Australian almond industry - liaison and extension project

Ben Brown
Almond Board of Australia (ABA)

Project Number: AL07008

AL07008

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FINAL REPORT

AUSTRALIAN ALMOND INDUSTRY LIAISON AND EXTENSION PROJECT

AL07008

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PURPOSE OF REPORT
This Final Report has been prepared to document the activities undertaken to ensure adoption of the research and development program undertaken by the Almond Board of Australia.

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DATE OF REPORT
May 2009

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MEDIA SUMMARY

The almond industry of Australia (the "industry") has recently undergone rapid expansion with planted hectares and production increasing from 4,595 hectares and 8,500 tonnes in 2000 to 27,300 hectares and 26,000 tonnes in 2008. Due to the recent expansion of the industry and the requirement to inform and empower the industry to make better business decisions - the Almond Board of Australia (ABA) employed an Industry Liaison Manager (ILM) and undertook the Australian Almond Industry Liaison and Extension project (Project AL07008).

The key outcomes of the project were:

- The delivery and technology transfer of the results and findings of the industry's recent and continuing major research projects; "Sustainable Optimisation of Australian Almond Production" (Projects AL01001, AL04009a, AL05002, AL06004, AL07003 and AL07005), "Economics of Almond Production in Southern Australia" (Project AL06008), "Angle Vale Leaf Tatter" (Project AL07006), "Improving the Management of Almond and Prune Rust" (Project AL06007), "Australian Almond Breeding Program Stage 2 – Secondary Evaluation" (AL08000) and "Enhancing Pollination Efficiency" (AL06003).
- Provide relevant material, resources and communications to enable continual industry development.

Field days, workshops, grower meetings, website updates, fact sheets, excel database management programs, regular email circulars, industry conference presentations, the provision of useful published research articles and website links regarding various almond production and management issues were all used to achieve the key outcomes.

In order to assess the success of the industry development outcomes and to receive recommendations for the future direction of this project a consultant was employed to undertake an Industry Development Needs Assessment (IDNA). A few of the key outcomes of this assessment were:

- A new project application to be for a period of five years.
- That it be structured to grow over that period as the need for Industry Development services grows.
- The ABA to be the contracting body for the project.
- Adequate resources (both staff and financial) are to be allocated to the project.
- For all future almond R&D projects, the contract should clearly stipulate that the research provider not be required to separately undertake technology transfer/extension; but that they should work closely with the ABA to incorporate their project outcomes.

INTRODUCTION

The almond industry of Australia (the "industry") has recently undergone rapid expansion, with planted hectares and production increasing from 4,595 hectares and 8,500 tonnes in 2000 to 27,300 hectares and 26,000 tonnes in 2008 and is predicted to further increase in production to 80,000 tonnes by 2015. As a result of: the recent expansion of the industry; the fact that less than 20% of Australian almond plantings have reached full maturity; the need to provide communication mechanisms between growers, industry stakeholders and researchers; the need to provide extension of past, current and future R&D outcomes; the requirement to develop industry capacity; and the requirement to enact on a recommendation from a human resources review and needs analysis - the Almond Board of Australia (ABA) employed an Industry Liaison Manager (ILM) and undertook Australian Almond Industry Liaison and Extension project (Project AL07008) in 2007/2008.

With the above in mind and taking into account HAL's categorisation of Industry Development, Project AL07008 aimed to undertake the following:

- **Facilitate** – Industry members define their own goals and learning needs and work with a facilitator to learn and improve.
- **Technology adoption** – Adoption of a specific technology, management practice or decision support system.
- **Training** – Specifically designed training programs and/or workshops to increase understanding and/or skill levels.
- **Information** – Access to broad range of information, such as websites, newsletters or conferences.
- **Consultant/mentor** – Where a mentor, consultant or advisor works over time with an individual or group to improve their managerial, technological, social, or environment situation.

(Source: Industry Development Needs Assessment Process – Guidelines July 2008)

As well as the above, the ILM was actively involved in the industry's two largest and current R&D projects, "Sustainable Optimisation of Australian Almond Production" (Project AL07005) and "Australian Almond Breeding Program Stage 2 – Secondary Evaluation" (AL08000). Furthermore, as a result of regular communication with the various industry stakeholders, the ILM was also part of the consultation for future R&D development priorities and projects. Furthermore, the ILM was actively involved in providing and managing the industry's genetic material for the continued development of the industry.

The implications of this project were ensuring:

- The Australian industry continues its drive to maintain its current position as one of the world's most productive and efficient almond industry
- To continue to illustrate improvement on the industry's benchmark yield (2007 benchmark of 3.2T/Ha)
- Improved profitability and competitiveness against our competitors such as California.

The above implications were of particularly relevance given: increased domestic and global production of almonds; the recent and current experiences of drought across the Murray Darling Basin (MDB) and the majority of our growing regions; and the recent, dramatic increase in fertiliser and chemical costs.

With the introduction of the ILM position, Project AL07008, and the wish to continue the project after May 2009, an IDNA was also undertaken to evaluate the current project and produce recommendations for the next industry development project proposal.

TECHNOLOGY TRANSFER STRATEGY AND METHODOLOGY / ACTIVITIES

The AL07008 project was achieved through a diverse but structured strategy and methodology primarily revolving around the employment and responsibilities of Ben Brown as the Industry Liaison Manager (ILM). The role was full time, working predominantly between the almond growers, research providers and other key industry stakeholders such as irrigation manufacturers, chemical and merchandise manufacturers, beekeepers, international consultants and experts, government departments, horticultural consultants and the almond industry committees (i.e. Production, Plant Improvement, Industry Advisory Committee and ABA Board). The ILM reported directly to Julie Haslett, CEO. The ILM was responsible for the technology transfer strategy and methodology/activities of the industry's R&D program and other crucial information pertaining to the almond industry such as information on the current drought across the MDB, pollination and international advances. A discussion of the technology transfer strategy and methodology/activities undertaken in AL07008 is provided below.

Project AL07005 - Sustainable Optimisation of Australian Almond Production

This project has been one of the major and most successful R&D projects undertaken by the almond industry and has been in operation since 2001. Whilst there has been some communications and extension of the research and results over the life of the projects (i.e. AL07005, AL01001, AL04009a, AL05002, and AL06004), there was a need to undertake a more significant and direct effort across the whole of industry. The following strategy was implemented to achieve this outcome.

Commercial Demonstrations Sites (CDS)

It was decided that one of the best ways to achieve technology transfer was the establishment of demonstration sites (i.e. model plots) on commercially operated almond orchards with a wide ranging exposure to different agronomic conditions and management techniques. Ultimately, five CDS were set up across all of the major Australian almond growing regions in the 2007/08 season, with each site having a different management program depending on the site specific characteristics and grower preference. A basic summary of the five CDS characteristics and related treatments is outlined in Table 1.

GROWER	REGION	SOIL TYPE	IRRIGATION SYSTEM	IRRIGATION TREATMENT	FERTILISER TREATMENT (N:P:K)
Keane Almonds	Adelaide	Clay loam to clay	Micro-sprinkler	60% of ETc	240:25:400
Jubilee Almonds	Riverland	Loamy sand to sandy loam	Full cover sprinkler	100% of ETc	320:50:600
SD & ML Pearce	Riverland	Sandy clay loam to light clay	Drip	60% of ETc	320:25:400
Select Harvest Ltd	Sunraysia	Loamy sand to sandy clay loam	Drip	60% of ETc	240:50:400
Dinicola MGT	Riverina	Sandy clay loam to light medium clay	Drip	60% of ETc	240:30:300

Table 1 – Summary of Commercial Demonstration Sites

Due to the onset of the current drought and increase in fertiliser costs, the majority of the CDS undertook a management program involving some of the lower inputs of project AL07005 and some sites have further modified their inputs in 2008/09 in comparison to that of 2007/08. The commercial application of these lower inputs has seen some experiences not learnt in comparison to the intensely managed AL07005 project. Lessons and outputs include salt accumulation, smaller kernel sizes and smaller yields, comparatively. The programs have only been implemented for two seasons, consequently a more accurate assessment would require the completion of further seasons.

To assist both the five CDS and the greater industry, an **excel spreadsheet entitled "Almond Water Use, Irrigation, Fertiliser and Foliar"** (Appendix 1) was developed to allow for the presentation of relevant best management programs on a day to day basis, as well as monitoring, tracking and summarising the results. The spreadsheet has undergone numerous revisions and updates to include flexible management options taking into account scenarios such as the current drought, leaf standards outside of the traditional January sampling period, more flexible choice of fertiliser products and applications, nutrient removal calculations to assist nutrient balancing, and calculators for irrigation operation and maintenance. The spreadsheet will continue to be updated as further best management practices become available from the "Sustainable Optimisation of Australian Almond Production" project AL07005.

To assist in the extension and communication of these results and the results of project AL07005, three strategically timed **field days** occurred at each of the five CDS in each of the two seasons. The first field day was held around October/November, the critical period for irrigation and fertiliser applications in order to maximise shoot growth and fruit development. The second field day was held in January to assess the results of the October/November period as well as discuss the leaf analysis procedure and the post harvest nutrition strategy for March/April. The third field day was held as part of our annual, regional almond meetings and summarised the results of the season.

Almond Water Use, Irrigation, Fertiliser and Foliar Spreadsheet

As mentioned, an excel spreadsheet was developed outlining the requirements of the most relevant irrigation and nutrition management techniques of AL07005. The excel spreadsheet allowed day to day monitoring and tracking of their requirements. The use of the spreadsheet was explained in regional workshops and available for download from the levy payers' access page on the ABA website.

Grower Progress Report
As part of the communication of results from the Sustainable Optimisation of Australian Almond Production project (AL06004 and AL07005), two grower progress results were produced and circulated to the industry for seasons 2006/07 (Appendix 2) and 2007/08 (Appendix 3). These reports provided a useful presentation of the season's materials, methodology and results.

Fact Sheets
Other tools used to further transfer the technology of AL07005 were the development and circulation of Fact Sheets, titled *All About Almonds*. The aims of these fact sheets were to distribute information throughout the season, communicating concepts, results, outcomes and implications of project AL07005, as well as to briefly outline general management principles and technical concepts of traditional almond management. Fact sheets were issued on an ad-hoc basis but timed to cover topical information relevant to the specific time of the year. Fact sheets were distributed to almond growers via email and fax, in addition to being made available for downloading from the levy payers' access page on the ABA website. In total, seven fact sheets were delivered (Appendix 4).

Workshops
Due to the trial site of AL07005 being located in Berri, South Australia there was a need to transfer the results and implications to further regions where they may not have had the ability or opportunity to inform themselves of this highly successful project. Consequently, six half day workshops were organised and run for the management and farm staff of Select Harvests Ltd who manage approximately 60% of the Australian almond plantings. The presentation provided information on general almond growing principles but predominantly presenting the methods, results and implications of the AL07005 project.

Statistical Analysis
The Project management team of AL07005 engaged a statistician to undertake an analysis of the water, soil chemistry and yield data to provide a preliminary summary of the trends over the life of the project. This provided the industry with guidance as to the likely effects of the innovative nutritional and irrigation approaches that had been incorporated. Due to the nature of the AL07005 trial, the difficulty in making sense of results obtained early with younger trees and the need for several seasons of repeatable data on older trees, it had not been possible to develop "optimum" requirements for a mature almond orchard which can be applied widely. However, the results to date and the statistical analysis provided some food for thought and emphasised the sorts of monitoring that would be necessary if the AL07005 management techniques were to be successfully adapted/adopted by the Australian almond industry. A summary of the statistical results and the implications were communicated to the industry via a comprehensive fact sheet and the 2008 Australian Almond Conference.

Australian Almond Conference
The results and implications of AL07005 and AL07008 were communicated to the almond industry via three presentations at the 2007 and 2008 Australian Almond Conferences and the proceedings which followed.

Project AL06008 – Economics of Almond Growing in Southern Australia

One of the major outputs from this project was the development of a comprehensive, excel spreadsheet allowing almond growers to input their own personal information regarding income and operating expenses. This allowed almond growers to analyse their economic performance and allow the opportunity for reference against industry benchmarks.

Workshops

To facilitate the uptake of this information and to provide the opportunity for instruction in the use and operation of the excel spreadsheet, a full day workshop was organised and run in each of the major almond growing regions, i.e. Northern Adelaide, Riverland, Sunraysia and Riverina. The courses were run by David Pocock, Rural Solutions SA (project leader of AL06008) and the ILM.

Murray Darling Basin Drought

Due to 97% of the Australian almond industry located within the MDB, the current drought has lead to new requirements of maximising production in light of severe water restrictions and high water prices. To assist these challenges a lot of information regarding the up to date status of water storages, water allocations and managing almond production with reduced water allocations was sourced and circulated to the industry via the ILM. This was in the form of press releases and newsletters from State and Federal water authorities, relevant presenters (e.g. State water Ministers, water brokers, etc) invited to industry meetings and conferences to provide regional and national water allocation information.

To keep abreast of the drought, allow for communication of relevant information and to partake in consultation on water policy and Federal disaster relief, there was industry representation by the ILM at a regional level on the Riverland Horticultural Reference Forum (RHRF) and at a Federal level on the Horticulture Australia Committee (HAC).

Due to the industry's inexperience in dealing with drought conditions and restrictions to water allocations the ILM facilitated and organised an across industry information seminar with the citrus industry. The seminar was based on a study tour (Project CT06044) of South Africa conducted by citrus colleagues and outlined the lessons learnt by the citrus irrigators in South Africa through the droughts of 1991 and 1992. The presentation was held in conjunction with CIT Groups of South Australia.

Pollination

The ILM, with the support of the host property Rijami Almonds, assembled an almond pollination field day to discuss various key topics such as: OH&S of bee hives and almond pollination, the chain of events involved in getting a bee hive from the beekeeper to the almond orchard, bee hive standards for almond pollination, bee hive inspection and assessment, bee hive placement, inner workings of a bee hive and bee foraging behaviour. The field day was well attended by the industry with over fifty growers, managers and apiarists coming to listen to the two presenters, Dr. Doug Somerville and Trevor Monson. Doug who currently works for the NSW Department of Primary Industries is one of only a few bee technical specialists in Australia and comes with over 20 years experience. Trevor with over 40 years experience as a commercial beekeeper, spends the majority of his time co-ordinating the pollination of the almond plantings in north-west Victoria.

Pest & Disease

Strategic Agrichemical Review Process
Facilitate and organise a Strategic Agrichemical Review Process (SARP) for the almond industry. AgAware Consulting P/L conducted the SARP in Mildura, May 2008. The purpose of the SARP was to investigate the pest problems, pesticide usage and pest management alternatives for the Australian almond industry through consultation. The information was presented in a report (Appendix 5) and will assist the almond industry with its pesticide selection and usage into the future, and which pesticides the industry could pursue for registration with the manufacturer, or minor-use permits with APVMA.

Chemical Permits
Facilitate the organisation and communication of the following chemical permits via AgAware Consulting P/L:

- Clofentazine (PER9914)
- Bifenazate (PER10963)
- Captan (PER9256)
- Trifluralin (PER11124)
- Simazine (PER11121)

International Advances & Relations

To enable the almond industry to keep abreast of international advances, to maintain or improve international relations, and to improve or maintain Australia's competitive advantages the ILM took part in two international study tours.

Project AL07011 - European Study Tour 2007
The ILM and two almond industry colleagues undertook a study tour through Spain and France to become more familiar with the European almond industry and some of its key personnel. In particular, the objectives were to:

- Revisit the research centres and farms from a previous study trip in 1999 and review the progress that had been made regarding potential new cultivars and rootstocks.
- Identify which new cultivars and rootstocks would strengthen the Australian almond industry.
- Examine the processing and manufacturing industries and evaluate any potential, new avenues.
- Strengthen the relationship with key researchers who currently collaborate with our plant improvement program and Australian Almond Breeding Program (AL08000).
- Observe and research what strategies are used to grow almonds under drought-like conditions considering the drought across the MDB.
- Report to levy payers and researchers and provide an update on the findings of the overseas trip.

The findings were communicated to industry via a presentation by the ILM at the 2007 Australian Almond Industry Conference, a presentation by the two colleagues was made to one of the funding partners, Almondco Ltd (almond processor and marketer) and a final report (AL07011) was published through HAL (Appendix 6).

European and American Study Tour 2008
The ILM and Dr Michelle Wirthensohn (Project Leader AL08000) attended the 2008 Mediterranean Research Group for Almond and Pistachio (GREMPA), followed by a visit to Spain to follow up on some of the implications out of the previous international study trip (AL07011), and a study tour of the Californian almond industry. In particular, the objectives were:

- Ben Brown to attend the XIV GREMPA in Greece, Athens for the first time and increase the knowledge about research into almond production and breeding.
- Michelle Wirthensohn to attend the XIV GREMPA in Greece, Athens to present a scientific paper titled "Investigation of Flavour Compounds from Sweet, Semi-Bitter and Bitter Almond Kernels" and increases the knowledge about research into almond production and breeding.
- Further investigate and finalise an official arrangement with the Spanish, government research station IRTA, regarding the testing, evaluation and commercialization of their four new cultivars Vayro, Marinada, Tarraco and Constanti.
- Investigate any further advances in new cultivars from IRTA's breeding program.
- Further investigate and finalise an official arrangement with another Spanish government research station, CITA, regarding the testing, evaluation and commercialization of three new *prunus* rootstocks suitable for almonds - Garnem, Felinem and Monegro.
- Investigate any further advances in new rootstocks from CITA's rootstock breeding program.
- Instigate and/or strengthen the relationship with key researchers in the Californian almond industry and universities.
- Instigate and/or strengthen the relationship with key nurseryman in the Californian almond industry.
- Instigate and/or strengthen the relationship with key almond growers in the Californian almond industry.
- To obtain an update of the latest research into almond production and breeding within the Californian almond industry.

The findings were communicated to industry via the publication of a final report (Appendix 7) which was disseminated to all the Australian almond industry committees and a summary of its findings via an article published in the industry's August 2008 edition of *In a Nutshell*.

International Publications
To continue international linkages and relationships, the ILM published an article for the Spanish, *NUCIS Newsletter, Number 14, December 2007* summarising the Australian almond industry.

International Linkages
Due to the ILM's participation in the two study tours, the Australian almond industry has had visits from two overseas researchers, Dr Bruce Lampinen from UC Davis, California and Dr Xavier Miarnau from IRTA, Spain. Both researchers visited the ABA, key Australian almond researchers, Australian almond producers and other key stakeholders in our industry to participate in dialogue about our respective industries. In particular, Dr Bruce Lampinen extended his research and implications to the Australian industry via a seminar organised by the ILM. Furthermore, a researcher and almond producer from Israel also visited the Australian almond industry over the last two seasons.

Other Technology Transfer Strategies and Methodology / Activities

The ILM has also been responsible for and/or actively involved in the following:

- Circulate published research articles and website links to the almond industry regarding various almond production and management issues.
- Facilitate and provide articles for the *Australian Nutgrower* journal.
- Undertake regular updates to the almond industry's website.
- Almond industry surveys.
- Maintain the almond industry's germplasm and genetic plantings for AL08000 and future industry expansion.
- Provide a point of contact for the almond industry and key stakeholders.

EVALUATION AND MEASUREMENT OF OUTCOMES – IMPACT AND ADOPTION

The ABA and ILM have employed various forms of evaluation and measurement to assess the outcomes of the AL07008 project, including:

- **Feedback forms** following field days, workshops, seminars and conferences.
- A wide ranging **industry survey** to determine which information source is most used and most valuable.
- An **Industry Development Needs Assessment (IDNA)** to undertake a review of its current industry development plan and provide recommendations for a future plan.
- Facilitate and provide the opportunity for feedback, evaluation and measurement through industry and member representation within its **committee** structure, in particular the Almond Production Sub-committee and Almond Plant Improvement Sub-committee.

Feedback Forms

Feedback forms are given out at field days, workshops and seminars (Appendix 8). Table 2 is a summary of the feedback received.

QUESTIONS	RESPONSES				
	Less than expected				More than expected
	1	2	3	4	5
Did the course provide you with what you expected to learn?	0%	2%	38%	45%	14%
Was the level of detail enough? If not, what else could be included?	0%	0%	23%	59%	18%
Overall, how satisfied are you with the quality of the course content?	0%	0%	23%	37%	40%
Overall, how satisfied are you with the quality of the course materials?	1%	1%	5%	35%	49%
Overall, how satisfied are you with the way the course was presented by the presenter?	1%	1%	17%	27%	54%

QUESTIONS	YES	NO	UNSURE
Do you intend to implement the knowledge from this training into your business?	83%	1%	14%

QUESTIONS	PARTICULAR NEED	COURSE CONTENT	LOCATION	TIMING	TRAINNG PROVIDER	TRAINING DELIVERY STYLE	OTHER
What was the main reason for choosing this training?	7%	55%	35%	22%	16%	5%	5%

QUESTIONS	Email	Internet	Fax	Post	Other
How did you find out about the course?	95%	0%	1%	7%	2%

Table 2 – Almond grower feedback summary from field days, workshops and seminars

The majority of the field days, workshops, seminars and conferences were well attended except for the workshop on instruction in the use of the Microsoft Excel spreadsheet from the Economics of Almond Production in Southern Australia project (AL06008). Attempts were made by the Project Leader and ILM to contact numerous almond producers to generate interest in attending the course, this was only partly successful. One thought as to why the attendance was poor may have been the requirement to competently use a computer and Microsoft Excel software. Consequently, introductory, training courses on the use and operation of Microsoft Excel were organised and advertised for the industry but again the uptake was poor, thus the courses were cancelled. The final thought of the Project Leader and the ILM was that the lack of attendance was consistent with similar experiences in other industries where "generally", farmers have a lack of interest in the direct analysis of financial figures and believe this is the role of their accountant. Furthermore, the timing of the workshop in relation to the significant increase in water and fertiliser costs was not ideal with most almond producers knowing that the analysis of the figures was not going to be positive.

Industry Surveys

As part of our annual, Australian almond statistics, irrigation system type was included in the 2008 edition to assess, amongst other reasons, the uptake of drip irrigation as per the recommendations of the AL07005 project. The survey indicated 90% of almond orchards are under drip irrigation and given the 2008 survey had a 95% response rate and took into account approximately 99% of total plantings, the industry can be confident that the adoption of drip irrigation has been profound and quite unique in comparison to many other irrigated industries. The statistical survey will be expanded in future years to take into account the uptake of other management techniques.

Prior to the IDNA a wide ranging industry survey was conducted to determine which information source is most used and most valuable. The results indicate that all sources are used and no information source was significantly used or more useful than another source. Sources of information used included: industry journals, email circulars, industry conference, trial sites, field days, website and consultants to name just a few. Some of the most valuable information sources included: industry

journals, fact sheets, industry conference, field days, trial sites and consultants. Refer to Appendix 9 for further information.

Industry Development Needs Assessment

An IDNA was undertaken by a consultant to review the almond industry's current industry development program (including the ILM position and AL07008 project) and provide recommendations for future industry development activities. Some of the most relevant and specific recommendations to come out of the review in relation to AL07008 were:

- The ABA to be the contracting body (i.e. service provider) for a new industry development project.
- That it be structured to grow over that period as the need for Industry Development services grows.
- For all future almond R&D projects, the contract clearly stipulate that the research provider not be required to separately undertake technology transfer/extension; but they should work closely with the ABA to incorporate their project outcomes with the industry's overall expanded Industry Development program.

Refer to Appendix 10 for further information.

DISCUSSION

The Australian Almond Industry Liaison and Extension project (AL07008) was undertaken over the 2007/08 and 2008/09 seasons. One of the primary objectives at the beginning of this project was the employment of an ILM and their role in the technology transfer of project AL07005, Sustainable Optimisation of Almond Production (and other preceding projects, AL01001, AL04009a, AL05002, and AL06004). AL07005 has operated since 2001 and has largely been recognised within the almond industry as the most successful R&D project to date. AL07005 is currently contracted until May 2010 and given numerous seasons of data and experience (a critical requirement of such an applied R&D project), it was essential for the current and most accurate results, outcomes and implications be transferred to all almond growers. The achievement of which revolved around the ILM's role and responsibilities and the instigation of five CDS covering all the almond growing regions. Whilst it is believed the sites and field days have been successful (a recent grower survey indicated the CDS and field days were the second and third most valuable information sources available), there have been some significant efforts required in the commercial application due to the dramatic reduction in irrigation allocations and sudden increase in fertiliser expenses over the last two seasons. Minimising salt accumulation, and maximising kernel size and yields were some of the key lessons learnt and issues which require additional investigation over further seasons. Nevertheless, the technology and principles learnt from AL07005 have been critical and made the commercial application and adoption successful by enabling almond producers to maintain their viability and profitability in difficult circumstances. A 2009 survey of the South Australian River Murray irrigated areas indicated there had only been a 0.8% reduction in irrigated, almond area between 1st July 2007 and January 2009 – the best result of all the surveyed irrigated perennial and annual horticulture.

Upon completion of AL06008, the ILM also facilitated the transfer of technology and information to the almond industry via workshops across all major growing regions.

Apart from the transfer of technology from AL07005 and AL06008, the industry liaison and extension project has evolved and transformed to become quite diverse and multifaceted. The ILM implemented several new initiatives to not only transfer technology from AL07005 but to compliment

and build capacity within the almond industry on many matters. Initiatives included the organisation and/or facilitation of many training workshops, field days, fact sheets, excel spreadsheet applications, newsletters, and access to websites and scientific research articles.

It is a consequence of the need to continue almond industry development that a new longer term project be lodged, contracted and further evaluated to achieve the objectives of the industry's strategic plan.

RECOMMENDATIONS

As a consequence of the AL07008 project and its outcomes, recent industry and external feedback via a grower survey and an IDNA, it is recommended a new industry liaison and extension project be lodged and based on the following points to keep the Australian almond industry one of the world's leading almond producers.

- Five year term.
- Continuation of the CDS to obtain a commercial assessment of project AL07005.
- Continuation of the Fact Sheets, Field Days, Grower Progress Reports and Conference Presentations to communicate the results and implications of AL07005.
- Continuation of the technology transfer of the entire almond industry's R&D program through liaison with the respective Service Providers and, organisation and facilitation of Fact Sheets, Field Days, Workshops, R&D Progress Reports, Industry Publications, and Articles and Conference Presentations.
- Continuation of the involvement, and transfer of results and implications from the industry's almond cultivar breeding program (AL08000).
- Facilitate and actively expand the almond industries R&D development program as levy and industry requirements justify.
- International study tours to keep abreast of overseas management and technology advances. The study tours should take place approximately every two to three years, with approximately every second tour open to all almond growers and levy payers.
- As levy and industry resources justify, employ an industry development officer to assist in the above roles, particularly with the travel and regionalism issues associated with having industry members and producers stretching across Adelaide, Virginia, Riverland, Sunraysia and the Riverina districts, and with currently only one ILM in the ABA office of Berri, South Australia.

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APPENDICES

Appendix 1 – Almond Water Use, Irrigation Fertiliser and Foliar Spreadsheet

Appendix 2 – 2006/07 Grower Progress Report (AL06004)

Appendix 3 – 2007/08 Grower Progress Report (AL07005)

Appendix 4 – Fact Sheets

Appendix 5 – Almond Strategic Agrochemical Review Process, 2008

Appendix 6 – European Study Tour 2007 Final Report

Appendix 7 – European Study Tour 2008 Final Report

Appendix 8 – Feedback Form

Appendix 9 – Almond Industry Survey, Evaluation of Information Sources

Appendix 10 – Australian Almond Industry: Industry Development Needs Assessment, Plan & Recommendations