



Know-how for Horticulture™

Almond

ANNUAL INDUSTRY REPORT 08 • 09

Overview

Despite the uncertainty created by the financial demise of Timbercorp, the almond industry has made significant steps forward in terms of both its underpinning structure and its development of markets to sell the increasing supply of product.

In 2008/09, the Almond Board of Australia (ABA) reorganised the committees that provide support to the Almond Industry Advisory Committee (IAC) resulting in the:

- Almond Plant Improvement Committee
- Almond Production Committee
- Almond Marketing Committee

These committees help to monitor research being undertaken in their respective areas of interest and identify industry needs that can be addressed by allocating the statutory R&D funding or the industry's voluntary

marketing levies. The advice from these committees has proven valuable to the IAC in directing the investment in the research program and providing input into marketing strategies to address the priority issues confronting the industry. To highlight this, during 2008/09 the almond industry was Australia's fourth highest export earning horticultural industry behind only table grapes, citrus and vegetables with sales being made to more than 40 countries.

The international market is in slight oversupply, despite nine per cent average annual growth in consumption over the past decade. Future demand is expected to continue at long-term growth rates of nine per cent per annum. However, assuming a conservative growth rate of five per cent per annum, demand should overtake supply by 2012.

To ensure that the Australian industry remains competitive in the international

market, the industry emphasis is on efficient production of a quality product.

The health benefits of almonds are an important sales driver with consumers. These key areas to the ongoing viability of the industry are reflected in the R&D program. The breeding program being undertaken by the University of Adelaide is aiming to improve production efficiency while seeking to deliver a highly desirable product for the industry to market. In doing this the Plant Improvement Committee is providing the crucial industry input to assist the research effort. Rootstock trials will soon be undertaken. This promises to be a critical area to delivering significant production gains in future.

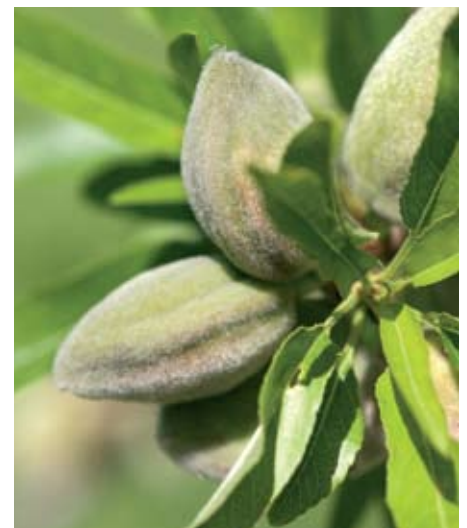
Researchers are working in the areas of pollination, irrigation, nutrition, leaf tatter, prune rust, growth disorder, QA and

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Climate Change is increasingly becoming a significant topic for the horticulture industry. In 2007/08 the industry began contributing to the horticulture component of Phase One of the national Climate Change Research Strategy for Primary Industries (CCRSPI).

The aim of CCRSPI Phase One was to develop a comprehensive research strategy that will allow industries to be informed by good research and be prepared to respond to the opportunities and risks presented by climate change. The scope of the strategy will be broad, covering any issue that needs consideration over the short (3 years), medium (5+ years) and long term (10+ years). The research strategy and Phase One final report is available from the CCRSPI website <http://lwa.gov.au/ccrspi/>.

HAL is now contributing to Phase Two of the project in 2008/09 in collaboration with other Rural RDCs, CSIRO and Federal, State and Territory Governments. This phase aims to develop an implementation plan for the research strategy for 2009/10 onwards.



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product safety. The development of knowledge only provides a return on investment if it is taken up by industry participants and this area requires both a commitment to deliver the knowledge in a useable, understandable form and a preparedness by industry stakeholders to search for and take on board project findings. The Australian almond industry is fortunate to have the ABA ably managing this process.

The industry's research endeavours are not limited to the orchard and 2008/09 saw market access issues addressed, consumer research undertaken, the identification of health benefits of almonds and the education of health professionals to these dietary advantages.

In regard to the 2008/09 R&D program, HAL invested \$863,180 in almond levy projects and \$942,311 in the matched voluntary contribution program and two per cent in the across industry program that funds projects providing a benefit to all Australian horticulturists. Information on the across industry program is contained on page 14 of this report.

The Almond IAC Chairman, Ben Robinson, retired at the end of the 2008/09 financial year. His leadership during a period of rapid expansion of the R&D program is greatly appreciated by Horticulture Australia Limited and the Almond Board of Australia. Mr Greg Buchanan is the new chair of the IAC.

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Ensuring market access through quality assurance

Ongoing market access for Australian almond exports is increasingly linked to the maintenance of strict quality standards.

To meet the requirements of export markets, the industry needs to ensure it has a comprehensive, holistic and constantly updated quality assurance (QA) system right along the supply chain.

This project incorporates a range of interlinking activities designed to assist the industry with the continued development and implementation of this QA system.

The focus this year has been the development of chemical residue guidelines and implementation of an industry-wide testing program for maximum residue limits (MRL).

The chemical screening program has been adopted by the industry in partnership with the National Residue Service (NRS).

Testing for chemical residues commenced in March 2009 and a compliance report will be issued annually by NRS.

NRS, in consultation with the Almond Board of Australia (ABA), will continually monitor and update the Almond MRL Table to reflect the requirements set by Australia's major export destinations. It will also ensure MRL testing is in line with these requirements.

Project AL06006

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ENHANCING POLLINATION EFFICIENCY

The rapid expansion by the almond industry has put pressure on beekeepers to supply additional beehives for pollination purposes.

To date the growing level of demand has been met, but this may not be the case when current almond plantings mature.

The tight supply situation is further complicated by the potential arrival in Australia of the Varroa mite. Quarantine and domestic access will then become a major issue and growers are likely to face a contraction in available pollination services and increasing prices.

Given the magnitude of the problem, a research project has been established to investigate strategies for improving the efficiency of existing beehives in pollinating crops.

Potential strategies include increasing pollen abundance on foraging bees to allow a reduction in beehive numbers per hectare.

The research study involved sampling pollen abundance on foraging bees after fitting various devices to the hive to place more pollen on exiting bees.

The study highlighted the value of one particular device and found pollination efficiency could be further enhanced by feeding sugar syrup to the bees, a standard strategy used by beekeepers when pollinating kiwifruit crops.

Project AL06003

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Improving the management of almond rust

While growers face difficulties improving the productivity of almond trees in times of drought, they also face another water problem – diseases due to water on their trees.

Water on leaves (leafwetness) is a factor influencing the incidence of rust, which is a disease that can cause major losses in wet seasons and in dry periods cause additional losses from unnecessary spraying.

Project AL06007 has been investigating the relationship between moisture and temperature and the onset of rust fungus in almond crops.

Over the past three seasons, weather information from almond orchards has been examined to determine its correlation with detailed observations of the rust fungus.

The data shows a close relationship between the duration of leafwetness at specific temperatures and the amount of rust infection on unsprayed leaves. Analyses undertaken during 2008/09 have shown relative humidity (RH) also plays a significant role.

In the past season, a model for rust infection has demonstrated a good ability to describe the times when rust occurs and periods when it is too cold



Weather data is crucial to assessing the epidemiology of the almond rust fungus

or too dry. The model's capabilities were further improved when RH was added to temperature and leafwetness in the calculations.

Adding this factor allowed the model to differentiate between events that appeared to be wet enough for rust to occur but actually were not. This differentiation is essential if unnecessary spraying is to be avoided during short moist periods in otherwise dry conditions.

Complete validation of the model for a disease like rust will take many seasons, given the wide array of temperature, leafwetness and RH factors occurring in the almond orchard.

Phase two of the project will involve refining the computer model and assessing ways it can be used to provide a disease management service that rapidly delivers clear information for growers. The aim will be to assess outputs from weather data analyses to help almond growers adjust their spray schedules.

Following similar research, grape growers have been able to develop technology ensuring they apply a few well-timed sprays when needed and confidently not spraying when it is not required.

Investigations will be undertaken to determine if a commercial disease management system similar to the grape industry's CropWatch can improve spray efficiency and disease management within the almond industry.

Project AL06007

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DATA COLLECTION PROGRAM

The Data Collection project provides valuable information to a number of horticultural industries, including the almond industry, on trade and domestic consumer purchasing patterns along with consumer demographics trends. This data supports knowledge building and allows the industry a basis to consider new market strategies and to influence consumer behaviours via use in marketing programs and strategy development.

MT08015 delivers information to the almond industry via reports created from the data platforms of Retail Scan

Data and Homescan Consumer data acquired in the project plus individual market reports where applicable.

Report topics provided to the almond industry include: major retailer sales volumes, values and price level trends; penetration of market; average component of sales; and demographics on the consumers of almond produce from a variety of market outlets. Domestic sales trends are displayed across retail and independent markets as well as providing consumer behaviour data on purchase frequency, and average values spent upon each market visit.

Reports are usually produced quarterly but industries with a peak season usually look to have theirs tailored to key time periods across the year. Project MT08015 is continuing to build capacity with improved data and reporting methods to aid the almond industry in the coming year.

Project MT08015

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Supporting health claims for almonds

For some time the almond industry has known convincing evidence exists to support a health claim around the role of almonds in reducing LDL cholesterol and reducing the risk of heart disease.

To provide the strong, credible scientific support needed to legally make this claim, the Almond Board of Australia (ABA) commissioned a review into the current research in the area. This report will be used to support an application to Food Standards Australia New Zealand (FSANZ) enabling the almond industry to develop a formal claim in relation to high level health claims.

In August 2006, The National Centre of Excellence in Functional Foods completed its review of the scientific literature supporting two high level health claims on tree nuts (almonds, walnuts, pistachios, cashews, macadamias, hazelnuts, chestnuts, pine nuts, brazil nuts, mixed tree nuts) and reduced risk of heart disease and reduced LDL cholesterol.

The review found there is 'convincing' evidence to support a health claim on almonds and reduced LDL cholesterol, with 'probable' evidence for a health claim on almonds and reduced risk of heart disease.

The ABA engaged Sara Grafenauer (an accredited practicing dietician and lecturer at the University of Wollongong) to develop a report written specifically for health professionals explaining the way almonds help lower LDL cholesterol and therefore reduce the risk of heart disease.

The project also involves developing summary documents specifically targeted at health professionals and consumers, including a report on the science related to almonds and reduced LDL cholesterol and the reduced risk of heart disease (derived from the 2006 Nuts for Life report).

The reports have significantly advanced the industry's ability to articulate the

health benefits of regularly eating almonds to the main health professionals influencing the dietary behaviour of Australians – general practitioners and dietitians.

A key health benefit of eating almonds is their ability to lower LDL cholesterol and thereby reduce the risk of heart disease, therefore nuts have a valuable role in preventative healthcare.

With prevention an increasingly important theme in Australian healthcare, a key recommendation from the project is for the development of a scientific report explaining the role of almonds in preventative healthcare.

Project AL06020

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OPTIMISATION TRIAL DOUBLES EFFORTS TO MAXIMISE YIELDS

Work on the almond industry's Optimisation Trial continued this year, with the aim being to determine the best possible conditions for long-term almond production from trees on Nemaguard rootstock.

The trial is now in its eighth year. Ongoing drought and rising production costs, make its focus on identifying the most efficient and economic use of inputs to maximise yields even more important.

Yields from the trial for the 2008/09 season were an improvement on 2007/08, with the average yield across all treatments of 4,000kg/ha and 4,200 kg/ha for the Nonpareil and Carmel varieties respectively.

This slight improvement over the previous year is probably due to the slight biennial cropping tendencies of the trees and their recovery from heavy pruning completed in winter 2007.

A change to the trial was made this year to further understanding about the impact on yields of reduced irrigation applications. Treatment 4, which is a duplicate of Treatment 2, has now been modified to 50 per cent.

To date, the research indicates canopy management is a major factor in maintaining long-term production throughout the entire almond tree, not just the top of the plant.

During June 2008 further canopy pruning was done at the trial site, based around maintaining tree shape created in the heavy pruning of winter 2007, rather than on major tree modifications.

Salinity management, soil acidification, nutrient management and environmental sustainability on drip irrigated crops continue to be key focus areas for the trial given the intensive water and fertiliser regimes.

To further enhance the study of the interaction between soil and plant

systems, Dr Tapas Biswas and the SARDI project team, engaged to work on the project in 2008/09, will continue their research throughout the 2009/10 season and will incorporate the use of the SoluSampler rootzone monitoring tool, lysimeters and plant-based monitoring equipment and modelling.

The project team will work towards informing the almond industry about the results of the lower water treatment (Treatment 6 – 60 per cent of E-pan) and SARDI's nutrition research and to demonstrate how yield can be maintained through water and fertiliser use efficiency.

Project AL07005

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Testing new growing systems for the almond industry

Several new growing systems have been introduced to Australia offering horticulturalists new levels of efficiencies and economic results.

The Autoagronom (AA) system is an example of this type of horticultural growing system and it is currently being evaluated by Select Harvests.

The trial of the AA growing system involves testing the viability of adapting this managerial concept to almond production in a commercially sustainable manner.

The concept underpinning the AA approach involves the creation of a dense, concentrated active and efficient almond tree root system, with optimum ratios between water content, oxygen levels and nutrients to maximise yields and minimise water and nutrient inputs.

While applying the managerial aspect of the AA system to almond production initially proved to be challenging, the positive results observed during the

2008/09 season are very encouraging.

To date, the young trees established under the AA system in 2007 have displayed a more vigorous juvenile phenological growth pattern than their conventional two year old counterparts.

A reduction in Nitrogen (N), an increase in Phosphorus (P), and Potassium (K) units combined with a relative increase in overall water usage compared to the conventional approach have assisted in sustaining this increased vigour.

This growing approach has also established solid tree root and canopy structures for the commencement of almond yielding in 2009/10 (Figures 1 and 2).

The mature trees (10 years and older) adapted from conventional management to the AA system in 2007 have generated and sustained almond yield attributes not grossly dissimilar to those exhibited by their conventional counterparts during 2008/09.

Table 1 – Mean (n=6) kernel length and weight of fruit on established Nonpareil almond trees at Kyndalyn Park in March 2009

Treatment	mm	g fruit ¹
Control	22.3	1.01
AA	21.8	0.92

A reduction in N, P, and K units combined with a relative decrease in overall water usage compared to conventional amounts assisted in obtaining and sustaining the almond kernel yield attributes noted in Table 1.

The information gained from this trial to date has provided Select Harvests with insights into how they may potentially manage their almond orchards in the future, relative to irrigation and nutrition.

Project AL07012

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Soil root zone analysis undertaken in early August 2009 by Select Harvests Technical Department

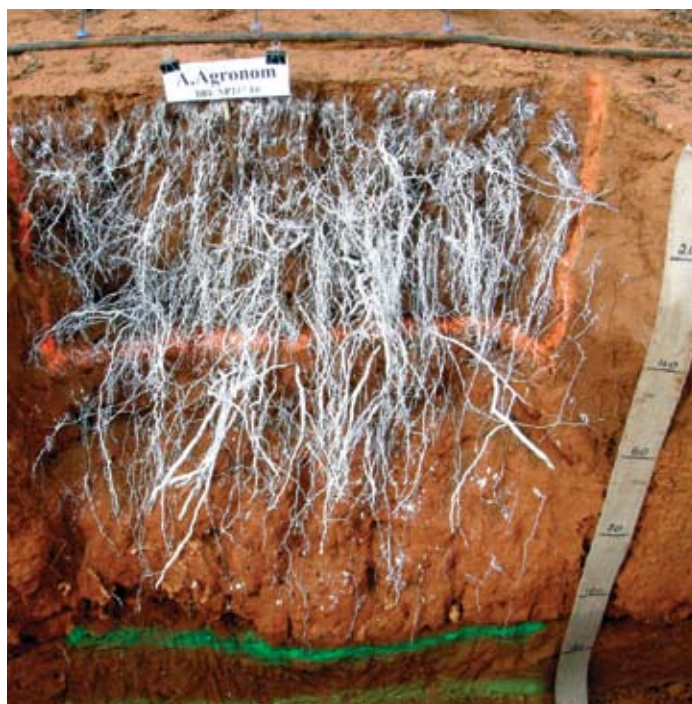


Figure 1. Diagram of tree root zone Control – August 2009



Figure 2. Diagram of tree root zone AA – August 2009

Building capacity in the almond industry

Rapidly growing horticultural industries need good communication mechanisms in place to ensure market information and new R&D learnings flow smoothly between growers, researchers and other industry stakeholders.

This is increasingly important for the Australian almond industry, as annual production has risen from a mere 8,500 tonnes in 2000 to 26,000 tonnes in 2008. Production levels are forecast to reach 80,000 tonnes by 2015.

To keep industry stakeholders informed and help them make better business decisions, the Almond Board of Australia (ABA) implemented an almond industry capacity building project designed to provide a mechanism for sharing past, current and future R&D outcomes.

It also included the employment of an Industry Liaison Manager (ILM), who is responsible for undertaking a variety of liaison and extension activities within the industry. These include facilitating learning by members of the industry, assisting with the adoption of new technologies and management practices, and providing tailored training and consulting services.

The ILM has also been involved in developing the industry's future R&D priorities and projects and in managing the industry's genetic material.

There have been a number of valuable outcomes from this project, including:

- delivery and technology transfer from the industry's major research projects
- provision of relevant material and resources to enable ongoing industry development
- organisation of field days, workshops and grower meetings
- transfer of industry information through website updates, fact sheets, regular email circulars and conference presentations
- communication of published research articles and website links related to almond production and management issues.

To assess the success of the project and develop recommendations for future directions, a consultant was employed to undertake an industry development needs assessment (IDNA).

The IDNA recommended that the next almond industry development project run for five years and be structured in such a way as to allow for growth in demand from the industry for additional development and extension services.

The assessment nominated the ABA as the most suitable contracting body for the project, but highlighted the need for the allocation of adequate staff and financial resources.

Project AL07008

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EDUCATING HEALTH PROFESSIONALS ABOUT ALMONDS

Communicating the health benefits of eating almonds every day to health professionals and encouraging them to discuss these benefits with their patients is vital in building the healthy image of Australian almonds.

The Educating Health Professionals Program aims to present the scientific case for including almonds in a healthy diet in such a compelling way that health professionals become 'almond advocates'.

A very effective tool in achieving this greater awareness of the health benefits of almonds has been heart-shaped snack tins containing 30 grams of almonds.

These tins have been very well received by health professionals, as they address concerns around over-eating by limiting portion size and also provide an easy way to show the recommended portion.

During the past six months over 500 health professionals have been sent sample packs consisting of the tin and accompanying fact sheets. There have also been requests for client samples and information.

Other activities have included the development of new fact sheets with Sports Dietitians Australia on almonds for healthy, growing children and fuelling fitness.

Educational material has also been presented at the Heart Foundation Conference, General Practitioner and Exhibition (GPCE) Sydney and the Dietitians Association Australia (DAA) Conference.

Project AL07017

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Evaluation and commercialisation of new almond selections

Although the Australian almond industry has expanded rapidly, production is still based on three main cultivars, making it essential to identify and develop improved cultivars and pollinators adapted to the local environment.

This five-year study aims to develop new almond cultivars and to begin secondary evaluation and PBR registration. It also involves an evaluation of overseas cultivars and rootstocks for Australian conditions.

The aim of the breeding program is to produce new cultivars with higher kernel yield and quality, self-fertility, drought and disease tolerance, economic gain and diversity of product/market.

Hybridisation program

The 2009 breeding objectives were reviewed by the industry committees, with the resultant 1,560 seedlings comprising 12 different crosses currently being planted for performance evaluation.

The hybridisations undertaken during July/August 2009 involved a

more targeted approach, with the parent selections being based on genetic value and self-fertility. The hybridisations include selections from both the breeding program and imported cultivars.

Evaluation of the 2004 progeny has begun, with several selections already looking promising. The key characteristics being assessed include yield in shell, percentage of double kernels, shelling percentage, shell seal, kernel size and appearance and colour. Taste assessment will also be undertaken on the selections.

Virology

To safeguard the breeding program, all breeding parents and selected progeny are screened yearly for Prunus Necrotic Ringspot Virus and Prune Dwarf Virus using PCR-based techniques developed at the University of Adelaide.

All trees in the Monash germplasm collection have now been tested over ten years to ensure virus-infected budwood is not distributed to the industry.

Almond genotyping

During 2008/09, two visiting researchers, Angel Fernandez from Spain and Professor Majid Rahemi from Shiraz University in Iran, worked with the research team on almond incompatibility, in particular why some almonds are self-fertile while most others are not.

The research involves using 3D modelling of the proteins causing self-incompatibility and identification of the incompatibility groups of Australian almond cultivars.

The project team also plans to start a database of almond genetic material (DNA fingerprints) using cultivars currently in Australia. This will help identify any unknown trees and assist with genetic certification of propagated material.

Project AL08000

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Bagged branch



Hand pollination with netting

Review confirms development activities on the right track

A recent review of the almond sector's programs for industry development and an analysis of its future needs in this area have confirmed they are delivering a range of valuable information and support services.

With rapid rises projected for almond production both here and overseas, these activities will be increasingly important in maintaining the growth and sustainability of the local industry.

In horticulture, industry development activities are defined as those 'informing and empowering businesses in the industry to make better business decisions'.

For the almond industry, these activities include:

- gathering and reporting information about domestic and international markets, market trends, production forecasts and market opportunities
- field days, workshops and the annual conference
- communications through the industry's website, *In A Nutshell* magazine and other publications

- various activities undertaken by the Industry Liaison Manager.

The review of industry development in the almond industry was carried out by a group of leading industry figures with some outside support.

In assessing how future development activities should be handled, the review group highlighted that:

- industry development activities should continue to be managed by the Almond Board of Australia (ABA)
- all growing regions, including those with newer plantings, must be supported with activities tailored to their specific needs
- efficiencies can be achieved by the industry working closely with the larger 'corporate' growers and linking in with their development activities
- younger industry participants need activities specifically directed towards them.

The review group agreed future development strategies for the almond

industry need to focus on five key areas – production, finance, supply chain, health care professionals and the foodservice industry.

While confirming the current industry development program was delivering good value for the levies invested into it, the review group made four recommendations for consideration. These include the need to:

- plan for anticipated growth in demand for industry development activities
- refine communication of R&D findings and recommendations
- ensure the significant workload involved in these activities is appropriately managed
- strengthen the collation and analysis of market data, particularly from international markets.

Project AL08004

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FUTURE SURVEILLANCE NEEDS FOR BEE BIOSECURITY

Concern has been growing about the availability of pollination services for the almond industry if foreign bee diseases arrive in Australia.

The aim of this project is to develop a set of surveillance options based on current knowledge about bee biosecurity. These options will be expert-based, with limited modelling to explore scenarios.

In the first instance the targets of the surveillance will be the threats identified under the Emergency Animal Disease Response Agreement, although the final list may change after the initial scoping discussion with key stakeholders. *Varroa* and *Tropilealaps* mites will be included in the final list.

The aim of the surveillance list will be to include some capacity for flexibility in the strategy to allow for the inclusion of other surveillance targets.

After initial discussions, the options will be restricted to the use of bait hives and sentinel hives and exclusion within particular areas.

Once the options have been developed a workshop will be held to validate the results and analysis.

Project MT08044

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Australian Almond Industry Conference 2008

The 2008 Australian Almond Industry Conference was hailed to be a resounding success. Held at the award-winning Novotel Barossa Valley Resort, 29th – 31st October, the informative and entertaining conference program, impressive speaker line-up and largest ever industry exhibition, attracted more than 200 delegates.

The 2008 conference was officially opened by the Honourable Rory McEwen, Minister for Agriculture SA.

The conference program then commenced with the Annual Levy Payer's Meeting and HAL update, followed by results from the Almond Optimisation Trial and the latest findings from Almond Prune Rust and Breeding research.

Afternoon sessions focused on irrigation research and pollination issues. Delegates were able to participate in an interactive panel session with pollination experts Dr Denis Anderson, Dr Mark Godwin, Dr Doug Sommerville and Trevor Monson.

The Annual Almond Conference Dinner, on Thursday night provided another chance for delegates to socialise with their industry peers.

Dinner included the announcement of the Phil Watters Memorial Award and a chance for all to enjoy some fine food and wine. The surprise entertainment

was a light-hearted and engaging performance by the amazing operatic voices of "The Three Waiters".

The final day's program began with a comprehensive look at water and climate change, headed by the University of Adelaide's Professor Mike Young and Dr Penny Whetton from CISRO.

This was followed by an Australian Perspective session with ABA CEO, Julie Haslett, and Joseph Ebbage, ABA's Marketing Program Manager, highlighting recent Almond Board marketing initiatives.

Jeff Oughton, Head of National Australia Bank's Economics division provided a light-hearted look at the global economy, explaining the significance and recent volatility of financial markets.

The final presentation to round out the conference was from Shirley Horn, Global Marketing Manager of the Almond Board of California. Her presentation gave delegates a closer look at California's current marketing strategies. Shirley also provided an interesting look at almond news clippings worldwide on her 'Sizzle Reel' DVD.

Project AL08006

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MINOR USE PERMITS FOR ALMONDS

While the use of pesticides in the almond industry is being modified through increased utilisation of integrated pest management, the need for strategic pesticide use remains.

This situation is complicated by the fact the industry does not have access to sufficient pesticide registrations for its needs.

To overcome this, HAL is funding an investment program in minor use permits.

This process is given direction by a Strategic Agrochemical Review Process (SARP) conducted by Peter Dal Santo of AgAware Consulting, in conjunction with the almond industry.

Project AL08003 funds the activities necessary for minor use permit access for the almond industry based on the priorities identified in the SARP.

In 2008/09, payments have been made for the renewal of the APVMA minor use permits for the miticide Acramite (bifenazate), Vertimec and the pre-emergence herbicide trifluralin in almonds.

The funds not spent in 2008/09 have been rolled over to 2009/10.

Project AL08003

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Information to support decision-making

Providing accurate and timely information for industry stakeholders is a crucial function of the Almond Board of Australia (ABA).

This project supports a broad range of communication tools aimed at ensuring industry members can access the information they need to make good business decisions and stay abreast of outcomes from the industry's R&D program.

During 2008/09, a number of communication initiatives were completed, including a revamp of the



Screenshot of the new industry website

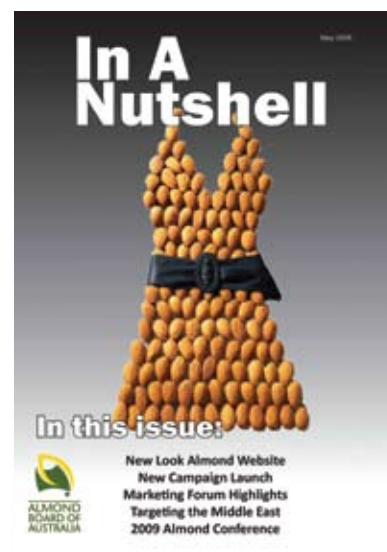
Australian Almonds website
www.australianalmonds.com.au.

The website was extensively redeveloped and divided into discrete sections servicing the needs of different audiences such as industry and growers, trade, consumers, health professionals, food service, food manufacturers and media.

The new look website also incorporates a log-in section enabling levy payers to access production information and the latest R&D reports.

Several print publications were produced during the year, including the *Australian Almond Statistics Report 2008*, which summarises data collected through the Annual Planting Survey and *Australian Almond Industry*, which provides readers with a succinct overview of the industry.

The industry's quarterly newsletter, *In A Nutshell*, continued to be produced throughout the year.



In A Nutshell, the almond industry's quarterly newsletter

Project AL08014

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HAL PARTNERSHIP PROJECT DELIVERS BENEFITS

Each year the Australian Almond Board of Australia (ABA) and Horticulture Australia Limited (HAL) enter an agreement under which the process undertaken to develop the investment program for almond R&D is funded.

This agreement ensures the industry implements a strong plan for the annual investment of its industry levies and that the results are communicated to both levy payers and government.

The activities involve close liaison between HAL, the Almond Industry Advisory Committee (IAC) and the industry's representative body, ABA.

The Almond IAC and the three sub-committees that oversee the plant improvement program, production issues and marketing programs, play a

key role in this consultative process by helping to set research priorities, and monitor and review the progress of various projects. The IAC recommends the annual budget for the research program after allocating the limited funding available to projects capable of delivering the highest return on investment to levy payers as identified in the Strategic Plan.

During 2008/09, revision of the Industry Strategic Plan commenced and this is continuing in the current financial year. The plan will document the knowledge, product, equipment, services and other outputs required to make the Australian almond industry more competitive and sustainable. This process is a responsibility of the Almond IAC which must work in consultation

with the Almond Board of Australia. The liaison involved is funded under the Partnership Agreement.

Keeping the industry informed about this process is vital and so significant effort is made to communicate widely on how levies are invested and the outputs of the various projects.

A number of channels are used by ABA and HAL to communicate with growers, not the least of which is the annual levy payers' meeting held at the industry conference.

Project AL08900

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Investigating almond growth disorder

The appearance of a widespread growth disorder in the Carmel variety during spring 2008 caused significant concern across almond production districts.

The disorder results in a failure of bud growth, which is very apparent in spring as reduced vegetative growth and extended areas of bare wood. Leaf buds are more extensively affected than flower buds, but reduced nut production especially in younger trees, has been noted in some orchards.

This research project is focused on bud initiation and development and the factors influencing these processes. To investigate bud viability and health, lateral growth budsticks from orchards in the MIA, Riverland and Sunraysia have been systematically cut from affected and unaffected trees since late February 2009.

The buds have been dissected and their internal and external appearance recorded, with the type and severity of damage coded to allow for comparison between samples and sampling times. Early research also involved virus testing to ensure viruses were not a potential cause of bud failure. Initial molecular testing of leaf samples from four MIA orchards did not detect the presence of Prunus Necrotic Ringspot Virus (PNRSV) or Prune Dwarf Virus (PDV), and it appears these viruses do not explain the onset or development of the disorder.

A literature review of bud development noted the potential role of post-harvest water deprivation. A review of post-harvest watering and pre-harvest temperature extremes has been made to determine if there is any correlation with the observed 2008 disorder. The contribution of environmental factors has not been determined but the heat waves of March 2008 and January 2009 are likely to have affected bud development to some degree. Post-harvest water deprivation in 2008 may have been a contributory factor, but rains during autumn 2009 were widespread and few orchards suffered

post-harvest water stress this season.

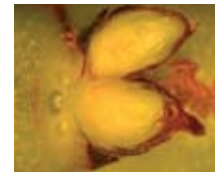
The research team has made orchard visits in September 2009, to observe leaf out in previously marked affected and unaffected trees. There is no evidence to suggest the disorder has spread between trees. However, the correlation between autumn bud dissection results and spring leaf out is strong. Trees with significant levels of damaged buds in autumn, have sparse canopies, poor leaf out and extensive areas of bare wood. Within affected trees, the results to date suggest 2007/08 affected wood has given rise to 2008/09 affected wood.

The role of genetics cannot easily be determined but the predictive value of bud dissections in late summer is being further investigated. It is too early in the research program to determine the cause of the Carmel disorder, or its trigger.

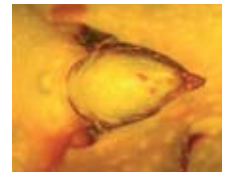
To help the researchers assess the extent of the disorder and the potential contributing factors, growers and nurserymen were surveyed about their orchard and the history of their budwood. To assist almond growers' understanding of the project, and of bud initiation and development and the factors that influence them, all were sent a fact sheet on bud development, a summary of the survey data, virus test results, and bud dissections.

Project AL08015

For more information contact:
Prue McMichael, Scholefield
Robinson Horticultural Services
T 08 8373 2488
E prue@srhs.com.au



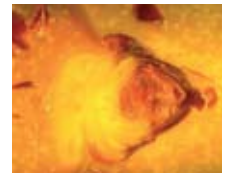
1 = Healthy green bud, 0% browning



1x = Healthy green bud; with a potentially lignified section inside bud, but not at bud heart, usually tip section, 0% browning



2 = Bud heart brown/stained (<50%)



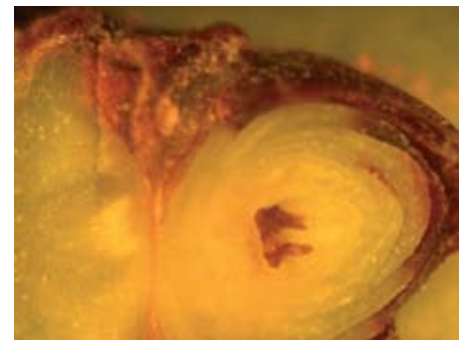
3 = Bud heart brown/stained (>50%)



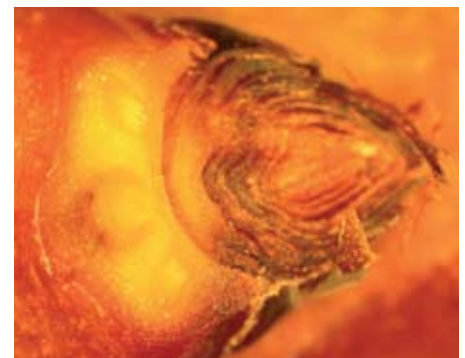
5 = Bud heart brown/stained (> 50%) PLUS staining/scarring below bud



C = Bud heart development advanced since previous observations (e.g. possible differentiation to floral bud)



DC = Bud heart is dead but still present



D = Entire bud dead but still present

Trialling deficit irrigation in almond production

A research project has been established to build the industry's knowledge about the role of water deficits on yield and nut quality.

To provide the necessary data, a trial has been established at Lake Powell near Robinvale in Victoria.

The site will have five levels of irrigation applied – a control, three levels of deficit irrigation (55, 70 and 85 per cent) and a high irrigation level (120 per cent).

The water deficits will be applied in two different patterns – regulated deficit irrigation, where the stress is biased towards pre-harvest, and sustained deficit irrigation, where deficits are applied throughout the irrigation cycle.

Work to date has involved the installation of the irrigation infrastructure (flow meters, fertigation tank, automatic controls and logging capacitance probes).

During the upcoming season, deficit irrigation will be applied to the site and its impact on tree growth and plant/soil water status will be monitored. Yield and nut quality will be assessed post-harvest.

Project AL08009

For more information contact:

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Installation of irrigation infrastructure at Lake Powell trial site



Flow meters for eight irrigation treatments at Lake Powell



Control unit in front and fertigation tank in background (Lake Powell)

SIMULATION WORKSHOP FOR VARROA MITE INCURSION

This project has been contracted to Plant Health Australia by the Pollination R&D Program. Its purpose is to use different scenarios to simulate an incursion of a potentially devastating honeybee pest – Varroa mite – into Australia, in order to explore current and potentially improved mechanisms for managing such an event.

This project is well underway, with workshop sessions held on 10 June and 19 August. These exercises brought together representatives from state and federal government, spanning both animal and plant sectors, in addition to representatives from Plant Health Australia, Animal Health Australia and industry. The first workshop focussed on planning of an eradication effort in response to an early detection of a Varroa incursion, while the second explored longer-term management strategies in response to recognition of a more deeply-entrenched invasion. The days highlighted potential gaps in the current proposed management system, which were constructively and positively explored, in order to maximise national preparedness in the event that such a scenario becomes reality.

Project MT08048

For more information contact:

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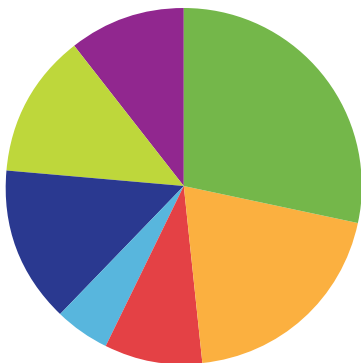
Investing in Australian horticulture

AUSTRALIAN GOVERNMENT PRIORITIES

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

The Australian Government's Rural Research and Development Priorities aim to foster innovation and guide R&D effort in the face of continuing economic, environmental and social change. HAL's operations are closely aligned with these priorities.

This chart shows the percentage of projects in HAL's almond R&D program allocated against each of the Australian Government priorities for rural research and development. Full details across all industries are available in HAL's annual report at www.horticulture.com.au



- Productivity and Adding Value (28.5%)
- Supply Chain and Markets (19.8%)
- Natural Resources Management (9.1%)
- Climate Variability and Climate Change (4.8%)
- Biosecurity (14.3%)
- Innovation Skills (13.0%)
- Technology (10.4%)

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.

RELATIONSHIPS AND ROLES RELATING TO HAL PROGRAMS

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 \$85 million annually in projects to benefit horticulture industries.

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

The Almond Board of Australia recommends membership of the IAC to HAL and ensures the skills required on an IAC are met by the persons they recommend for appointment to the committee. The Almond Board of Australia is responsible for recommending to HAL the establishment of, and any changes to, statutory levies.

For more information please visit www.horticulture.com.au

In 2008/09 the Almond Board of Australia acted as the service provider on nine projects.

Full details can be found on page 15 of this report.

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 2008/09 \$156,972 of consultation funding was budgeted to be provided to the Almond Board of Australia.

Across Industry Program

The almond industry contributes funding towards an across industry program that addresses issues affecting all of horticulture. Details of the current program are listed below. A full report of the program can be found at www.horticulture.com.au/industry/acrossindustry.asp.

Project No	Title	Project start	Project completion	Organisation	Contact
Outcome 1 Enhance the efficiency, transparency, responsiveness and integrity of the supply chain for the total industry to provide clear market signals					
AH04007	Pesticide regulation coordinator	5 Jul 04	1 Jul 09	AKC Consulting	Kevin Bodnaruk 02 9499 3833
AH07033	Incident Response Protocol – development and training for horticulture	21 Apr 08	30 Sep 09	Control Risks	Julian Heath 02 9279 0099
AH08011	A baseline survey of knowledge, attitudes, approaches and aspirations regarding contamination management	31 Jul 08	31 Jan 09	Instinct and Reason	David Donnelly 02 9283 2233
AH08012	Country of origin labelling research project	1 Oct 08	31 Oct 08	Horticulture Australia Limited	David Chenu 02 8295 2300
MT07029	Managing pesticide access in horticulture	1 Jul 07	30 Jun 10	AgAware Consulting Pty Ltd	Peter Dal Santo 03 5439 5916
Outcome 2 Maximise the benefits of horticultural products in the eyes of consumers, influencers and government					
AH07006	Promoting the health advantage of fruit and vegetable to increase their consumption	1 Jul 07	30 Jun 10	Horticulture Australia Limited	Chris Rowley 02 8901 0329
Outcome 3 Position horticulture to compete in a globalised environment					
AH07002	HAL market access coordination	1 Jul 07	30 Jun 09	Stephen Winter & Associates Pty Ltd	Stephen Winter 03 9832 0787
AH07003	Market access support program	30 Jun 08	30 Jun 09	Horticulture Australia Limited	Kim James 08 6389 1407
AH08010	Workshop on quantitative methods applied to horticultural improvement	16 Jul 08	30 Sep 08	Australia Crop Genetic Services	Craig Hardner 07 3346 9465
Outcome 4 Achieve long term viability and sustainability for Australian horticulture					
AH07031	Peri-urban horticulture and land use planning: Literature Review & 'Tool-kit'	1 Apr 08	31 Oct 08	GHD	Luke Jewell 02 9241 5655
AH08002	Horticulture Water Initiative 2008/09	1 Jul 08	30 Jun 09	Horticulture Australia Limited	Alison Turnbull 02 8295 2300
AH08003	Analysis of Horticulture's carbon footprint	15 Jan 09	31 May 09	Horticulture Australia Limited	Alison Turnbull 02 8295 2300
AH08014	Horticulture industry consultation on Award modernisation	17 Nov 08	30 Apr 09	Horticulture Australia Limited	Ravi Hegde 02 8295 2300

Almond Program 2008/09

Project No	Project Title	Levy or VC	Project start	Project completion	Organisation	Contact
AL06003	Enhancing pollination efficiency	VC	1 Jul 07	2 Apr 10	Department of Agriculture & Food Western Australia	Rob Manning 08 9368 3567
AL06006	Ensuring market access through quality assurance	VC	1 Jul 06	31 May 11	Almond Board of Australia	Julie Haslett 08 8582 2055
AL06007	Improving the management of almond and prune rust	Levy	1 Aug 06	15 Sep 09	Magarey Plant Pathology	Peter Magarey 08 8584 6386
AL06018	Almond industry profile pack	VC	15 Jun 07	31 Oct 08	Almond Board of Australia	Julie Haslett 08 8582 2055
AL06020	Almond health claims	VC	26 Jun 07	31 May 09	Almond Board of Australia	Joseph Ebbage 0407 543 340
AL07005	Sustainable optimisation of Australian almond production	Levy/ VC	11 Aor 08	31 Dec 10	Almond Board of Australia	Ben Brown 08 8582 2055
AL07008	Almond industry liaison and extension project	VC	15 May 08	31 May 09	Almond Board of Australia	Ben Brown 08 8582 2055
AL07012	Auto Agronom – new horticultural growing system and concept – commercialisation project	VC	27 Nov 07	31 May 12	Select Harvests	Luke Englefield 03 50 26 92 16
AL07013	The generation of residue data from the application of bifenazate to almonds	VC	1 Jan 08	31 Mar 09	Agrisearch Services	Bill Frost 08 8365 7266
AL07017	Educating health professionals as to the health benefits of almond consumption	VC	1 Jun 08	1 Jun 10	Almond Board of Australia	Joseph Ebbage 0407 543 340
AL08000	Australian almond breeding program stage 2 – secondary evaluation and commercialisation	Levy/ VC	1 Aug 08	1 Jun 13	The University of Adelaide	Michelle Wirthensohn 0427 526 473
AL08003	Minor use permits for almond industry	Levy	8 Dec 08	31 May 11	Horticulture Australia Limited	Brad Wells 02 8295 2327
AL08004	Almond industry development needs assessment	Levy	1 Nov 08	30 Jun 09	de Vos Consulting	Richard de Vos 0413 588 054
AL08005	Expanding Asian and European markets for Australian almonds	VC	1-Aug-08	31-Jan-09	Almondco Australia Ltd	Amos Weigall 0438 888 607
AL08006	Australian Almond Industry Conference 2008	VC	24 Sep 08	31 May 09	Almond Board of Australia	Julie Haslett 08 8582 2055
AL08009	Optimising water use of Australian almond production through deficit irrigation strategies	Levy	31 Dec 08	30 Sep 12	Victorian Department of Primary Industries	Mark Downey 0428 543 122
AL08014	Australian almond industry communications	VC	1 Mar 09	31 Mar 11	Almond Board of Australia	Julie Haslett 08 8582 2055
AL08015	Carmel growth disorder	Levy	30 Apr 09	31 Dec 10	Scholefield Robinson Horticultural Services Pty Ltd	Prue McMichael 08 8373 2488
AL08900 /10	Almond Partnership Agreement 2008–2011	VC	1 Jul 08	30 Jun 11	Almond Board of Australia	Julie Haslett 08 8582 2055
MT08015	Data information project	Levy/ VC	15 Sep 08	31 May 10	Horticulture Australia Limited	Roger Bramble 02 8295 2300
MT08016	Protecting pollination for the Australian horticultural industry	Levy	1 Nov 08	1 Jul 09	Horticulture Australia Limited	Kim James 08 6389 1407
MT08044	Future surveillance needs for bee biosecurity	Levy/ VC	5 Jan 09	31 Jul 09	Rural Industries R&D Corporation	David Dall 02 6271 4128
MT08048	Simulation workshop for Varroa mite incursion	Levy/ VC	5 Jan 09	15 Nov 09	Rural Industries R&D Corporation	David Dall 02 6271 4128

Financial Report

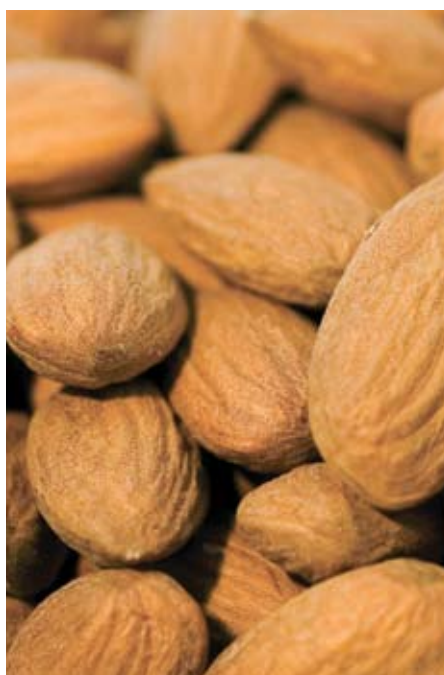
ALMOND LEVY INVESTMENT SUMMARY

Year Ended 30 June 2009

	Marketing 2008/09	R&D 2008/09	Combined 2008/09
Funds available 1 July 2008		159,915	159,915
INCOME			
Levies Received		550,090	550,090
Commonwealth Contributions		490,373	490,373
Other Income		13,448	13,448
Total Income	N/A	1,053,911	1,053,911
Budget		1,132,269	1,132,269
<i>Variance to Budget</i>	<i>N/A</i>	<i>(78,358)</i>	<i>(78,358)</i>
PROGRAM INVESTMENT			
Levy Programs		863,180	863,180
Service Delivery Programs by HAL		117,565	117,565
Across Industry Funding		10,013	10,013
Levy Collection Costs		5,940	5,940
Total Investment	N/A	996,698	996,698
Budget		1,156,333	1,156,333
<i>Variance to Budget</i>	<i>N/A</i>	<i>159,635</i>	<i>159,635</i>
Annual Surplus/Deficit	N/A	57,213	57,213
Funds available 30 June 2009	N/A	217,128	217,128

ALMOND INDUSTRY ADVISORY COMMITTEE (IAC)

Ben Robinson (Chair)
Graham Johns
Brent Kaiser
Andrew Lacey
Paul Martin
Vic Szabo
Max Tolson
Julie Haslett (ex-officio)
Ross Skinner (ex-officio)



FOR MORE INFORMATION CONTACT:



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