into production earlier. At some sites there was no significant increase in yield and fruit size was reduced on the scored branch. This technique is still experimental and may not necessarily work under all growing conditions.

Project AV08020

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Industry supply chain projects

The Australian avocado industry rolled out a series of programs designed to monitor and improve quality and track volumes. The overarching goal was to improve quality in the marketplace and as a result grow consumption and the industry. Best recommended practices and tools have been put in place to enable all supply chain members to fulfil their role in delivering the highest quality fruit to consumers.

Consumers want and therefore the industry's goals are to supply:

- Ripe and ready fruit they can eat today or tomorrow
- Mature fruit – measured through Dry Matter (DM)
- Fruit with less than 10% internal flesh defects.

Avocado resource audit web database

This project (AV08025) was undertaken to develop and implement a web-based database of all known avocado industry resources from the last 35 years. These materials helped to form the existing recommended best-practice techniques for avocados that have helped to set industry benchmarks. This database will be incorporated into the online Best Practice System, which is being developed as a part of AV10006. This project concluded in March 2012.



Avocado Transport Guide

Avocado retail quality surveys

Benchmarking of fruit quality was established to monitor internal fruit quality at a retail level and avocado maturity. Ripe Hass and Shepard fruit are purchased from 64 retail outlets across Sydney, Perth, Melbourne and Brisbane each month and assessed for internal defects. Fruit is also selected at random from the Sydney wholesale market once a month and independently assessed to monitor maturity. This project (AV08034) concluded in November 2011 and surveys will continue under the avocado industry fruit quality project (AV11015). These projects provide an invaluable tool for benchmarking the industry's performance against established consumer standards.

Avocado supply chain educational materials

This project (AV10006) aimed to fill identified information gaps within the supply chain on how best to handle fruit and maintain quality. The following guides have been developed as a part of this project:

Document	Target Audience	Purpose
Harvesting Guides	Growers/managers and pickers	Outlining the best recommended harvesting practices. They form the benchmark for growers.
Transport Guides	Packhouses and transport companies	Identifies key issues to be aware of when transporting avocados. They form the benchmark for transport companies.
Grading Guide	Packhouses	Details the most current recommendations for grading fruit. Will help form the benchmark for packhouses.

Through this project, a retailer education program was rolled out to over 600 retailers spread across Sydney, Perth, Melbourne, and Brisbane. This program is designed to ensure retailers are aware of the best recommended practices for handling avocados to ensure fruit quality is maintained. An online, interactive, adult training system where existing education materials will be converted to a training format is also in development. This Best Practice System is designed to be a training and induction aid for all members of the supply chain. The system will be up and running for some sectors of the supply chain by the end of the 2012 calendar year. This program is due to conclude in November 2012. An application to fund the next phase of this program has been made to Horticulture Australia Limited (HAL).

National avocado quality and information management system

This project (AV09001) incorporates the ongoing maintenance and rollout of the Infocado and OrchardInfo programs.

Infocado was developed to assist with the collection of data on the volume of avocados entering the Australian marketplace. It assists individual packhouses and grower packers to make better informed management and marketing decisions.

Currently there are four modules included in the system: seasonal forecasts, weekly forecasts, dispatch, and the wholesale modules. A minimum of 80% of production is included in the system. Weekly, quarterly, and annual reports are distributed to contributors showing short and long term forecasts and dispatches.

OrchardInfo is a data collection program which is designed to assist with long-term forecasting and productivity measurement. Data gathered included tree numbers per hectare, by variety and

rootstock.

This project also included the rollout and establishment of a quality accreditation system. A workshop with industry stakeholders was held in October to gather feedback on how this should proceed. This feedback will be used to guide how the program will develop into the future. This project is due to conclude in early 2013; an application to fund the next phase of the program is currently with Horticulture Australia Limited (HAL).

AV08025, AV08034, AV09001, AV10006, AV11015

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Improving yield and quality in avocado through disease management, phase II

This project focuses on the management of soil-borne 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.

Brown root rot, caused by the fungus *Phellinus noxius*, represents a significant constraint to current and potential productivity of the avocado industry in some eastern production areas. This fungus infects healthy roots through contact with infested roots in soil, and slowly kills trees. Two large trials have been established. One trial will assess curative and protective effects of treatments to trees, while the other trial will evaluate survival and

establishment of young nursery trees replanted into previously infested sites which had received chemical and cultural disinfestation treatments. Due to the nature of the infection and spread by the fungus, these trials are long term.

Phytophthora root rot (PRR) has maintained its position as the most significant disease affecting avocado production, particularly with the recent wet summers experienced in the eastern states. Evaluation of the ability of young trees grafted to different rootstocks to establish and survive under high PRR pressure continues. Trials have also been initiated to improve efficacy of phosphonate spray applications.

Another significant project activity is pathogenicity testing to confirm that *Calonectria ilicicola* (*Cylindrocladium parasiticum*) is a serious fungal pathogen causing severe root rot of young avocado, often resulting in deaths of newly-planted trees. This work has been reported in the scientific literature and disseminated to industry in an article published in *Talking Avocados*.

Project AV10001

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The progressive decline of avocados caused by *Phellinus noxius*

Optimising phosphonate use for PRR management in Shepard Avocados

Phytophthora root rot (PRR) remains the major limiting factor to avocado production in Australia. Shepard avocados account for 18% of the Australian avocado crop, with 45% grown in North Queensland, however, no specific phosphonate research has been conducted on Shepard avocados.

The project aims to optimise phosphonate use in Shepard avocados on the Atherton Tablelands by monitoring tree phenology and root phosphonate levels over a full crop cycle.

The first workshop for the project was conducted in February 2012 in Mareeba, and was attended by 45 growers and agribusiness representatives. Five trial sites were identified and established for the monthly phosphonate treatments on the Atherton Tablelands, at Mutchilba, Paddy's Green and Tolga. Monthly root analysis will be conducted on trees at this site and at two further sites for trees injected once a year in Paddy's Green and Tolga.

The first monthly samples have been collected and phenology data was

recorded prior to any treatments being applied. This project is ongoing and further findings will be available in 2012/13.

Project AV11011

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Development of an avocado rapid library tray system for Hass and Shepard

Library tray systems are used by many fresh produce industries around the world. A library tray is simply a representative sample of produce which is retained and used as a reference for out-turn quality issues. The primary function is to serve as an insurance policy against poor product quality feedback. However, in more progressive industries, the library tray system has been used to track quality through the cold chain and to feed information back to growers regarding their out-turn quality.

A library tray system was developed for Hass and Shepard avocado fruit, funded by voluntary contributions (VC) from Simpson Farms Ltd, CostaExchange Ltd and the Department of Agriculture, Fisheries and

Forestry (DAFF), with funding matched by Horticulture Australia Limited (HAL). This two-year project was completed in September 2011.

Since the Australian avocado industry is domestic-market focused, the system was tailor made for the local market. A simple, easy-to-manage system was developed using a single ripening/fruit storage regime which delivers fruit quality comparable with that of fruit on the domestic market. Results are obtainable within seven days of fruit packing, which is often before the fruit reach the retail stores or sometimes even the markets. Therefore, the system can be used as an effective marketing tool, giving distributors an early warning of the expected fruit quality.

The library tray system was commercially tested by Simpson Farms during the 2011 Hass season, and in 2012 was implemented for all avocado fruit packed at the Simpson Farm pack shed.

Project AV09028

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Reducing flesh bruising and skin spotting in Hass avocados

Bruising is the single most important post-production contributor to poor quality in avocado fruit. Despite efforts to understand this problem at different levels in the supply chain, there is limited understanding of how and when bruising occurs, and of how to minimise it.

This project was commissioned in July 2011 with the objective to reduce flesh bruising in Hass avocado fruit. The initial research areas were laboratory studies for characterisation of fruit bruising under controlled conditions, and supply chain

studies for monitoring fruit bruising under non-controlled conditions.

Illustrative findings from the supply chain studies are presented from surveys conducted for specific fruit consignments on a regular basis. Fruit sampling was from the ripener onwards, and encompassed four stores for each of two supermarket retailers. Samples were collected on arrival and dispatch at the ripener (points 1 and 2), on arrival and dispatch at the distribution centre (3 and 4), and at the storage area and on the shelf at the retailer (5 and 6).

Data from both supermarkets and supply chains were complementary, in that bruising clearly and consistently occurred mostly at the retail store level.

Future work will involve a detailed laboratory study to better understand the mechanics of flesh bruising, including:

- Evaluation of shock indicator decision aid tools
- Tracking of tagged fruit through supply chains
- Targeted investigation at the retail store level to ascertain the contributions to bruising by staff and customers
- Pre- and post-purchase studies with consumers to assess the ultimate level of bruising at consumption.

Project AV10019

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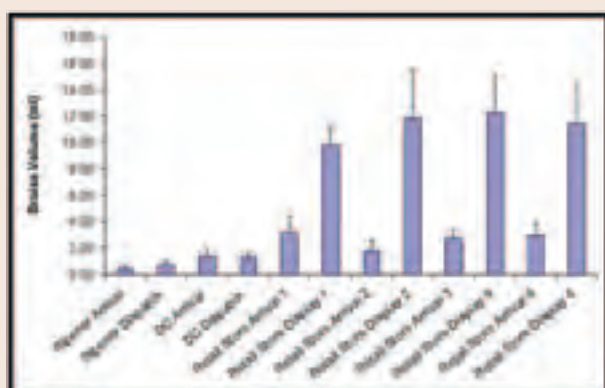


Figure 1: The averaged (mean +/- standard error) bruise volume (ml) per fruit (n=20) at serial levels in a supermarket supply chain from the ripener onwards to each of four retail stores



Protecting pollination

The Pollination Program is currently managing a number of research projects to secure the pollination of Australia's horticultural and agricultural crops into the future on a sustainable and profitable basis. The Pollination Program is a jointly funded partnership with the Rural Industries Research and Development Corporation (RIRDC), HAL and the Australian Government Department of Agriculture, Fisheries and Forestry.

The impact of an exotic pest or disease incursion is considered to be the most significant risk to the beekeeping industry and therefore the industries reliant on pollination. One of the key threats is the Varroa mite and much of the activity in the year the Program has been running is focused on this pest. If Varroa mite or similar bee pests reach Australian shores and become entrenched, it's expected to cost between \$21 million and \$50 million per year over 30 years. This is not just from lower honey production, but the impact of the loss of pollination by both managed and wild European honeybees on a range of fruits, vegetables and pastures.

RIRDC funds for the program are provided by the Honeybee Research and Development Program, with industry levies matched by funds provided by the Australian Government. Funding from HAL for the program is from the apple and pear, almond, avocado, cherry, vegetable and summerfruit levies and voluntary contributions from the dried prune and melon industries, with matched funds from the Australian Government.

Several projects are continuing their work to raise awareness of the importance of pollination, and the need to plan and prepare for Varroa.

Bee Force - improving surveillance and sentinel hive traps and developing the model for other regions

Ports have been identified as one of the most likely entry points for bee pests such as the Varroa mite, which has devastated bee colonies around the world. Australia is the last major country free of the pest, and with 65 per cent of our horticultural and agricultural crops requiring pollination, its arrival would cause devastation. When Varroa mite was first reported in New Zealand in 2000 by a hobby beekeeper, it was already endemic and found to have

likely been in the country for up to three years.

'Bee Force' is a community engagement pilot project aimed at recruiting confident beekeepers located within close proximity of high risk points of entry, and to train them to conduct in-hive surveillance for early detection, of exotic honeybee pests such as Varroa mites. The objective is to determine if the involvement of carefully handpicked beekeepers is of any value to the current surveillance programs managed by the Victorian Department of Primary Industries.

This two-year pilot project, to be completed in 2012, will evaluate the level of engagement and reliability of non-professionals, their willingness to be involved in a biosecurity project and test their level of commitment to a relatively long-term pilot project that requires discipline and a moderate level of expertise.

The pilot project in Melbourne with ten hobby beekeepers has worked exceptionally well, and another ten are now in place in Geelong. The beekeepers around the shipping ports of Melbourne and Geelong complement the National Sentinel Hive Program and similar programs designed to quickly find and identify both

bees and pests that might come into the country.

The project will be assessed to determine what it takes to make it work and if it can be implemented nationally. The project is gathering detailed information on costs, level of engagement and commitment by participants, potential issues, as well as strengths and weaknesses.

The project is managed on the ground by the DPI. Sabine Perrone, an expert in biosecurity, will assess how Bee Force could be designed to be rolled-out nationally.

Projects MT09086 and MT09087

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Developing a honeybee and pollination CRC bid

This project was designed to determine whether sufficient support (including co-investment funding) existed to develop a bid for a Honeybee and Pollination Security Cooperative Research Centre for submission in June 2012.

Early in 2012 it became clear that in addition to a shortfall of cash co-investment, the absence of obvious key



Monitoring the arrival of a swarm of bees to a bait box instrumented with cameras and weight, temperature and relative humidity sensors in controlled trials

stakeholders from the bid appeared certain to undermine the credibility of the bid. Under those circumstances it was decided that the intended bid would not be viable.

Nevertheless, the bid development process identified a program of high-quality R&D and extension activities, covering enhanced bee breeding and genetics, pest and pathogen control, and pollination enhancement and sustainability that would deliver important outcomes. Participants in the bid development agreed that alternative routes to seeking funding support for the work would be explored.

Project MT09090

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Implementing biosecurity to strengthen honeybee and pollination-responsive industries

To assist industries in identifying the biosecurity risks associated with new pests of honeybees, prioritisation of risks and mitigation activities, through development and implementation of a Honey bee Industry Biosecurity Plan (IBP), is a critical biosecurity preparedness activity. Implementation of the IBP will be assisted by development of a Honey bee Biosecurity Manual (HBM).

An IBP, a Honey bee Biosecurity Manual and contingency plans for four pest threats of honey bees is being produced. An Industry Biosecurity Group has been established and drafts of these documents have been prepared and circulated to this group for feedback. All documents are

expected to be completed by the end of September 2012.

Project MT10058

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Pollination - pesticide and bees booklet

A booklet that will help beekeepers and horticultural producers to manage the risk of honeybee pesticide poisoning – a major barrier to the increased supply of commercial pollination services – was developed.

The booklet contains:

- A list of pesticides known to be toxic to bees
- Information about the APVMA's pesticide registration regime
- Recommended practices for beekeepers and growers
- A *Pesticide Poisoning Risk Management Plan* that growers and beekeepers can work through prior to each pollination job.
- A *Pesticide Poisoning Investigation Form* designed to help facilitate the calm and accurate investigation of suspected poisoning events.

Verifying the accuracy and completeness of pesticide toxicity information provided by other sources has revealed errors and gaps in previous work of a similar nature, and this in itself has been a significant outcome of this project. The result is a list of 349



Photo captured inside the bait box as the swarm arrives

pesticides registered for horticultural and broadacre use in Australia that the APVMA has assessed as being toxic to bees.

Hard copies of the book can be purchased online, or downloaded as a free PDF at <https://rirdc.infoservices.com.au/items/12-043>

Project MT10060

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Remote sensing of beehives to improve surveillance

Currently, apiary inspectors routinely and manually check bait boxes at ports around Australia for the incursion of an exotic swarm. This project aims to develop an automated detection system that notifies apiary inspectors when a swarm has arrived at a bait box.

Controlled trials conducted at an apiary site in the first year of this project have demonstrated that temperature, weight and relative humidity sensors and camera imagery are all responsive to the presence of a swarm in a bait box. Further testing has enabled the identification of the sensitivity of different sensors to different swarm sizes arriving in a bait box under controlled conditions. A solar-powered bait box instrumented with a remote access camera that is viewable online has been deployed to the Port of Brisbane as an initial installation.

Project MT10063

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Bees clustered on the top bar inside the instrumented bait box



A multi-target approach to fruitspotting bug management

Fruitspotting bugs (FSB) are a major native pest in a number of subtropical and tropical horticultural crops in Australia. Until now, 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 a number of management strategies, including:

1. A database collating research and practices of FSB management, related insects and technologies
2. Evaluating IPM compatible insecticides, new chemistry and biopesticides
3. A monitoring and trap cropping program
4. Biological control for mass-rearing FSB and *Anastatus* egg parasitoid of FSB, release strategies, ecology and initial evaluation of various biological control agents
5. Improved management options through IPM case studies on selected

commercial farms to strengthen adoption of management strategies

6. Control strategies on a regional basis implemented through area wide management (AWM), which will be integrated and tested at farm level and regionally
7. Industry adoption to ensure that industries are thoroughly consulted and have input into the project, that research is relevant across all industries and that project outcomes will be accessible to all growers.

Project findings and developments for 2011/12 are as follows:

- New chemicals are promising candidates as replacement for endosulfan and first season harvest from research, and commercial field trials have commenced. Biological control agent for mass-rearing selected and first releases have been made.
- Biological control agent for mass-rearing selected and first releases made

- Chinese oak silkmoth eggs proved to be a suitable alternative host for the egg parasitoid *Anastatus sp.*
- Mass-rearing for egg parasitoid is basically developed and is being refined
- Pheromone composition *A.l. lutescens* has been refined and narrowed down to two major components
- Prototype of pheromone traps for *A.l. lutescens* developed and small-scale field trials undertaken
- *A. nitida* examined for pheromones to confirm earlier findings
- Cover crop trials as part of PhD work commenced, and harvest for the first season field trial has commenced
- Collection of invertebrates in cover-crop field trials on commercial farms as part of the PhD has commenced
- Invertebrates collected are assessed for natural enemies of FSB
- Trap crop hedges have been planted on further macadamia and avocado farms and data from established hedges is being collected.



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

Project MT10049

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Coordination of export development for Australian avocados

This VC-funded project provided training to retailers and staff, as well as importers, on how to handle avocados and to identify potential future markets and the possible volumes required.

Five markets were identified, including Hong Kong, Thailand, Singapore and Malaysia; these markets now receive supply of Australian avocados. The growth in exports has been as high as

30% in Singapore over the past two years, and export growth in other countries has varied from 5-15%. Fruit is also now being exported to the Middle East, with volumes slowly increasing.

The training was a great success, with over 300 trainees participating in the program. As a result, the quality of the product in store has improved, and retailers are more confident with handling avocados, resulting

in decreased losses due to mishandling. The outcomes have exceeded expectations, with export reaching 182,000 trays in 2011.

Project AV09005

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To increase demand for Australian avocados

Marketing program

The 2011/2012 annual marketing plans for the domestic promotion of avocados took the industry into its second year of the new strategic plan. The central focus was the continuation of the agreed strategy to specifically target light and medium users of avocados, aiming to shift perceptions of the fruit from being a versatile product ingredient in the kitchen to an indispensable ally and a must-have.

The aim was to maximise investment in creative assets developed in the previous year to maintain continuity of existing activities and communication. Marketing activities continued to focus on the target audiences of 'bustling families' and 'start-up families' (Nielsen HomeScan segments) identified as the best opportunity for increased purchasing.

Overall, the marketing program for 2011/2012 achieved excellent results:

- 202,000 more Australian households bought avocados this year, both buying more and spending more
- Overall purchase frequency held steady on the back of penetration gains, with gains coming from all life-stage segments
- With the core-target segments, there has been small-scale growing in volume and value of average weight of purchase (AWOP) - 'bustling families' increased volume, while 'start-up families' showed a dip on the back of important penetration gains.

Australian avocados advertising

In evolving the communications message of versatility with an everyday call to action, "Add an Avo Everyday", the media selection for 2011/2012 also evolved to include a greater investment in social media and digital channels.

Designed to engage brand advocates, technologies such as facebook and Youtube were integrated into the Australian Avocado website, which enabled the sharing of content across a wide range of users. This was a complimentary strategy to the purchased media schedule.

Television and magazine

Television and magazines continued to be important tools - with television bringing the versatility message to life, while magazines delivered purchase consideration through high-involvement recipe-based messages.

The avocado TV commercial was seen across the Lifestyle digital channel network including Lifestyle YOU, HOME and the Lifestyle Channel, supported by the 60-second interstitials. Programming included *Jamie's 30-Minute Meals*, *Good Chef Bad Chef*, *Come Dine with Me*, *Cake Boss*, *Secrets of a Restaurant Chef* and *Mexican Food Made Simple*.

A range of print advertising appeared in magazine such as *Good Taste*, *Super Food Ideas*, *Women's Weekly*, *Woman's Day*, *Donna Hay*, *MasterChef* and *Recipes Plus*.

Digital advertising

Digital advertising targeted popular websites, where the target audience were actively searching for avocado-relevant information. The aim was to direct traffic back to the Australian Avocados website as a resource for recipes, tips and usage.

Digital advertising continued at taste.com.



Great Aussie Avo Recipe Project promotion



Internet video advertising on watchmojo as part of the digital media strategy

au, with the Australian Avocado advertorial page. Taste is Australia's most popular food website, drawing content from various NewsLifeMedia food titles such as *Delicious*, *Australian Good Taste*, *Super Food Ideas* and *MasterChef Magazine*. Taste has an audience of over 1.72 million each month and includes more than 23,000 recipes.


Food service campaign

During 2011/2012, the food service program facilitated training classes with commercial caterers Alliance, as well as the student training at TAFEs in New South Wales, Queensland and Victoria. The chef training sessions covered new ground with the inclusion of Newcastle chefs into the program, concluding with the annual restaurant circuit in Brisbane, Sydney and Melbourne, where influential chefs raised the bar of creativity in the usage of avocado in fine dining menus.

Underpinning this program are relevant supporting materials, including the *Fresh Avocados Masterbook*, product knowledge bags, a food service public relations campaign targeting industry magazines, as well as social media platforms to communicate directly with the market.

Consumer website

The website is the hub of all avocado information for consumers, which has received in excess of 276,000 unique



visits. Users join the Australian Avocados database by registering with the website, signing up for emails and entering competitions. If they wish to be contacted, electronic direct mails (EDMs) are sent as a vehicle to maintain the relationship and keep Australian avocados top of mind, as well as provide any relevant news.

Educating early childhood educators

For two years, avocado growers have provided a resource kit for early childhood educators to equip them with knowledge on how to promote healthy eating amongst young children i.e. to eat a 'rainbow of colourful vegies and fruit'. The initiative has greatly increased its participation numbers with over 1,071 long day care and preschool centres in 2011 signing up, and over 31,000 children experiencing the program delivery.

The ongoing success of the 'Eating My Colourful Vegies and Fruit' program in early childhood centres, and the positive feedback from the wider education sector provides encouragement to investigate furthering the reach of the program. Food and nutrition for children continue to be a focus of concern amongst health educators. After discussions with key education, health and nutrition stakeholders in several states, there is interest in the 'Eating My Colourful Vegies and Fruit' kit being made available to primary schools, with some additions and modifications to make it relevant to the curriculum.

A primary school version of the program will be developed and piloted in 10 schools in 2012/13 ready for a full roll out in 2013.



'Eating My Colourful Vegies and Fruit' kit as used in early childhood centres

Nutrition and educating health professionals

The Australian Avocado Nutrition Research and Education program was initiated by the *Australian Avocado Industry's Strategic Plan 2011-15* as part of the objective to increase consumer demand for Australian avocados. This objective articulated that there is a "significant opportunity for avocados to claim a space in the 'health' sector. However any health claims need to be underpinned by validated and trusted research".

The 2011/12 nutrition and health program focused on the following key audiences: dietitians, doctors in general practice - GPs, and public health policy professionals.

The foundation of the Australian avocado nutrition and health program was to ensure the current nutritional messages being communicated were fully researched and validated. To this end, Lisa Yates, the program dietitian, worked throughout the 2011/12 program with all agencies involved in marketing activities to review and enhance the health and nutrition content.

The focus of the research activities with dietitians during the 2011/12 nutrition programs was on paediatric health. This



Alchemy chef Brad Jolly preparing inspiring avocado dishes



Australian avocado masterclass menu at Bentley Restaurant & Bar, NSW

emphasis on the health of mothers and young children was consistent with two of the key audiences of the Australian avocado marketing program: namely start-up families and small scale families.

The research program with GPs aimed to create two-way communication in which the health profile of avocados could be raised and the nutritional perspectives of GPs would be understood. One method of generating engagement with GPs was the launch of the Australian avocado 'Refer A Dad' program. This program provides GPs with a kit of materials they can use to increase the number of men having checkups in their practice.

A major conclusion of the 2011/12 avocado nutrition and health program was to focus on two key nutrients of avocados – namely, healthy fats and folate:

- The importance of folate resonates with women aged 25-40 for themselves and their young children
- The importance of healthy fats resonate with an over 35 demographic - both male and female, that are concerned about heart health and preventing diabetes.

This leads the Australian avocado industry to strongly argue there is a significant proportion of the Australian population whose health prospects would be improved by regularly eating avocados. This position is the foundation of the Australian avocado's public health campaign.

Project AV11500, AV11016, AV11018 and AV11019

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Export-import market intelligence

Since Australia is a small player in the global fresh produce market gathering reliable market intelligence is vital for setting realistic market access and development objectives and understanding the growth opportunities and competitive environment in which the avocado industry is operating in outside Australia.

This project gathers export and import trade statistics from both Australian and international sources and analyses the data providing critical trade information for industry leaders to monitor the industry's position against development objectives relative to competitors and other industry trends. This analysis includes monitoring of volume, value and dollars per kilogram by market, annual, monthly and season to date measures. By active participation the

project also gathers market intelligence information from the Southern Hemisphere Association of Fresh Fruit Exporters (SHAFFE) and other international links at Asia Fruit and Produce Marketing forums.

During January - December 2011, the total exports of Australian avocados were 2,215 tonnes valued at \$7.2 million. Australian avocados accounted for 2.1% of Australian fresh fruit exports that were valued at \$347 million in 2011.

Singapore, Middle East and Thailand were the top three market destinations for avocados accounting for 77% of the exported volume in 2011. Chile, South Africa and New Zealand were Australia's main global competitors. Overall Australian avocados accounted for 37% of 4,600

tonnes of avocados imported by various Asian markets (excluding Japan) in 2010. Of interest is that Japan is the largest importer of avocados in Asia accounting for 45,000 tonnes per annum mostly from Mexico. Australia has no access to the Japan market.

The project delivers four reports each year in addition to ad hoc analysis when needed by industry leaders. The project concluded in June 2012 and a new revised project starting July 2012 will deliver ongoing analysis.

Project MT10022

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Menu penetration survey

In November 2011, 1,082 food service outlets were contacted by telephone and asked questions about the use of avocados in their menu. The survey was short and simple, and designed to be answered by the person(s) who could accurately report on the dishes listed on their menu and comment on the quality of avocado supply.

The research followed a survey in May 2009 where the same questions were asked. There were some changes in the regions, type of food service outlet and cuisine type.

This sample size gives a confidence level

of $\pm 2.9\%$ at the 95% confidence level.

There was little overall change from 2009 to 2011, however there were changes found by food service type. Hotels are less likely to offer avocados (54% have avocado meals), whilst pubs and restaurants are just as likely offer avocados (57% and 58% respectively have avocado meals). Clubs are more likely to offer avocados (58% have avocado meals)

Additionally, differences were found by region. Canberra is less likely to offer avocados (48% have avocado meals), however Sydney, Melbourne, Brisbane, FNQ and Newcastle are just as likely

to offer avocados (all around 60%). The Gold Coast is more likely to offer avocados (75% have avocado meals).

The research project is completed and results have been delivered. It is anticipated that a future benchmark study will be carried out to assess change from 2009 and 2011.

Project AV11017

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

During last year an additional 200,000 households bought avocados, resulting in around 7 out of 10 Australian households

purchasing avocados in 2011. At the same time, we now understand that the average Australian household is now buying avocados almost nine times per year, and senior couples are the most important lifestage from a value perspective.

Project MT10017

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Australia Fresh

Australia Fresh is the multi-industry export program managed by Horticulture Australia Limited (HAL) on behalf of its members to build awareness of Australian horticultural produce in overseas markets. The program builds on trade facilitation, trade briefings intelligence gathering and information dissemination through shared export learnings.

2011/12 showed a marked shift in priorities for Australia Fresh, with the focus moving away from Europe and the Middle East towards the Asian region. As a result, Australian horticulture industries were showcased at two important trade shows - Asia Fruit Logistica in Hong Kong, and the China Fruit and Vegetable Trade Fair in Nanning, China.

Asia Fruit Logistica 2011

Asia Fruit Logistica continues to grow, establishing its unique status as one of the leading business, information and networking events for the fresh fruit and vegetable trade in Asia. The three-day exhibition and forum in Hong Kong, open only to trade professionals, attracted over 332 exhibitors from 33 countries, and 5,300 visitors from 63 countries.

Australian exporter briefing session

An exclusive briefing session was conducted by Austrade in September 2011 for registered co-exhibitors of the Australian Pavilion. Fourteen Australia Fresh co-exhibitors attended the session on the day, with representation from state governments such as Victoria and Queensland.

The session focused on providing a brief overview on each market and current

market conditions within the region. This also created the opportunity for exporters to meet with each of the Austrade Business Development Managers for the various regions in Asia prior to the launch of the main exhibition.

Networking reception

The networking reception in Hong Kong is the highlight for most exhibitors each year, where exporters have the opportunity to attract new customers and to maintain and develop existing business relationships within an informal setting. In 2011, the networking function took place at the Austrade function room and attracted over 180 guests, including 80 overseas importers from various Asian markets. The night was also attended by Les Luck, the Australian Consul General in Hong Kong and other distinguished Austrade personnel.

China Fruit and Vegetable Trade Fair

Based on the interest levels from various industries and exporters alike, Australia Fresh took part in organising an Australian trade pavilion at the China Fruit and Vegetable Trade Fair in November 2011. The program was initially driven by the summerfruit, table grape, cherry, and apple and pear industries, but later was joined by the Avocado Export Company, representing the Australian Avocado industry.

The total exhibition area at the 2011 event was 8,100 sqm, with 189 exhibitors from 10 countries participating including Australia, Chile, China, India, Malaysia, Philippines, Spain, Thailand, United States and Vietnam.

The Australian trade activity was undertaken with the main objective to demonstrate a unified approach of Australian horticulture and to communicate the commitment to develop strong relations with the local market and an

opportunity to meet with government organisations including;

- China Entry & Exit Inspection and Quarantine Association (CIQA)
- China Fruit Marketing Association China Cash Forest Association (CCFA)
- China - ASEAN Export Secretariat
- Administration of Quality Supervision, Inspection and Quarantine - People's Republic of China (AQSIQ).

The trade event included a number of symposiums driven by the government organisations on international trade and quarantine matters, which was attended by the Australian delegation. The Australian contingent was recognised by the government officials at the symposium and received appreciation and acknowledgment for the significant presence of Australia and continued support at these types of events.

Trade advertising

In 2011/12, Australia Fresh advertised in two global trade publications - *Asia Fruit* magazine and *Euro Fruit* magazine. All advertisements coincided with Australia Fresh's key events, such as attendance at trade shows and new season's arrival and availability for Australian fresh exports.

Furthermore, Australia Fresh also advertised on *Fresh Plaza*, www.freshplaza.com, an internet magazine dedicated to fresh produce with an audience reach of over 25,000. The banner advertisement campaign ran for a 52-week period, with the banner being changed every month to draw attention to different key events and announcements for new season's arrival and availability for Australian fresh exports.

Outlook for Australia Fresh in 2012

In October 2011, HAL conducted an extensive review of the Australia Fresh



Phil Ingram, Senior Trade Commissioner, Austrade, addressing delegates



Frances Cheung, Business Development Manager, Austrade with overseas buyers



Australia Fresh stand at Asia Fruit Logistica, 2011

program in consultation with industry members and exporter groups, with the intent to ensure that any future program priorities and activities are closely aligned with that of its contributing industry members and exporters. The outcome of this review has resulted in a robust program model that can be adopted by exporting industries, complimenting industry and exporter competencies and building synergy across marketing capabilities.

The new Australia Fresh program was launched in July 2012.

Project AV11501 and ES11500

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Chef training classes in export markets

A series of masterclass workshops for chefs and buyers were held in Singapore, Malaysia and Hong Kong in May, 2012. The aim of this project was to increase awareness, and to better educate the food service industry about Australian avocado's versatility, season, types, handling and purchasing.



A masterclass participant with the *Fresh Avocado Masterbook*

In Asia, avocados are mainly used in cold and side dishes, predominantly in Western cuisine, however in the masterclasses, nine new recipes were created, and proper techniques developed, which utilise avocado in hot Chinese, Indian and Malay

cooking. These recipes are featured in the newly printed *Fresh Avocado Masterbook*, which has been translated into Malay and Chinese language.

The masterclasses attracted a total of 251 chef and purchaser participants from 'star' hotels and independent restaurants. As a result of the workshops, more than \$42,000 worth of media publicity value was achieved through six news clippings and two media interviews.

Participant feedback suggested the masterclasses were very well received by the chefs in all three countries. The majority of participants sited the workshop and print materials as being incredibly valuable. The survey findings demonstrated the key messages of this program were delivered and achieved.

Masterclasses held in 2012/13 will respond to participant feedback and further develop innovative recipes for Malay, Indian and Chinese cuisine.

Project AV11024

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Avocado marketing strategy review

Horticulture Australia Limited (HAL), at the request of the Avocado Industry Advisory Committee (IAC) which provides research and development (R&D), and marketing program recommendations on behalf of the Australian avocado industry, undertook an independent assessment of the current avocado marketing strategy and activities in preparation for the new 2013-16 strategic marketing plan.

Review Partners were commissioned to conduct a critical review of all avocado marketing activities to assess how the avocado marketing levy can deliver the greatest net benefit to the avocado industry. The review focused on five key topic areas which provided the framework for a process of stakeholder consultations and desktop research. The five key topic areas covered were:

1. Market review and economic trends
2. Competitor review

3. Strategic Development review

4. Creative effectiveness review

5. Media effectiveness review.

The review, which concluded in July 2012, lead to the following recommendations:

1. Research should be conducted to establish how much equity is currently held among the Australian population for each element of the current campaign, the potential influence of the messages contained within it and the definition of the target market that offers the greatest potential for increased consumption
2. Research needs to define the ideal consumer, based on consumption (frequency and volume) to support the goals of the industry (i.e., increase consumption to support increased production, and to define what would

make more people the 'ideal consumers', referring to heavy buyers for inspiration)

3. Research needs to explore the range of messages that could be used to promote avocados with a view to finding a hierarchy of messages that are likely to stimulate the most people to become regular consumers of avocados.

The recommendations will be incorporated in into the new *Avocado Industry Strategic Marketing Plan 2013-2016*, which will be launched in the first quarter of 2013.

Project AV11023

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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

The avocado industry communications project provides the Australian avocado industry with a mix of communication tools, with the objective of sharing factual and timely industry-related information, and provides an opportunity to grow and improve the business prospects of Australian avocado growers.

The industry website is the primary method of communication, as it allows the timely reporting of and access to relevant industry information. The website offers information that includes, but is not limited to: a daily newsfeed, weekly avocado retail prices, grower notices, bi-monthly dry matter results, and listings of relevant national and international industry events.

Australian avocado growers (levy payers) are also issued with a username and password to access the Online Reports Centre via the website. The Online Reports Centre is a useful communication tool that offers users easy access to annual reports,

R&D and marketing final reports, market monitoring reports from Nielsen, as well as study group minutes.

The industry's quarterly publication, *Talking Avocados*, is a clear and succinct magazine that focuses on technical and industry issues and also augments most email, website and hard copy industry communication. The magazine is posted to 1,000 Australian avocado growers, government representatives, and retail and industry service providers. With a readership estimated in excess of 2,300, *Talking Avocados* will continue to be a vital tool to communicate with industry stakeholders.

Other effective communication tools utilised in this project include direct emails, such as the fortnightly e-newsletter *Guacamole*, as well as grower and industry specific emails, hard copy mail outs, face-to-face meetings/briefs and participation at industry forums.

A review of industry communications will be undertaken in late 2012 and recommendations from that review will be incorporated into AV10008.

Project AV08045 and AV10008

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The avocado industry website

Best management practices and internet-based information delivery

Currently there are no up-to-date production guidelines for Australian growers. The *Agrilink Avocado Information Kit* published in 2001 is now significantly out-of-date and out-of-print. As a response to the lack of quality, current information, this project aims to provide Australian growers with dynamic information resources to assist with the production of high-quality avocados in a competitive and sustainable manner.

The material for the first information product, the *Avocado Problem Solver Field Guide*, is complete and available. This hardcopy guide illustrates and describes 98 pests, diseases and other disorders, and provides advice on their prevention and treatment. It also illustrates and describes 23 beneficial insects and nine high risk exotic pests and diseases. Printed on water-resistant paper, it contains over 400



The Avocado Problem Solver Field Guide

colour photographs and is arranged in distinct colour-coded sections for quick reference. Designed for use in the orchard, pack shed and throughout the market chain, it is an invaluable reference for growers, packers, marketers, wholesalers, advisers and scientists.

In addition, work has commenced on the development of an online content management system. This system aims to provide growers with key information on best management practices, and has the potential to deliver the information in a number of different forms including text, video clips and live crop calendars.

Project AV10002

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Analysis of the competitive threat to Australian fresh avocado markets from processed avocado products

The current impact of imported processed avocado is small, but the potential future impact could be high in both retail and food service markets. The best primary strategy for competing with imported products is increasing consistent supply of quality and suitably ripened fresh Australian avocado to retain and grow local markets. Secondary strategies include:

- Strengthening the food service supply chain by including providers in future survey and promotion work
- Promoting Australian processed products, where appropriate, as a secondary block to imported processed product.

A further recommendation is that future food service menu surveys provide information on the use of fresh versus processed product.

Fresh fruit has a price advantage over processed products on a \$/kg of product flesh basis. The gap is smaller when labour and skills for preparation are considered.

Cafes and quick service restaurants are the primary domains where processed products are used.

Results from the consumer research demonstrates:

- Australian whole avocados were the overall preference for participants
- Strongest incentive for purchasing processed avocado is to avoid low-quality avocados and provide convenience
- Price-sensitive consumers are motivated to trial imported processed avocado if cheaper.

A gap exists for a whole avocado alternative that satisfies the need for a ready ripe, high quality, convenience format such as a fresh cut avocado product.

Project AV11006

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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 aims 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.

Ambrosia beetles around three avocado growing areas in Queensland and Northern New South Wales have been trapped to identify endemic species and to survey for *X. glabratus*. The trapped beetles and fungal symbionts have been identified using DNA bar-coding methods. Fortunately, *X. glabratus* has not been found. However, it has been

discovered that a branch dieback disease of avocado, associated with the beetle *Euwallacea fonicata* and first found in macadamia and avocado orchards on the Sunshine Coast is also present in the Atherton Tablelands.

Research is continuing to develop and validate tests for *R. lauricola* and *X. glabratus*.

Project AV10004

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INVESTING IN AUSTRALIAN HORTICULTURE

Australian Government priorities

As part of the Australian Government's commitment to rural research and development, horticulture industries can access matching Commonwealth funding through HAL for all research and development activities.

The Australian Government's Rural Research and Development 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 R&D program against each of the Australian Government priorities for rural research and development. Full details of expenditure across all industries is available in HAL's annual report at www.horticulture.com.au

The Australian Government priorities are:

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 mitigate the effects of climate change.

Biosecurity

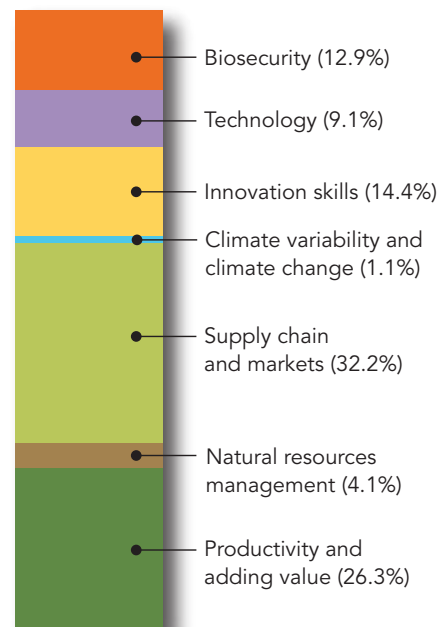
Protect Australia's community, primary industries and environment from biosecurity threats.

Innovation Skills

Improve the skills to undertake research and apply its findings.

Technology

Promote the development of new and existing technologies.



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 2011/12 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 Industry Representative Body (IRB) for an industry is responsible for recommending to HAL the establishment of, and any changes to, statutory levies. The IRB 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

HAL partnership agreement and consultation funding

The partnership agreement between Avocados Australia Limited (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.

Partnership agreement activities are funded by HAL using the avocado R&D and marketing 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 2011/12 was \$292,918. This represents 5.3% of the total annual levy expenditure. Consultation funding in respect of R&D represents 6.1% of the investment in R&D expenditure and consultation funding in respect of marketing represents 4.0% of the investment in marketing expenditure.

Project AV11910

For more information contact:

John Tyas, AAL

T 07 3846 6566

E j.tyas@avocado.org.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.

Project No.	Project title	Levy or VC	Project start	Project finish	Organisation	Contact
Objective 1: To enhance the efficiency, transparency, responsiveness and integrity of the supply chain						
AH11025	Fresh Food Summit and Supply Chain Forum 2011	Levy	1/10/2011	30/06/2012	AXS Partners Pty Ltd	Tristan Kitchener 0407 827 738
Objective 2: Maximise the health benefits of horticultural products						
AH11016	Partnership program with Dietitians Association of Australia	Levy	1/10/2011	30/06/2013	Dietitians Association of Australia	Jodie McHenery 02 4954 4964
Objective 3: Position horticulture to compete in a globalised environment						
AH09025	Office of Market Access Program	Levy	1/10/2009	30/06/2012	Horticulture Australia Limited	Jodie Pedrana 0404 314 751
AH09027	Investing in Youth Successful Scholarship applicant	Levy	31/05/2010	31/03/2015	Rural Industries R&D Corporation	Margo Andrae 02 6271 4132
AH10008	Future Focus - ongoing maintenance	Levy	7/03/2011	27/07/2012	Centre for International Economics	Derek Quirke 02 6245 7800
AH11014	Leadership training	Levy	1/04/2012	31/12/2012	Horticulture Australia Limited	Alison Anderson 02 8295 2316
AH11015	Data acquisition & management	Levy	1/04/2012	31/05/2012	Australian Bureau of Agricultural & Resource Economics	Max Foster 02 6272 2095
AH11020	Opportunities for Australian horticulture in the Carbon Farming Initiative	Levy	29/11/2011	25/05/2012	Growcom	David Putland 0408 984 039
AH11027	HAL dimethoate and fenthion options seminar	Levy	1/09/2011	14/10/2011	Horticulture Australia Limited	Kim James 08 6488 2209
AH11028	Updating statistical handbook for horticulture	Levy	1/12/2011	31/05/2012	Oliver and Doam	Agnes Barnard 02 8011 4743
AH11036	Industry Development Forum 2012	Levy	1/04/2012	31/10/2012	Horticulture Australia Limited	Richard Stephens 02 4739 1654
Objective 4: Achieve long term viability and sustainability for Australian horticulture						
AH09003	Plant protection: Regulatory support and co-ordination	Levy	1/07/2009	30/05/2014	AKC Consulting Pty Ltd	Kevin Bodnaruk 0408 567 252
AH09014	Across-industry climate research, development and extension (RD&E) activities	Levy	13/04/2010	31/01/2012	Horticulture Australia Limited	Peter Melville 02 8295 2317
AH10003	Horticulture component of the National Climate Change Research Strategy for Primary Industries	Levy	30/11/2011	3/05/2016	Horticulture Australia Limited	Peter Melville 02 8295 2317



Project No.	Project title	Levy or VC	Project start	Project finish	Organisation	Contact
AH10006	Pesticide spray drift in horticulture - a response to new guidelines from the APVMA	Levy	1/07/2010	31/05/2012	Horticulture Australia Limited	Jodie Pedrana 0404 314 751
AH11005	Horticulture environmental desk audit	Levy	30/11/2011	31/08/2012	Growcom	Jane Muller 07 3213 2483
AH11006	Carbon amelioration in horticulture	Levy	1/12/2011	31/08/2012	NSW Department of Primary Industries	Justine Cox 0438 770 187
AH11007	Developing an LCI database for Australian agriculture	Levy	2/01/2012	1/10/2013	Rural Industries R&D Corporation	Peter Melville 02 8295 2317
AH11008	Horticulture response to APVMA spray drift regulations	Levy	20/12/2011	30/05/2013	Horticulture Australia Limited	Jodie Pedrana 0404 314 751
AH11010	Biotechnology awareness in horticulture	Levy	10/10/2011	25/04/2012	Horticulture Australia Limited	Alok Kumar 0418 322 070
AH11019	The impacts of the proposed carbon price mechanism on Australian horticulture	Levy	29/11/2011	31/05/2012	Growcom	David Putland 0408 984 039
MT09043	Enhancing confidence in product integrity in domestic and export markets	Levy	1/07/2011	28/12/2013	Horticulture Australia Limited	Richard Bennett 0429 329 731
MT10029	Managing pesticide access in horticulture (cont from AH04009 and MT07029)	Levy	1/07/2010	2/07/2015	AgAware Consulting Pty Ltd	Peter Dal Santo 03 5439 5916
MT10049	A multi target approach to fruitspotting bug management	Levy	1/03/2011	1/04/2016	NSW Department of Primary Industries	Dr Ruth Huwer 02 6626 1196
Objective 5: Other						
AH10016	Horticulture support for the CRCNPB rebid - round 14	Levy	24/05/2011	14/01/2012	CRC For National Plant Biosecurity	Kim James 08 6488 2209
AH11003	Support Function for Across Industry Committee	Levy	15/09/2011	30/08/2013	Horticulture Australia Limited	Warwick Scherf 02 8295 2323
AH11017	Sponsorship of Appetite for Excellence Awards	Levy	1/07/2011	22/06/2014	Horticulture Australia Limited	Erin Riley 02 8295 2340
AH11023	Graham Gregory Award and function	Levy	1/07/2011	30/06/2016	Horticulture Australia Limited	Erin Riley 02 8295 2340
AH11026	Across industry program administration	Levy	1/07/2011	30/06/2012	Horticulture Australia Limited	Warwick Scherf 02 8295 2323
AH11038	Horticulture information unit	Levy	15/05/2012	15/08/2013	Horticulture Australia Limited	Richard Bennett 0429 329 731
AH11800	Across Industry Annual Report 2011/12	Levy	1/07/2011	30/06/2012	Horticulture Australia Limited	Amanda Lucas 02 8295 2318

AVOCADO PROGRAM

Project No.	Ind obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Organisation	Contact
AV07023	2	 	Avocado retail price surveys	Levy	25/06/08	30/08/12	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV08000	1	  	Rootstock improvement for the Australian avocado Industry - phase III	Levy	1/01/09	1/03/13	Sunshine Horticultural Services Pty Ltd	Dr Tony Whiley 07 5441 5441
AV08002	1	  	RNA silencing based PRR resistant avocado rootstocks for improved production of GM-free fruit	Levy	28/11/08	31/05/13	Dept of Agriculture, Fisheries and Forestry, Queensland	Neena Mitter 07 3346 6513
AV08018	1	 	Development of best practice guidelines for avocado ripening	VC/ Levy	26/06/09	30/09/11	Dept of Agriculture, Fisheries and Forestry, Queensland	Terrence Campbell 07 4132 5544
AV08020	1	  	Evaluation of sustainable orchard management practices for extension into general industry standards to reduce costs	Levy	30/01/09	30/11/12	Avocados Australia Limited	Dr John Leonardi 07 3846 6566
AV08025	3	  	Avocado resource audit web database	Levy	15/05/09	31/12/11	Avocados Australia Limited	Julie Petty 07 3846 6566
AV08034	1	 	Avocado retail quality surveys - phase II	Levy	1/04/09	31/10/11	Avocados Australia Limited	Julie Petty 07 3846 6566
AV08045	3	  	Avocado industry communications strategies	Levy	15/05/09	29/07/11	Avocados Australia Limited	Courtney Vane 07 3846 6566
AV09001	1	  	National avocado quality and information management system	Levy	1/03/10	1/03/13	Avocados Australia Limited	Julie Petty 07 3846 6566
AV09005	1	  	Coordination of export development for Australian avocados	VC	10/03/10	30/11/11	Avoz Exports	Wayne Franceschi 08 9776 1332
AV09015	3	 	Avocado research capacity building	Levy	1/12/09	1/08/13	Horticulture Australia Limited	Alison Anderson 02 9829 2316
AV09024	1	    	Mechanisms of cultivar and race-based disease resistance in avocado	Levy	30/08/10	1/07/14	The University of Queensland	Dr Andre Drenth 07 3255 4391
AV09028	1	  	Development of an avocado rapid library tray system for Hass	VC	15/04/10	14/10/11	Dept of Agriculture, Fisheries and Forestry, Queensland	Dr Danielle Le Lagadec 07 4132 5529
AV09029	3	    	Planning for the VII World Avocado Congress	VC	30/07/10	1/09/11	Avocados Australia Limited	John Tyas 07 3846 6566
AV10001	1	 	Improving yield and quality in avocado through disease management - phase II	VC/ Levy	31/12/10	31/12/14	Queensland Alliance for Agriculture & Food Innovation	Dr Elizabeth Dann 07 3255 4352
AV10002	3	  	Avocado best management practices and internet-based information delivery	Levy	1/11/10	31/12/13	Dept of Agriculture, Fisheries and Forestry, Queensland	Simon Newett 07 5453 5800





Project No.	Ind obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Organisation	Contact
AV10004	3		Biosecurity capacity building for the Australian avocado industry	Levy	1/10/10	31/01/13	Dept of Agriculture, Fisheries and Forestry, Queensland	Dr Andrew Geering 07 3896 9353
AV10006	1		Avocado supply chain education materials - phase II	Levy	5/10/10	30/11/12	Avocados Australia Limited	Julie Petty 07 3846 6566
AV10008	3		Avocado industry communications	Levy	1/05/11	1/10/14	Avocados Australia Limited	Courtney Vane 07 3846 6566
AV10012	3		Consultant fees for scholarship management	Levy	18/10/10	18/10/11	John McKenzie and Associates Pty Ltd	John McKenzie 02 6366 5000
AV10019	1		Reducing flesh bruising and skin spotting in Hass avocados	Levy	1/07/11	28/11/14	Dept of Agriculture, Fisheries and Forestry, Queensland	Dr Daryl Joyce 07 3255 4368
AV11006	3		Analysis of the competitive threat to Australian fresh avocado market from processed avocado products	Levy	3/10/11	27/04/12	Dept of Agriculture, Fisheries and Forestry, Queensland	Kent Fanning 07 3276 6011
AV11011	1		Optimising phosphonate use for PRR management in Shepard avocados in North Queensland	VC	1/12/11	31/05/13	Dept of Agriculture, Fisheries and Forestry, Queensland	Matthew Weinert 07 4048 4651
AV11013	3		Integrated industry and market data	Levy	15/02/12	30/05/12	p2p business solutions pty ltd	Jenny Margetts 07 3311 27
AV11015	1		Avocado industry fruit quality benchmarking	Levy	7/03/12	31/05/16	Avocados Australia Limited	Julie Petty 07 3846 6566
AV11016	2		Chef training classes	Levy	1/07/11	30/06/12	Whiteworks	Stewart White 02 9557 1433
AV11017	2		Menu penetration survey	Levy	1/07/11	30/06/12	StollzNow Research	Neil Stollznow 02 9953 7543
AV11018	2		Educating early childhood educators	Levy	1/07/11	31/03/12	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV11019	1		Avocado nutrition plan 2011-12	Levy	1/10/11	30/06/12	Consumer Insights	Joseph Ebbage 0407 543 340
AV11020	2		Business case to effectively compete against imported product	Levy	1/07/11	30/09/11	Jones Donald	Tony Jones 02 9267 6444
AV11021	1		An analysis of fruitspotting bug activity in avocado crops from fruit-set to harvest	Levy	24/01/12	1/07/15	The University of Queensland	Dr Harry Fay 07 4048 4663
AV11023	2		Avocado marketing strategy review	Levy	15/03/12	12/12/12	Horticulture Australia Limited	David Chenu 02 8295 2381
AV11024	2		Avocado chef training classes in export markets	Levy	2/04/12	30/06/12	Team Strategy Concept Sdn Bhd	Rose Yong 03 9057 3733
AV11500	2		Annual domestic marketing plan 2011/12	Levy	1/07/11	30/06/12	Horticulture Australia Limited	Duncan Sinclair 02 8295 2376
AV11501	2		Avocado export activities 2011/12	Levy	1/07/11	30/06/12	Horticulture Australia Limited	David Chenu 02 8295 2381
AV11701	3		VII World Avocado Congress 2011	VC	5/09/11	30/11/11	Avocados Australia Limited	John Tyas 07 3846 6566



Project No.	Ind obj.	Rural R&D priorities	Project title	Levy or VC	Project start	Project finish	Organisation	Contact
AV11800	3		Avocado Industry Annual Report 2011/12	Levy	1/07/11	30/06/12	Horticulture Australia Limited	Amanda Lucas 02 8295 2318
AV11910	3		2011 Avocado Partnership Agreement	Levy	1/07/11	10/08/12	Avocados Australia Limited	John Tyas 07 3846 6566
MT08035	1		Providing data packages for new fruit fly control technology	VC/Levy	1/07/08	25/05/12	Dept of Agriculture, Fisheries and Forestry, Queensland	Dr Hainan Gu 0401 676 360
MT08036	1		Ecology and preharvest control of fruit flies for systems approaches to market access for fruit fly host commodities	Levy	1/07/08	30/04/12	CRC For National Plant Biosecurity	Anthony Clarke 07 3864 5023
MT09026	1		Protecting pollination for the Australian horticultural industry Stage 2	VC/Levy	30/03/09	31/07/12	Horticulture Australia Limited	Kim James 08 6488 2209
MT09086	1		Bee Force - improving surveillance and sentinel hive traps	VC/Levy	14/06/10	30/05/12	Rural Industries Research & Development Corporation	David Alden 02 6271 4128
MT09087	1		Bee Force - developing the model for other regions	VC/Levy	14/06/10	30/05/12	Rural Industries Research & Development Corporation	David Alden 02 6271 4128
MT09090	1		Developing a honeybee and pollination CRC bid	VC/Levy	14/06/10	30/03/12	Rural Industries Research & Development Corporation	David Alden 02 6271 4128
MT10017	2		Understanding the purchase behaviour of fresh produce consumers	VC/Levy	1/09/10	30/08/12	Horticulture Australia Limited	David Chenu 02 8295 2381
MT10021	1		Determination of cold tolerance in immature stages of Australian pest fruit fly species	Levy	1/11/10	31/12/13	Department of Agriculture, Fisheries and Forestry, Queensland	Peter Leach 07 4057 3679
MT10022	2		Export-Import market intelligence	VC/Levy	1/09/10	31/05/12	Horticulture Australia Limited	David Chenu 02 8295 2300
MT10049	1		A multi-target approach to fruitspotting bug management	Levy	1/03/11	1/04/16	Department of Primary Industries	Dr Ruth Huwer 02 6626 1196
MT10058	1		Biosecurity implementation to strengthen Australia's honey bee and pollination responsive industries	VC/Levy	15/07/11	31/12/12	Plant Health Australia	Rodney Turner 02 6260 4322
MT10060	1		Pollination - Pesticide and Bees booklet	VC/Levy	1/08/11	30/04/12	TQA Australia	Daryl Connelly 0488 333 893
MT10063	1		Remote sensing of beehives to improve surveillance	VC/Levy	1/08/11	30/04/13	National Centre for Engineering in Agriculture	Cheryl McCarthy 07 4631 1647
MT11028	2		Fruit and Nut Tracking Study 2011-2013	Levy	15/03/12	30/06/13	Sprout Research	Heath Adams 0733147456



AVOCADO INVESTMENT SUMMARY

Year Ended 30 June 2012

	Marketing 2011/2012 \$	R&D 2011/2012 \$	Combined 2011/2012 \$
Funds available 1 July 2011	661,777	1,409,180	2,070,957
INCOME			
Levies Received	2,352,803	1,582,584	3,935,387
Commonwealth Contributions		1,642,670	1,642,670
Other Income	54,968	77,218	132,186
Total Income	2,407,771	3,302,472	5,710,243
Budget	2,243,703	3,384,115	5,627,817
Variance to Budget	164,068	-81,643	82,425
PROGRAM INVESTMENT			
Levy Programs	1,887,093	2,896,785	4,783,878
Service Delivery Programs by HAL	230,000	388,555	618,555
Across Industry Funding		49,854	49,854
Levy Collection Costs	53,905	34,689	88,594
Total Investment	2,170,998	3,369,883	5,540,881
Budget	2,182,853	3,847,568	6,030,421
Variance to Budget	11,855	477,685	489,540
Annual Surplus/Deficit	236,773	-67,411	169,362
Closing Balance 30 June 2011	898,550	1,341,769	2,240,319

Avocado Industry Advisory Committee (IAC)

Bob Granger (Chair)
 Peter Annard - as of Jan 2012
 Daryl Boardman
 Russell Delroy
 Lachlan Donovan
 Nick Hobbs
 Jim Kochi
 Henry Kwaczynski - to Dec 2011
 Chris Nelson
 Tom Silver
 John Walsh
 Antony Allen (Ex-Officio) - to May 2012
 Astrid Hughes (Ex-Officio) - from May 2012
 John Tyas (Ex-Officio)



FOR MORE
INFORMATION
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