Avocado

INDUSTRY ANNUAL REPORT 2009/10

Avocados Australia

HAL

Know-how for Horticulture™

Contents

Overview

This industry annual report provides a snapshot of the key avocado projects undertaken during 2009/10 through the avocado investment program.

One of the key activities undertaken in 2009/10 was a review of the last five years of investment against the 2005-2010 Avocado Industry Strategic Plan, as part of a process to develop a new five year plan. A qualitative review of previous investments over the past five years demonstrated a very high degree of achievement against the strategies set down five years ago.

Consumer demand has continued to grow in line with increasing supply, as demonstrated by increasing per capita consumption and assisted by a well targeted marketing and promotion program. Market development has been underpinned by comprehensive consumer research over the past five years, which has provided a very high level understanding of consumers and markets. The foundation has been laid to substantially expand new market segments such as the food service sector, with the first stage of a food service strategy implemented in 2009/10.

Fruit quality at the retail level has improved, as demonstrated by quantitative retail quality monitoring, which continued in 2009/10. This has been assisted by research and development (R&D) to improve the effectiveness of the supply chain and on-farm improvements in disease management. The industry has one of the most comprehensive market information systems (Infocado) in the horticulture sector, which helps the industry maintain a sustainable balance between supply and demand and to facilitate quality improvement. In 2009/10, this program achieved industry participation levels at about 85 per cent of production.

R&D projects to improve productivity have been undertaken, such as canopy management, disease management and rootstock improvement. In 2009/10 a new rootstock with resistance to *Phytophthora cinnamomi* was identified for commercial release. Information regarding practices and approaches for driving yield increases cost-effectively is being disseminated through various mediums as it becomes available. R&D projects to fill knowledge gaps about the major determinants of yield improvement are being commissioned.

Numerous communication and extension projects have been implemented over the past five years to ensure that growers and the supply chain are well informed about improved practices to meet consumer needs and improve grower profitability.

In addition to this qualitative analysis, a quantitative economic evaluation of four strategic plan objectives delivered under the 2005-2010 Avocado Industry Strategic Plan was also completed in 2009/10, in line with the Council of Rural R&D Corporations framework. The benefit cost ratios ranged from 2.9:1 to 14.6:1.

Although long-term projections show the industry is continuing to steadily grow with new plantings coming into production, the crop size in 2009/10 was similar to 2008/09 with a total levy income in 2009/10 of $3,414,765. Total levy program expenditure (including Australian Government matching funds for all R&D) was $4,144,869 with $1,837,261 invested in promotion activities and $2,307,608 in R&D projects.

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

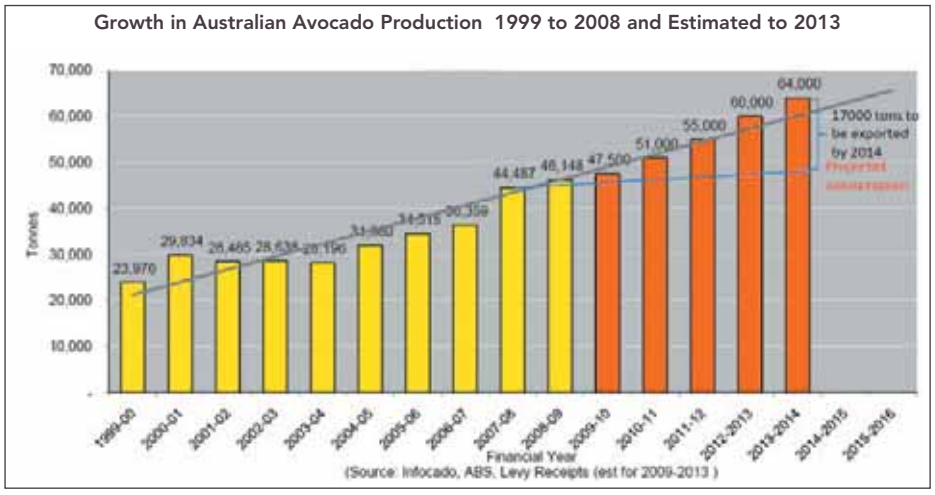
Climate change research is not new, but the urgency of information for growers to understand and be able to respond to the threats of climate change is. Since 2007 HAL's climate RD&E investment, through industry levies, voluntary contributions and matched Australian Government funds, has increased by 30 per cent. Achievements include: empowerment of industry leaders, through forums and presentations; partnerships, through cross-collaborative programs; and adoption, through grower workshops and fact sheets.

Further climate RD&E is planned in 2010, including generation of information on the critical temperature thresholds of a number of horticulture crops, identification of best management practices on-farm for reducing emissions and linkages with the Climate Change Research Strategy for Primary Industries (CCRSPI). Information on Climate RD&E and links to various tools for industry are available at www.horticulture.com.au/climate.

Coordinating exports of Australian avocados

Australia's anticipated avocado production growth clearly shows that other markets outside of Australia need to be developed to ensure the domestic market is not over supplied. A group of leading growers, packers and marketers have incorporated the Avocado Export Company (AEC) in May 2009. This company has proceeded to actively develop the avocado export market in Asia and the Middle East. Initial research indicated that international markets have tremendous potential, but the logistics chain and consumers need to be educated about how to handle and enjoy avocados.

This project was funded by voluntary contribution.



Projected Growth of Australian Production

Avocado export market development plan

To develop the export market, a number of key areas had to be addressed.

A communications plan was developed to communicate the message to growers, packers, logistics service providers, importers, merchandisers and consumers.

A quality manual was developed for all growers, packing sheds and logistics providers and importers to adhere to the same quality standard required for export avocados. The manual will be distributed shortly to the participating packing sheds.

Training programs were developed to educate all the key players about the export market requirements. Specific training programs were created for growers, packing sheds, logistic providers, wholesale and retail chains, and promotions personnel.

Training has commenced in Singapore, Malaysia and Hong Kong. More than 400 personnel of importers, wholesale and retail chains have been trained so far in handling, merchandising and promoting Australian avocados.

Project AV09005

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Avocado food service menu survey and product performance panel

This project was the first step in the implementation of the Avocado Food Service Marketing Action Plan, endorsed by the Avocado Industry Advisory Committee (IAC) in early 2009.

The first component involved a survey of food service businesses to establish a benchmark for avocado use in four target food service outlet segments. It also provided detailed insight into what is currently happening in the market.

In May 2009, 1,101 food outlets were contacted by phone and asked questions about their use of avocados in their menu. A report providing insight into the use of fresh avocados by restaurants, cafes, hotels and clubs was completed in August 2009. The project has ensured that the success of the food service marketing strategy can be evaluated against this benchmark and trends in the market can be monitored over time.

The second activity developed the *Avocado Food Service Masterbook*, which was completed in August 2009. To create the masterbook, a two-day cooking and tasting panel was held with a team of professional chefs. The panel process confirmed the value proposition for fresh avocados in food service including:

- principal selling features and language
- 'hero' meal ideas
- a range of new recipes
- detailed product information.

The project's findings are now being used by HAL to deliver the market development program to the food service sector.

Project AV08044

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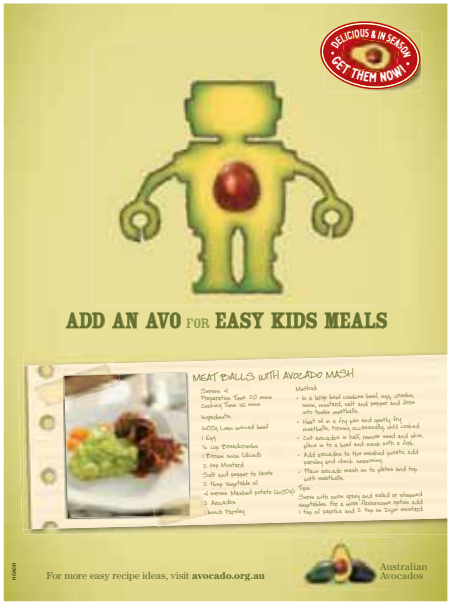
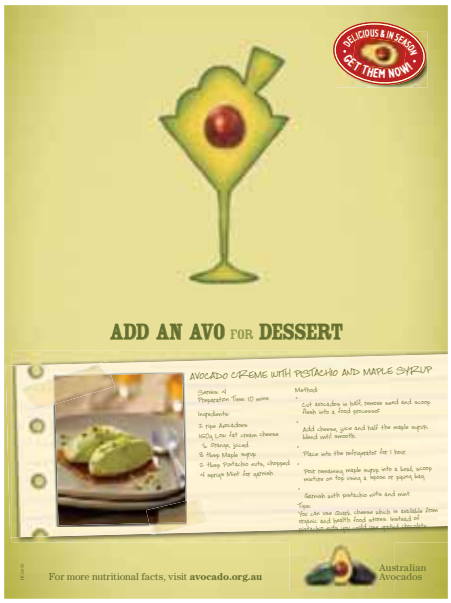
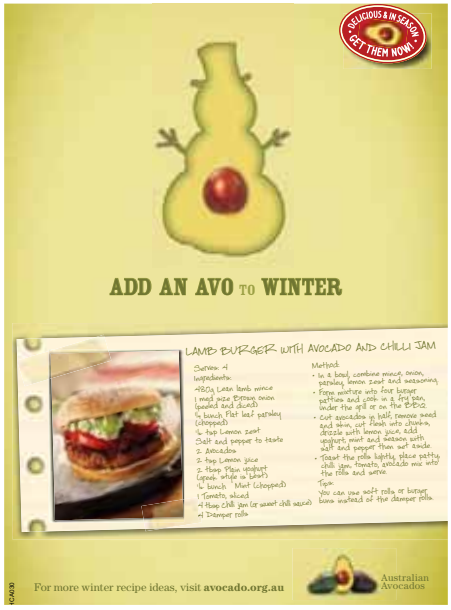
Avocado marketing program 2009/10

June 2010 saw the finalisation of the current three-year avocado marketing strategy, which was designed to highlight its versatility through inspiring recipes. The marketing campaign incorporates a mix of TV, print and web-based advertising, public relations, consumer and food service promotion. The campaign has generated positive results in the past 12 months, outlined in detail below.

A mix of media is used to reach the core consumer target - primary grocery buyers aged between 18 and 39. This ensures that the key message repeatedly reaches the core consumer target from multiple sources. The media mix used in 2009/10

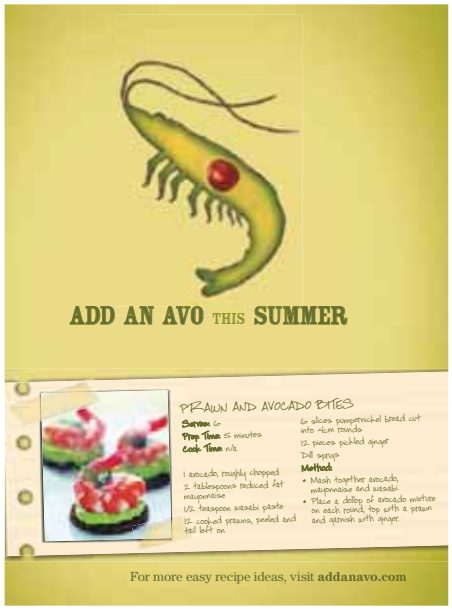






has included television, both free-to-air and subscription; print advertising in prominent food and women's magazines (*Delicious, Donna Hay, Mother & Baby*); and the internet. The campaign had a strong online element, featuring sponsorships with three large publishers - Fairfax Digital, Yahoo!7 and News Digital. It focused on editorial content rather than display advertising.

To date, the 2009/10 television activity has reached 1.1 million grocery buyers aged between 18 and 39; the magazine advertising reached 654,000 people an average of 3.5 times; and the online campaign had delivered 924 million impressions against a target of 922 million with six weeks to go.



Of the digital publishers, Fairfax delivered the highest overall click-through rate of 0.58 per cent followed by Yahoo!7 with 0.10 per cent. Fairfax also outperformed other publishers in terms of engagement, with 18.62 per cent of people engaging with the online banner advertisements, and 17.93 per cent of people interacting with the expanding banner adverts.

The 2009/10 financial year has also seen some fantastic results for the Australian Avocados website. Most impressively, the site has achieved a 50 per cent increase in traffic for the period, reaching more than 116,000 visitors compared to 77,000 in 2008/09.

Website reports show that the increase in traffic has been significantly affected by search traffic, with close to 30,000 different keywords leading people to the website.

The increase in traffic navigating around the avocados website demonstrates the relevance of content. Over the past three years the site has maintained the same content strategy, focusing growth on the most popular areas: recipes, 'how to grow', and nutritional information.

Project AV09501

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Fresh avocados masterclass for food service

In late 2009, Australian Avocados embarked on an educational program to engage with food service professionals to increase the use of avocados.

Avocados present a unique model for food service. While loved by consumers, the food service repertoire is low due to the perception of their culinary inflexibility and previous market unpredictability. There is a potent opportunity for avocados if the right information is delivered to chefs.

The masterclass program is tailored to educate food service professionals about the versatility, seasons, types, handling and purchasing tips of Australian avocados. The masterclasses include an introductory insight into the history, world usage, types and global production of the avocado. Nutritional benefits of the fruit are also addressed.

Recipe ideas are the foundation of the classes, whether devised by the host chef or taken directly from the masterbook. Every session commences with an avocado tasting plate as a sensory exercise featuring raw, salted, sugared and flash fried avocado, as well as an avocado and coconut shooter. The host chef is encouraged to create the rest of the menu for the event. The research and experimentation to do this provide an instantly successful peer end-user story for other chefs attending the masterclass.

To date, the program has been introduced to a number of industry sectors, including restaurants, cafés, clubs, hotels and pubs.

Avocado masterclass video available on Youtube: www.youtube.com/user/addanavo

Chefs responded to the program positively. According to the surveys, attendees ranked the masterclass an average 4.14 out of 5 for usefulness and an average of 3.54 for likelihood of increasing avocado usage following the session. In the post-masterclass interviews, 68 per cent of the chefs suggested that the avocado usage had increased on their menus. At the same time, masterclass videos are produced and uploaded to Youtube (www.youtube.com/user/addanavo), Wine.Food.Hotel (www.winefoodhotel.com/tube/view/0/canterbury-league-club-avocado-996) and the Australian Avocados website (www.avocado.org.au/foodservice). This utilises the internet as a new platform to inform food professionals about the program and avocado usage.

While continuing to engage with food professionals from the aforementioned sectors, the 2010/2011 program steps into the new territory of large commercial catering groups and TAFE students and lecturers. The structure of the program has been customised meticulously in cooperation with the catering company and schools to fit into their curriculums. This development will not only increase the use of avocados in many more dining occasions but also educate the next generation of chefs about how to use avocados properly, effectively and creatively.

Project AV09013

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Avocado retail data

Transparency of retail price information is necessary so that growers can compare the trends in retail prices with the trends in production volume and quality throughout the season. The ability to do this helps ensure that all members of the supply chain have the tools necessary to work together with fluctuating volumes of fruit in the market. Both volume and quality data is available through the Infocado and retail quality survey projects respectively.

This project collects a range of data on a weekly basis in Brisbane, Sydney, Melbourne and Perth. This includes details about display, fruit weight, fruit price, and whether or not fruit is on special. This data is then reported to the industry via weekly Infocado reports and the avocado website, www.avocado.org.au. There is now almost two years of data providing historical trends and comparisons between price, volume and quality.

Project AV07023

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Avocados in early childhood

In 2009, a scoping study was completed, that identified the most effective way for the avocado industry to engage with educators to equip them with a range of learning tools and knowledge on the issue of healthy eating.

While the original intention of this scoping study was to investigate the primary school setting for opportunities for avocado education, it quickly became clear that there was a better opportunity in the earlier years' learning setting. The primary school curriculum is overwhelmed with many competing demands and the opportunities for meaningful real food experiences are limited.

Using the expertise of two noted early childhood educators - Shelley Woodrow and Nadine McCrea, each with over 20 years experience in the school or early childhood education field - an avocado-focused education resource has been developed titled, *Eating my colourful vegies and fruit*.

Increasing the consumption of fruit and vegetable has been identified as a priority by national and state health departments. This resource has been created to support these initiatives by helping educators contribute to wellbeing and food-focused learning experiences for young Australian children.

The resource includes a book of learning activities for Early Childhood educators as well as other colourful learning resources such as a poster (*Eating the rainbow every day*), a rainbow colour swatch, an avocado-shaped food finder and a DVD featuring tips and suggestions for using the resources.

The concept of 'eating the rainbow every day, when choosing fruit and vegetables', a message which emerged from research by the Cancer Council in the US in the 1990s, provides an aspirational and fun framework within which avocados can be experienced and explored. Other key messages include 'Try new food – start with green!' and 'Eat more plant food'.

With 70 per cent of food habits established by aged three, this resource will provide educators with the tools to establish healthy eating habits early.

The final resources were offered to a selected 440 centres in three states, with first round offers for the September 2010 program to specific metropolitan regions in Melbourne, Sydney and Armidale in the Hunter. The second round of offers, in May 2011, will be to specific metropolitan regions in Adelaide, Brisbane and Sydney.

Project AV09522

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Bioactive components and portion sizes of avocados

The avocado industry saw current consumer interest in the health benefits of food as an opportunity for promoting avocados. Avocados are high in vitamin E, B1, B2, niacin, folate, potassium, magnesium and antioxidants. However, more information was needed.

There is some confusion about what is appropriate when avocados are included in a healthy, balanced diet. This project aims to firstly clarify the food labelling guidelines, which are complex and currently under review, and the 'recommended' portion size of avocado.

For nutrient promotion, more data is needed for Shepard and Hass avocados, and to identify the changes in nutrient content relative to season and district.

In addition, some consumer focus groups will be run to determine how best to communicate the revised health information.

Project AV09000

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Consumer and retail scan data collection

This project provided the avocado industry with an understanding of domestic retail trade volumes and values, as well as consumer purchasing behavior.

Retail Scan data from a major domestic retail chain and Homescan data on the produce purchased and taken home by a panel of over 10,000 people across Australia was collected.

Homescan provides information on the demographics of the purchasers, their buying frequency, purchase values and their retail channel of purchase. This information is best used as a trend analysis displaying market impacts.

Through having a much improved understanding of the real actions consumers of avocados are taking across a range of market outlets, the avocado industry is able to drive better market supply and marketing decisions. This research can also be used to guide and improve market supply relationships and build improved supply chain transfer to the end market.

Project MT08015

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Consumer tracking study

HAL commissioned Brand Story to undertake an ongoing online survey of 1,800 consumers annually, conducted over six years, covering the key growing seasons.

The survey is designed to track areas such as consumer preferences, product selection criteria, the incidence, frequency and volume of purchase and consumer attitudes and reactions to assorted education materials and industry activities.

Avocados are regularly purchased by around half of consumers surveyed.

There is wide consumer awareness that avocados are healthy, containing good, rather than bad fats and are very versatile to use in cooking. The fruit has good residual levels of advertising awareness, which have been built upon with the creation of a new print campaign and the positioning of avocados as an easy to use, versatile family food.

Project MT08060

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Avocado consumer research survey

The initial phase of this project consisted of a consumer research survey conducted online, using a questionnaire. The sample of the survey is nationally representative of main grocery buyers and comparable with the 2005 survey on key demographic measures.

The current campaign is working well with 18 per cent of respondents having seen at least one element of the campaign. This rises to 22 per cent among women. The avocado advertising has greatest appeal among its target audience (urban/suburban females aged 25-39), with 98 per cent stating 'versatility' was a message from the print ads. Just under half also said 'healthy' was a message in the campaign, many also mention seeing avocados on the Woolworths market update.

Those who had seen the campaign were significantly more likely to have used avocados in the less common ways suggested in the campaign (in pasta, on pizza, in soup).

A lack of avocado recipe ideas appears to be less of a barrier to purchase now than in 2005. Significantly less are now claiming that recipes providing ideas would increase their purchasing. Conversely, there have been significant increases in the proportions saying price is a barrier (even though avocado prices are seen to be gradually falling), and that cost had stopped them buying avocados in the last year.

This increasing price sensitivity is likely to be at least in part a reaction to the current financial crisis. The factors which respondents claim would be most likely to increase purchasing of avocados are consistently cheaper, consistently ripe and more recipes.

Project AV08013

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ENSURING HIGH QUALITY FRESH AVOCADOS AT RETAIL

Avocado quality and industry information systems

It is recognised that a wide variety of factors affecting avocado quality, productivity and supply chain efficiency are interrelated. This project was developed to manage a range of projects that are aimed at addressing these issues.

Access to good avocado crop flow information is integral to ensuring supply chain efficiency. This project was tasked with managing the Infocado crop flow data system, and also managing the roll out of new modules within the system. The system now consists of a weekly dispatch module, weekly forecast module, seasonal forecast module and wholesale module. Eighty five per cent of production is accounted for by the Infocado system. Reports are produced and distributed to contributors on a weekly and quarterly basis. The system also includes the OrchardInfo module for collecting and reporting orchard information, including tree age, tree numbers, varieties, rootstocks, row and tree spacings and yields.

The management of the avocado supply chain projects involved developing and managing a range of different projects to build a comprehensive picture of fruit quality and supply chain efficiency, and to address the issues identified. The projects managed in 2009/2010 included:

- Avocado retail quality surveys, phase II (AV08034)
- Avocado retail prices surveys (AV07023)
- Avocado supply chain education materials (AV08017).

Information has been gleaned within Australia and overseas to help develop a framework for the introduction of an avocado quality management system (QMS). It is hoped the QMS will help improve quality at the retail level and subsequently increase purchases and returns to all members of the supply chain. Tools are being developed to assist in making improvements and to work in conjunction with a QMS.

Project AV06006

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National avocado quality management system

This project began in March 2010 and follows on from a project that concluded in November 2009 (AV06006).

The current project aims to expand on the results from the previous project, specifically the supply chain projects that were managed by it, and to develop and implement a quality management system.

The supply chain projects identified critical points of quality at which consumer purchasing is affected, where the industry currently sits in terms of quality, and points in the supply chain where issues related to product quality should be addressed. This project will seek to implement a system based on accreditation of members of different sectors of the supply chain, guaranteeing that a mimimum standard of quality (based on known consumer acceptances) is fulfilled.

The roll-out of OrchardInfo and Infocado requires ongoing management and maintenance as well as a mechanism for implementing future expansions and updates to those programs.

A consumer research project has been instigated and conducted this year to develop maturity benchmarks for Shepard avocados and to determine consumer attitudes to the concept of a quality guarantee. A Wholesaler Accreditation system is currently being drafted for piloting later this year and wholesale prices will be introduced to Infocado reporting in the coming months.

Project AV09001

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Development of an avocado ripening manual

Ripening is a critical step in the avocado supply chain and must be done correctly to ensure that consumers consistently receive fruit of the right quality. This project, funded by the avocado levy and voluntary contributions, will publish an avocado ripening manual to improve knowledge, practices and consistency in ripening avocados.

The project team has mapped and monitored fruit quality and handling practices from the packing shed to dispatch from ripeners, completed an analysis of the information needs for workers at ripening facilities, and undertaken four research trials to generate new information where gaps in knowledge existed.

Ripeners face complex decisions given the variation in cultivars, districts, grower/packer practices, transport times, receival temperatures, ripening facilities and customer requirements. To help manage this complex situation, a simple, usable ripening manual is being created. A hard copy version of the manual is supported with web-based reference material and a decision tool for recommending best practice ripening and storage.

Future activities for the project include preparation and testing of the ripening manual prior to its publication and publication of the research reports. The project is supported by a voluntary contribution from Fresh Exchange, a major avocado ripening business.

Project AV08018

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Quality controller assessing fruit quality on arrival at ripening facility

Assessing quality of avocados stored after ripening to determine best practice recommendations

Monitoring fruit temperature in a pallet of avocados during ripening

Evaluating the use of a library tray system to monitor quality

The aim of this project was to determine the potential for use of a library tray system for tracking, potentially improving Australian avocado fruit quality in the local and/or export marketplaces. A literature review and survey of international fruit industry practices were conducted.

Library tray systems are used in many fruit industries to provide a means of monitoring and improving overall fruit quality. Generally a sample of fruit is taken at an appropriate point in the handling chain (most likely from the packing line) and held in the packhouse or a central location. Fruit quality of the sample is assessed on one or more occasions during storage and/or shelf life.

Instigation of a library tray system has potential for improving quality of Australian fruit and an appropriate system should be considered by the Australian avocado industry.

Project AV08022

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Avocado supply chain education materials

Retail quality surveys have identified that there is still up to 30 per cent of avocados at the retail level that have more than 10 per cent internal flesh damage, with bruising being the biggest issue.

The education materials developed through this project have been designed to assist in addressing quality issues including maturity, ripeness and internal damage, with a significant focus on reducing bruising damage at all points of the supply chain.

Because of the close relationship between level of ripeness and susceptibility to damage, the first piece of material developed was aimed at providing a tool to better identify the different levels of ripeness both by colour and firmness. Handling guides for fruit at different levels of ripeness, from the packing shed right through to the retail floor were subsequently developed.

The Little Green Book, *The Adventures of Alvin*

In conjunction with the handling guides, *The Little Green Book* was developed, featuring the character Alvin Avocado. The book was produced to illustrate to everyone in the supply chain how their handling of avocado can impact on the end quality of the product.

Project AV08017

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Avocado handling guide for packhouses

Avocado handling guide for wholesalers

Avocado handling guide for retailers

Avocado colour and ripeness chart

Identifying acceptable maturity levels in Shepard avocados

Dry matter content (DM) of avocados represents the amount of carbohydrates and nutrients that have been transported from the tree into the fruit. The longer the avocado remains on the tree, the higher the dry matter, and consequently, dry matter percentage. DM% is used by growers to decide when avocados are ready to harvest.

In the current study, 112 consumers tasted Shepard, a variety of avocado that can be harvested early in the season. The avocados were collected from a range of locations in Northern Queensland in order to ensure that fruit of varying maturity (DM%) were available for tasting at the same time.

Consumers' liking of flavour increased progressively as the DM content of avocados increased from 18 per cent to 23 per cent but then reached a plateau, where further increases in DM did not result in corresponding increases in liking. The immature (lower DM) avocados were frequently described as having 'bland/ tasteless' or 'watery' flavour, as well as being less liked than other avocados.

Following tasting, consumers were asked about their experience with avocados and the extent that a quality guarantee offering to refund or replace damaged fruit might increase purchasing.

Consumers continued to report a high incidence and severity of damage in the avocados they purchased for consumption at home. The study indicated that consumers' willingness to buy avocados increased as a consequence of the quality guarantee.

Project AV09026

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Avocado retail quality surveys

In 2007, work was commissioned to develop benchmarks for industry performance in eating quality (primarily maturity and freedom from internal defects) by measuring the points at which fruit quality impacts on actual consumer purchasing behaviour.

The quality benchmarks developed were that fruit must have no more than 10 per cent internal damage, and all Hass avocados should have a dry matter percentage (DM%) no lower than 23 per cent. To measure the current and ongoing level of quality in the market, surveys are undertaken at the retail level (internal damage) and wholesale level (DM% as a measure of maturity).

Internal quality

Internal quality surveys are conducted on a monthly basis in Brisbane, Sydney, Melbourne and Perth. Fruit is collected from a broad range of retail outlets and tested for internal quality. The data for calendar years 2008 and 2009 have recently been analysed to observe the change in quality between the two years. The retail survey results show that the proportion of fruit that has more than 10 per cent damage has reduced from 28.1 per cent to 25.4 per cent from 2008 to 2009. The results also show that both body rots and stem end rot has increased over this period, but that bruising and vascular browning has decreased.

Maturity

Avocados are collected on a monthly basis from wholesalers and then tested for dry matter content as an indicator of maturity. The table below illustrates the most up-to-date data on the range of DM% for fruit sampled by growing region. Individual results are sent to the growers whose fruit are tested. Summarised information by origin region is also available from the Avocados Australia website, www.avocado.org.au

This project is scheduled to continue until the end of 2011.

Project AV08034

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Dry Matter Intervals	Proportion of fruit tested for each dry matter interval 31st May 2010									
	NQ		CQ		SC	SQ	NNSW	CNSW	Tri	WA
	Hass	Shepard	Hass	Shepard	Hass	Hass	Hass	Hass	Hass	Hass
<=18%	0%		0%			0%	0%			
18.1%-20.9%	4%		8%			15%	0%			
21%-22.9%	12%		23%			15%	20%			
23%-28%	64%		55%			40%	80%			
27.1%-40%	20%		13%			30%	0%			
>40%	0%		0%			0%	0%			

Developing an avocado robustness test

Fruit quality is a major factor limiting the expansion of the avocado market. One of Avocado Australia's strategic objectives is that 90 per cent of fruit on the retail shelf meet or exceed consumer expectations. This objective has yet to be realised.

A method of predicting internal fruit quality several weeks prior to commercial harvest was developed. This information could be a valuable tool for growers in making informed marketing decisions and possibly altering their farm management practices.

Avotest, the rapid ripening test, provides a means of gauging the effect of various farm management practices on fruit quality. It was developed and verified over two seasons for domestic market fruit and over one season for long storage fruit. Fruit quality predicted in the domestic market, eight weeks prior to the commercial harvest, correlated well with that of fruit subject to a simulation of commercial conditions (r=0.6).

The long storage Avotest, carried out four weeks prior to the commercial harvest, had a strong correlation with commercial conditions (r=0.74). This is not a rapid test and requires a two to three week cold storage period.

The Avotest successfully provided growers with invaluable information regarding their end-use fruit quality and could effectively rank a block or orchard's fruit quality performance.

The Avotest also had some shortcomings. Only defects that originated in the orchard could be predicted, such as rots, some insect damage and some physiological disorders. Handling injuries, such as bruising, an important cause of retail spoilage, could not be predicted by the Avotest.

The project was terminated by agreement prior to completion.

Project AV07005

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IMPROVE PRODUCTION & MARKETING EFFICIENCIES

Production using reduced water supplies

Hass avocado trees are known to display an alternate bearing nature, often mixed within a block. The differing yielding of trees within a block results in different water requirements from tree to tree. Traditionally, irrigation has been set to the higher water demanding trees, thus overwatering the lighter water demanding trees. This is inefficient and compromises tree health due to over-wet conditions.

This project, funded by voluntary contribution, is measuring the capacity of the avocado tree to withstand temporary water stress during a light fruit set season. Potential water savings are also being identified.

In the 2009/10 season, the soil and plant monitoring sensors were installed and testing of the sensors and telemetry units was conducted.

Irrigation treatments are yet to commence, but yield and tree growth data (flowers, shoots, roots and fruit) have been collected from the past season using the grower's standard irrigation habits.

Project AV07017

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Plantsens D6 dendrometer sensor unit installed to the trunk of a Hass avocado tree to monitor changes in trunk diameter.

Investigating *Avocado sunblotch viroid* in Australia

Avocado sunblotch viroid (ASBVd) is a damaging pathogen, but one that is controlled easily through the use of clean planting material. The Avocado Nursery Voluntary Accreditation Scheme (ANVAS) has been in place since the early 1980s. A mandatory practice for nurseries participating in this scheme is that all propagation material be tested for ASBVd. The last official report of ASBVd in Australia was in 1989 and it is unclear how widespread the pathogen is now.

This project is quantifying the incidence of ASBVd in Australia.

Surveys for ASBVd have been undertaken in northern NSW and South-Eastern Queensland. In total, 3222 avocado trees have been tested and only one infected tree found. The affected property was surveyed nearly two years later, and no more infection was found, suggesting that field spread of ASBVd is either very slow or non-existent.

It was concluded that ASBVd is now very rare in Australia.

Project AV07001

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Evaluating superior rootstocks

Rootstocks significantly impact on avocado tree health, fruit yield and quality. The industry standard, Velvick, is a good rootstock but new material has been developed and needs to be tested under local commercial conditions.

The efficacy of imported and locally developed seedling and clonal rootstocks that had not been included in the national avocado rootstock program have been tested.

Based on the average cumulative yield for 2005-2010, Velvick remains one of the best rootstock for Shepard as scion. However, if yield is expressed in terms of tree size (kg/m^3 of canopy), a local rootstock, BW2, and an Israeli rootstock, Ashdot, produces 25 per cent more crop than Velvick.

With Hass as scion, the seedling rootstock BW2 produced 25 per cent more fruit than seedling Velvick for 2005-2009. If expressed in relation to canopy volume, Ashdot, which appears to be a dwarfing rootstock, produced more than double the crop load achieved by Velvick.

Many of the new clonal rootstocks out performed clonal Velvick both in average yield and in yield per canopy volume. The variability between trees is greatly reduced by grafting onto clonal rootstocks.

The trial has been established on good deep red soil with low Phytophthora pressure. The trees are in excellent health with no sign of root rot stress. However, some of the rootstocks in the program were developed for their Phytophthora resistance and so could not be tested for their true purpose given the low disease pressure at the trial site.

Project AV07008

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Improving rootstocks for the Australian avocado industry

The avocado rootstock improvement project has been running for eight years. During this time, results have been reported via articles in *Talking Avocados*, industry and international conferences and at two industry R&D road shows, with presentations in seven districts across Australia where avocados are commercially grown. These activities have increased grower awareness on the importance of selecting the correct rootstock when ordering new trees from nursery sources. The project has 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.

During 2004/05 approximately 1,400 Hass and Shepard trees were planted in different production areas of Australia for long-term evaluation. The trees were grafted to rootstocks representative of the three horticultural races of the species, since they impart different performance characteristics to trees. Rootstocks were either clonally propagated giving genetic uniformity between trees or grown as seedlings imparting genetic variability. In 2007, the first yield data was collected from these experiments and has been collected for each subsequent year of the investigation.

With three years of consecutive yield data collected from the experimental sites, the difference in performance between cloned and seedling rootstocks have been examined. Across the 32 pairs of rootstocks evaluated over all experimental sites, there are only three occasions where cloned rootstocks have significantly out-yielded their seedling partners, whereas on nine occasions the seedling partner has outperformed the clone. In the other 20 cases there were no significant differences between the cloned and seedling pairs. Some reports suggest clones are slower to reach cropping maturity than seedling rootstocks, so it is still possible in the life of the project that the former may overtake their seedling counterparts.

A new rootstock (SHSR-04) has been identified with resistance to *Phytophthora cinnamomi*. Commercialisation of this line is in progress and will be reported on in greater detail once the process has been finalised.

Project AV08000

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Harvesting the avocado rootstock trial at Hampton.

Market access R&D

Gaining and maintaining market access continues to be a key priority for Australia's avocado industry and a science based strategic approach to market access R&D is essential to support these market access initiatives.

In support of market access, horticultural industries and government invested $3.2 million for market access-related R&D projects as part of the 2006 HAL Market Access R&D Plan. There are currently 13 projects underway as a result of this funding. It is anticipated that the majority of these projects will be completed by the second half of 2010. Project results will then be compiled, analysed and distributed to industry

The plan has now been revised under a strategic framework termed *Pathways to Market 2009-2014* to better align with the recommendations of the National Fruit Fly Strategy (NFFS) and to keep pace with changes in the international market access environment.

The dynamic nature of domestic and international market access requirements clearly indicate that both pre and postharvest projects remain essential to gain and maintain markets. Development and refinement of pest free areas, pest monitoring and surveillance techniques, alternative pest management and treatment techniques and alternatives to some chemical treatments have been identified as key market access R&D investment areas.

The 2009–2014 HAL Market Access R&D Plan outlines proposed projects to the value of $15 million over five years. Importantly, the plan provides even greater focus on direct market access outcomes through a multi-industry approach and has been endorsed by the recently established Office of Horticultural Market Access.

Copies of the 2009–2014 HAL Market Access R&D Plan are available on request.

Project MT06020

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Freight container trials and long-term storage impact

The Australian avocado industry continues to grow at around 10 per cent per year. The peak of production continues to be concentrated in the period between May and September each year.

This can impact upon the domestic price of avocados. Sunfresh Marketing Cooperative Limited initiated this voluntary contribution project to develop sea freight protocols to European markets, building on the successful static trial undertaken in 2008. The research focused on understanding fruit quality and variety, lenticel damage, confirming controlled atmosphere (CA) conditions, market capacity, and the infrastructure and skills of the importing agent.

Sunfresh exported a 40ft CA container of Hass avocados to customers in the United Kingdom and Europe in May 2009. The project has been successful in demonstrating to Australian growers that product can be successfully shipped and marketed to the European Economic Community (EEC).

A second trial is planned for August 2011.

Project AV08046

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Sunfresh avocados pallet ready for export

Sunfresh and Halls representatives at container opening

Climate change and policy implications

The potential impacts of climate change and climate policies on the Australian avocado industry are being assessed. This information is required for the industry to adapt to future climatic conditions, minimise possible negative impacts and capitalise on any opportunities.

The first aim is to provide a thorough review of a range of climate policies that may have an impact on avocado producers. This will have a strong focus on mechanisims that may be used to establish a carbon price, such as the 'Carbon Pollution Reduction Scheme'. Policies relating to offset schemes, such as carbon footprinting and product labelling will also be reviewed.

The second aim is to provide a detailed analysis of the potential impacts of projected climate change across the key Australian avocado production regions.

This will be achieved through combining a thorough literature review of the climatic conditions favourable for avocados with data on existing and projected climate conditions. The results will be summarised using regional climate mapping and bioclimatic modelling. The project will assess the range of adaptation options that are available to minimise climate risks while capitalising on any possible opportunities, and identify potential issues and priority research needs for inclusion in industry strategic planning.

A review of the impacts of climate policies and an assessment of climate risks for the main growing regions has been completed.

Project AV09003

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Ecology and preharvest control of fruit flies

Fruit flies directly impact on crop quality and are the single most significant phytosanitary barrier for domestic and international market access.

In the near future, some of the common chemicals currently registered for fruit fly pre-harvest and postharvest treatments are likely to have their usage significantly reduced.

Alternative treatments, especially for Queensland fruit fly (Q-fly), need to be developed in order to maintain crop protection and market access.

Systems approaches, which link two or more independent management techniques, offer a promising alternative. Unfortunately, however, much of the underpinning science is not available.

This project aims to identify these knowledge gaps in Q-fly biology and ecology pertinent to the development and/or refinement of management tools. A formal scientific literature review of Q-fly biology and ecology - the first ever produced for this pest - has been completed.

The review identified key areas of scientific weakness including knowledge of how and why the fly moves within and between crops, and how and why it forages for protein and the chemical attractant, cue-lure.

Knowing such information is vital for the development and refinement of pre-harvest controls, protein bait sprays and the Male Annihilation Technique (MAT).

Having identified the gap, research is pursuing these areas by quantifying where flies occur and where flies forage for protein on individual plants within orchards to allow better placement of protein and MAT.

Adult Queensland fruit fly

Preliminary results on protein foraging show that the Q-fly searches for protein at heights greater than 1.3m above the ground, implying that protein should preferentially be applied to the mid and upper canopy of orchards.

The project has completed its first field season and will run for two more seasons - 2010/11 and 2011/12.

Project MT08036

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Evaluating pyraclostrobin products for disease control

Anthracnose (caused by *Colletotrichum spp.*) and stem-end rot (caused by a range of fungi including anamorphs of *Botryosphaeria spp.*) are the two most important postharvest diseases in mango, avocado, passionfruit and lychee. Together they cause losses in the order of 25 per cent in the marketplace.

Field diseases such as pepper spot in avocado (caused by *Colletotrichum gloeosporioides*) also cause serious fruit losses in the packing shed. A key strategy in the management of these field and postharvest diseases is the calendar-based application of protectant fungicides (i.e. mancozeb and/or copper-based fungicides) during fruit development. In mango, avocado and passionfruit, the strobilurin fungicide azoxystrobin (Amistar®) is also registered for disease control and is generally applied up to three times during the fruit development phase. Another fungicide in the strobilurin group, pyraclostrobin, also has potential for the control of these diseases.

This project, funded by voluntary contributions, evaluated a range of products containing pyraclostrobin (marketed by Nufarm Australia) for the control of fruit diseases in mango, avocado, passionfruit and lychee.

Fungicide evaluations in this project were undertaken by conducting a series of field trials for each crop. For avocado, passionfruit and lychee, a range of products were initially screened in the field during the first season. The best performing fungicide was selected for further evaluation in field trials incorporating anti-resistance strategies.

Cabrio® (pyraclostrobin) was identified as the most effective fungicide for the control of anthracnose in avocado, particularly when tank-mixed with the protectant Polyram® (metiram). A single late season Cabrio® application was also effective for anthracnose control.

Based on overall performance of fungicides, a focus on obtaining registration for Cabrio® for fruit disease control in avocado, passionfruit and lychee is recommended.

From a scientific viewpoint, this work has shown that pyraclostrobin has activity against *Colletotrichum gloeosporioides, Septoria passiflorae* and to some extent anamorphs of *Botryosphaeria* spp. It has also shown that boscalid has activity against *Septoria passiflorae*.

Management of fungicide resistance is an important issue for strobilurin fungicides such as pyraclostrobin and azoxystrobin. A component of any future work therefore should include reinforcing the message of correct fungicide usage to growers, particularly once these products become registered for use. Further field studies to optimise the application of these fungicides for fruit disease control would also be of benefit.

Project MT06055

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Developing sustainable orchard management practices

There are increasing demands on growers to optimise fruit yield and quality, reduce chemical use, develop market opportunities, meet consumer expectations and to remain competitive. An increase in public awareness and concern for the environment has also led to an increase in demand for 'safer' food and more environmentally sensitive production methods.

The objective of the project is to:

- identify sustainable practices that are currently employed by avocado growers across Australia
- conduct trials to evaluate the effectiveness of these strategies against current industry standards
- provide recommendations for inclusion into a revised orchard management system.

A total of 23 sites have been selected as case studies from the major production areas across Australia (including North, Central and Southern Queensland, Northern and Central NSW, the Tri-State area and WA). A range of orchard management practices and products are being used, including: mulching, natural mineral fertilisers, fish and kelp concentrates, composts, teas and other brewed microbes, molasses and branch scoring.

Growers from each site provide information on: tree age and spacing; the timing of flowering, vegetative flushing and harvesting; and details on their nutrition, irrigation, pest, disease and other management practices. The effectiveness of each orchard management system in terms of cost of operation, impact on tree health, yield, fruit size and quality and the net return per hectare will be determined.

Trials have been established to test the effectiveness of a range of orchard management practices.

Mulching trials

A trial investigating the effect of mulching treatments on tree growth, fruit yield and quality was established in Central Queensland during September 2009. Two and a half year-old Hass trees were mulched with filter-press (a sugar industry by-product), avocado chip and cane-tops to a depth of five, 10 and 20 centimetres, respectively. A grower treatment (inter-row slashings with a thin layer of filter-press of less than two centimetres) was included for comparison.

In the first year of the experiment there was no significant effect on shoot growth and yield. However, all mulch treatments tended to reduce the severity and incidence of fruit rots and disorders.

Soil and foliar treatments

A range of soil and foliar treatments were also established in Central and Southern Queensland in September/October 2009. These trials were harvested in June and data will be analysed in July.

Branch scoring trials

The effect of branch scoring on fruit size and yield was investigated at several sites across Australia. Results indicate that branch scoring may provide a non-chemical approach for increasing cropping in vigorous avocado trees, particularly in southern growing regions.

Evaluation of several orchard management practices is ongoing and further trials will be establish in other growing regions during the 2010/11 season.

Project AV08020

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Improving yield & quality through disease management

It is important to continually evaluate and improve the disease management practices currently employed by the avocado industry and assess new approaches so that tree health and fruit quality can be managed in an environment demanding cost-effective methods of production that are acceptable to local and international markets.

Rootstock material that establishes and grows well at sites heavily infested with *Phytophthora cinnamomi* was identified. Further selections made available, from seedling and clonal origin, were planted at a trial site earlier in 2010 for continued evaluation and identification of promising material. It is expected that some of this superior material will become available to growers within the next few years. In the interim, the industry relies on effective use of potassium phosphonate applications to manage Phytophthora root rot, particularly in higher rainfall areas.

Results show that in the cultivar Reed, the optimal time for phosphonate injections is late winter, when most of the oil-building metabolic activity in fruit has slowed down and they are no longer a priority sink for photosynthates and phosphonate. Injecting earlier resulted in unacceptable levels of residue in fruit flesh. Foliar sprays through winter did not cause excessive flesh residues, but levels of phosphonate in roots were lower than after injections.

Other major constraints to fruit quality are postharvest anthracnose and stem end rot disease, and there is pressure to investigate non-traditional approaches and products to assist in management. Two carbonate-based products reduced anthracnose disease levels in a preliminary trial where harvested Hass fruit were dipped in solutions of a range of different products prior to ripening. Data from the first trials, where a selection of these products were applied in the field from early fruit set, are currently being analysed, but initial indications are that disease is less in some treatments. These trials will be repeated and results will be reported to industry.

Project AV07000

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Protecting Australia's pollination

Three multi-industry-funded projects have invested significant research to assist the pollination of Australia's horticultural and agricultural crops into the future on a sustainable and profitable basis.

Future surveillance needs for honeybee biosecurity

A risk-based framework has been sought for considering the costs and benefits of surveillance systems for honeybee pests and diseases. The use of sentinel hives in monitoring exotic pest incursions has been clarified and could deliver positive cost-effective outcomes to detect exotic bee mites (notably Varroa and *Tropilaelaps* spp).

However, a lack of knowledge as to how sensitive they are at actually detecting the mites is undermining their use as a surveillance method.

The risk-based framework developed can be used in future studies to determine how the National Sentinel Hive Program (NSHP) can be improved. There is scope to optimise the current NSHP and, while sentinel hives are beneficial in the early detection of exotic bee mites, the current surveillance for the early detection of Asian honeybees (*A. cerana*) is ineffective and needs to be re-examined.

Pollination simulation: a report on two scenario driven workshops

These workshops tested and recommended improvements to emergency response arrangements for a honeybee disease/ pest incursion that have implications for the pollination sector. It also re-appraised pollination transition arrangements that would be used following the establishment of a honeybee disease or pest.

The workshop considered the containment or management of Varroa if eradication using the arrangements in the Emergency Animal Disease Response Agreement (EADRA) are not feasiblement are ne. Containment and managot covered by any formal arrangements at this stage. From the workshop, there was:

- recognition that eradication may not be possible
- exploration of possible transition arrangements and implications regarding cost sharing
- discussion on potential projects for developing business continuity strategies and a broader level of preparedness
- knowledge of pesticide registration processes and a decision that HAL will work with Pollination Australia on this.

The eradication response strategy is outlined in the AUSVETPLAN Disease Strategy for eradication but there are no guidelines for management.

The importance of being pollination aware

The value and importance of pollination to Australian rural industry production, and key pollination management issues from enterprise to national level, were considered through a case study-based approach.

The project considered the need for defined standards for the collection, recording and reporting of pollination data, and identifying opportunities for improving the effectiveness and efficiency of pollination in Australia.

Projects MT08044, MT08048, MT08079

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Maintaining dimethoate and fenthion use

Dimethoate and fenthion were registered many decades ago. Existing registrations may be based on residue data that is now considered insufficient, out-dated, or inconsistent with current use patterns.

Efforts are progressing to maintain as many registered uses of dimethoate and fenthion as possible following a review by the Australian Pesticides and Veterinary Medicines Authority (APVMA). The review requested that extra data be generated for most of the crops that appear on the label of products that contain dimethoate or fenthion to ensure that pesticide products meet improved safety and performance standards.

The review generated data on the residues that remain in produce following pre-harvest sprays and postharvest dips.

A large, multi-industry project was conducted to generate the data that APVMA require, which began in 2007 and was completed in June 2010.

A Good Laboratory Practice (GLP) residue report was submitted to the APVMA so that they can complete their review.

Until the APVMA complete this process, it is unclear what the maximum residue level (MRL) of these pesticides will be accepted for each crop. Once the acceptable MRL is established, this will determine which uses will remain registered on product labels.

Project MT06022

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RNA silencing for Phytophthora-resistant rootstocks

Phytophthora is the most serious pre-harvest disease in avocados, causing $40 million in lost production and fruit downgrading (mainly sunburn and small size) per year. Growers spend approximately $3.5 million per year on chemical prevention practices alone, excluding the cost of other cultural practices designed to reduce the effect of the disease.

A project investigating RNA silencing (RNAi) to engineer avocado rootstocks for resistance to Phytophthora root rot is currently underway. RNA silencing can provide high-level pathogen resistance, which could make a substantial difference to the cost involved in management of the root rot disease.

RNAi-mediated resistance does not involve expression for foreign proteins in the plant. The modification for imparting resistance will be limited to the rootstock; the grafted scion will remain non-transgenic and will produce GM-free fruit. No alterations are envisaged in the ability of the scion's agronomic characteristics.

The project involved the design of double-stranded RNA virus (dsRNA) constructs to target essential genes in *Phytophthora cinnamomi* to deliver resistance.

A model plant *Arabidopsis thaliana* was transformed with the same dsRNA constructs used for avocado with the presence of *P.cinnamomi*-specific small interfering RNAs by RNA blot analysis. Resistance screening of transgenic plants is currently underway.

Somatic embryos of five cultivars (Reed, Duke 7, Hass, A10 and Velvick) were successfully obtained. Three to four weeks after subculturing the somatic embryos, they are of a suitable size for transformations to be carried out.

Transformation of approximately 100,000 somatic embryos with selected dsRNA constructs targeting *P. cinnamomi* is in progress. The time required for shoot generation from transformed embryos may be 14-18 weeks. Techniques for efficient and reliable shoot development from transformed embryos are currently being investigated.

Project AV08002

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ASSISTING PRODUCERS TO ACHIEVE BUSINESS GOALS

Improving technology uptake in the WA avocado industry

The WA avocado industry has been undergoing rapid growth in recent years that has seen many people new to avocado production enter the industry. This project, funded by voluntary contribution, was designed to provide structured and funded processes to identify technology of benefit to the WA avocado industry, and then design and implement strategies to maximise the flow of this information to the industry.

The key outputs for this past year have been a literature review into the issue of irregular crop loads with particular reference to cool climate production, investigations into the use of GA3 as a potential tool to moderate alternate bearing, and investigations into the flowering sequence of various avocado varieties under the conditions of the lower south west region to identify likely suitability for cross-pollination of the Hass variety.

Project AV06002

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Hass flowers showing honey bee foraging on a functionally male flower with a functionally female flower in the foreground

Key supply chain resources on the web

A web-based database has been built with a search and filtering tool for both journal articles of all known avocado research and for all resources collected and maintained by Avocados Australia over the last 35 years. In this project, the supply chain is defined as production though to consumer and includes ripening, wholesaling, independent retailing, specialist produce distribution, food service distribution/ catering, and processing functions.

The services login

It is recognised that a wide variety of factors affecting fruit quality, productivity and supply chain efficiency are interrelated, therefore the Supply Chain Improvement Program (of which this project is one component) was developed.

The Australian Avocado Industry Strategic Plan 2005-2010 identifies eating quality of avocados, productivity and supply chain efficiency as priority areas for the industry to address. The project, *Avocado Supply Chain Mapping and Resource Audit* (AV06026), identified a wide range of existing resources that that were hard to access.

The two databases are available once undertaking a simple registration process at industry.avocado.org.au.

Project AV08025

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Achieving globally competitive avocados

Avocado consumption must keep pace with expansion in plantings and production to keep the industry profitable. Avocado production is expanding rapidly in countries with low production costs and imports of cheap fruit pose one of the greatest threats to the Australian avocado industry.

It is essential to improve competitiveness for the long-term viability of the industry. Much of the technology and information to achieve better quality and productivity is already available but adoption needs to be improved.

The aim of this project was to improve the productivity and fruit quality of the Australian avocado industry though better communication of technology and production knowledge to growers.

The main strategy was to establish nine regional grower study groups across Australia and to conduct workshops for these groups on topics chosen by them. The topics were on production issues that growers identified as limiting their ability to improve yield and fruit quality.

Six workshops were conducted for each of the five biggest production areas whilst three workshops were conducted for each of the other four production areas. In all, 42 workshops were conducted with the assistance of expert guest speakers and were followed-up with comprehensive illustrated minutes and copies of the presentations.

The project drew upon the knowledge and skills of RD&E officers across the country for input into workshops and information material.

During the 2009/10 year a total of eight workshops were held around the country with an average attendance of 45 per meeting. Topics covered included disease management, canopy management, soil and orchard floor management, weed control, marketing, integrated pest management and nutrition.

A survey to 638 growers was distributed with 89 per cent saying they had made changes to their farming practices as a result of the project.

Project AV06003

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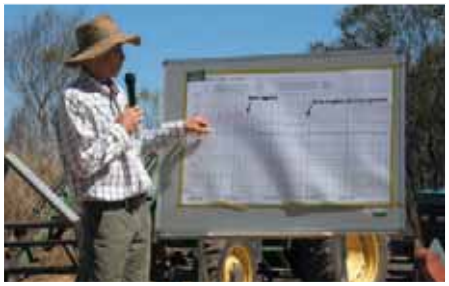
Tony Whiley from Sunshine Horticulture Services explains to a WA study group the theory and management of biennial bearing and rootstock selection

4th Australian & New Zealand Avocado Conference 2009

The 2009 Australian and New Zealand Avocado Growers' Conference, 'Avocados for Life' was the fourth joint conference over the last 12 years. The Conference provided over 455 industry members with an opportunity to gain further information, both from Australia and overseas on the latest research and trends to work through issues affecting the industry. The Conference was also an opportunity for growers and industry representatives from allied sectors from throughout Australia and NZ to renew acquaintances and further develop business relationships to strengthen the two industries.

An exciting line-up of 65 speakers from the international arena, Australia and NZ presented the latest knowledge



and understanding of important issues relevant to successful avocado production and marketing. Areas covered included: flowering and fruit set; yield, fruit size and production; new germplasm and global breeding programs; pest and disease control strategies; integrated production systems and the impact on market access; postharvest quality and outturn; competing in a global world; building demand; promotions and marketing; and customer trends and expectations.

The conference contained a number of field visits and networking sessions where growers and other industry representatives had the opportunity to interact with presenters. Over 23 sponsors participated in the conference, demonstrating the commercial links that industry has developed and maintained.

The conference program was developed to appeal to growers, researchers and related industry sectors. Over 70 per cent of attendees were growers. The conference was designed to provide all attendees with an opportunity to gain a greater understanding of industry issues and events through attendance at plenary sessions and field visits.

The conference proceedings/papers have been distributed to delegates online at industry.avocado.org.au

Project AV08031

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INDUSTRY, ORGANISATION, RESOURCING & MANAGEMENT

Environmentally responsible agricultural practices

The avocado industry identified the need for an environmental audit in its 2005 - 2010 Strategic Plan. The purpose of conducting an environmental audit was to provide the avocado industry with data to support its management of natural resources, to demonstrate those practices to interested parties and to identify opportunities for improving on-farm practices.

The objective of this project was to determine the current level of understanding and implementation of environmentally responsible agricultural practices among Australian avocado growers. The project provides complementary and contextual information relating to community attitudes and chemical residues from which to consider the results. Information was collected through surveys and interviews of 328 growers, representing around 40 per cent of the industry. Involvement in the survey process alone has helped raise the environmental awareness of all participating growers.

The contextual information relating to community attitudes revealed a persistent concern for the implications of fruit production on human health, particularly relating to chemical spraying, and to a lesser degree on the environment. Surveys in the Bundaberg community returned only one mention of avocado growing in the unprompted answers, which demonstrates the relatively good or neutral position that the avocado industry holds in the minds of fruit consumers.

Additional contextual information on chemical heavy metal residue testing determined high levels of Australian legal limit compliance. A watching brief and preparatory grower education on the international market trend towards zero tolerance is required to ensure that the avocado industry remains at the forefront of innovative and good agricultural practices.

Among growers in the avocado industry, there is currently a moderate to high level of understanding and implementation of environmentally responsible agricultural practices, with a few areas that warrant improvement and/or monitoring.

Project AV08001

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Structured approach to fruit fly research & management

Fruit flies are a large and important group of insect pests that globally attack a wide range of fruit and vegetables and can have a major impact on Australia's capacity to trade in domestic and international horticultural markets that have an average annual value of $4.8 billion.

In November, 2008, the Federal Minister of Agriculture, Fisheries and Forestry released a draft National Fruit Fly Strategy (NFFS) as an initiative to implement an effective national management strategy for the control of all fruit fly species in Australia.

To direct the implementation of the draft, this project was initiated to provide support, in partnership with the Australian Government, for the formation and work of an expert based NFFS Implementation Committee (IC).

With reference to an analysis of the commodity supply chain, the committee reviewed and prioritised the initiatives within the draft and developed a comprehensive implementation Action Plan. It outlines 15 key projects, together with a governance structure, that are designed to facilitate an enhanced and sustainable national approach to the management of fruit flies in Australia.

After the release of the draft NFFS Action Plan in October 2009, followed by a two month period for public consultation, the NFFS Action Plan was finalised and released in May 2010.

To complement the draft Action Plan, the committee proposes to commission further economic analysis of the specific projects in 2010. This will outline general benefits to growers, government agencies and the wider community and form the basis of an investment plan that will match actions with costs and benefits.

Project MT08080

For more information contact:
Nicholas Woods, Plant Health Australia
T 02 6215 7704
E nwoods@phau.com.au

Male fruit fly (Drosophila funebris)

Avocado program evaluation

The avocado program evaluation is part of a series of economic impact assessments being completed by HAL on an industry basis to comply with Australian Government requirements.

Four randomly selected clusters of avocado industry R&D investments were evaluated:

- **Plant protection investments:** 10 projects that addressed issues such as avocado sunblotch viroid, fruit spotting bug, fungal diseases of fruit and roots, and red-shouldered leaf beetle control
- **Postharvest and fruit quality:** eight projects that addressed the maintenance of postharvest fruit quality, qualities of avocados for human health, processed avocado quality and the potential for an avocado oil extraction industry
- **The supply chain cluster:** nine projects that addressed market reporting, quality systems, supply chain mapping, the food service sector, and retail quality and price surveys
- **Market and consumer research projects:** six projects that included consumer attitudes, health professional usage and attitudes, quality surveys and sensory research, and processed avocado market research.

The evaluation included assessment of all R&D costs, description of project activities and outputs, identification of project outcomes, translation of outcomes into benefits and quantification of current and forecast industry and public spillover benefits. Modelling was required and an independent review of the analysis was completed.

Benefit cost ratios for agricultural R&D are typically between three and 11 for successful programs. The avocado R&D demonstrated an average benefit cost ratio of nine for every dollar invested.

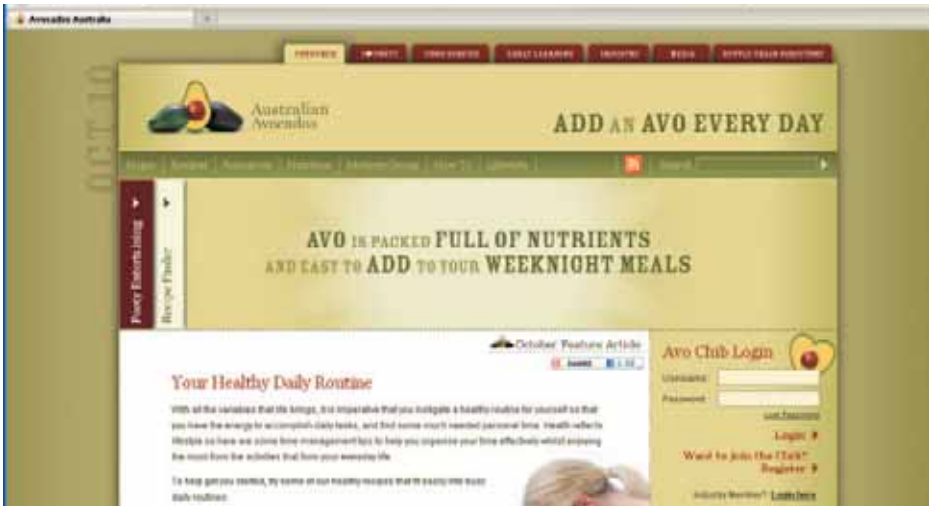
Program evaluation results have been used to inform the Analytical Business Case that guides the new *Avocado Industry Strategic Plan 2010-2015*.

Project AV08029

For more information contact:
Michael Clarke, AgEconPlus
T 0438 844 024
E clarke@ageconplus.com.au

Essential avocado communication tools

Communication is absolutely essential to stay in business in today's world, and it's a priority to keep a constant watch on any and every piece of information that will improve the bottom line of the avocado business. Avocados Australia provides growers with a mix of communication tools. *Talking Avocados* and the website www.avocado.org.au form the current suite of communication tools.



www.avocado.org.au

Talking Avocados

Talking Avocados continues to be an important and effective communication tool for the industry. Published quarterly, and distributed to approximately 1,100 growers across Australia, *Talking Avocados* updates growers on industry R&D, marketing, industry matters and avocado information from around the world.

The reports are easy-to-read, practical summaries for growers.

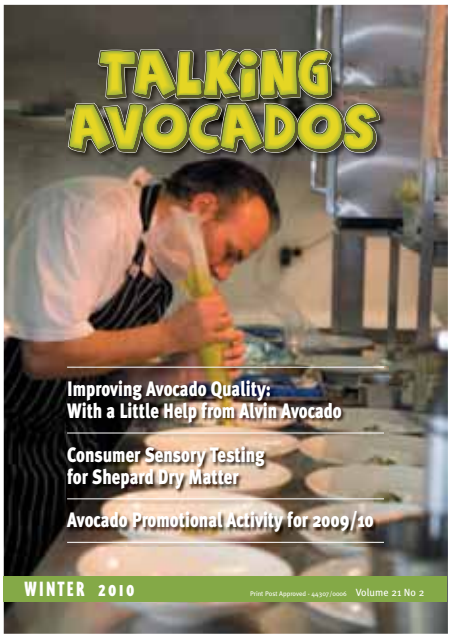
www.avocado.org.au

The website remains an essential vehicle of communication as it continues to grow in content. The public pages of the website offer up-to-date information for consumers, the food service industry, growers, the media and members of the supply chain. Consumers have access to a plethora of information about avocados, including hundreds of avocado recipe ideas, important health and nutritional information, and a 'talk to an expert' forum.

The website also contains a grower-only login section that provides all registered Australian avocado growers with full versions of R&D final reports and marketing updates.

Project AV08045

For more information contact:
Antony Allen, Avocados Australia
T 07 3846 6566
E ceo@avocado.org.au



Talking Avocados **Winter 2010 Edition**

Industry Strategic Plan

In early 2010 the process to develop the industry's next strategic plan began. The Avocado Industry Advisory Committee (IAC) and the Avocados Australia Board were keen to build on the vision and direction of the 2005-2010 plan, which has served the industry well.

After review of the outcomes from the previous plan and assessment of the current state of the industry, a series of workshops were held with key industry stakeholders. These workshops looked at possible future scenarios that may impact the industry and aimed to capture the strategies and actions the industry will need to realise its full potential.

The new draft plan articulates the following:

Industry strategic intent: Australian Avocados everyday for a healthy life.

Industry key aspirations: The Australian avocado industry aspires to be:

- a growing, progressive, profitable and sustainable industry
- a leader in product, supply chain and industry development innovation.

The industry aims to deliver to its customers:

- a consistent, good quality product
- innovation and choice
- a product that is recognised and appreciated as Australian and an essential health food.

These aspirations aim to place Australian avocados as an everyday food option/ purchase with consumers.

The objectives and strategies of the new plan focus on building sustainable and profitable supply, driving demand and ensuring there are sufficient resources and appropriate structures to support industry development.

The draft plan has been made available to the broader industry for comment and after consideration a final plan will be available in late October 2010.

Project AV09008

For more information contact:
Jenny Margetts, p2p business solutions
T 07 3366 2710
E jmargetts@bigpond.com

Australian Government priorities

As part of the Australian Government's commitment to rural research and development, horticulture industries can access matching Commonwealth funding though 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

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 market 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

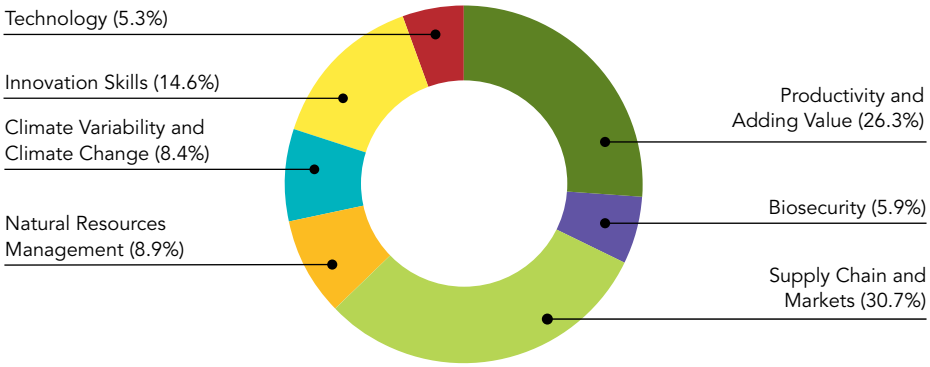
Protect Australia's community, primary industries and environment from biosecurity threats.

Innovation Skills

Improve the skills to undertake research and apply its findings.

Technology

Promote the development of new and existing technologies.



Consultation funding

Consultation funding is paid by HAL to cover costs for IAC meetings, annual levy payers' meetings and costs within the partnership agreement between HAL and the member industry that are specified as consultation, for example R&D program consultation.

In 2009/10 $298,936 of consultation funding was provided to Avocados Australia Limited.

Relationships and roles relating to HAL

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.

HAL invests over $90 million annually in projects to benefit horticulture industries and the wider community.

An Industry Advisory Committee (IAC) is established for each industry with a statutory levy and annual income exceeding $150,000. The IAC makes recommendations to HAL on the expenditure of funds.

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

In 2009/10 Avocados Australia Limited acted as the service provider on 10 projects.

Full details can be found on pages 23 to 24 of this report.

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 http://www.horticulture.com.au/industries/across_industry_program.asp

Project No	Project Title	Levy or VC	Project start	Project completion	Organisation	Name
Objective 1: To enhance the efficiency, transparency, responsiveness and integrity of the supply chain						
AH07033	Incident Response Protocol - development and training for horticulture	Levy	21-Apr-08	30-Sep-09	Control Risks	Julian Heath 02 9279 0099
AH09009	Food security discussion paper	Levy	01-Apr-10	28-May-10	Horticulture Australia Limited	Richard Bennett 03 5825 3753
Objective 2: Maximise the health benefits of horticultural products						
AH07006	Promoting the health advantage of fruit and vegetable to increase their consumption	Levy	01-Jul-07	30-Jun-10	Horticulture Australia Limited	Chris Rowley 02 8901 0329
AH07007	Horticulture Wellbeing Initiative	Levy	27-Jun-08	31-Jul-09	Horticulture Australia Limited	Natalie Weigand 02 8295 2300
Objective 3: Position horticulture to compete in a globalised environment						
AH07002	HAL Market Access Coordination	Levy	01-Jul-07	01-Oct-09	Stephen Winter & Associates Pty Ltd	Stephen Winter 03 9832 0787
AH07003	Market access support program (follows project AH05034)	Levy	30-Jun-08	01-Oct-09	Horticulture Australia Limited	Kim James 08 6389 1407
AH09012	Codex participation 2009-10	Levy	01-Oct-09	28-May-10	Horticulture Australia Limited	Richard Bennett 03 5825 3753
AH09018	Office of Horticulture Market Access – National Director	Levy	01-Apr-10	28-Feb-12	Stephen Winter & Associates Pty Ltd	Stephen Winter 03 9832 0787
AH09019	Office of Horticulture Market Access – Technical (SPS and Research and Development) Manager	Levy	01-Oct-09	30-Sep-10	Kalang Consultants	Rob Duthie 02 6286 7151
AH09021	Office of Horticulture Market Access - Operations Support	Levy	01-Sep-09	31-Dec-11	Horticulture Australia Limited	Wayne Prowse 02 8295 2300
AH09023	Health and well-being in horticulture	Levy	01-Nov-09	01-Nov-10	Horticulture Australia Limited	Chris Rowley 02 8901 0329
AH09026	Productivity Commission Study on Bilateral and Regional Trade Agreements	Levy	08-Feb-10	31-Mar-10	Stephen Winter & Associates Pty Ltd	Stephen Winter 02 6286 7151
HG08061	Market Access R&D Support Service	VC	01-Jul-08	01-Oct-09	Kalang Consultants	Rob Duthie 02 6286 7151
Objective 4: Achieve long term viability and sustainability for Australian horticulture						
AH04007	Pesticide Regulation Coordinator	Levy	05-Jul-04	31-Jul-09	AKC Consulting Pty Ltd	Kevin Bodnaruk 02 9499 3833
AH08003	Analysis of Horticulture's carbon footprint	Levy	20-Feb-09	23-Oct-09	Horticulture Australia Limited	Lyndall Miller 02 8295 2300
AH08014	Horticulture industry consultation on Award modernisation	Levy	17-Nov-08	30-Nov-09	Horticulture Australia Limited	Dr Ravi Hegde 02 8295 2300
AH08019	Access to the Invasive Species Compendium for the Australian horticultural industry	Levy	01-May-09	31-May-10	CRC For National Plant Biosecurity	Nick Langley 02 6201 2882
AH09003	Plant protection: Regulatory support and co-ordination	Levy	01-Jul-09	30-May-14	AKC Consulting Pty Ltd	Kevin Bodnaruk 02 9499 3833
AH09005	Horticulture Water Initiative - 2009-10 Program	Levy	01-Sep-09	30-Jun-10	Horticulture Australia Limited	Lyndall Miller 02 8295 2300
AH09014	Across-industry climate research, development and extension (RD&E) activities	Levy	13-Apr-10	31-Mar-11	Horticulture Australia Limited	Lyndall Miller 02 8295 2300
AH09029	Horticulture Balanced Scorecard - Economic Assessment	Levy	16-Apr-10	12-May-10	Access Economics Pty Ltd	Dr Isabel Faeth 03 9659 8300
MT07029	Managing pesticide access in horticulture	Levy	01-Jul-07	30-Jun-10	AgAware Consulting Pty Ltd	Peter Dal Santo 03 5439 5916
MT09043	Enhancing confidence in product integrity in domestic and export markets	Levy/VC	30-Sep-09	31-May-11	Horticulture Australia Limited	Richard Bennett 03 5825 3753

AVOCADO PROGRAM 2009/2010

Project No	Project Title	Levy or VC	Project start	Project completion	Organisation	Contact
AV06002	Improving technology uptake in the WA avocado industry	VC	01-Nov-06	01-May-10	Department of Agriculture & Food WA	Alec McCarthy 08 9780 6273
AV06003	Study groups to achieve globally competitive avocados	Levy	15-Dec-06	31-Jul-10	Agri-Science Queensland	Simon Newett 07 5453 5800
AV06006	Scoping of a national avocado quality system and management of avocado industry information systems	Levy	01-Oct-06	30-Nov-09	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV07000	Improving yield and quality in avocado through disease management	Levy	02-Jul-07	30-Sep-10	Agri-Science Queensland	Elizabeth Dann 07 3896 9468
AV07001	Investigation of the distribution and incidence of Avocado sunblotch viroid in Australia	Levy	10-Jul-07	31-Dec-10	Agri-Science Queensland	Dr Andrew Geering 07 3896 9353
AV07005	Development and commercial application of an avocado fruit robustness test	Levy	04-Jan-08	31-May-10	Agri-Science Queensland	Daniell Le Lagadec 07 4132 5524
AV07008	Field evaluation of superior avocado rootstocks with 'Hass' and 'Shepard' as scions	VC	15-Sep-07	31-Dec-10	Agri-Science Queensland	Daniell Le Lagadec 07 4132 5524
AV07017	Avocado production in the south west using reduced water supplies	VC	02-Nov-07	01-Oct-11	Department of Agriculture & Food WA	Alec McCarthy 08 9780 6273
AV07023	Avocado retail price surveys	Levy	25-Jun-08	30-Aug-12	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV07024	Market opportunities for avocados beyond fresh fruit sales	Levy	25-Apr-08	31-Aug-09	p2p business solutions pty ltd	Jenny Margetts 07 3366 2710
AV08000	Rootstock improvement for the Australian avocado industry - Phase 3	Levy	01-Jan-09	01-Dec-12	Sunshine Horticultural Services Pty Ltd	Dr Tony Whiley 07 5441 5441
AV08001	Environmental stocktake of the avocado industry	Levy	04-Jul-08	30-Sep-09	TQA Australia	Jan Lovell 03 6423 6008
AV08002	RNA silencing based Phytophthora root rot resistant avocado rootstocks for improved production of GM free fruit	Levy	28-Nov-08	30-Oct-11	Agri-Science Queensland	Dr Neena Mitter 0434 628 094
AV08013	Avocado consumer research	Levy	16-Mar-09	15-Sep-09	Bread & Butter Research & Planning	Anna Herron 02 9963 4600
AV08017	Avocado supply chain education materials	Levy	25-Mar-09	31-May-10	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV08018	Development best practice guidelines for of avocado ripening	Levy/ VC	26-Jun-09	11-Feb-11	Agri-Science Queensland	Terrence Campbell 0427 602 007
AV08020	Evaluation of sustainable orchard management practices for extension into general industry standards to reduce costs	Levy	30-Jan-09	30-Nov-12	Avocados Australia Limited	Dr John Leonardi 07 3846 6566
AV08021	Refinement of guidelines for avocado irrigation management under Australian conditions for different phenological stages	Levy	15-Apr-09	26-Feb-10	RMCG	Dr Anne-Maree Boland 1300 306 043
AV08022	Avocado quality monitoring via library tray system	Levy	20-Mar-09	28-Aug-09	The New Zealand Institute for Plant and Food Research Ltd	Dr Allan Woolf +64 9 925 7267
AV08025	Avocado resource audit web database	Levy	15-May-09	31-Dec-11	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV08029	Avocado program evaluation	Levy	23-Feb-09	30-Sep-09	AgEconPlus Pty Ltd	Michael Clarke 0438 844 024
AV08031	4th Australian and New Zealand Avocado Conference 2009	VC	17-Jun-09	20-Nov-09	Avocados Australia Limited	Courtney Vane 07 3846 6566
AV08034	Avocado retail quality surveys phase II	Levy	01-Apr-09	31-Oct-11	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV08038	Avocados in primary schools - Scoping study	Levy	12-Jan-09	31-Jul-09	Woodrow Consulting Pty Ltd	Shelley Woodrow 0405 414 167

AV08044	Implementation of avocado food service product performance panel and national menu survey	Levy	01-Mar-09	30-Sep-09	Inovact Consulting	Brian Ramsay 02 6140 3900
AV08045	Avocado industry communications strategies	Levy	15-May-09	01-Mar-11	Avocados Australia Limited	Antony Allen 07 3846 6566
AV08046	Real-time freight container trials to assess impact of long-term storage of Australian avocados exported to Europe	VC	01-May-09	08-Aug-11	Sunfresh Marketing Cooperative	Brian Prosser 0438 467 069
AV08900 /10	Partnership Agreement 2008-2011	Levy	01-Jul-08	30-Jun-11	Avocados Australia Limited	Antony Allen 07 3846 6566
AV09000	Identifying bioactive components and portion sizes in avocados for consumer health	Levy	15-Nov-09	20-May-11	Applied Horticultural Research Pty Ltd	Dr Jenny Jobling 02 8627 1040
AV09001	National avocado quality & information management system	Levy	01-Mar-10	01-Mar-13	Avocados Australia Limited	Joanna Embry 07 3846 6566
AV09003	Climate change and climate policy implications for the Australian avocado industry	Levy	01-Dec-09	31-Dec-10	Growcom	David Putland 07 3620 3823
AV09005	Coordination of export development for Australian avocados	VC	10-Mar-10	30-Nov-11	Avocado Export Company	Louis Grey 0488 071 800
AV09008	Avocado Industry Strategic Plan	Levy	31-Mar-10	01-Nov-10	p2p business solutions Pty Ltd	Jenny Margetts 07 3366 2710
AV09013	Food service - Chefs masterclasses	Levy	04-Jan-10	30-Jul-10	Whiteworks	Stewart White 02 9557 1433
AV09025	Australian avocado export efficiency powers consultation	Levy	01-Nov-09	31-Aug-10	Avocados Australia Limited	Antony Allen 0438 132 477
AV09026	Shepard avocado maturity consumer sensory research	Levy	18-Jan-10	31-May-10	The New Zealand Institute for Plant and Food Research Ltd	Roger Harker +64 9 925 7000
AV09500	Export marketing program 2009/10	Levy	31-Jul-09	30-Jun-10	Horticulture Australia Limited	Wayne Prowse 02 8295 2300
AV09501	Domestic marketing plan 2009/10	Levy	03-Aug-09	30-Jun-10	Horticulture Australia Limited	Gunjan Tandan 02 8295 2300
AV09522	Avocados in early childhood initiative	Levy	16-Dec-09	30-Jul-10	Horticulture Australia Limited	Gunjan Tandan 02 8295 2300
MT06020	Improving market access R&D for the horticultural industries	Levy	01-Jul-06	31-May-12	Horticulture Australia Limited	Kim James 08 6389 1407
MT06022	Generation of dimethoate and fenthion residue samples to maintain market access	Levy/ VC	06-Jun-07	16 Aug-10	Crop Protection Research Pty Ltd	Dale Griffin 03 9005 9041
MT06055	Evaluation of pyraclostrobin products for disease control in mango, avocado, passionfruit and lychee	VC	01-May-05	30-Oct-10	Agri-Science Queensland	Dr Lindy Coates 07 3896 9468
MT08010	Prioritising biosecurity activities and investment	Levy	01-Jul-08	31-Jul-09	Plant Health Australia	Dr Ryan Wilson
MT08015	Data collection program	Levy/ VC	15-Sep-08	30-Jun-10	Horticulture Australia Limited	Wayne Prowse 02 8295 2300
MT08036	Ecology and pre-harvest control of fruit flies for systems approaches to market access for fruit fly host commodities	Levy	01-Jul-08	30-Apr-12	CRC For National Plant Biosecurity	A/Prof Tony Clarke 07 3138 5023
MT08044	Future surveillance needs for bee biosecurity	Levy/ VC	05-Jan-09	15-Apr-10	Rural Industries R&D Corporation	Dr Dave Alden 08 6271 4128
MT08048	Simulation workshop for Varroa mite incursion	Levy/ VC	05-Jan-09	15-Apr-10	Rural Industries R&D Corporation	Dr Dave Alden 08 6271 4128
MT08060	Consumer tracking study	Levy	01-Dec-08	01-Dec-11	Brand Story Pty Limited	Steve Sheppard 02 8399 3850
MT08079	Pollination Aware – it's importance to Australia	Levy/ VC	25-May-09	15-Apr-10	Rural Industries R&D Corporation	Dr Dave Alden 08 6271 4128
MT08080	Structured approach to fruit fly research and management for the Australian horticultural industry - Phase 1	Levy/ VC	31-May-09	31-May-10	Plant Health Australia	Nicholas Woods 02 6215 7704

AVOCADO INVESTMENT SUMMARY

Year Ended 30 June 2010

	Marketing 2009/2010 $	R&D 2009/2010 $	Combined 2009/2010 $
Funds available 1 July 2009	423,851	1,100,333	1,524,184
INCOME			
Levies Received	2,045,880	1,368,885	3,414,765
Commonwealth Contributions		1,327,798	1,327,798
Other Income	45,840	40,094	85,934
Total Income	**2,091,720**	**2,736,777**	**4,828,497**
Budget	*2,210,755*	*3,413,288*	*5,624,043*
Variance to Budget	*(119,035)*	*(676,511)*	*(795,546)*
PROGRAM INVESTMENT			
Levy Programs	1,837,261	2,307,608	4,144,869
Service Delivery Programs by HAL	277,059	347,987	625,046
Across Industry Funding	25,696	25,696	
Levy Collection Costs	41,198	35,433	76,631
Total Investment	**2,155,518**	**2,716,724**	**4,872,242**
Budget	*1,995,623*	*3,832,610*	*5,828,233*
Variance to Budget	*-159,895*	*1,115,886*	*955,991*
Annual Surplus/Deficit	-63,798	20,053	-43,745
Closing Balance 30 June 2010	**360,053**	**1,120,386**	**1,480,439**

Avocado Industry Advisory Committee (IAC)

Bob Granger (Chair)

Daryl Boardman

Russell Delroy

Lachlan Donovan

Nick Hobbs

Jim Kochi

Henry Kwaczynski

Chris Nelson

Tom Silver

John Walsh

Antony Allen (Ex-Officio)

John Tyas (Ex-Officio)

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