

Riverlink Annual Report 2006

Riverlink

PO Box 905

Mildura VIC 3502

Phone 03 5051 4569

Fax 03 5051 4523

Email lee.byrne@dpi.vic.gov.au

Website www.riverlink.gov.au

Riverlink and its employees do not guarantee that the Riverlink Annual Report 2006 is without flaw of any kind or is wholly appropriate for particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from reliance on any information in this publication.

Contents

Riverlink Council Chair	1
Riverlink	2
History	2
Vision	2
Mission	2
Goals	3
Links with industry	3
Links with education	3
Funding	3
Council	4
Riverlink Citrus Industry Representative	5
Riverlink Vegetable Industry Representative	6
Riverlink Dried Grape Industry Representative	7
Riverlink Wine Industry Representative	8
Riverlink Wine Grape Industry Representative	10
Riverlink Table Grape Industry Representative	12
Riverlink Nut Industry Representative	13
Programs	16
Riverlink Program Leader – Citrus	17
Riverlink Program Leader – Viticulture	26
Riverlink Program Leader – Plant Protection	30
Riverlink Program Leader – Vegetables	32
Riverlink Program Leader – Tree Crops	37
Riverlink Program Leader – Sustainable Horticulture	40
Riverlink Program Leader – PRN	43
<i>Current student listing</i>	45
<i>Completed studentships</i>	46
Riverlink Communication and Development Officer	47
Budget	49
Riverlink Projects List 2006	50
Riverlink Staff	60
Riverlink Publications	70
Acronyms	82

Kevin Cock

Riverlink Council Chair

It is very rare that most horticultural industries experience difficult growing, processing and marketing conditions in the same season. The nut industry was probably the exception to the rule. Having said this, every industry is focussing on achievable, deliverable strategies that will set them up in a global market. Many of these initiatives have been funded through the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) Industry Partnerships Programme.

Our aim at Riverlink has been to identify projects that can attract funding from non-traditional sources. We continue to pursue this goal as a high priority.

In February, 2006, Vicki Manson, DAFF Industry Partnerships Programme Leader addressed the Riverlink Council on areas that DAFF are focussing on for horticultural growth. Our approach of collaborative research activities was encouraged at a national level.

Results from many of the major horticultural industry projects are now delivering outcomes that have been promoted at regional field days, publications and national forums, branded under the Riverlink banner.

The continuation of yet another spell of dry weather has brought home the reality of more water restrictions this season; the challenge will be to grow quality crops with less water.

I would like to thank David Crawford for his dedicated representation on behalf of the nut industry, welcome Dr Ragini Wheatcroft as the new Victorian Department of Primary Industries representative. I would also like to acknowledge the good work done by all Riverlink Council representatives, Program Leaders and agency staff throughout the year. Thanks to Glenn Milne for his contributions as the Riverlink Communications and Development Officer over the 2005 – 2006 year.

Welcome to Lee Byrne as our new Riverlink Communications and Development Officer who brings a wealth of knowledge in the communication and project management area.

(Australian Citrus Growers, Vice President)

Riverlink

Riverlink is a unique network of five government horticultural research agencies, located in the Sunraysia-Riverland region:

- New South Wales Department of Primary Industries (NSW DPI), Dareton
- Victorian Department of Primary Industries (Vic DPI), Irymple
- CSIRO Plant Industry, Merbein
- Primary Industries and Resources South Australia (PIRSA), Loxton
- South Australian Research and Development Institute (SARDI), Loxton

Riverlink agencies work together, sharing resources and expertise, to improve the research and development services provided to Australian horticultural industries.

History

In 1991, Riverlink was initiated by the then Chief Executives of the State and Federal agencies involved in horticultural research and development in the Sunraysia-Riverland region. Four program leaders were appointed to integrate research and service delivery across the research agencies in the region.

Since that time, Riverlink has achieved a high level of functional integration across the tri-state area. Joint planning for research and development and cross-organisation, multi-discipline teams are now commonplace. Increased collaboration has been beneficial, with obvious efficiencies in sharing of human and physical resources and greater support from industry and funding organisations.

Vision

Riverlink will continue to be a synergistic network of horticultural research agencies and industries, relevant to the Sunraysia-Riverland region and to each other.

Mission

Riverlink is a collaborative network delivering targeted research, development and training to improve the competitiveness of the Sunraysia-Riverland horticultural industries and the sustainability and profitability of the region. To achieve this, Riverlink will make optimal use of human and physical resources and develop agency-industry partnerships.

Goals

1. To pursue innovative approaches to planning, funding, resourcing and implementing major horticultural initiatives in the Sunraysia-Riverland region.
2. To ensure that Riverlink programs are aligned with and responsive to client and member needs, and contribute to sustainable and profitable horticultural industries and communities.
3. To create an effective collaborative research network in the Sunraysia-Riverland region, and ensure optimal use of resources.

Links with industry

The Riverlink Council integrates industry and government agency staff in regional research planning and provides a vehicle for regular communication. Riverlink also endeavours to seek contribution from industry and community at all stages of research and development – from planning to implementation.

Links with education

Riverlink is increasingly seeking greater links with tertiary education providers, and acknowledges the immense benefits of increased communication and collaboration between Riverlink researchers, students and academic staff.

The development of close links with La Trobe University through the Riverlink Postgraduate Research Network (Riverlink.PRN) has led to greater numbers of Honours and PhD students undertaking study within Riverlink agencies, with a resulting increase in research capacity in the region.

Funding

Riverlink is proudly supported and funded by:

- New South Wales Department of Primary Industries (NSW DPI)
- Victorian Department of Primary Industries (Vic DPI)
- CSIRO Plant Industry
- Primary Industries and Resources South Australia (PIRSA)
- South Australian Research and Development Institute (SARDI)
- Grape and Wine Research and Development Corporation (GWRDC)
- Horticulture Australia Limited (HAL)
- La Trobe University

Council

A council of industry and government agency representation guides Riverlink. The Riverlink Council plays an integral role in providing direction and fostering collaboration between the Riverlink agencies.

Riverlink Council have set the following objectives to develop future directions in horticultural research:

- To build on and improve collaboration between the horticultural research agencies in the Sunraysia-Riverland region.
- To ensure optimal use of regional resources.
- To ensure that research, development and extension is relevant to the needs of regional industries and communities.
- To drive the development of large-scale regional initiatives that add value to the Riverlink network and capitalise on its critical mass.

Riverlink Council Industry Representatives

- Kevin Cock – Citrus
- Roger Schmitke – Vegetables
- Peter Jones – Dried Grapes
- Kevin Pfeiffer – Wine
- Michael De Palma / Richard Dolan (alternating) – Wine Grapes
- David Agg – Table Grapes
- Max Tolson – Nuts

Kevin Cock

Riverlink Council Citrus Industry Representative

This past season has seen challenges across all levels of the industry. Below freezing temperatures caused loss of crop and downgrading of produce in most areas.

Planting trends continue towards easy-peelers and navel varieties, at the loss of Valencia volume. The removal of a large quantity of mandarin trees, in the Emerald, Queensland, due to citrus canker and large plantings by managed investment schemes (MIS) will make monitoring the planting trends increasingly important.

At a national level, Australian Citrus Growers (ACG) has recognised the need for a focussed national strategic direction with good leadership throughout the supply chain. Marketing and market development has been identified as a high priority through the consultation process across all levels of the industry.

Exports continue to be a bright light with the United States (US), Japan and China the leaders during the 2005-2006 season.

Fullers Rose Weevil has become a problem pest, with containers being refused before leaving Australian ports. Most Asian markets have this pest on prohibited lists.

The domestic market experienced the usual over supply in mid-season and we must attempt to smooth out the volumes across the whole of the season. The major supermarket chains are willing to pay for high quality Australian product which is a trend that the industry has been working towards.

The final results of the rind quality project have been reported to industry. Hopefully we have learnt that years with high crop loads need to be treated with a lot of caution when being shipped for long distances.

Water quality has never been better in my lifetime, BUT water security and availability will be a big issue for the whole community in the future.

(Australian Citrus Growers, Vice President)

Roger Schmitke

Riverlink Council Vegetable Industry Representative (Garlic)

The start of the 2006 season was the worst I have experienced in 29 years of growing garlic. Very heavy frosts early in the growing season caused a reduced tonnage at harvest. Frosts affected crops growing from the lower Murray to Mildura area. Over all, crop yield was only 50 – 60% and in most cases bulb size was down.

The bright side is demand for Australian garlic is the best it has been since the mid 1980's. Prices above \$10,000 per tonne are not uncommon in all major markets.

This last season has seen the largest area of garlic grown in Australia for many years, possibly 20 years.

The position with irrigation water may have an adverse effect on planting in the 2007 season as many garlic plantings rely on water from the Murray River.

Ninety-five percent of garlic is imported. This needs to be investigated, as there is the capacity to overcome this large import.

With rain in the catchments and more water in the river systems larger growers may have the confidence to grow larger crops and as a result more constant supply would be achieved.

If larger growers can grow good quality garlic, Australian large retail outlets can rely on the supply of Australian grown garlic and in so doing make the industry viable.

(Chair Australian Garlic Industry Association)

Peter Jones

Riverlink Council Dried Grape Industry Representative

The year 2006 saw a real struggle for dried grape growers as the prices paid for the fruit were down 20% on the previous year and now is well below cost of production.

The crop yield per vine was again good, making it three years in a row. However, little rain and very cool conditions from mid March through to June provided growers with a difficult drying season. Dehydration, the only alternative to ensure fruit would dry to acceptable moisture levels.

Uncontracted growers of currants and sultanas returning from the winery market were severely penalised with a 30 to 60% reduction in prices paid.

The same issues on price recur again. The big crops overseas, the high Australian dollar, the supermarkets' power in retail and imports in retail and manufacturing are all factors that determine prices paid to growers of dried vine fruits. The added pressure this season for the processors/ marketers to return value to share holders was an added burden born by growers/suppliers.

Clyne Foods 12% of the Australian crop this year. Sunbeam Foods' share was 88% of the dried grapes and most of the dried tree fruits. Total intake was just over 29,000 tonnes counting all varieties.

More super wetter trials by researchers and some growers using various concentrations and machinery were done this harvest.

Sunmuscat berry setting research was also carried out this season and the berry size and crop load research was finalised.

Additional research on crown bunch removal has begun using a different range of chemicals, but the new Government regulations on Security Sensitive Chemicals is making it difficult.

The industry's training program "Dried Grapes – A Growing Business" is now available to any grower wishing to update skills. This is a new course started by the Australian Dried Fruits Association (ADFA) in August 2006, and involves 10 x one day workshops throughout the year.

The Vine magazine produced a research edition in June 2005 and in June 2006, which highlighted all the current projects being conducted for industry.

The annual research and development (R&D) planning forum in October went well with a format that included sessions on yield versus quality, processing and customer needs, and some new blue sky opportunities.

I wish to thank all those in the Riverlink family who helped out the dried grape industry throughout the year, much appreciated.

(Australian Dried Fruits Association, Chair)

Kevin Pfeiffer

Riverlink Council Wine Industry Representative

2006 Crush

Australian wine grape production was another large crush following on from the industry high in 2005.

Highlights from the 2006 harvest:

- Total area under vines – 166.665 harvest.
- Australian crush of 1.85 million tonnes of grapes.
- Domestic sales of Australian produced wine reaching a new high of 430 mega litres.
- Australian wine exports reaching a record high of 700 mega litres.

Australia imported 22 mega litres equivalent to some 30,000 tonnes of grapes with increases from New Zealand on a steady increase.

2007 Vintage

The 2007 vintage poses to be a difficult year:

- Drought and water restrictions never before encountered are about to significantly effect the total Australian wine industry.
- Frosts and drought in many districts have severely reduced crops.
- I believe growers in the Sunraysia-Riverland region will be in a strong position to increase grape prices if growers are able to manage the reduced water allocations.
- Riverlink have been in strong support to regional organisations in both areas in making growers aware of the prevailing problems and instrumental in providing well informed speakers to assess growers in trying conditions.

Future

We have experienced our lowest planting year.

- Drought and water restrictions are to have a significant effect on fruit availability in 2008.
- The industry must prepare to service our export sales commitment, which has been developed at all costs to allow us to progress to 2009 and beyond.
- Tremendous progress has been made in the Sunraysia-Riverland region to unify wine grape growers and I believe strength from this will emerge when applying for all forms of research and development grants from all organisations.
- Grower extension work is really beginning to have real effect over the recent years, which can only be good for the future of our grape growing and wine industries of these regions.

(Riverland Wine Industry Development Council)

Michael De Palma

Riverlink Council Wine Grape Industry Representative

The 2006 year for many wine grape growers was one most would like to forget, with significant amounts of fruit left unharvested or dropped and even greater amounts sold for less than sustainable pricing has caused great angst amongst growers both emotionally and financially.

It is times like these that cause the industry to question what it has and will achieve and is it possible to return to a viable industry in a short time. Over the past decade the wine grape industry has been the jewel in crown of the horticultural sector with international growth over that period of time nothing short of phenomenal. But the question growers ask, "Has it all been for nothing"? As many growers face an uncertain financial future for themselves and the generation that may follow.

Many in the industry are working to find possible solutions and outcomes which are yet to come to full fruition, and other than allowing market forces to apply; this for many, will be cold comfort and too late.

One constant that will remain is the ability of the Australian wine grape industry to adopt and adapt to changes in world and consumer preferences and to remain on the cutting edge of technology to continue one step ahead of our worldwide competition.

This is where the work and investment of research agencies such as Riverlink is important in maintaining an advantage. Riverlink is the vehicle in which growers in the Murray Valley and Riverland can obtain and influence long/medium term research activities.

It was with this view that Murray Valley Winegrowers and Riverland Winegrape Growers Association along with research agencies that make up Riverlink, decided it was time to improve the process in which important and relevant projects could be undertaken by Riverlink. Therefore a Riverlink Wine Grape Industry Research, Development and Extension (RDE) Committee was formed of four equal representatives from Murray Valley, Riverland and the research agencies. The committee aims to receive and recommend projects that would come from the wider wine grape community.

Members of the committee are:

Executive

Lee Byrne, Riverlink Communication and Development Officer

Riverland

Chris Byrne, Riverland Wine Growers Association

Peter Byrne, CCW

Rachel Reid, Orlando

Shane Phillips, Riverland Wine Industry Development Council

Murray Valley

Len Schliefert, Murray Valley Wine Grape Industry Development Council

Brad McMaster, Fosters

Liz McGuire, Murray Valley Winegrowers

Jeff Mitchell, Murray Valley Wine Grape Industry Development Council

Riverlink

Peter Clingeffer, Riverlink Program Leader – Viticulture

Bob Emmett, Riverlink Program Leader – Plant Protection

Rob Stevens, Riverlink Program Leader – Sustainable Horticulture

An annual forum will still be held in which outcomes from existing projects will be presented and important feedback given for existing and new proposed projects. Of course, this will not be the only form or avenue for growers to present ideas for projects. Growers should contact their relevant regional Industry Development Officers for further information.

I urge all growers to utilise this opportunity to give some valuable input and perhaps in some small way shape the future of this industry

(Murray Valley Winegrowers Inc., Chair)

David Agg

Riverlink Table Grape Industry Representative

Decreased crops were experienced across the Australian table grape industry in 2006. Estimates have been remarked to be between a 10 to 15% drop in production.

Export market development is a major priority for the Australian table grape industry. Throughout 2006 the Australian Table Grape Association (ATGA) continued to work with Biosecurity Australia (BA) to gain further access to countries such as China, Japan and Korea.

China is the industry's main concern. Regular meetings have been conducted between ATGA and relevant government departments to investigate and resolve concerns raised by the Chinese government.

Water availability has become a very important issue. The resource that has been previously accessible for many years in abundance now threatens to bring the horticulture industries to a situation never before experienced.

However, there is optimism about the quality of fruit and growers are hoping that the lower crop level will be compensated by excellent quality.

A domestic marketing program has been put into place to promote Australian table grapes nationally. Greater evaluation will take place to ensure the message is being received and that it is resulting in increased domestic sales.

The Riverlink Table Grape Industry Planning Forum to set research priorities was held in November 2006. The forum assisted the industry to move forward in areas of research and development, highlighting areas of importance:

- Market access to China, Korea, Japan and other countries
- Enhanced breeding technologies
- Storage of table grapes
- Access to information
- Disease management
- Water use efficiency
- Mechanisation

Researchers and industry will work together on these priorities and aim to achieve outcomes to facilitate advancement of the Australian table grape industry.

Max Tolson

Riverlink Nut Industry Representative

Almonds and pistachios had an 'off crop' in 2006, prices remain high and investment in new plantings continues.

Promotional efforts expounding the health benefits of nuts as part of a balanced diet has been taken seriously by consumers around the globe and supply demand modelling predicts increasing consumption as supply increases. It is encouraging to see that after a decade of growers adopting a wait and see attitude to the pistachio industry there has now been a move to recommence new plantings.

The rapid growth of almonds in particular means we are entering an exciting new era in terms of levy collection and a massive increase in funds available for research. It is anticipated the Riverlink agencies can adapt to become involved in these industries that are dominated by a handful of corporate investors.

Pistachios

Unfortunately 2006 followed the normal pattern of biennial bearing with a crop of around 800 tonnes compared to 1,500 tonnes last year. Growers, however, continued to benefit from high prices.

Domestic sales to the major supermarkets dominated the marketing scene with demand continuing to grow. Fluctuating yields remains a major marketing issue; processors and marketers have to make allowances for this quirk of pistachios ensuring they have in place the capacity to process the 'on' crop and then having under utilised capacity in the following year. The fluctuation also affects the tactics of marketing Australian pistachios.

Confidence in new investment in plantings is underpinned by the efforts of the Pistachio Growers Association's in house researcher Dr Jianlu Zhang, the team from Vic DPI, Adelaide University and CSIRO. The work being carried out by Dr Zhang is providing a solid base for the commercial producers. An increasing scientific knowledge or database now underwrites many of the current practices. Biennial bearing, pruning and nutrition and irrigation strategies remain the major areas of commercial interest.

In the current circumstance of drought and water restrictions it is comforting to have the science backing to support difficult production decisions.

For further information on specific research progress and results visit Dr Zhang's website:
<http://www.geocities.com/pgaiz/ZhangJianLuWorkingWebsite/JlZhangWorkSheet.html>

The pistachio industry is appreciative of the work done by all involved.

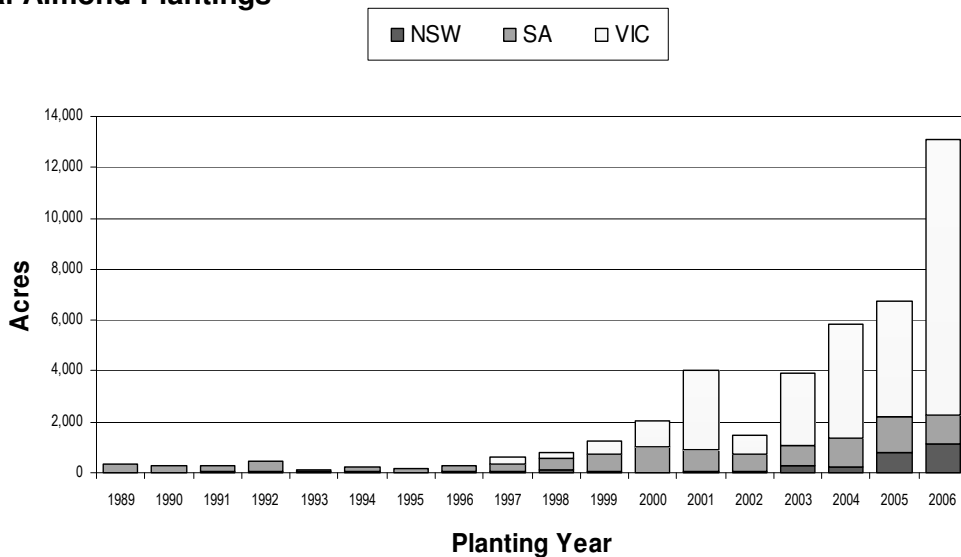
Almonds

In 2006, there were increased new plantings mainly in the Robinvale area but also in the Riverland and the Griffith and Hillston areas of NSW. The trees currently in the ground are predicted to lift production more than threefold by 2012. These trees are expected to produce around 55,000 tonnes annually, new development planned for 2007 and beyond could take total production close to 100,000 tonnes within ten years; with the crop worth around \$1billion at the cracking shed door. Demand and prices remain strong; marketers predict prices will soften as world production increases, but this will be offset by increased awareness of the products health benefits and increasing consumption worldwide. Some recent Australian Tax Office decisions could dramatically reduce planned development of managed investment scheme (MIS) funded orchards.

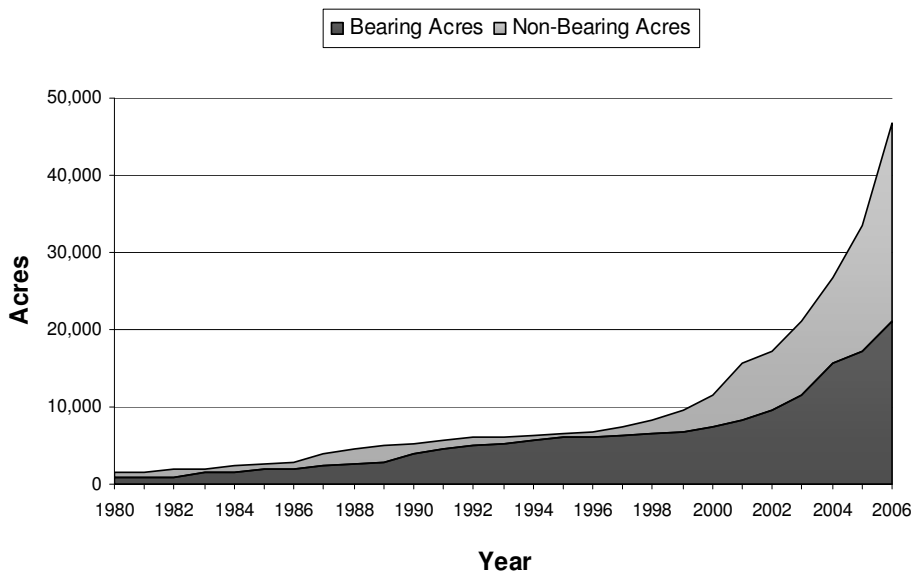
The 2006 Australian almond crop is estimated at 15,917 tonnes, or 2% less than 2005 despite new orchards coming into production. After the heavy crop in 2005 most of the mature age trees had a rest and some orchards were down 30% to 50% compared to the previous 'on crop' year.

The following graphs have been provided by the Almond Board of Australia.

Annual Almond Plantings

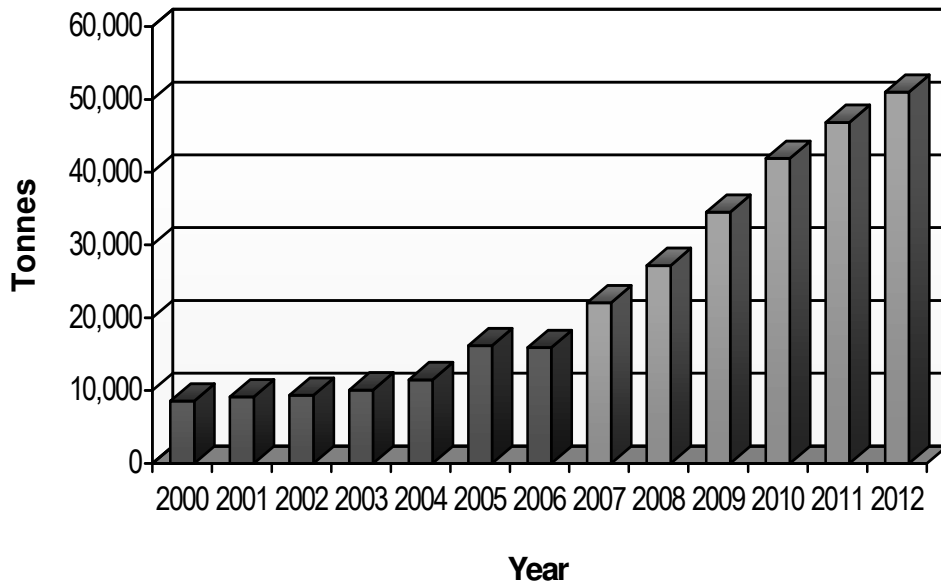


Almond acreage 2006 total = 46,670 Bearing = 21,012 Non-bearing = 25,658

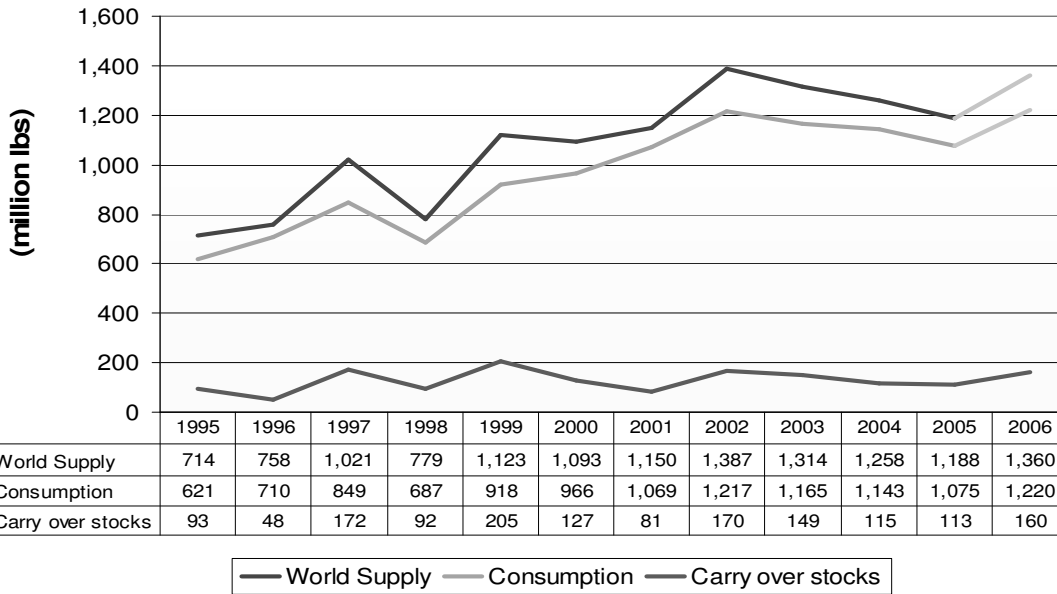


Production Estimates

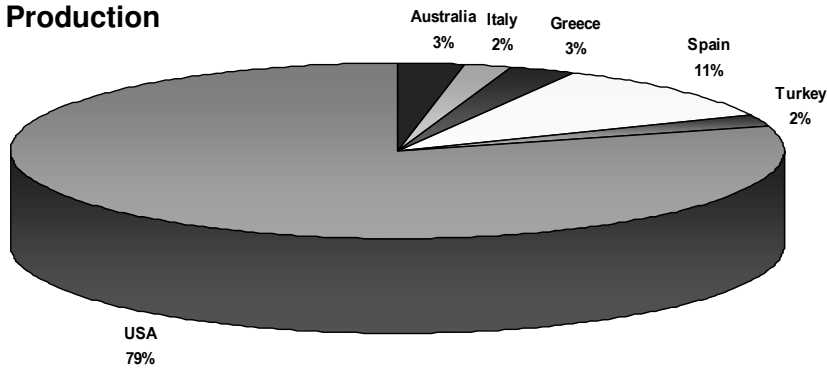
* Based on current plantings only, no inclusion of future plantings



World Almond Supply



World Almond Production



Source: Draft '06 Almond Almanac – Almond Board of California

Programs

Riverlink research agencies employ over 150 research, extension and support staff to service horticultural industries in the Sunraysia-Riverland region.

Research leaders coordinate the following programs:

- Dr Tahir Khurshid (previously Dr Ken Bevington, retired 2006) – Citrus
- Peter Clingeffer – Viticulture
- Dr Bob Emmett – Viticulture Plant Protection
- Gerard Kelly – Vegetables
- Michael Rettke – Tree crops
- Rob Stevens – Sustainable horticulture
 - + Land and water use
 - + Biodiversity
- Vacant (previously Dr Aldo Poiani, resigned 2006) – Riverlink.PRN

Riverlink Program Leaders' reports are based on the three Riverlink strategic goals:

1. To pursue innovative approaches to planning, funding, resourcing and implementing major horticultural initiatives in the Sunraysia-Riverland region.
2. To ensure that Riverlink programs are aligned with and responsive to client and member needs, and contribute to sustainable and profitable horticultural industries and communities.
3. To create an effective collaborative research network in the Sunraysia-Riverland region, and ensure optimal use of resources.

Dr Tahir Khurshid

Riverlink Program Leader – Citrus

The Riverlink citrus program is primarily directed at enhancing export opportunities through ongoing improvement of fruit quality and the development of new varieties to address changing consumer preferences.

The total citrus production was 698,000 tonnes across all areas in the 2006 season, while the total production of southern regions was 535,000 tonnes. The Sunraysia-Riverland region produced 345,000 tonnes in 2006 (49%) of the total citrus production which was comprised of navel oranges (49%), Valencia oranges (39%), mandarins (7%), lemons (4%) and grapefruit (2%). Crop level for navel was low as compared to 2005 citrus production.

The predicted total citrus production across all areas in 2007 season is 596,000 tonnes, while the predicted citrus production for the Sunraysia-Riverland region is 275,000 (45% of the total production).

The predicted lower crop levels may be due to severe frost experienced during flower initiation periods. However, fruit size is larger than the average which will attract premium prices in the export market. There is also a possibility of the crop reaching its maturity earlier due to the early occurrence of flowering in September 2006 providing the climatic conditions are optimum from now until harvest.

Program Strategic Plan Objectives

Improvement of fruit quality to assist export development programs

Reducing rind breakdown and improving outturn quality

The impact of seasonal conditions and cultural practices on the predisposition of navel oranges to postharvest rind breakdown was studied in a major Horticulture Australia Limited (HAL) funded project, 'Communicating the Effects of Production Conditions on Outturn Quality', involving NSW DPI, CSIRO and SARDI. A further aim of the project was to develop an objective diagnostic test for rind age to detect the early onset of deterioration in rind condition.

The project identified rootstock and scion selection, low tree potassium status, tree health, canopy aspect, orchard topography, time of harvest and storage temperature as key contributors to the likelihood that fruit would develop postharvest rind breakdown. Key seasonal indicators of susceptibility to breakdown appeared to be time of flowering and above average temperatures during autumn, which led to earlier fruit maturity and onset of rind senescence. Substantial variation can exist within orchards in flowering, rind colour development and fruit maturity and in the susceptibility of fruit harvested. The variation had a strong spatial component (such as was possibly due to topography, soil texture or soil fertility or any combination thereof), but canopy aspect also played a role. The take home message is that navel orange producers need to be aware of which sections of their orchards mature earliest and plan harvest strategies accordingly.

The effectiveness of summer 2005 gibberellic acid (GA) sprays in reducing the incidence of albedo breakdown, and in delaying rind aging and maintaining rind firmness was confirmed, and a key recommendation from the project is that summer GA sprays should be considered essential for the production of export fruit.

The development of an objective test for rind age focussed primarily on the use of molecular techniques. Essentially, the expression profiles of specific known genes likely to be involved in fruit development were compiled for three navel orange selections differing in seasonality. In another approach the expression profiles of unknown genes were also compiled, but the function of some of these genes is unknown. Out of both approaches, candidate genes have been identified which could be useful markers for different stages of fruit development and which could assist in the determination of rind age and early onset of rind senescence when visual inspection and phenological characteristics cannot be used; for example, Stages I and II of fruit development or post-colour break. This is a major step forward and with further development and testing be the basis of a diagnostic test for rind age.

Regulating cropping and improving fruit size

Fruit size is an imperative crop management issue for citrus growers, packers and marketers. Grower returns are directly linked to fruit size with most markets preferring fruit in the larger size classes. Various approaches to regulating cropping and improving fruit size are being considered. Crop manipulation is one of the management strategies used to adjust crop load at various phenological stages during the growing season.

The effectiveness of Ralex®, which is a GA-based formulation, for suppressing flowering in expected on-crop years of navel oranges was evaluated by Dr Tahir Khurshid at NSW DPI, Dareton. The final report has been submitted and accepted by HAL. The work was funded by HAL in association with Valent BioSciences. Ralex® applied during the first sensitivity peak of floral initiation in June under Sunraysia conditions was shown to be effective in decreasing the proportion of undesirable leafless inflorescences at flowering, improving fruit size distribution at harvest and eliminating alternate bearing over two seasons. The work from the Ralex® project has been widely presented throughout Australia, and overseas and in industry and referred journals. Ralex® has now been registered for the commercial use for flower suppression in navel oranges throughout Australia.

Research on the expression of citrus flowering genes is being carried out by Steve Swain at CSIRO. The outcome sought from this work is the development of a gene-based test to predict flowering and improve crop regulation with winter GA sprays. The work was funded by HAL and the MVCB. The final report has been submitted and accepted by HAL. Steve Swain has since published a review on flowering in a refereed journal.

Development of new varieties and rootstocks to address current and future market requirements

National program for screening and evaluation of new rootstocks

Rootstocks bred locally and introduced from China are being evaluated in a HAL-funded national program by Dr Tahir Khurshid (NSW DPI) at Dareton. It also involves CSIRO, SARDI and QDPI. In this project, the horticultural potential of locally-bred and recently introduced rootstocks grafted to Valencia, Lane Late navel, Navelina navel, Eureka lemons and Imperial mandarins are being assessed in short term field trials. These short-term horticultural trials are essential to evaluate disease, salt and lime tolerance characteristics, which have already been tested for in glasshouse trials. Another major objective of these trials is to assess the horticultural potential of different rootstocks in terms of fruit yield, fruit size and fruit quality. The trials will also provide early indications of graft incompatibility problems with standard cultivars before wider adoption by the citrus industry after the stock was successfully tested in other soil conditions (clay/heavy soils).

There are a total of four stages of the Chinese and Vietnamese rootstocks at Dareton. All stages have been planted at different times. These stages have a total of 16 replicated trials. An additional trial on Valencia orange rootstocks has recently finished and is ready to be pulled out for root assessments.

Valencia: Root assessment of the Chinese rootstocks:

A total of six trees were lifted to assess the root system. The aim was to test and modify the root assessment technique for different stages (1, 2, 3 and 4) which is planned to be carried out in the proposed Project CT07002.

Valencia: Data analysis indicated that a range of rootstocks have been very promising on the basis of cumulative yield/tree, yield efficiency and fruit size. The data showed that trees on the control rootstock 'Swingle' had higher accumulative yields (02-06) of 360 kg compared to trees on other Chinese rootstocks. However, yield efficiency (yield/Trunk cross section area) data proved that the most yield efficient rootstocks were Chinese trifoliolate types. Donghai had the higher yield efficiency of 4.2 followed by Tanghe, Lunan and Swingle (control rootstock). Quality data suggested that these rootstocks had Juice percentage of 53, 55, 56 and 56 respectively and Brix:acid ratios of 11, 12, 11 and 10 respectively. Fruit from trees grafted to the Donghai rootstock also had higher average fruit weight which is directly related to the fruit size at harvest. The 2006 season data indicated that Donghai produced fruit with an average weight of 181 grams compared to two standard rootstocks Troyer (158g) and Swingle (176g). Based on these results, Donghai appears to be the best rootstock for Valencia oranges in deeply sandy soil conditions. Some of these rootstocks need to be tested in Riverina clay soils before final recommendations for commercialisation are made.

Root excavation was carried out on a few test trees to assess the root system. Donghai rootstock seemed to have a better root system than the other rootstocks tested and is well suited for the deep sandy conditions. This rootstock did not appear to have any disease or graft compatibility issues.

Navelina: Data analysis for Navelina navel oranges was carried out on the accumulated yields from 2002 to 2006. The recent results indicated that Zao Yang, Lunan, Zhoupi and Tri22 (standard) were the best rootstocks for Navelina in terms of yield efficiency. However, Zao Yang had a higher yield efficiency than others. These results were also confirmed when the yield efficiency was calculated for the 2006 season. The 2006 results for fruit quality show that Zao Yang, Lunan, Zhoupi, Tanghe and Tri22 had percent juice contents of 44, 46, 44, 47 and 45 and Brix:acid ratios of 13.3, 12.2, 11.7, 11.6 and 10.9 respectively. Average fruit weight for Zao Yang, Lunan, Zhoupi, Tanghe and Tri22 was 233, 227, 217, 230 and 210 respectively. Taking into account both yield and quality attributes, Zao Yang seems to be doing well so far. However, this needs to be confirmed after the 2007 harvest data is analysed.

Salt tolerant citrus rootstocks

Research funded by the Australian Centre for International Agricultural Research (ACIAR) up until 2002 on monitoring the salt tolerance of new rootstock introductions from China and Vietnam has been continued by CSIRO. This aspect of rootstock research has been entered into a number of trials that were established as a collaborative project involving CSIRO and NSW DPI at Dareton.

Data collected in 2006 have continued to show that some *Poncirus trifoliata* rootstocks introduced from China have better chloride exclusion capacity than others. For example, Eureka lemon and Imperial mandarin trees grafted to accessions No. 5, Xiaogan, Wangchang large leaf and 78-85 had low leaf chloride concentrations in 2005 and 2006. These results, coupled with better growth under saline conditions and thus an ability to give a more salt tolerant grafted plant, means that these rootstocks may have value where root zone salinity is an issue. These accessions of *Poncirus trifoliata* were identified in glasshouse experiments as being good chloride and sodium excluding genotypes during the ACIAR-funded projects.

The trials have also demonstrated that depending on how it performs with regard to fruit yield and quality, the mandarin-type rootstock Mantou hong from China is a promising new salt tolerant rootstock for Australia.

Evaluation of new citrus varieties

Ongoing evaluation of new scion varieties is considered essential for future industry development. Thirty new varieties have been listed for evaluation in trial sites across Australia in the HAL-funded Auscitrus project 'Evaluating new varieties and ensuring healthy budwood' being conducted in collaboration with NSW DPI. The national sites will allow assessment of varietal performance across a range of climatic zones and soil types. Information collected will include climatic data from each region as well as tree phenology, early yield and fruit quality. Sites were established in the Riverina, Riverland, Sunraysia, Queensland and Western Australia in October 2005. The first plantings were mainly of patented mandarin varieties introduced into Australia by the Australian Nurseryman's Fruit Improvement Company (ANFIC). By summer 2006, 19 of the 30 new varieties were established in field trials, six more were released from quarantine and propagated at Dareton for a spring 2007 planting and five remained in Australian Plant Quarantine.

New varieties from CSIRO

CSIRO announced at the Australian Citrus Growers Annual Conference in Mandurah, Western Australia during March 2006 that two new mandarin varieties had been nominated for release.

Merbeingold 2336 and Merbeingold 2350 were bred at CSIRO's research station at Merbein, Victoria, after a series of controlled crosses made in 1984. The crosses recombined the characteristics of Imperial mandarin and Ellendale tangor for Australian conditions.

Both new varieties produce sweet, juicy and easy-to-peel fruits that are seedless or have the capacity to be seedless. They meet a range of criteria that will make them attractive to consumers, who are increasingly demanding more convenient-to-eat fresh citrus fruits.

Merbeingold 2336 has segments that separate readily, are very tender and can be described as melting. The juice is tasty and sweet and the seedless fruits are very popular with children. This variety matures from June to July in Sunraysia, Victoria, although the exact time for optimum quality will depend on region, rootstock and season.

Merbeingold 2350 is seedless under the right conditions, depending on cross-pollination. Where trees are planted close to navel oranges, seed numbers have been one-or-less per fruit with a large proportion of the fruits seedless. When surrounded by strong pollen producers there can be up to 10 seeds per fruit. The rind of Merbeingold 2350 is thin with tender, readily separated segments and a pleasant eating texture. Despite a thin rind, the fruit is robust, suggesting it will ship well and be suited for export. Fruits of Merbeingold 2350 have a pleasant sweet flavour with wide appeal and the rind is an attractive red-orange. Fruit size is good and in the range 120-140g. The variety reaches maturity during late June to August in Sunraysia, depending on soil type, rootstock and season.

Through the Citrus Scion Breeding Reference Committee, which functions to oversee operations of the National Citrus Scion Breeding Program, a commercialisation strategy for the new varieties has been developed and CSIRO, through this committee, is currently in the process of licensing a national commercialiser to take the varieties from the research station to the industry.

The varieties were presented to the local citrus industry at CITTgroups Australia meetings during July and August in Sunraysia and the Riverland.

This research is part of project CT04007, which is supported by the citrus levy with matching funds from the Australian Government through Horticulture Australia Limited (HAL), in partnership with Australian Citrus Growers. The research is also supported by citrus growers in the Riverlink region, as well as in other production regions, by in-kind support through provision of orchard facilities to evaluate selections from the breeding research. While the identities of these growers remain confidential, their willingness to support the breeding program is acknowledged as an extremely valuable contribution to the research.

New salt tolerant hybrids and seedling juvenility

Two areas of research that have continued at Merbein following on from ACIAR-funded citrus germplasm projects involve some of the germplasm introduced from China and Vietnam.

As mentioned above, new salt tolerant accessions of *Poncirus trifoliata* were discovered during the course of the ACIAR projects. As a follow up to the screening experiments that identified these, crosses were conducted in China to produce a range of hybrid families to investigate the inheritance of chloride exclusion in these *Poncirus* variants. The seeds from the controlled crosses were sent to CSIRO Merbein where glasshouse experiments were conducted to investigate the variation in chloride exclusion between and within families. The data generated has provided new information concerning the inheritance of chloride exclusion and have allowed new selections to be made which potentially combine salt exclusion with other *Poncirus* characteristics as well as traits from the other parents used. The selections were made during 2006 and they will be screened for other rootstock attributes starting with seed and seedling characteristics when they produce fruits.

The other area of research that has led on from the ACIAR projects concerns breeding for short seedling juvenility. Juvenility is the period of time between seed germination and flowering and is generally around six to eight years for citrus seedlings and hybrids, which is a serious impediment for breeding and genetic research. Some of the new germplasm introduced from China and Vietnam was identified as having very short juvenile periods. Seedlings of a lemon from Vietnam and a trifoliolate orange from China have been shown to flower after one year and crosses have been made with these in an attempt to introduce this characteristic into the citrus breeding population at Merbein. Hybrids between these accessions and parents from the breeding program flowered one-to-two years after germination and have been used in further crosses. This discovery has potential to speed up citrus breeding and lead to new discoveries as far as citrus genetics and inheritance is concerned.

While the research concerning juvenility will have important positive consequences for the Australian citrus breeding program, it has also attracted interest back from China with renewed collaboration with scientists from Huazhong Agricultural University.

Provide scientific leadership and ensure effective communication amongst Riverlink staff:

- Program staff from all centres participated in the annual Citrus Research and Extension Liaison meeting held in Mandurah, WA. The meeting was held in conjunction with the ACG 58th Annual Conference in March 2006 at Mandurah, WA.
- Meetings were held with program staff as required to review and plan new project proposals.

Convene regular inter-agency or industry meetings to review and report on Riverlink projects

- Dr Ken Bevington regularly interacted with all sectors of industry and participated in grower presentations and Riverlink discussions on research priorities.

Assist industry in the setting of priorities for research and technology transfer

- As a board member of MVCB Dr Ken Bevington participated in the management meetings for 2006.

Providing scientific leadership and effective communication

Staff Development

- Program staff from NSW DPI, SARDI and CSIRO attended the ACG 58th Annual Conference in March 2006 at Mandurah, WA.
- Steven Falivene (NSW DPI) visited to Israel and USA with a study grant NPSI AND ANCID. Steven presented the findings of the tour at Sunraysia, Riverina and at the National ANCID conference. The tour report is available on the MVCB website and Steven has also produced a DVD movie of the tour that is available to industry.
- Dr Ken Bevington visited China/Vietnam/Malaysia to review a completed ACIAR project in January 2006.
- Dr Steve Sykes was invited to visit Huazhong Agricultural University in 2006 and Professor Wenwu Guo will visit Merbein for three months in 2007.

Dareton infrastructure development

NSW DPI, Dareton is now a Centre of Excellence in Irrigated Horticulture. Dareton has an international image for citrus work. During 2006 a range of groups including scientists, growers, extension personnel and marketers visited Dareton from China, Brazil, Oman, USA and Pakistan.

New Glasshouse

The Dareton citrus propagation glasshouse was re-glazed with Thermoclear sheeting in 2006 at a cost of \$60,000 and is part of the upgrade of the propagation facilities at the station

Water Pump

In July 2006 a new irrigation pumping system (\$450,000) was commissioned by NSW DPI, Dareton. The new system consists of three submersible pumps installed in flow sleeves in the Murray River and connected to a common discharge manifold. Each pump has a variable speed drive which adjusts the speed of the pump(s) to maintain a constant set point pressure. This new system is more efficient use of water with the ability to utilise small flows without the need to lay off water around the research station.

InSight Sweetness Head

InSight Sweetness Head uses non-invasive near infrared light to detect such internal characteristics as sweetness and dry matter. Near infrared (NIR) internal fruit quality grading is available on most fruit and vegetables. This equipment (\$40,000) will be added to the existing Colour Vision Grading machine at the Dareton packing facility.

Citrus production research at Dareton is focussed on the evaluation of citrus cultivars and citrus rootstocks. Yield and fruit quality are important factors in differentiating the performance of the citrus varieties under trial at Dareton. The new Colour Vision grader has allowed the accurate collection of yield and fruit size data from trials and the additional 'sweetness head' gives a capacity to grade fruit on sugar content or sweetness. This has major benefit for the market and consumer evaluation of citrus fruits. A consistent line of fruit, with a known internal quality, can be graded to provide samples for market and sensory testing. One factor which has always been a problem with sensory taste panel evaluation of citrus has been the variability in fruit quality. This is often associated with the position of the fruit on the tree.

The addition to the grader also provides a new Riverlink resource which can be utilised by other research organisations. CSIRO Plant Industry has recently entered the commercialisation phase of the citrus breeding program and will now have a capacity to grade fruit samples on sugar content from their new hybrids.

Cold Storage Facilities

A new cool room has been approved in 2006 to be installed to upgrade the packing facility at Dareton. This new cool room will allow carrying out short term fruit storage trials without the need to borrow cool room space from the other agencies. The cool room will be used for a range of funded projects.

Communication

A range of workshops and CITTgroups Australia presentations were delivered by citrus program researchers to the growers regarding project progress and results. Special workshops on water reduction for citrus were also delivered.

The program has continued to work closely with regional CITTgroups Australia coordinators and industry in communicating the outcomes of research. During 2006, presentations were made at CITTgroups Australia meetings held in the Riverland, Sunraysia, Barham and Riverina on the rind breakdown project, crop regulation projects, and the variety and rootstock evaluation programs. Research results were also presented at the ACG 58th Annual Conference 2006 held in Mandurah, Western Australia.

China protocol

Steven Falivene (NSW DPI) was working in collaboration with AQIS and members of industry to develop working protocols for growers to export to China. This included the development of posters and field guides. Chinese inspectors were impressed with the protocols.

Rind breakdown workshops

A series of workshops were held in Sunraysia, Riverina and Riverland regions and latest results were presented by Dr Ken Bevington to the growers organised by CITTgroups Australia.

A rind breakdown poster will be available at the ACG 59th Annual Conference 2007, Renmark.

Frost workshops

A series of frost detection workshop were held in June and July. The workshops were developed by Steven Falivene (NSW DPI) and Tony Fillipi (MVCB). The workshops were to train growers and packers to detect frosted fruit. A fact sheet was also developed. Although the district has significant frost damage, export markets reported a very good out turn with negligible levels of frosted fruit reaching the market.

Water reduction workshops

A range of special workshops were held in the Riverland, Sunraysia and Riverina presenting information on reduced water effects on citrus and strategies to survive the drought. Jeremy Giddings, Tahir Khurshid, Graeme Sanderson and Steven Falivene delivered presentations in Sunraysia and Riverina. A document on 'Managing citrus orchards with less water' was compiled by NSW DPI staff and placed on the internet in December 2006.

Citrus phenology

A citrus phenology poster was produced by Dr Tahir Khurshid in association with CITTgroups Australia co-ordinators and distributed to growers. Detailed phenology work on a range of orange and mandarin varieties will start next year at Dareton.

- *Dr Tahir Khurshid, Citrus Physiologist*
New South Wales Department of Primary Industries

Note: Dr Ken Bevington resigned from his position as Riverlink Program Leader – Citrus in November 2006, Dr Tahir Khurshid has now taken up the role.

Peter Clingeffer

Riverlink Program Leader – Viticulture

The viticulture industries in the Riverlink region are significant contributors to total Australian viticultural production. Currently about half of Australia's wine grapes, around 98% of dried grapes and 80% of table grapes are produced in Sunraysia-Riverland.

The 2006 season was excellent from a production point of view, with high yields and quality achieved for all commodities under very favourable climatic conditions. Unfortunately this success has been tempered by ongoing difficulties in marketing, particularly of winegrapes leading to over supply and depressed prices. As a consequence, significant quantities of winegrapes were harvested onto the ground or left on the vine in both the Sunraysia and Riverland regions. The ongoing over supply issue with winegrapes led to considerable industry interest in crop reduction techniques and short-term maintenance of vineyards with minimal input without cropping (such as mothballing vineyards) leading into the 2006/07 season.

There has been significant input by Riverlink agencies, together with industry to develop strategies to address the issue. It is apparent across the districts that significant areas of winegrapes are being maintained with minimal maintenance and in many cases not irrigated and will not be harvested in 2007.

In hindsight, this is quite unfortunate as it appears there will be a large short fall in winegrape production in 2007 in both the warm irrigated regions and cool climate districts associated with effects of drought, frost and reduced water supply.

The effects of extreme drought conditions has also been a dominant issue across all the viticulture industries, both with respect to longer term effects on vine performance but also impacts on water supply. In the 2006/07 season, significant restrictions in water availability have been imposed in New South Wales and the Riverland region with further cuts predicted, including Victoria, in the 2007/08 season. Again there has been strong involvement of Riverlink agencies with all industries to develop strategies to minimise drought impacts with further inputs into ongoing workshops and seminars.

Riverlink's viticulture program continues to value strong links and interaction with regional industries, with a particular focus on industry development, research project planning and technology transfer. Research planning forums were held in 2006 for the dried and table grape industries. A list of the key issues and industry priority rankings developed at each are tabulated below. As a consequence, a number of new Riverlink projects have been developed and submitted to agencies and funding bodies.

With respect to winegrapes, a Riverlink Wine Grape Industry RDE (research, development and extension) Committee with members from the Riverland Viticulture Technical Group, a subcommittee of the Riverland Wine Industry Development Council, and the Murray Valley Winegrowers has been formed with endorsement of the Riverlink council. This committee will identify research and extension projects and develop mechanisms, including the format of industry forums to achieve strong industry input and endorsement for the development of new projects.

A strong Riverlink viticultural presence was again evident at industry field days, seminars and other extension activities over the year. These activities have included the Mildura District Horticultural Field Days and the Riverland Field Days.

Contributing to innovative, sustainable and profitable horticultural industries

Development of effective networks within key viticulture industry groups is a key factor to achieving the program goals. Input into the development of new projects aligned to industry needs and facilitation of the delivery of project outputs are also areas that have progressed the program.

Close involvement by key industry groups and personnel in assistance with planning the projects and representation on project steering committees is considered to be of great importance to ensure that industry needs are met in both the planning and delivery processes. As a result of involvement in viticulture planning and project development within Riverlink, a number of new projects have been submitted to funding bodies for consideration. These processes have been facilitated with the production of the Riverlink Viticulture Research, Development and Extension 2006 (previously Riverlink Viticulture Direction) publication which provides summaries of all projects currently undertaken in viticulture by Riverlink agencies.

Industry linkages have involved substantial inputs from all agencies, and include contributions to:

- Murray Valley Winegrowers and Murray Valley Wine Industry Development Committee
- Riverland Wine Industry Development Council and its subcommittee, the Riverland Viticulture Technical Group
- Murray Valley Table Grape Growers Council
- Australian Table Grape Growers Association
- Australian Dried Fruits Association
- Australian Vine Improvement Association and state vine improvement bodies
- La Trobe University
- Mildura Horticultural Task Force

Notable industry interactions in 2006 included:

- Industry research planning and feedback forums conducted for dried grapes in October and table grapes in November 2006.
- The formation of the Riverlink Wine Grape Industry RDE Committee with members from the Riverland Viticulture Technical Group, a subcommittee of the Riverland Wine Industry Development Council, and the Murray Valley Winegrowers. This included development of a memorandum of understanding between all parties and endorsement from the Riverlink Council.
- Reactivation of the Murray Valley Wine Industry Technical Group.
- Development of strategies and workshops in regard to 'mothballing vineyards' to assist in alleviation of the oversupply of winegrapes, particularly for uncontracted growers, while maintaining future production capacity.

- Development of strategies and associated workshops enabling growers to manage issues associated with the extreme drought conditions and impacts of reduced water supply on both the short and long term vine performance.
- Coordination of discussions in May with the table grape industry to assess storage issues with Red Globe and Crimson Seedless and potential for project development.
- Significant input into the ADFA Drying for Profit and training programs.
- Formation, in South Australia of a state based grouping of regional technical committees to consider state issues.

Collaborative research networking

Riverlink viticulture research staff should be aware of the key issues facing the viticultural industries and have input into project planning forums and subsequent project development.

Around 32 research and development projects are currently part of the Riverlink viticulture program, including pest and disease projects (see lists attached). These projects are spread across the three research objectives of the program which include:

1. Development and rapid adoption of new varieties and rootstocks.
2. Adoption of improved practices for economically and environmentally sustainable viticulture.
3. Adoption of practices to produce consistent supply of quality products.

Project development has involved close coordination with viticulture researchers within Riverlink including post forum meetings, close liaison with funding agencies and involvement of industry.

However it is clear that resource capability for viticulture within the Riverlink region is being significantly diminished, as only two new projects commenced in 2006 while 15 viticulture projects were completed. A significant proportion of these (seven projects) were funded from the CRCV for which closure will be completed in June 2007.

There appears to be limited potential to access further funding for new projects, particularly for winegrape research funded by GWRDC because of the significant predicted shortfall in winegrape production in 2007 and ongoing effects of the extreme drought conditions and restricted supply of irrigation.

As mentioned in the 2005 report, this issue is compounded by competition for funding from other regions. Hence it is likely that Riverlink agencies may have short to medium term difficulty in accessing funds, particularly from GWRDC, despite continuing to produce more than 50% of the national wine grape crop.

Riverlink Industry Planning Forums

Dried grape priorities

Thirty-six participants attended the Riverlink Dried Grape Industry Research and Development Planning Forum at CSIRO Plant Industry, Merbein on 19 October 2006.

Processors and marketers presented information that offered an insight into barriers to expanding markets and production issues faced by the industry.

In determining research and development priorities for the dried grape industry, participants were asked to respond to questions regarding production, processing and marketing.

To assist this process, small groups were formed to discuss the issues and formulate priorities for further analysis. Feedback from these groups provided a list of topics, including major themes of contaminant reduction and vineyard management.

This information was collated; industry and researchers then allocated importance to the key priority areas.

Table grape priorities

Whilst grower attendance was small, thinking was lateral and progressive at the Riverlink Table Grape Industry Research and Development Planning Forum held at the Victorian Department of Primary Industries, Irymple on 1 November 2006.

A range of project presentations illustrated the progress of table grape research covering issues such as berry collapse, breeding, irrigation and water use, and product performance. These project updates and an overview of outcomes from the 2005 planning forum allowed participants to explore current research and develop initiatives for new research projects.

The table grape planning forum also utilised small groups of participants to discuss the topic, 'What research initiatives need to be put into place to assist the development of the table grape industry?'

Feedback from the small group discussion was collated into major themes, which has been presented to regional grower groups for further discussion and ranking allocation.

The major themes developed encompass a number of sub-issues (these are listed below according to grower association allocation):

- Market access to China, South Korea, Japan and other potential markets
- Enhanced breeding technologies
- Storage
- Access to information
- Disease management in the vineyard
- Water use efficiency
- Mechanisation

– *Research Scientist*
CSIRO Plant Industry

Dr Bob Emmett

Riverlink Program Leader – Viticulture Plant Protection

The main objectives of the Plant Protection Program in 2006 were to contribute to the development of innovative, sustainable and profitable horticultural industries and maintain an effective collaborative research network in the Sunraysia-Riverland region that ensured optimal use of resources. It was also important that the Program continued to be aligned with and responsive to client and member needs.

Contributing to innovative, sustainable and profitable horticultural industries

Keeping industry informed of the progress and outcomes of R&D projects

Program staff participated in inter-agency and/or industry meetings, industry workshops, seminars and field days that were held to share expertise, review the progress and outcomes of projects and/or facilitate the development of new collaborative projects. Some examples of these activities are listed below.

- Riverlink plant protection staff continued their collaboration on the delivery of disease and pest warnings and management information for grape growers through the CropWatch Horticultural Hotlines, CropWatchOnline.com and other 'on-line' services in Sunraysia and the Riverland in early 2006. Later in the year, plant protection staff in Sunraysia worked with viticultural industry representatives to review options for the development of a commercially funded Horticulture Hotline service after the existing service closed when government funding ceased.
- Program staff in the Riverland worked with the RWIDC Viticultural Technical Group to complete a Grapevine Downy Mildew Action Plan (DMAP) for the region. The plan will be used to address issues that arise in seasons with severe disease outbreaks.

Plant Protection staff made numerous presentations on the progress/outcomes of projects at industry and scientific meetings in 2006 including the Murray Mallee Organics Meeting (March), the Renmark Agricultural Bureau Meeting (April), the ECO V Global Organics and Sustainability Show (May), the Mildura Horticultural Field Days (May), the Berri/Baramera Agricultural Bureau Meeting (September), the Phylloxera and Grape Industry Board Seminar (September), the RWIDC Viticultural Technical Group Meeting (September), the Combined Riverland Agricultural Bureau Seminar (September), the Riverland Field Days (September), the ADFA Dried Grape Industry Workshop (October) and the GWRDC Grapevine Powdery Mildew R&D Workshop (October).

The outcomes of plant protection projects that were completed in 2006 were summarised in a series of final reports. Most of these were made available to industry and researchers by funding providers. The completed projects included those titled 'Sustainable management of *Aspergillus carbonarius* in vineyards' (CRCV, HAL), 'Improved management of grapevine powdery mildew' (GWRDC), 'Australian grapevine yellows – source, spread and control' (GWRDC), the 'Fifth International Workshop on Grapevine Downy and Powdery Mildew' (GWRDC), the 'Grapevine Downy Mildew Action Plan' (RITA) and 'CropWatchOnline.com (taking E-tech to Growers)' (RITA).

Setting priorities for research and the development of new projects

Staff of the Program participated in a series of planning meetings in 2006 to help the viticulture industries set priorities for future research and development (R&D) and plan new projects. These meetings included the Riverlink Dried Grape and Table Grape R&D Planning Forums, meetings of the Riverland Wine Industry Development Council's Viticulture Technical Group and its R&D Priority Setting Subcommittee, and meetings of the Murray Darling Viticultural Technical Group and the Riverlink Wine Grape Industry Research, Development and Extension Committee. At the meetings, staff contributed to discussions on plant protection issues and, depending on priorities, worked with representatives of industry and funding providers to develop projects or other activities to address the issues.

Some plant protection staff also participated in the assessment of priorities for citrus pathology R&D and assisted the development of funding proposals for a National Citrus Pathology Program.

Plant protection staff also reviewed recent research and/or appraised opportunities for further research through their involvement in various conferences, workshops or meetings including the following:

- International Conference of the Australasia-Pacific Extension Network, Beechworth, Victoria, March 2006 (further R&D on the extension and adoption of pest and disease management practices).
- Fifth International Downy and Powdery Mildew Workshop, Trento, Italy, June 2006 (further R&D to improve mildew disease prediction and reduce the cost of disease control).
- GWRDC Grapevine Powdery Mildew R&D Workshop, Adelaide, South Australia, October 2006 (further R&D to improve pathogen detection and quantification, increase the efficiency of disease prediction and control, and increase the adoption of more efficient and effective disease management practices).

Collaborative research networking

Informal liaison and networking between staff in the Program and with industry continued in 2006, mostly in conjunction with meetings on collaborative projects or on specific industry or inter-agency issues. Liaison with the table grape and citrus industries, for example, led to the development of proposals for projects on 'Lightbrown apple moth in export table grapes' and 'Managing Fuller's rose weevil on citrus', respectively. These projects were developed to ensure that issues related to these pests did not prevent access to export markets. Another example was liaison with the almond and prune industries and other researchers that resulted in a new project on 'Modelling almond and prune rust for improved management'.

- *Senior Research Scientist*
Victorian Department of Primary Industries

Gerard Kelly

Riverlink Program Leader – Vegetables

There was increased interest in growing vegetables during the year as market challenges for permanent crops and irrigation cutbacks took effect. Vegetable crops with a high security water allocation are generally expected to be grown successfully throughout the summer of 2006/07 due to efficient water use measures such as drip irrigation and plastic mulch.

Contributing to an Innovative, Sustainable and Profitable Industry

High pressure processing of fruit and vegetables

The project conducted carotenoid analyses of carrots and melons this year following the assessment of antioxidant levels in carrot and melon varieties the previous year.

A range of carotenoids was present in the carrots analysed - lutein, a-carotene, b-carotene and lycopene. The colour of the carrots varieties determined which carotenoids were present. Lycopene was only detected in red carrots. White and yellow carrots had no or little carotenoid content, except for lutein in yellow carrots. Purple carrots had high levels of lutein, a-carotene and b-carotene.

In melon varieties there was a great variability in b-carotene content. This again was due to the range of flesh colour in melon varieties. Orange fleshed melons had the most b-carotene and white and green fleshed melon varieties had very little or no b-carotene. There was also variation between orange fleshed varieties.

For both carrots and melons, the application of the high pressure processing (HPP) treatment on these products had no effect on carotenoid levels.

Irrigation benchmarking – centre pivot irrigated potatoes

Dr Zoe Toll, Victorian Department of Primary Industries (Vic DPI), is working on a new irrigation benchmarking project studying potatoes grown under centre pivots which is part way through its first season of data collection. This sub-project is one part of the Vic DPI irrigation benchmarking project that is occurring in dried vine fruit, almonds, table grapes and citrus open hydroponics.

Two potato growers currently involved in the first season's benchmarking have provided data enabling analysis of a number of performance indicators relating to water use, yields and returns. We are currently looking to expand grower and site numbers. With this independent monitoring and peer comparison of their water use efficiency, it is envisaged that participating growers will become more water use efficient where possible.

Improving yield of vegetables grown with over-canopy, saline irrigation

Saline irrigation has been found to produce decreases in vegetable yields.

The yield of vegetables is reduced by foliar salt uptake and saline overhead irrigation increases foliar salt uptake. However, flushing the canopy with non saline water reduces the effects of saline overhead irrigation on yield.

In three experiments, researchers from SARDI's Saline Horticulture group investigated the effect of a short non-saline irrigation applied immediately following each saline irrigation on yields of glasshouse grown onion and potato crops.

Experiments consisted of various combinations of irrigation treatments:

- control – irrigated using overhead sprinklers with non-saline water for the whole irrigation event,
- saline – irrigated using overhead sprinklers with saline water for the whole irrigation event, (SALT)
- saline plus flush – irrigated using overhead sprinklers with SALT water for 92.5 or 85 or 77.5% of the irrigation event and CONT water for the remainder of the irrigation event, (SALT+7.5% or 15% or 22.5%F)
- 85% saline – irrigated using overhead sprinklers with saline water containing 85% of the NaCl added to SALT treatment, (85%SALT)

In the first potato experiment, SALT+15%F with irrigation water salinity (ECi) of 4.3 dS/m had 30% higher yield than the SALT treatment with ECi 4.8 dS/m. In the second potato experiment, SALT+15%F, ECi 3.8 dS/m, had 60% higher yield than the 85%SALT, ECi 3.8 dS/m.

In the onion experiment, the SALT+15%F, ECi 3.4 dS/m, yield was equivalent to that in the 85%SALT, ECi 3.4 dS/m. Researchers have shown from these results that foliar salt uptake is causing yield loss in potatoes, but not in onions. In potatoes under sprinkler irrigation with saline water, applying a short non-saline flush at the end of each irrigation increases yield.

Irrigation benchmarking project

Activities in this project included the collection of data and the development of a methodology to benchmark the water use of annual crops. This will help to encourage the adoption of improved irrigation practices for vegetable growers. Reports were prepared and distributed to participating growers.

Asparagus rust disease project

Field evaluation of fungicide treatments was conducted under commercial conditions. Five protectant and systemic fungicides were evaluated on an asparagus crop in fern stage in the summer/autumn period. The level of rust infection were low at the time of the trial and was a major factor in the results. The analysis of results showed no significant differences between treatments. Fungicides tested were metiram (Polyram), chlorothalon (Bravo), mancozeb (Mancozeb), difenoconazole (Score) and propiconazole (Tilt).

Other developments within the project were the approval of permits and registrations of fungicides to manage the disease, reporting of trial results and production of information sheets. The results of the fungicide trials and an update with the projects were presented at an industry meeting in May. Information sheets were distributed at that meeting

Asparagus group marketing strategies

An Austrade consultant completed a study and presented a report that contained options for asparagus growers to participate in coordinated marketing activities and rationalisation of purchasing. Further progress was left with individual businesses to develop as there was little interest in doing anything as a group.

Sustainable practices project

This project aims to increase the horticulture industry's capability in sustainable production and access to environmentally oriented export markets. Integrated pest management, soil management and weed management are some of the production aspects of vegetable growing that were incorporated in the project. During the year, three workshops were conducted for consultants to improve their knowledge on current best management practices for horticultural crop production.

Better brassicas project

Best practice disease control was presented to brassica growers in production areas all over Australia. This year the evaluation was conducted and the final report completed. The evaluation reported that 25% of growers changed their chemical application programs, 20% changed their methods of adjusting soil pH to manage club root disease and 25 % changed their irrigation practice to manage the white blister disease.

Melon thrips accreditation scheme

Some vegetable growers in New South Wales (in the Sunraysia region) were affected by new plant health arrangements introduced by the South Australian state government regarding the entry of melon thrips host material into South Australia.

Vegetable crops known as melon thrips hosts – beans, peas, silver beet, capsicum, chilli, eggplant, tomato, okra, melon, cucumber, pumpkin, zucchini, squash – require additional plant health certificates to accompany consignments sent to South Australia. A compliance accreditation operation procedure was developed to assist affected growers with meeting the new requirements. A dozen growers joined the auditable Compliance Accreditation Operational Procedure MTF01 for the trade into South Australia.

Quality assurance training

Training in Freshcare quality assurance and food safety was provided to several vegetable and horticultural businesses. There is a steady demand for information and this type of training as the support for horticulture businesses to be accredited increases.

Collaborative research networking

Melon supply chain project

Staff at New South Wales Department of Primary Industries (NSW DPI) and Vic DPI participated in several activities including conducting fruit quality assessments, the preparation of melon quality manual guides and technology transfer activities of the national melon supply chain project, '*Improving melon supply chain handling systems*'.

The melon quality guides will be an industry reference document to assist businesses in supply chain to use common language when discussing melon quality characteristics. The guides, one for watermelons and one for rockmelons will include set of colour photographs and accompanying terms to describe quality characteristics.

The technology transfer activities include several grower and industry meetings to report on the project results and gain feedback of the content and design of the quality guides.

Development of the Australian Melon Industry

This project focus refers to communication and technology transfer activities and an industry development officer (IDO) position.

The Sunraysia-Riverland region is an important part of the Australian melon industry and some Riverlink staff contribute to industry development. Local activities conducted include communication of the results from the melon supply chain project.

A meeting of the regional growers group was addressed by a prominent marketer of melon produce who outlined aspects related to consumer preferences, quality control and promotions. During the year the industry's national strategic plan was reviewed and updated and a new annual operation plan produced.

Vegetable industry forums (greenhouse vegetables industry forum)

Staff were involved in industry activities including vegetable commodity forums (greenhouse vegetables, carrots, melons, asparagus), development of project proposals, conducting research projects and collaborative extension activities such as field days and industry meetings. These forums provide a useful method for seeking feedback on relevant issues for industry and clients.

A forum for greenhouse vegetable growers discussed developments in production management and training needs for the industry. The workshop was part of the project, '*Pathways to production greenhouse training development workshops*'. Jeremy Badgery-Parker outlined the project and the industry aims for nationally accredited training for greenhouse horticulture and vegetables. When established, the training will provide qualifications at various levels and for various end users, for example growers, managers and workers.

Growers considered and assessed personal and industry needs for training, including maintaining the environment, hydroponics and commercial production, cultural and management practices, quality management, pest and disease management.

New project proposals submitted

Staff collaborated on the development and submission of several new project proposals. Some of these were:

- Boosting the health benefits of fresh and processing carrots in Australia
 - Better management basics extension strategy to fast track development of the Australian greenhouse industry
 - Pests, Beneficials, Disorders and Diseases in Cucurbits: Field Identification Guide
 - Post harvest disease control of fruit and vegetables by hot water treatment
 - Pilot study into the application of 'Committee Based Social Marketing' techniques to biosecurity issues.
- *District Horticulturalist (Vegetables)*
New South Wales Department of Primary Industries

Michael Rettke

Riverlink Program Leader – Tree Crops

The major tree crops that Riverlink agencies are actively involved with are pistachios, summer fruits, almonds and olives.

Riverlink Tree Crops Program Goals

Riverlink staff have maintained close liaison with the various tree crop industries. During the year staff involved with tree crops have interacted and contributed to industry organisations including:

Almond Board of Australia

Australian Nut Industry Council

Australian Olive Association Ltd

Canned Fruits Industry Council of Australia

Pistachio Growers Association Inc

South Australian Dried Tree Fruits Association

South Australian Fresh Fruit Growers Association

Summerfruit Australia Ltd

Staff of the Riverlink agencies through their consultation and input with industry representatives and research advisory committees have developed and maintained a suite of projects addressing the key priorities of the pistachio and summerfruit industries and to a lesser extent the olive industry. Limited activities relating to almonds are carried out by Riverlink agencies. Non-Riverlink agency groups currently service the substantial research and development program of the almond industry, now one of the most significant tree crops grown in the region.

Collaborative Research Networks

Project activities carried out by Riverlink agencies for the individual tree crops continue to be centred in the agency locations where the production of each tree crop is concentrated, for example, the Riverland for summerfruit, and Sunraysia for pistachios. Both programs have significant collaborations outside of the Riverlink network that lead to the efficient use of knowledge and resources. Discussions have been made to increase cooperation in the field of molecular techniques assisting prunus breeding programs around Australia, of which two operate in the Riverlink region. These will continue to be explored, but are restricted by the level of funding available.

Interaction has been maintained with the olive industry. Production of olives is continuing to expand and the industry continues to establish its viability within the regions covered by Riverlink. Agencies and the University of Adelaide have undertaken a number of small projects and investigations for the olive industry, mainly relating to disease issues, industry communication, development and strategic planning. Currently the Australian olive industry does not have a research and development levy, with a proposed levy being narrowly defeated this year. This is an impediment to the development of major projects for the olive industry. Opportunities may arise in future for the Riverlink agencies to assist this industry.

Project list

Apricot breeding and mechanising the dried apricot industry

- Develop varieties with high sugar (low drying ratio), firm fruit that dry with comparable or better quality to Moorpark.
- Utilise firm fruited, even maturing selections from the breeding program to facilitate mechanisation of harvesting.
- Evaluate mechanisation options for traditional drying varieties.

Australian almond breeding program

- Breeding of new improved almond varieties to maintain a competitive edge on both local and overseas markets.
- Classical breeding using Australian cultivars crossed with European and American cultivars, utilising molecular techniques to aid the selection process.
- Also investigating the genetic control and phenotypic expression of important agronomic traits, such as taste and disease resistance.

Challenges to the Australian pistachio industry – bacterial dieback and nut quality

- Continue research on causes and the control of dieback.
- Investigating the shell-staining problem that has recently emerged.

Evaluation of apricot breeding lines for canning

- Capitalise on the genetic material in the Loxton apricot breeding program to service the need for a second variety suitable for processing in Australia, adding greater security to fruit supply.

Investigation of an area wide approach to control Carpophilus beetles in stone fruit.

- To determine the dominant species in the Riverland
- Establish an area-wide, sustainable, cost-effective program to control Carpophilus beetle.

– *Senior Research Scientist*
South Australian Research and Development Institute (SARDI)

Rob Stevens

Riverlink Program Leader – Sustainable Horticulture

In the 2006-07 financial year, irrigators in the Sunraysia-Riverland region did not receive their full allocations. As of November 2006, irrigators in South Australia were restricted to 60% of allocation and those in New South Wales to between 44% and 52% of allocation. Irrigators in Victoria were restricted to 95% of allocation. Flow into the Murray River from the Darling River has been insignificant. Continuing on from last season, salinity in the River Murray has remained low.

All Riverlink agencies have been responding to the water restrictions. The state agencies have been sharing resources in preparation for delivery of drought survival workshops, which began in November in NSW and SA. As part of this preparation the agencies drew on fact sheets and water use studies prepared in 2003 by Riverlink in response to anticipated water shortages in 2003.

Sustainable Horticulture Program Goals

Raising regional water use efficiency

Irrigated Crop Management Service (ICMS) – PIRSA is developing codes of practice for Land and Water Management Plans. In the southern Mallee where irrigation utilises groundwater, ICMS is supporting the promotion of water use efficiency in production of irrigated vegetable.

Officers in Vic DPI have continued the expand irrigation benchmarking with recent field activity in citrus, potatoes, dried fruit, table grapes and almonds.

The Vic DPI Future Farms project is seeking to predict the effects that changes in economic, environmental and social sectors will have on irrigation.

Providing support for local management of water and land resources – through organisations such as catchment management committees and local community groups

Officers in all three states continue to provide training in many aspects of irrigation management. For example, officers in Victoria deliver courses in irrigation management, dripper irrigation, scheduling and pumps; those SA in use of IRES irrigation management software and drought survival; and those in NSW on drippers, filtration and drought survival.

Optimising regional horticultural production while reducing the impact of production on regional soils

ICMS in conjunction with Tri-State Salinity project is undertaking deep drainage case studies. This year, SARDI soil suction cups have been installed at the sites and are being used by irrigators to assess the effect of irrigation practices on soil salinity and changes in practice. NSW DPI is using these cups to quantify the effects of different fertigation practices on soil solution composition.

NSW DPI is investigating the suitability of native grasses that will survive on 250 mm or less annual rainfall for orchard and vineyard cover crops. It is hoped that the project will identify cover crops suitable for the mid row in drip irrigated crops.

Managing poor quality irrigation water

The PIRSA Saline Horticulture project found that the use of over-canopy sprinklers to apply saline irrigation water to potatoes causes large yield losses which could be attributed to foliar uptake of salts. In contrast, yield losses in onions under saline over-canopy irrigation could not be attributed to foliar uptake. This project is continuing work in grapevines on boron tolerance and carryover effects of salinity.

CSIRO Plant Industry finished a project investigating the difference in chlorine (Cl) levels in leaves and fruit of Shiraz and Chardonnay vines on Cl excluding rootstocks at Merbein and at Padthaway. After seven years of saline irrigation the Cl levels in vines at Merbein were much higher than those at Padthaway despite similar levels of salinity in the irrigation water. The higher rainfall and lower evapotranspiration rate at Padthaway may have been a factor.

Bio-diversity sub program

Vic DPI has been benchmarking biodiversity on horticultural farms. This project was a follow-on to support the development of the environmental code of best practice for viticulture. Researchers are also developing a biodiversity checklist for new irrigation developments.

Links to Riverlink Strategic plan

Impact of the Sustainable Horticulture Programs on national horticultural research and development

Projects on solute movement, irrigation benchmarking, and water use efficiency case studies continue to attract national interest.

Sustainable Horticulture Program resource levels

With regard to the Sustainable Horticulture Program specific goals there is a good level of activity in all but that addressing soil health. In particular the continuing growth in the use of open hydroponics would benefit from input from a professional with skills in soil chemistry and plant nutrition.

Processes used within program to engage with and seek feedback from clients on a regular basis

Riverlink is focussed on activities that span state borders. Most of the program clients are state based national resource management (NRM) bodies with no requirement for reporting on cross border activities. It had been anticipated that a cross-border reporting requirement may have emerged had establishment of the tri-state NRM forum led to calls for cross border projects. Since the tri-state forums inception there has been no change in calls for cross border projects within Riverlink's areas of expertise.

Effectiveness of feedback processes

In the absence of a formal feedback processes, the program has continued to attract substantial funding.

Generic to Program Leader's role

Provision of scientific leadership to Riverlink staff, industry and the community

The program leader has:

- Established a research partnership with CSIRO Marine and Atmospheric Research.
- Continued input into the major collaborative project, Salinity impact on Lower Murray Horticulture, which involves all Riverlink agencies.
- Attended and presented at international conferences on potatoes production and irrigated horticulture.
- Obtained financial support for the write up of eight year citrus salinity experiment undertaken by NSW DPI in the 1980-90's.

Ensuring effective communication among Riverlink staff

Over half of Riverlink Sustainable Horticulture Program personnel attend regular meetings associated with the salinity impact on the Lower Murray Horticulture project and the irrigation benchmarking projects.

Convene regular inter-agency and/or industry meetings to review and report on project work and to keep in touch with developments in science and industry

Many of the projects undertaken by staff within this program are overseen by project steering committees, which contain industry representatives.

Recommendations to Riverlink Council about the human and financial resources of Riverlink programs

Conversations with scientists in a number of Riverlink agencies about the level of statistical support leave me with the impression that it is becoming more difficult to access statistical advice. Field trials are a core feature of research in this region. High quality design and interpretation of these trials requires ready access to biometricians. It is recommended that Council determine whether my impression reflects reality and if so, then that the Council asks agencies to propose strategies which would provide adequate levels and timeliness of statistical advice.

- *Senior Research Officer – Salinity / Irrigation
South Australian Research and Development Institute (SARDI)*

Dr Aldo Poiani

Riverlink Program Leader – Riverlink.PRN

The aim of the Riverlink.PRN program is to provide increased post-graduate research and training opportunities in the Sunraysia-Riverland region. In mid 1997 the Sunraysia Consultative Committee initiated a community and industry forum to discuss the need for specialised training, education and research for the irrigated horticultural sector. From this identified opportunity, Riverlink and La Trobe University developed the Riverlink.PRN.

Increased links between postgraduate students and Riverlink has led to a flow of skilled students into horticultural research and development. Regional industries benefit from these skills and lead to a larger quantity of highly qualified people in the Sunraysia-Riverland area.

Innovations in planning, funding and resourcing

Riverlink.PRN aims to draw on Riverlink's unique expertise and relationship with industry to provide student opportunities to contribute to the future of irrigated horticulture in Sunraysia-Riverland.

The objective is to achieve high standards of postgraduate research and training, leading to an increased pool of skilled and adaptable graduates for employment within Australian horticultural industries.

Through linkages with La Trobe University and other higher education institutions and research programs Riverlink.PRN endeavours to achieve these innovations.

Seven students are currently enrolled in the Riverlink.PRN program.

Riverlink.PRN has been promoted in a range of areas:

- Riverlink.PRN information was displayed at La Trobe University Open Days, Mildura Campus.
- Riverlink.PRN information was displayed at the La Trobe University Postgraduate Expo, Bundoora.
- Dr Aldo Poiani advertised a La Trobe University Postdoctoral Research Fellowship scheme to Riverlink researchers, nationally and internationally through scientific society websites in order to attract applicants to work within Riverlink.

A recent proposal to La Trobe University, that contained Riverlink.PRN information, was also included in the Mildura Campus submission to the University's review of regional campuses. The proposal aims to establish a collaborative scheme with local horticultural industries and Riverlink research centres in which competitive postgraduate scholarships (of at least \$30,000 per year) are co-funded equally by the University and one (or more) Riverlink partner and/or horticultural company.

Collaborative Networking

An effective communication plan and regular networking among Riverlink.PRN postgraduate students and supervisory staff has assisted to ensure a team approach to professional development and promotion of the program.

Riverlink.PRN organised a workshop in Mildura regarding strategies to write successful research proposals, which was well attended by both Riverlink students and researchers.

- *Senior Lecturer*
Science Program Coordinator
Faculty of Science Technology and Engineering
La Trobe University

Note: Dr Aldo Poiani resigned from his position as Riverlink Program Leader – PRN in December 2006, a replacement has not yet been confirmed.

Riverlink.PRN – current student listing

Name	Location	Supervision Associate supervisor	Project	Status
Katina Lindout	CSIRO Merbein	Prof. Roger Parish – LaTrobe University, Dr Michael Treeby – CSIRO Merbein	Physiology of postharvest rind breakdown in navel oranges.	Current PhD
Joanna Tregheagle	CSIRO Merbein	Dr Judy Tisdall – LaTrobe University, Dr Rob Walker – CSIRO Merbein	Sustainable salt exclusion by salt tolerant rocks.	Current PhD
Yasmin Chalmers	Vic DPI-Mildura	Prof. Peter Dry – University of Adelaide, Dr Brian Loveys – CSIRO Waite Precinct, Dr Mark Krstic – Vic DPI- Mildura	Future Farming Systems – Understanding the physiological differences between the response of wine grapes to water deficit, and effects on the production of secondary metabolites in the berries and wine.	Current PhD
Adrian Rakimov	Vic DPI-Mildura	Prof. Ary Hoffmann – University of Melbourne, Dr Greg Buchanan – Vic DPI Mildura, Dr Mali Malipatil – Vic DPI Knoxfield	Soft scale insects in Australian vineyards	Current PhD
Pippa Kay	CSIRO Merbein	Prof. Roger Parish – LaTrobe University, Dr Steve Swain – CSIRO Merbein	Analysis of genes involved in plant fertilisation.	Current PhD
Lara Boyd	Vic DPI-Mildura	Prof. John Field and Dr John Banks – Australian National University, Ian Dreher – Vic DPI-Ballarat	Improving the quality of native vegetation.	Current PhD

Riverlink.PRN – completed studentships (since 2001)

Name	Location	Supervision Associate supervisor	Project	Status
Tara Seddon	Vic DPI-Mildura	A/Professor Mary Millikan – Victoria Univeristy, Mark Downey – Vic DPI, Mildura	Exploring the extent of variability in tannin content and composition found in the skins of grape cultivars (<i>Vitis vinifera</i> L.)	Honours completed 2006
Allison Hogg	Vic DPI-Mildura	Dr Tony Gendall – LaTrobe University, Dr Mark Krstic – Vic DPI-Mildura	Bunch technology and cell biology of cabernet sauvignon and chardonnay.	Honours completed 2006
Nerida Crothers	Vic DPI-Mildura	A/Professor Mary Milliken – Victoria University, Dr Mark Downey – Vic DPI, Mildura	Investigation into sun exposure of chardonnay vv and its effect of grape and wine quality.	First class Honours completed 2006
Rachel Ashley	CSIRO Merbein	Prof. Peter Dry – University of Adelaide, Peter Clingeffer – CSIRO Merbein, Dr Bob Emmett – Vic DPI-Mildura	Sustainability and wine quality in warm region irrigated vineyard.	PhD thesis accepted 2004
Fiona Filardo	CSIRO Merbein	Prof. Roger Parish – LaTrobe University, Dr Steve Swain – CSIRO Merbein	Gibberellins and their reproductive development.	PhD thesis accepted 2004
Catherine Cox	CSIRO Merbein	Prof. Roger Parish – LaTrobe University, Dr Steve Swain – CSIRO Merbein	Analysis of genes involved in seed set and fruit development.	Honours completed 2004
Marica Njegovan	Vic DPI-Mildura	Dr Aldo Poiani – LaTrobe University, Dr Mark Krstic and Dr Mark Downey – Vic DPI-Mildura	Extractability of anthocyanins into red wine.	First class Honours completed 2004
Rosie Hannah	Vic DPI-Mildura	Dr Judy Tisdall – LaTrobe University, Dr Mark Krstic – Vic DPI-Mildura	Exposure and expression of anthocyanins in wine grapes.	Second Upper Honours completed 2003
Hannah Mason	Vic DPI-Mildura	Dr Judy Tisdall – LaTrobe University, Dr Mark Krstic – Vic DPI-Mildura	Thompson seedless berry collapse.	Honours completed 2002
Andrea Muller	CSIRO Merbein	Dr Judy Tisdall – LaTrobe University, Dr Steve Swain – CSIRO Merbein	The role of gibberellins in pollen shoot elongation.	Second Upper Honours completed 2002

Lee Byrne

Riverlink Communications and Development Officer

A number of changes have affected the Riverlink project, most noticeable has been the resignation of Meryll Whyte in December 2005. Meryll had held the position of Riverlink Communications and Development Officer for eight years. Some key goals achieved by Meryll include:

- Development of the horticultural industries research and development planning forums.
- Development of the Riverlink website.
- Facilitation and development of Riverlink Strategic Plans.
- Introduction of an evaluation culture.
- Regular production of Riverlink Newsletter.
- Development of Riverlink Viticulture Directions publication.

Glenn Milne, Assistant Communications and Development Officer completed his contract in August 2006.

Lee Byrne began the Riverlink Communications and Development Officer position, in a full-time capacity, in September 2006.

Collaboration and networking

The Riverlink Council has direct input into research and development (R&D) agency planning through its member agency Chief Executive Officers and regional industry representatives. The Council provides an effective pathway for communication between industry and agencies in the Sunraysia-Riverland region, and innovation in improving services to Australian horticultural industries.

The Riverlink Communication and Development Officer ensures that the network continues to deliver outcomes, supporting the Riverlink Council and Program Leaders in progressing strategic objectives.

Communication highlights

Communications to industry and research staff are essential aspects of the Riverlink project, it is through this efficient communication that the Riverlink network works and achieves the goal of collaboration.

The Riverlink Newsletter is aimed to communicate research, development and extension outcomes in a user-friendly format, with appropriate language. The newsletter is currently circulated to over 510 representatives of horticultural industries, government agencies, funding organisations and the media. Distribution of the newsletter is done through postal mail, email and via the Riverlink website.

Riverlink aims to produce the newsletter quarterly to ensure information is distributed in a timely manner.

Riverlink also works closely with regional horticultural industries to partner with individual growers, processors, packers, suppliers, marketers and exporters. The annual Riverlink Industry Research and Development Planning Forums provide an opportunity for all facets of industry to be involved in research planning and potentially as collaborators. Interested industry members are encouraged to work with regional researchers in project development and delivery as part of this process.

In 2006, Riverlink conducted planning forums for the dried and table grape industries. These forums were successful in technology transfer and proposing industry priorities. However, due to limited numbers of growers attending the forums achieving consensus on setting the industry priority issues has been constrained.

There was no planning forum organised for the wine grape industry in 2006, this is due to the change in methods of reporting and issue priority setting as developed by Riverlink in conjunction with industry representatives. A Riverlink Wine Grape Industry RDE Committee has been developed to review and set priorities, annual planning forums will continue in 2007 to provide opportunities for industry input.

A goal for future planning forums is to encourage larger numbers of growers and industry representatives to attend and contribute to discussion, including priority resolution.

The '*Riverlink Viticulture Research, Development and Extension 2006*' (previously Riverlink Viticulture Directions) publication provided viticultural industries – dried, table and wine grapes – with an overview of current and recently completed projects undertaken by Riverlink agencies.

The Riverlink Annual Report reviews achievements and outcomes the network has produced throughout the year. Reports are submitted by council industry representatives, program leaders and the Riverlink Communications and Development Officer. This information provides a record of activities and services conducted and information regarding horticultural industries in the Sunraysia-Riverland region.

Other Riverlink communication tools include the annual report, website and attendance to the Mildura and Riverland Field Days. These tools are utilised to create awareness and promote project outcomes regarding Riverlink agencies.

Riverlink also ensures regular media releases are submitted to the regional newspapers in Sunraysia and the Riverland for community and industry awareness of projects and achievements.

Budget

The Riverlink budget covers the annual costs of:

- Riverlink Communications and Development Officer salary and oncosts
- Travel and accommodation
- Stationery and postage
- Field day attendance and site costs, Mildura and Riverland
- Events, planning forums and meetings – catering and venue hire
- Riverlink Awards
- Staff professional development
- Promotional and reporting materials, printing and design

Balance sheet 2006/2007 budget to March 2007

Carry over funds		\$1,533.88
Income 2006/07		
	Horticulture Australia Limited	\$10,000.00
	Grape and Wine Research and Development Council	\$22,500.00
	New South Wales Department of Primary Industries	\$11,250.00
	CSIRO Plant Industry	\$11,250.00
	Primary Industries and Resources South Australia	\$11,250.00
	South Australian Research and Development Institute	\$11,250.00
	Victorian Department of Primary Industries	\$68,691.00
	Total income	\$146,191.00
Expenses to March 2007		\$97,340.46

Riverlink Projects List 2006

Title	Coordinator	Location	Collaborators	Funding	Duration
Riverlink					
Riverlink – supporting industry and agency collaboration in Australia's main horticultural production region	Lee Byrne	Vic DPI-Mildura	CSIRO-Merbein, NSW DPI-Dareton, PIRSA/SARDI-Loxton	HAL, GWRDC, DPI, NSW DPI, CSIRO PI, SARDI, PIRSA	2006-2011
Riverlink Postgraduate Research Network (Riverlink.PRN)	Lee Byrne	Vic DPI-Mildura	LTU, CSIRO-Merbein, NSW DPI-Dareton, PIRSA/SARDI-Loxton	DPI, NSW DPI, CSIRO PI, SARDI, PIRSA, LTU	2006-2011
Citrus					
Evaluating new varieties and ensuring healthy budwood	Mike Arnold (Auscitrus)	NSW DPI-Dareton and EMAI	Auscitrus, NSW DPI, WADA, SACIDB, Queensland Citrus Improvement Scheme	HAL	2004-2009
National citrus scion breeding program	Dr Steve Sykes	CSIRO-Merbein	QDPI&F	HAL	2004-2007
National program for screening of new citrus stocks	Dr Tahir Khurshid	NSW DPI-Dareton	NSW DPI-EMAI, CSIRO-Merbein, SARDI-Loxton, QDPI&F-Bundaberg	HAL	2003-2007
New cost effective methods to increase size of navels for export markets	Andrew Thompson	SARDI-Loxton		HAL	2003-2007
Physiology of postharvest rind breakdown in navel oranges	Dr Michael Treeby	CSIRO-Merbein	LTU	MVGB, HAL	2002-2006
Delivering postharvest decay, food safety and market access solutions for export citrus	Peter Taverner	SARDI	Caltex Australia	HAL, SACIDB, MVGB, RC, Riversun, Caltex Australia	2003-2008
Synthesis of a citrus thrips IPM system with production and environmental benefits	Greg Baker	SARDI	University of Adelaide	HAL	
Options for the Fresh and Juice segments of the citrus industries	David Pocock	Rural Solutions SA Loxton		PIRSA	2005-2006

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Sustainable horticulture: biodiversity</i>					
Value of native vegetation to irrigated horticultural pest management in the Northern Mallee region – non crop vegetation and biological control of pests	Dr Shelley Rozario	Vic DPI-Mildura		Vic DPI	2003-2006
River contaminants; sources, transformation and movement within the Mallee catchment	Dr Mahabubur Mollah	Vic DPI-Mildura	NSW Department of Environment and Conservation	NAP, Mallee CMA, VIC DPI	2003-2006
Biological indicators of vineyard sustainability	David Sharley	Vic DPI-Mildura	LTU, Melbourne Water	LTU, NAP, Mallee CMA, Southcorp, VIC DPI, CRCV	2003-2006
Horticultural buffers for the protection of conservation values	Kelly Fyfe	Vic DPI-Mildura		NAP, MCMA	2003-2006
Assessment of remnant native vegetation on public and private land in the Victorian Mallee	Lara Boyd	Vic DPI-Mildura	Australian National University	ANU, DSE	2004-2007
<i>Sustainable horticulture: land and water use</i>					
Outline development plans	Glen Sutherland	Vic DPI-Mildura and Swan Hill		NAP	Ongoing
Irrigation management programs	Jeremy Giddings	NSW DPI Dareton		NSW Water Management Fund	Ongoing
Skills development in application efficiency	Maxine Schache	Vic DPI-Mildura	Mallee CMA	DSE, NAP	Ongoing
Open Hydroponic System Benchmarking	Maxine Schache, Julio Vargas	Vic DPI-Mildura	NSW DPI-Dareton, Rural Solutions SA ICMS	NAP/DSE	2004-2006
Productive Agricultural Systems that Protect Water Quality	Dr David Nash	Vic DPI-Ellinbank	Vic DPI-Mildura and Werribee	Vic DPI	2005-2008
Influence of sustained deficit irrigation on premium wine grape varieties	Yasmin Chalmers	Vic DPI-Mildura	CSIRO-Adelaide, Adelaide University	Vic DPI	2003-2007
Efficient reuse and recycling of organic wastes	Austin Brown	Vic DPI-Werribee	Vic DPI-Mildura, Knoxfield and Tatura	CRC-CARE, Vic DPI	2005-2008

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Sustainable horticulture: land and water use</i>					
Water Use Efficiency – Case Studies <ul style="list-style-type: none"> Cobdogla (20 growers) Murtho (12 growers) Pike River (78 growers) Bookpurnong/Lock 4 (24 growers) Development of IRES (Irrigation Recording and Evaluation System) and rollout to case study groups.	Tony Adams	Rural Solutions Loxton		RMCWMB, DWLBC, PIRSA	2001-2007
Code of Practice – developing guidelines for growers to meet 85% water use efficiency.	Tony Adams	Rural Solutions Loxton		DWLBC	Ongoing
Water Use Efficiency – Drainage	Tony Adams	Rural Solutions Loxton		RMCWMB	2004-2007
Mallee Irrigation Efficiency Incentives	Maxine Schache	Vic DPI-Mildura	DPI/DSE Mallee CMA, FMIT, Lower Murray Water	DSE, NAP	Annual Review
Saline Horticulture	Rob Stevens	SARDI-Loxton		CNRM	2004-2007
Salinity impact on Lower Murray Horticulture	Gerritt Schrale	SARDI-Loxton	NSW DPI-Dareton, Vic DPI-Mildura, CSIRO-Merbein	MDBC, RMCWMB, LMW, L&WA, NAP	2003-2006
Almond irrigation benchmarking	Maxine Schache, Julio Vargas	Vic DPI-Mildura	NSW DPI Dareton, Rural Solutions SA ICMS	NAP/DSE	2004-2006
Dried fruit irrigation benchmarking	Maxine Schache Julio Vargas	Vic DPI-Mildura	NSW DPI-Dareton, Rural Solutions SA ICMS	NAP/DSE	Ongoing
Table grape irrigation benchmarking	Maxine Schache Julio Vargas	Vic DPI-Mildura	NSW DPI-Dareton, Rural Solutions SA ICMS	NAP/DSE	2003-2006
Irrigation Benchmarking – centre pivot irrigated potatoes	Zoe Toll	Vic DPI		Mallee CMA, DSE	2005-2008

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Sustainable horticulture: land and water use</i>					
Managing Soil and Water to Target Quality and Reduce Environmental Impact	Ian Goodwin	Vic DPI-Tatura	Part of GWRDC Soil and Water Initiative: including DPI-Mildura	GWRDC, CSIRO, Vic DPI	2005-2009
<i>Tree crops</i>					
Apricot breeding and mechanising the dried apricot industry	Michael Rettke	SARDI-Loxton		HAL	2004-2009
Evaluation of apricot breeding lines for canning	Michael Rettke	SARDI-Waite Campus	SARDI-Loxton	HAL	2004-2009
Investigation of an area wide approach to control Carpophilis beetles in stone fruit	Mofakhar Hossain	Vic DPI-Tatura	SARDI-Loxton	HAL, Vic DPI, SARDI	2005-2008
Challenges to the Australian pistachio industry – bacterial dieback and nut quality	Eileen Scott	University of Adelaide	Vic DPI-Mildura, PGA, SARDI-Waite Campus	HAL, Vic DPI	2006-2009
Australian almond breeding program	Michelle Wirthensohn	University of Adelaide	Almond Board of Australia	HAL	Ongoing
<i>Vegetables</i>					
Influence of raw materials on high pressure processing of horticultural produce	Michael Treeby	CSIRO-Merbein	Food Science Australia	CSIRO Food Futures Flagship	2003-2007
Better Brassicas	Caroline Donald	Vic DPI-Knoxfield	Vic DPI-Mildura	HAL	2004-2006
Development of the Australian melon industry	Gerard Kelly	Australian Melon Association Inc	NSW DPI-Dareton, Australian melon industry	HAL, Australian melon industry	Ongoing
Sustainable Practices – Increasing industry capability	Robin Segrave	Vic DPI-Knoxfield	Vic DPI-Mildura	Vic Government – Naturally Victorian Initiative	2003-2006
New Asparagus Diseases	Dr Cheah, Christine Horlock	QDPI&F	Vic DPI-Mildura, NSW DPI-Dareton	HAL, industry and New Zealand Government	2002-2006
Quality Management Training & Implementation	Gerard Kelly	NSW DPI-Dareton	Freshcare	Industry	ongoing
Veg Cheque	Rob Dimsey	VIC DPI-Bairnsdale	Vic DPI-Mildura	Vic Government	ongoing

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Viticulture: Dried grapes</i>					
Development of rain tolerant dried grape varieties	Peter Clingeffer	CSIRO-Merbein		HAL	2004-2009
Evaluation of sultanas with decreased browning	Peter Clingeffer	CSIRO-Merbein		HAL	2003-2007
Optimising Sunmuscat dried fruit quality	Peter Clingeffer	CSIRO-Merbein		HAL	2003-2006
Fruit set in Sunmuscat	Dr Michael Treeby, Dr Steve Swain	CSIRO-Merbein		HAL	2005-2009
Evaluation of new rootstocks for dried sultanas	Adam Wightwick	Vic DPI-Mildura		HAL, Vic DPI	2002-2007
<i>Viticulture: Dried grapes</i>					
Influence of vine spacing on productivity and WUE in dried grape production systems	Dr Mark Krstic	Vic DPI-Mildura	CSIRO Merbein	HAL, Vic DPI, CSIRO PI	2003-2006
Further improve the drying efficiency of bunches	Dr Mahabubur Mollah	Vic DPI-Mildura	NZ Forest Research, Vic DPI	HAL, Vic DPI	2004-2006
Cordon bunch removal for trellis dried grapes	Dr Mahabubur Mollah	Vic DPI-Mildura		HAL	2005-2008
Sustainable management of <i>Aspergillus carbonarius</i> in vineyards	Dr Bob Emmett	Vic DPI-Mildura	CSIRO FSA-North Ryde	HAL, Vic DPI, CRCV	2003-2006
Rootstock breeding and development for Australian dried grapes	Peter Clingeffer	CSIRO-Merbein	Vic DPI-Rutherglen	HAL	2006-2011
<i>Viticulture: Table grapes</i>					
Causes and prevention of table grape berry collapse	Dr Michael Treeby	CSIRO-Merbein	Vic DPI-Mildura	HAL, Vic DPI	2003-2008
Unique table grapes for the 21 st Century	Peter Clingeffer	CSIRO-Merbein	QDPI&F, WADA, NT DPI	HAL	2004-2009

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Viticulture: Table grapes</i>					
Best management production manual for Australian table grape varieties	Rosie Hannah	Vic DPI-Mildura	WADA, QDPI&F, NSW DPI-Dareton	HAL, Vic DPI	2004-2006
Interlink – Developing intellectual networks with table grape researchers and industry personnel in California	Dr Mark Krstic	Vic DPI-Mildura		HAL	2004-2007
Predicting product performance – development of a prediction model for tablegrapes	Bruce Tomkin	Vic DPI-Knoxfield	Vic DPI-Mildura	Vic DPI	2004-2007
Market access for Australian table grapes to the North Asian markets of Japan, South Korea and China	Dr David Eagling	Vic DPI-Knoxfield	Vic DPI-Mildura	HAL, Vic DPI	2004-2006
<i>Viticulture: Wine grapes</i>					
Identification and detection of key wine flavour compounds in grapes	Peter Clingeffer	CSIRO-Merbein	CSIRO Adelaide	GWRDC, CSIRO Food Futures Flagship	2003-2009
Optimisation of canopy function	Peter Clingeffer	CSIRO-Merbein	Part of GWRDC Soil and Water Initiative	GWRDC, CSIRO	2005-2009
Unique Australian winegrapes	Peter Clingeffer	CSIRO-Merbein		CSIRO-FIA, Commercial	1998-2007
Improved management of grapevine powdery mildew	Dr Bob Emmett	Vic DPI-Mildura	SARDI-Loxton, University of California,	GWRDC, Vic DPI	2002-2006
Influence of sustained deficit irrigation on premium wine grape varieties	Yasmin Chalmers	Vic DPI-Mildura	CSIRO, Adelaide University	Vic DPI	2003-2007
Viticare Trials (Sunraysia and Swan Hill)	Nicole Dimos	Vic DPI-Mildura	NSW DPI-Dareton	CRCV	2004-2006
Viticultural management of grape tannin and anthocyanin levels to achieve desired wine quality specifications	Dr Mark Krstic	Vic DPI-Mildura	AWRI, E & J Gallo	GWRDC, Vic DPI	2005-2010
Developing Australian Grapevine Yellows management strategies – searching for the source and spread	Peter Magarey	SARDI-Loxton		RWIDC, Phylloxera Board SA, industry	2005-2006
Winegrape Future Options - developing industry options	David Pocock	Rural Solutions SA		PIRSA, RWGA	2005-2006

Title	Coordinator	Location	Collaborators	Funding	Duration
<i>Viticulture: Wine grapes</i>					
Grapevine rootstocks for use in warm inland regions	Phil Nicholas	SARDI-Loxton		SARDI	2005-2007
Revision of the book Grape Production Series No 1 Diseases and Pests	Phil Nicholas	SARDI-Loxton		SARDI	2005-2007
Virus tested clones for national nuclear grapevine collections	Phil Nicholas	SARDI-Loxton	AVIA	GWRDC	2000-2006
Viticare Trials (Riverland)	Vanessa Narbeth, Phil Nicholas	SARDI-Loxton		CRCV	2004-2006
Rootstock breeding and development for Australian wine grapes	Peter Clingeffer	CSIRO-Merbein	Vic DPI-Rutherglen	GWRDC	2006-2011
<i>General viticulture projects</i>					
Investigating grapevine pollen flow under Australian conditions; a pre-requisite to field evaluation of transgenic grapevines	Dr Steve Sykes	CSIRO-Merbein		CRCV	2004-2006
Australian Viticultural Decision Support and Business Management System	Dr Rob Walker	CSIRO-Merbein, Adelaide, Perth and Wagga Wagga	University of WA, University of Adelaide, Charles Sturt University, National Wine and Grape Industry Centre, La Trobe University, CSIRO Land and Water, CSIRO Sustainable Ecosystems, CSIRO Atmospheric, CRC for Irrigation Futures	CSIRO	2003-2006
Sustainable salt exclusion by salt tolerant rootstocks	Dr Rob Walker	CSIRO-Merbein	La Trobe University, SARDI-Loxton, University of Adelaide	CRCV, GWRDC	2003-2006

Title	Coordinator	Location	Collaborators	Funding	Duration
General viticulture projects					
Distribution, Lifecycle and Biological Control of the Grapevine Scale (Parthenolecanium persicae) in Australian Vineyards	Dr Greg Buchanan, Dr Ary Hoffman Adrian Rakimov (PhD student)	Vic DPI-Mildura, University of Melbourne	Vic DPI, GWRDC	Vic DPI, ARC Linkage Grant, GWRDC	2004-2007
GrapeCheque	Jeff Milne	Vic DPI-Mildura	Vic DPI-Tatura, Box Hill, Rutherglen, Bendigo	Vic DPI	1997-2008
The suitability of plantation thinnings as vineyard posts	Dr Mahabubur Mollah	Vic DPI-Mildura	ensis - A joint venture between CSIRO FFP Pty Ltd & Forest Research Australasia Ltd	RIRDC	2005-2006
Revision of the Australian and New Zealand Field Guide to Diseases, Pests and Disorders of Grapes	Peter Magarey	SARDI-Loxton	Winetitles	SARDI	2005-2007
CropWatch Online: Information when you need it	Peter Magarey, Tim Smythe, Richard McGeachy	SARDI-Loxton, RWIDC, McLaren Vale Wine Grape Tourism		SARDI, RWIDC, McLaren Vale Wine Grape Tourism, GWRDC RITA	2004-ongoing
Downy Mildew Action Plan	Peter Magarey, Tim Smythe	SARDI-Loxton, RWIDC		SARDI, RWIDC, GWRDC RITA funds	2005-ongoing
Cropwatch SA – pest and disease information service for grape growers	Tim Smythe	RWIDC	Rural Solutions SA, SARDI, Fruit Doctors, Western's Electronic Design.	Commercial	Ongoing
GA and reproductive development	Dr Steve Swain	CSIRO-Merbein	LTU, CSIRO		Ongoing
Technical enquiries for horticulture	Shirley Sylvia	Rural Solutions SA Loxton		PIRSA	2005-2006

Title	Coordinator/s	Location	Collaborators	Funding	Duration
General viticulture projects					
Communicate with industry via Food SA emailed publication Food-E-News and magazine Food Talk	Shirley Sylvia	Rural Solutions SA Loxton		PIRSA	2005-2006
Horticulture Input to PIRSA Website	Justin Dixon,	Rural Solutions SA Loxton		PIRSA	2005-2006
Multi-head, air assisted sprayers: design, prototype manufacture, evaluation and commercialisation	Geoff Furness	SARDI-Loxton	Croplands Spraying Equipment Pty Ltd, Bolly Products Pty Ltd, John Packer Design, Aspiration Holdings Ltd New Zealand	Commercial, royalty income	Ongoing
Distance/unit canopy row spray calibration	Geoff Furness	SARDI-Loxton	Commercial	Commercial	Ongoing

Riverlink staff

New South Wales Department of Primary Industries (NSW DPI), Dareton Research Station

Name	Position title
BAILEY, Eric	Technical Assistant
BAIRD, Anthony	Technical Assistant
BEVINGTON, Ken	Research Horticulturalist
BOWES, Brad	Operational Staff
CAMIN, Douglas	Leading Hand
CASEY, John	Technical Assistant
DAVIDSON, Bob	Research Station Manager
DRISCOLL, Andrew	Dfo, Lower Murray
DYKE, Paul	Operational Staff
FALIVENE, Steven	District Horticulturalist
GIDDINGS, Jeremy	Irrigation Officer
HEGEDUS, Leanne	Accounts Clerk
JESSOP, Peter	Rangelands Officer
KELLY, Gerard	District Horticulturist
KHURSHID, Tahir	Citrus Physiologist
MCINTOSH, Graeme	District Agronomist
MOULDS, Gregory	District Horticulturalist
PATULLO, Kate	Technical Assistant
POLKINGHORNE, Raymond	Farm Supervisor B
POTTER, David	Fo, Lower Murray
SANDERSON, Graeme	Research Horticulturalist
STANDBROOK, Mandy	Office Supervisor
WITTE, Troy	Technical Assistant

Victorian Department of Primary Industries (Vic DPI), Mildura

Name	Position title
BAILEY, Marissa	ORL Project Officer
BAKER, Nardia	Technical Officer
BLOOME, Aaron	ORL Project Officer Assistant
BRASTRUP, Andrew	Irrigation Extension Officer
BUCHANAN, Greg	Key Project Manager – Our Rural Landscape
BURROWS, Deanne	Benchmarking Technical Officer
BYRNE, Lee	Riverlink Communication and Development Officer
CAMERON, Ian	Native Title Coordinator
CHALMERS, Yasmin	Plant Physiologist
CLARK, Denise	Business Service Officer
CLARKE, Kathy	Research Officer, Plant Protection
COOMBE, Keith	Project Officer – Our Rural Landscape
CRISERA, Tonina	Business Service Officer
CROTHERS, Simone	Project Officer
DAVIS, Wayne	Administration Facilities Manager
DERRICO, Vince	Plant Standards Officer
DIMOS, Nicole	Extension Officer
DIXON, Peter	Fruit Fly Sub Project Manager
DOWNEY, Mark	Research Scientist
DRISCOLL, Metaxia	Business Service Officer
EDRAKI, Masoud	Irrigation Officer
EMMETT, Bob	Senior Research Officer, Plant Protection
FINIS, Peter	Temporary Survey Officer

Victorian Department of Primary Industries (Vic DPI), Mildura continued ...

Name	Position title
FRASER, John	Finance and Contracts Officer
GEORGESON, Nicole	Farm Administration Officer
GORDON, Jenny	Technical Assistant, Crop Quality
GRIFFIN, Peter	Technical Assistant, Business Services
HAMENCE, Peter	Project Leader, Salinity
HANCOCK, Fred	Technical Officer, Crop Protection
HANNAH, Rosalie	Irrigation Training Officer
HENDERSON, Sally-Ann	Vegetable Extension Officer
HISKINS, John	Centre Coordinator / Commercial Manager
JACKA, Lyn	Communication Officer
JONES, Bob	Casual Trap Inspector
KAZI, Benozir	Plant Pathologist
KIRBY, Julie	Winegrape Research Officer
KRSTIC, Mark	Section Leader, Physiology and Food Sciences
LEAMON, Keith	Key Project Manager, Efficient Plant Production Systems
LONGERI, Bianca	Program Support Officer
MADGE, David	Research Officer, Plant Protection
MANSELL, Daniel	Plant Standards Officer
MASON, Sue	Business Support Officer
MAZZA, Marica	Laboratory Manager
MCCONNELL, Sue	Environment Team Leader
MCLEAN, Scott	Environment and Soil Officer
MCTMAHON, Lyn	Librarian
METCALFE, Bob	Pest Management Officer

Victorian Department of Primary Industries (Vic DPI), Mildura continued ...

Name	Position title
MILNE, Jeff	Grapecheque Facilitator
MOLLAH, Mahabubur	Senior Agricultural Engineer, Viticulture
MOODIE, Michael	Top Crop Agronomist
NANCARROW, Narelle	Technical Officer, Crop Quality
NEMTSAS, Michael	Assistant Senior Plant Standards Officer
ORMESHER, Bryan	Occupational Health and Safety Officer
PITT, Kristen	Table Grape Research Officer
POLLOCK, Linda	Technical Officer, Crop Quality
PUTLAND, Stuart	Sub Project Manager, Sustainable Landscapes – Mallee
RAKIMOV, Adrian	PhD student – Soft Scale in Australian Vineyards
ROBINSON, Joanne	Environment and Soils Officer
ROGERS, Kevin	Finance and Administration Manager, North West
ROZARIO, Shelley	Research Officer, Plant Protection
SCHACHE, Maxine	Irrigation Extension Officer
SHAW, Pam	Business Support Officer – Plant Standards
SLOANE, Ken	ORL Project Officer Assistant
SMITH, Tony	Yelta Landcare Coordinator
SOMMER, Karl	ORL Future Farms Project Officer
STEPHENS, Lincoln	Farm Manager
SUDHOLZ, Kathy	Human Resource Team Leader, Murray
SWAENEY, Narelle	Finance Officer
TAYLOR, Cathy	Pistachio Research Officer

Victorian Department of Primary Industries (Vic DPI), Mildura continued ...

Name	Position title
TOLL, Zoe	Irrigation Benchmarking Officer
TREEBY, Jenny	ORL Future Farms Project Officer
WAGSTAFF, Shirley	Business Service Officer
WELSH, Mark	Technical Officer, Viticulture

CSIRO Plant Industry, Merbein

Name	Position title
BLACKMORE Deidre	Experimental Scientist
CLINGELEFFER Peter	Research Scientist/Sub-program Leader
CONNOLLY Karen	Technician
COX, Suzanne	Technician
CUPPER Philip	Farm Assistant
DAVIS Hilary	Experimental Scientist
DUFFIELD Shona	Technician
EMANUELLI David	Technician
EDWARDS Everard	Research Scientist
FITOS Jacqui	Technician
GROSZMANN, Michael	Postdoctoral Fellow
HANLIN Rachel	Experimental Scientist
JONES Tim	Postdoctoral Fellow
LO IACONO Ilma	Information Specialist
MCCARTHY Belinda	Experimental Scientist
MCCARTHY Grant	Farm Manager
MOORE Colin	Purchasing Officer
MORALES Norma	Technician
NGUYEN Tori	Experimental Scientist
OGAWA Mikihiro	Postdoctoral Fellow
RINNIE Peter	Cleaner
RUDD Emily	Apprentice Horticulture
SCHREIBER Bianca	Technician
SINGH Davinder	Research Scientist

CSIRO Plant Industry, Merbein continued ...

Name	Position title
STOREY Richard	Research Scientist
STRICKLAND Natalie	Laboratory Administration Manager
SWAIN Stephen	Research Scientist
SYKES Stephen	Research Scientist/Sub-program Leader
TARR Caroline	Experimental Scientist
TREEBY Michael	Research Scientist/Sub-program Leader
WALKER Robert	Research Scientist/Program Leader
WILLIAMSON Kim	Farm Assistant
WOLBANG Carla	Postdoctoral Fellow

South Australian Research and Development Institute (SARDI) / Primary Industries and Resources South Australia (PIRSA), Loxton Research Station

Name	Position title
ADAMS Tony	Senior Irrigation Consultant
ALAM Jahangir	Irrigation Consultant
BAKER Max	Rural Financial Counsellor
BASS Tony	Technical Officer, Plant Propagation (Weather Data)
BIELE Andrew	Farm / Field Operations Manager
COOK Vesna	Operations Manager (ACML/SASPAS)
FISHER Kate	Technical Assistant (ACML)
FURNESS Geoff	Senior Research Scientist – Entomology, Spray Application Technology
GILLETT Scott	Research Officer / Revegetation Consultant
GRAETZ Darren	Research Scientist – Post Harvest
GRIGSON Gary	Senior Agricultural Officer – Saline Horticulture
HUNT Melinda	Laboratory Technical Officer (ACML)
KNOWLES Simon	Irrigation Consultant
LANGE Ian	General Hand – Field Office
LEARHINAN Tash	Technical Assistant – Plant Pathology
LIPMAN Ashley	Horticultural Consultant
MCGONOUGH Chris	Sustainable Agricultural Systems Consultant
MCGILL Dale	Laboratory Technical Officer (ACML)
MAGAREY Peter	Senior Research Officer – Plant Pathology
MANN Brenton	General Hand – Field Office
MAPLEY Melissa	Business Support Consultant – Reception
NICHOLAS Phil	Senior Research Scientist – Viticulture
NICKOLAI Kaylene	Business Support Consultant – Reception

South Australian Research and Development Institute (SARDI) / Primary Industries and Resources South Australia (PIRSA), Loxton Research Station continued ...

Name	Position title
PECH Joanne	Senior Research Officer – Saline Horticulture
POCOCK David	Horticultural Consultant
POLYMIADIS Dafni	Team Leader – Business Services
POWELL Jan	Business Support Consultant – Administration
PROUD Glenys	Technical Officer (ACML / SASPAS)
ROGERS Jo	Business Support Consultant
SAUNDERS Richard	Research Officer – Field Crop Evaluation
SCARFE Bev	Senior Administrative Consultant – ICMS
SKEWES Mark	Senior Irrigation Consultant – Water Management
SPARROW Denis	Irrigation Consultant – Systems
STANLEY Brooke	Fisheries Compliance Officer
STEVENS Rob	Senior Research Officer – Salinity / Irrigation
STYLES Julie	Senior Research Officer – Micrometeorology
SYLVIA Shirley	Horticultural Consultant
TAYLOR Emily	Irrigation Consultant
THIEL Donna	Sustainable Horticulture Systems Consultant
THIELE Sally	Sustainable Horticulture Systems Consultant
THOMPSON Andrew	Citrus Research Officer
TRELOAR Peter	Sustainable Agricultural Systems Consultant
TSCHIRPIG Karina	Business Support Consultant – Reception
TULLETT Duncan	Project Manager – Horticulture
YOUNG Jason	Senior Scientist (ACML)

Riverlink publications

New South Wales Department of Primary Industries, Dareton Research Station

Barkley, P and Sanderson, G. P. (2006). Study Tour of New Citrus Varieties in Spain, Sicily, Corsica and California. Report to Auscitrus and Horticulture Australia Limited for CT04003 – February

Falivene, S., Giddings, J., Hardy, S and Sanderson, G. (2006). Managing citrus orchards with less water. NSW Department of Primary Industries website publication, December.

Falivene, S., (2006) USA and Israel citrus study tour report

Kelly G., (2006) Melon growers appraise marketing and promotion. *Riverlink Newsletter Summer 2006/07, No. 79*

Kelly G., (2006) Greenhouse vegetable management and training issues discussed. *Riverlink Newsletter Summer 2006/07, No. 79*

Khurshid T., (2006) Better flowering, bigger fruit and regular yields for navel orange crops Australian Citrus News Vol.82: 14-15 Feb/Mar

Khurshid T., (2006) Local and foreign rootstock evaluation Australian Citrus Insight, Vol.82: 36

Khurshid T., (2006) Citrus scoping study to Pakistand under Agricultural Sector Linkage Program Australian Citrus News Vol.82 Jul/Aug

Khurshid T, Sykes S, Smith M. Local and foreign rootstock evaluation. In: Citrus Insight – a special edition of Australian Citrus News 2006; 82, 36.

Sanderson, G.P. (2006). Study tour provides insight into new citrus varieties. *Australian Citrus News* Vol. 82. April/May: 25.

Sanderson, G.P. (2006). Auscitrus Annual General Meeting Report, Evaluation of new varieties and ensuring healthy budwood, 31 Oct.: 13-14.

Sanderson, G.P. (2006). New citrus varieties to meet future market opportunities. *Citrus Insight* (*Australian Citrus News* technical edition). Vol. 82. December: 39.

Victorian Department of Primary Industries, Mildura

Final reports, books and scientific papers

Byrne, L (2006) DG3009 Riverlink Final Report, Horticulture Australia Limited

Byrne, L (2006) Riverlink Viticulture Research Development and Extension, Riverlink

Chalmers, Y (2006) Impacts of sustained deficit irrigation on flavonoid composition and sensory attributes of small-scale ferments, ACTA Horticulture

Crothers, S (2006) Australian Regional Wine Grape Crush Survey 2006, Murray Darling & Swan Hill, Vic
DPI external website <www.dpi.vic.gov.au>

Downey, M (2006) Travel report: E&J Gallo 2006

Edraki, M (2006) Travel report: United States and Turkey 24 April – 15 March 2006

Emmett, RW (2006) Viticulture Plant Protection, In: *2005 Riverlink Annual Report* pp41-43

Emmett, RW (2006) Sustainable management of *Aspergillus carbonarius* in vineyards, CRCV Project Progress Report April 2006

Emmett, RW (2006) Sustainable management of *Aspergillus carbonarius* in vineyards, HAL Progress Report Jan-Jun 2006

Emmett, RW (ed) (2006) Sustainable management of *Aspergillus carbonarius* in vineyards, Final Report on CRCV Project 1.5.4 and HAL Project DG03002 for the Cooperative Research Centre for Viticulture and Horticulture Australia Limited, Department of Primary Industries, Victoria, p92

Emmett, RW (ed) (2006) Improved management of grapevine powdery mildew, Final Report on GWRDC Project DNR 02/06 for the Grape and Wine Research and Development Corporation, Department of Primary Industries Victoria, p61

Leong, SL; Hocking, AD; Pitt, JI; Kazi, BA; Emmett, RW and Scott, ES, (2006) Australian research on ochratoxin fungi and ochratoxin A. *International Journal of Food Microbiology* 111: S10-S17.

Leong, SL; Hocking, AD; Pitt, JI; Kazi, BA; Emmett, RW and Scott, ES, (2006) Black *Aspergillus* spp. in Australian vineyards: from soil to ochratoxin A in wine. In 'Advances in Food Mycology.' A.D. Hocking, J.I. Pitt, R.A. Samson and U. Thrane (eds.), Springer, New York. p153-171.

Mollah, M (2006) Final report: CRCV attachment 1 for 'Clean & Green'

Mollah, M (2006) Final report: CRCV attachment 2 for 'Clean & Green'

Pitt, K (2006) Travel report: California 2005 – Advice to Secretary

Conference Proceedings and Papers

Ashley, RM; Clingeleffer, PR; Emmett, RW and Dry, PR (2006) Effects of canopy and irrigation management on Shiraz production, quality and disease development in Sunraysia region. In: 'Proceedings of ASVO Seminar Finishing the Job – Optimal Ripening of Cabernet Sauvignon and Shiraz, Mildura, Vic.' D. Oag, K. DeGaris, S. Partridge, C. Dundon, M. Francis, R. Johnstone and R. Hamilton (eds.), Australian Society of Viticulture and Oenology, Adelaide SA.

Buchanan, G (2006) ORL Inland open water, Aquaculture Futures Workshop

Downey, M (2006) Poster: Expression of genes involved in flavonoid biosynthesis in skins of Cabernet Sauvignon and Chardonnay, 8th International Congress on Plant Molecular Biology

Downey, M (2006) Poster: Variation in tannins and anthocyanin content across grape cultivars, 12th Annual Romeo Bragato Conference, Queenstown, New Zealand

Downey, M (2006) Poster: Rapid determination of phenolic compounds in red wine fermentations using UV-vis spectroscopy, 57th Annual Meeting of the American Society for Enology & Viticulture, Sacramento, CA. June 27-30, 2006

Downey, M (2006) Conference paper: Proceedings of the Phenolics Symposium – 56th Annual Meeting of the ASEV

Edraki, M (2006) Conference paper: Advances in efficient water use of wine grapes through deficit and subsurface drip irrigation, International Symposium on Water and Land Management for Sustainable, 4-8 April 2006, Adana, Turkey

Emmett, RW; Clarke, K; Hunt, TJ; Magarey, PA and Learhinan, N (2006) Grapevine bud infection by powdery mildew (*Erysiphe necator*): Varietal susceptibility and the evaluation of fungicide treatments to reduce flag shoot development. In: 'Proceedings of the Fifth International Workshop on Grapevine Downy and Powdery Mildew, San Michele all'Adige'. I. Pertot, C. Gessler, D.M. Gadoury, W.D. Gubler, H.H. Kassemeyer and P.A. Magarey (eds.). Instituto Agrario di San Michele all'Adige SafeCrop Centre, Italy. p174-175

Leong, SL; Hocking, AD; Kazi, BA; Emmett, RW and Scott, ES (2006) Ochratoxin A in grapes and wine – the Australian story. In 'Abstracts of Fungi and Mycotoxins in Food and Indoor Air, a Joint Symposium of the International Commission on Food Mycology and the International Commission on Indoor Fungi at the Eighth International Mycological Congress, Cairns, Queensland, 19-20 August 2006'. p23

Newsletter, media and industry articles

Buchanan, G (2006) Technical note 3. Genetic profiling of soil microbes

Buchanan, G (2006) Better biodiversity, better mums, DPI website <www.dpi.vic.gov.au>

Buchanan, G (2006) Technical note 9. Cooler ewes, bigger lambs and biodiversity gains, DPI website <www.dpi.vic.gov.au>

Buchanan, G (2006) Technical note 10. Native grasslands and cropping in SW Victoria, DPI website <www.dpi.vic.gov.au>

Newsletter, media and industry articles continued ...

Buchanan, G (2006) ORL Technote 11. Protecting our scattered trees, DPI website <www.dpi.vic.gov.au>

Buchanan, G (2006) Technical note 4. Identifying functional genes in Victorian soils #2

Byrne, L (2006) Riverlink Newsletter Spring 06, No.78

Byrne, L (2006) Riverlink Newsletter Summer 2006/07, No.79

Clancy, T and Emmett, RW (2006) Shoots flag a potential control pathway. In: 'GWRDC R&D at Work', May 2006. p14-15

Dimos, N (2006) Viticare Trials says Goodbye, *Murray Valley Winegrowers The Grapevine*, August 2006

Downey, M (2006) Visiting scientist at DPI-Mildura, *PPS Newsletter*, December 2006

Downey, M (2006) Reversing the brain drain, *PPS Newsletter*, August 2006

Downey, M (2006) Australian scholar visits Prosser IAREC, *WSU Wine and Grape Research and Extension Newsletter*, 2006

Downey, M (2006) Technical report: Changes in grape anthocyanins and tannins during berry development, *Australian Viticulture*, July/August 2006

Downey, M (2006) Technical report: Which grape cultivar has the highest tannin concentration?, *Australian Viticulture*, 2006

Downey, M (2006) Technical report: Know your phenolics, *Australian Viticulture*, 2006

Emmett, RW; Clarke, K and Magarey, PA (2006) Improving management of grapevine powdery mildew. *Australian and New Zealand Grapegrower and Winemaker* No. 512: 62-64

Emmett, RW and Kazi, BA (2006) Sustainable management of *Aspergillus carbonarius* in vineyards. *The Vine* 2 (6): 13-14

Krstic, M (2006) Developing intellectual networks with table grape researchers and industry personnel in California through Interlink, July 2006

Krstic, M (2006) Influence of vine spacing on productivity and water use efficiency in dried grape production systems, *The Vine – Annual Technical Issue*, July/August 2006

Madge, D (2006) Organic citrus management

Mollah, M (2006) Cordon bunch removal, *The Vine*, July/August 2006

Mollah, M (2006) Further improve drying efficiency of bunches, *The Vine*, July/August 2006

Smith, P; Emmett, RW and Kazi, BA (2006) Management tools to prevent black *Aspergillus* bunch moulds. *The Vine* 2 (3): 32-33

CSIRO Plant Industry, Merbein

Journal Papers

Clingeffer PR. Management practices for Sunmuscat (*Vitis vinifera* L.) : a new drying variety. Australian Journal of Grape and Wine Research 2006;12(2):128-34.

Clingeffer PR, Emmanuelli DR. An assessment of rootstocks for Sunmuscat (*Vitis vinifera* L.) : a new drying variety. Australian Journal of Grape and Wine Research 2006;12(2):135-40.

Cox CM, Swain SM. Localised and non-localised promotion of fruit development by seeds in *Arabidopsis*. Functional Plant Biology 2006;33(1):1-8.

Henriod RE. Postharvest characteristics of navel oranges following high humidity and low temperature storage and transport. Postharvest Biology and Technology 2006;42(1):57-64.

Lindhout K, Treeby MT, Parish RW. Chill out: chilling-related injuries in navel oranges. Acta Horticulturae 687, 77-84.

Petrie PR, Clingeffer PR. Crop thinning (hand versus mechanical), grape maturity and anthocyanin concentration: outcomes from irrigated Cabernet Sauvignon (*Vitis Vinifera* L.) in a warm climate. Australian Journal of Grape and Wine Research 2006;12(1):21-9.

Treeby MT, Wheatley DM. Effect of nitrogen fertiliser on nitrogen partitioning and pool sizes in irrigated sultana grapevines. Australian Journal of Experimental Agriculture 2006;46(9):1207-15.

Tan F-C, Swain SM. Genetics of flower initiation and development in annual and perennial plants. Physiologia Plantarum 2006;128(1):8-17.

Tregeagle JM, Tisdall JM, Blackmore DH, Walker RR. A diminished capacity for chloride exclusion by grapevine rootstocks following long-term saline irrigation in an inland versus a coastal region of Australia. Australian Journal of Grape and Wine Research 2006;12(3):178-91.

Industry Articles

Bevington K, Falivene S, Treeby M. Communicating the effects of production conditions on outturn quality. In: Citrus Insight – a special edition of Australian Citrus News 2006; 81, 44.

Clingeffer P, Tarr C, Connelly K. Optimising Sunmuscat dried fruit quality. The Vine 2006; 2, 15.

Clingeffer P, Tarr C, Thomas M, Robinson S, Walker R. Evaluation of Sultanas with decreased browning. The Vine 2006; 2, 17.

Clingeffer P, Sykes S, Davis H. A systematic and smarter approach to breeding and developing grapevine rootstocks adapted to Australian conditions. The Vine 2006; 2, 17.

Clingeffer P, Tarr C, Sykes S, Emanuelli D, Morales N, Walker R. Development of rain tolerant drying varieties to meet market specifications. The Vine 2006; 2, 19.

Industry Articles continued ...

Clingeffer P, McCarthy B, Sykes S, Walker R, Cameron I, Oag D, Kenna G. Table grapes for the new millennium. *The Vine* 2006; 2, 26.

Clingeffer P, McCarthy B, Sykes S, Walker R, Cameron I, Wills S, Oag D, Kenna G. Unique Australian table grapes for the 21st century. *The Vine* 2006; 2, 28.

Lindhout K, Treeby M. Postgraduate training in the physiology of postharvest rind breakdown in navel oranges. In: *Citrus Insight – a special edition of Australian Citrus News* 2006; 81, 24.

Sykes SR. CSIRO: commercial release of two new mandarin varieties. *Australian Citrus News* 2006;82(April/May):4-6.

Sykes SR. Merbeingold 2336 and 2350 : first varieties nominated for release from the national citrus breeding program. *Citrep* 2006;(44):12-3.

Sykes S. National citrus scion breeding program. In: *Citrus Insight – a special edition of Australian Citrus News* 2006; 81, 36-37.

Sykes S, Smith, M. Progress on breeding new 'consumer – friendly varieties. In: *Citrus Insight – a special edition of Australian Citrus News* 2006; 82, 40.

Sykes SR. Grape (*Vitis vinifera*) 'M 51-18'. *Plant Varieties Journal* 2006; 19, (4) 189-194

Swain S. Key genes for horticultural markets. In: *Citrus Insight – a special edition of Australian Citrus News* 2006; 81, 39.

Swain SM. Regulating citrus flowering. *Australian Citrus News*;2006; 82 (Dec-Jan), 37.

Swain SM. Key Genes for Horticultural Markets – Genes for seedless fruit and plant colour. *GMO Newsletter* Nov 2006

Swain SM. Key Genes for Horticultural Markets. *Horticulture Australia Across industry report 2005/2006*: 2.

Treeby MT, Storey R. Gene expression - unlocking the mysteries of rind age and senescence. *Australian Citrus News* 2006;82(Oct./Nov.):26-7.

Treeby M, Swain S. Sunmuscat fruit set and bunch shatter. 2006; *The Vine* 2, 23.

Treeby M, Nguyen T, Krstic M, Pitt K. Causes and prevention of table grape berry collapse. *The Vine* 2006; 36-37.

Walker RR. VineLOGIC Virtual Vineyard. Software Package Users manual. CRC for Viticulture Technologies Pty Ltd 2006 pp 84.

Conference Proceedings and Papers

Clingeffer PR, Pellegrino A. Pruning, rootstock and seasonal impacts on vine carbohydrate status. In: Walker RR, editor. Vine carbohydrate dynamics and source-sink relationships : proceedings. CSIRO. Merbein, Vic.: CSIRO Plant Industry, 2006: 45-54.

Cooley NM, Walker RR, Clingeffer PR. Effects of water stress on grapevine carbohydrate reserves. In: Walker RR, editor. Vine carbohydrate dynamics and source-sink relationships : proceedings. CSIRO. Merbein, Vic.: CSIRO Plant Industry, 2006: 32-44.

Groszmann M, Swain SM. Molecular control of reproduction in the weed *Raphanus raphanistrum* (wild radish) [abstract]. In. Book of abstracts, 8th International Congress of Plant Molecular Biology . Adelaide, S. Aust. Adelaide, S. Aust.: International Society for Plant Molecular Biology , 2006: 153.

Kay PT, Parish R, Swain SM. Regulation of fertilisation and seed set by the *HOUDINI* gene [abstract]. In. Book of abstracts, 8th International Congress of Plant Molecular Biology . Adelaide, S. Aust. Adelaide, S. Aust.: International Society for Plant Molecular Biology, 2006: 148.

Ogawa M, Matthews B, Swain SM. Promotion of fruit growth by seeds in arabidopsis [abstract]. In. Book of abstracts, 8th International Congress of Plant Molecular Biology . Adelaide, S. Aust. Adelaide, S. Aust.: International Society for Plant Molecular Biology, 2006: 61.

Singh DP, Mai C, Swain SM. Gibberellins and reproductive development in arabidopsis [abstract]. In. Book of abstracts, 8th International Congress of Plant Molecular Biology . Adelaide, S. Aust. Adelaide, S. Aust.: International Society for Plant Molecular Biology, 2006: 199.

Walker RR, editor. Vine carbohydrate dynamics and source-sink relationships : proceedings. CSIRO. Merbein, Vic.: CSIRO Plant Industry, 2006.

Final Reports

Clingeffer PR. Integrated strategies to manage seasonal variation in winegrape maturation. Final Report to GWRDC, Project CRC 01/1, CSIRO Plant Industry, Merbein, Vic.

South Australian Research and Development Institute (SARDI) / Primary Industries and Resources South Australia (PIRSA), Loxton Research Station

Reports, books and scientific papers

Based on information from Lavar, E., Kalmar, D., Farmnote 42/July 2005. Department Agriculture and Food, WA, (2006) Avocado irrigation in drought conditions. Irrigated Crop Management Service (ICMS) – Rural Solutions SA, Primary Industries & Resources SA Fact sheet, November.

Baker, G., (2005) Mealybugs. South Australian Research & Development Corporation, Primary Industries & Resources SA Fact Sheet, March.

Coelho, B., (2005) The Price of Frozen Concentrate Orange Juice. Primary Industries & Resources SA, December.

Corporate Strategy and Policy Branch, (2006) Structure of the South Australian Olive Industry. Primary Industries & Resources SA.

Furness, G.O. (2006). Orchard and Vineyard Spraying Handbook for Australia and New Zealand. South Australian Research and Development Institute, February 2006, ISBN: 0 7308 5343 8.

Furness, G.O., Thompson, A.J., Manktelow, D.W.L. (2006). A visual droplet number rating chart and fluorescent pigment sprays to estimate chemical deposition and spray coverage on plant foliage. *Aspects of Applied Biology* 77: 171-178.

Furness, G.O., Thompson, A.J., Manktelow, D.W.L. (2006). Multi-fan spray towers to improve dose efficiency and spray coverage uniformity in citrus trees. *Aspects of Applied Biology* 77: 481-488.

Grieve, A.M., Prior, L.D., and Bevington, K.B. (accepted) Effects of saline irrigation water on field-grown 'Valencia' oranges in the Murray Valley: growth, yield and fruit quality. *Australian Journal of Agricultural Research*

Gunner, E., Langberg, J., Wodecki, R., (2005) South Australian Citrus Industry Situational Analysis. Rural Solutions SA, Primary Industries & Resources SA.

Habili, N., Farrokhi, N., Lima, M.F., Nicholas, P. and Randles, J.W. (2006) Distribution of Rupestris stem-pitting-associated virus variants in two Australian vineyards showing different symptoms. *Annals of Applied Biology* 148, 91-96.

Heaven, D., (2006) Fruit flies. Primary Industries & Resources SA Fact Sheet, November.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Australian native citrus. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Bush tomato production. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Reports, books and scientific papers continued ...

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Davidson and Illawara plums. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Mountain pepper production. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Muntries production. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Native food background notes. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Native food crops – frequently asked questions. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Native herbs and vegetables with potential in SA. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Quandong production. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) The Native Food Industry in SA. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hele, A., Updated by Latham, Y., Ryder, M., (2006) Wattleseed production. CSIRO, Primary Industries & Resources SA Fact Sheet, March.

Hill, J., (2005) Refrigerated transport of fresh produce. Rural Solutions SA, Primary Industries & Resources SA Fact Sheet, May.

Industry Strategy and Structure Team, Corporate Strategy and Policy Branch (2005) South Australian Fresh Citrus – Issues and Prospects. Primary Industries & Resources SA, September.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA, (2006) Irrigating horticulture crops with reduced water supplies. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA, (2006) Olive irrigation in drought conditions. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA, (2006) Regulated deficit irrigation strategies in winegrapes. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA, (2006) ICMS Seasonal Water Allocation Tool. Government of South Australia, Primary Industries and Resources SA website publication.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA, (2006) ICMS Weekly Water Budgeting Tool. Government of South Australia, Primary Industries and Resources SA website publication.

Reports, books and scientific papers continued ...

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - almond. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - avocado. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - citrus. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - olive. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - pistachio. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - pomefruit. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - stonefruit. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water budgeting guidelines - vine. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Water Trade Decision Tool. Primary Industries and Resources SA website publication, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Monitoring soil salinity for irrigated horticulture. Primary Industries and Resources SA Fact Sheet, November.

Irrigated Crop Management Service (ICMS) – Rural Solutions SA (2006) Drought Strategy Checklist (Horticulture). Primary Industries and Resources SA Fact Sheet, November.

Jevremov, D., (2005) Horticultural crop monitoring. South Australian Research & Development Corporation, Primary Industries & Resources SA Fact Sheet, June.

Jevremov, D., (2005) Integrated pest management. South Australian Research & Development Corporation, Primary Industries & Resources SA Fact Sheet, June.

Magarey, PA (ed) (2006) Report on GWRDC Project GWT 05/04 for the Grape and Wine Research and Development Corporation, South Australian Research and Development Institute, p44

Magarey, PA; Emmett, RW; Evans, KJ; Scott, E and Savocchia, S (2006) Fifth International Workshop on Grapevine Downy and Powdery Mildew: A review of outcomes. In 'Fifth International Workshop on Grapevine Downy and Powdery Mildew: A Summary'. Magarey, PA (ed.). Report on GWRDC Project GWT 05/04 for the Grape and Wine Research and Development Corporation, South Australian Research and Development Institute p9-32.

Reports, books and scientific papers continued ...

McFarlane, P., Philp, B., Fennell, J., Tothill, M., Pocock, D., Thiel, K., Stepien, A., Green, A., (2005) Strategic Plan of the South Australian Citrus Industry. McFarlane Strategic Services, Primary Industries & Resources SA, Rural Solutions SA, Citrus Growers of SA, South Australian Citrus Industry Development Board, December.

McFarlane, P., Fennell, J., Megow-Dowling, D., Sweeney, S., Tothill, M., Rowntree, L., (2006) South Australian Olive Industry Strategic Plan. McFarlane Strategic Services, Primary Industries & Resources SA, Rural Solutions SA, Olives South Australia, September.

Nicholas, P.R. (2006) Grapevine Clones Used in Australia. (South Australian Research and Development Institute).

Nicholas, P.R. (2006) National Register of Grapevine Varieties and Clones. (Australian Vine Improvement Association: Mildura, Victoria).

Nicholas, P.R. (2006) Virus Tested Clones for National Nuclear Grapevine Collections. Final Report to Grape and Wine Research and Development Corporation. (South Australian Research and Development Institute).

Philp, B., (2006) South African Citrus Industry Study Tour. Primary Industries & Resources SA, April.

Prior, L. D., Grieve, A.M., Bevington, K. B., and Slavich P. G. (accepted) Long-term effects of saline irrigation water on 'Valencia' orange trees: relationships between growth and yield, and salt levels in soil and leaves. Australian Journal of Agricultural Research

Rawnsley, B., (2005) Phomopsis cane and leaf spot of grapevine. South Australian Research & Development Corporation, Primary Industries & Resources SA Fact Sheet, October.

Rettke, M.A. Pitt, T.R. Maier, N.A. & Jones, J.A. (2006). Growth and yield responses of apricot (cv. Moorpark) to soil applied nitrogen. Australian Journal of Experimental Agriculture, vol 46, pp 115-122.

Rettke, M.A., Pitt, T.R. Maier, N.A., and Jones, J.A. (2006). Quality of fresh and dried fruit of apricot (cv. Moorpark) in response to soil applied nitrogen. Australian Journal of Experimental Agriculture, vol 46, pp 123-129.

Sadras, V.O., Stevens, R.M., Pech, J., Taylor, E., Nicholas, P., and M.G. McCarthy (submitted). Anthocyanins and Sugars in Berries of *Vitis vinifera*: Trade-off Between Duration and Rate of Accumulation. Australian Journal of Grape and Wine Research.

Sweeney, S., (2006) South Australian Olive Industry Situational Analysis. Rural Solutions SA, Primary Industries & Resources SA, January.

Taylor, P., Chapman, P., Coelho, B., (2005) The Growing Juice Gap – Opportunities for South Australia. Primary Industries & Resources SA, August.

West, S., Henry, K., Updated by Willmott, P., (2005) Locust control in horticulture. Primary Industries & Resources SA Fact Sheet, September.

Conference Proceedings and Papers

Magarey, PA; Dixon, JR; Hills, C; Hook, J; McGeachey, R and Emmett, RW (2006) CropWatchOnline.com: A web site for growers and researchers to improve vineyard management of grapevine downy and powdery mildew. In: 'Proceedings of the Fifth International Workshop on Grapevine Downy and Powdery Mildew, San Michele all'Adige'. I. Pertot, C. Gessler, D.M. Gadoury, W.D. Gubler, H.H. Kassemeyer and P.A. Magarey (eds.). Instituto Agrario di San Michele all'Adige SafeCrop Centre, Italy. p178-179

Magarey, PA; Thiele, SA; Tschirpigg, KL; Dixon, JR and Major, MA (2006) *Disease Diagnosis*: A web site for swift identification of grapevine downy and powdery mildew and other diseases and pests from the tractor seat! In: 'Proceedings of the Fifth International Workshop on Grapevine Downy and Powdery Mildew, San Michele all'Adige'. I. Pertot, C. Gessler, D.M. Gadoury, W.D. Gubler, H.H. Kassemeyer and P.A. Magarey (eds.). Instituto Agrario di San Michele all'Adige SafeCrop Centre, Italy. p180-181

Newsletter, media and industry articles

Biswas, T (2006) Simple and inexpensive tools for root zone watch. J.Australian Nutgrower 20: 14-16.

Biswas, T (2006) Simple tools and sophisticated technologies to better assess water use efficiency, New Ag International, Nov 2006, p71

Biswas, T (2006) Rivers of vineyards water savings start with Brooks, Adelaide Review, November 2006, p5

Biswas, T (2006) SARDI tackles soil scourge, National Grapegrowers, December 2006, p37

Graetz, D (2006) 'Reinventing the apricot' Summerfruit Australia Quarterly Vol. 8, No.3, Spring 2006 pg16-17

Nicholas, P.R. (2006) Selection of clones for the Australian National Nuclear Grapevine Collection. Australian and New Zealand Grapegrower and Winemaker 508, 32-35.

Nicholas, P.R., and Taylor, E.J. Research into improving Cabernet Sauvignon quality. Sunraysia Daily 10/5/06.

Rettke, M.A., and Graetz, D.K. (2006) Dried apricots – Mechanisation of harvesting. SARDI, Adelaide.

Acronyms

ACG	Australian Citrus Growers
ADFA	Australian Dried Fruit Association
ACIAR	Australian Centre for International Agricultural Research
ANU	Australian National University
ARC	Australian Research Council
AWRI	Australian Wine Research Institute
CMA	Catchment Management Authority
CNRM	Centre for Natural Resource Management
CRC	Cooperative Research Centre
CRC-CARE	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment
CRCV	Cooperative Research Centre for Viticulture
CSIRO PI	Commonwealth Scientific and Industry Research Organisation Plant Industry
DSE	Department of Sustainability and Environment (Victoria)
DWLBC	Department of Water, Land and Biodiversity Conservation (South Australia)
EMAI	Elizabeth Macarthur Agricultural Institute
FMIT	First Mildura Irrigation Trust
GWRDC	Grape and Wine Research Development Corporation
HAL	Horticulture Australia Limited
L&WA	Land and Water Australia
LMW	Lower Murray Water
LTU	La Trobe University
MDBC	Murray Darling Basin Commission
MVCB	Murray Valley Citrus Board
NAP	National Action Plan for Salinity and Water

Acronyms continued ...

NSW DPI	New South Wales Department of Primary Industries
PIRSA	Primary Industries and Resources South Australia
QDPI&F	Queensland Department of Primary Industries & Fisheries
RC	Riverina Citrus
RIRDC	Rural Industries Research and Development Corporation
RITA	Regional Innovation and Technology Adoption
RMCWMB	River Murray Catchment Water Management Board (South Australia)
RWGA	Riverland Wine Grape Association
RWIDC	Riverland Wine Industry Development Council
SACIDB	South Australian Citrus Industry Development Board
SARDI	South Australian Research and Development Institute
WADA	Western Australia Department of Agriculture
Vic DPI	Victorian Department of Primary Industries