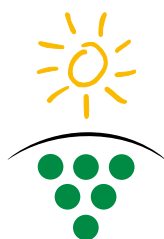


# Closing Newsletter

Volume 12 no 6

November-December 2006



COOPERATIVE  
RESEARCH CENTRE  
*for*  
VITICULTURE

## Inside

Message From Chairman and CEO	1
Research Success Stories (Sub-Program 1)	2-3
Research Success Stories (Sub-Program 2)	4-5
Research Success Stories (Sub-Program 3)	6
AVi™ and AusVit™ Product Updates	7
In Brief and Diary Dates	8

### Cooperative Research Centre for Viticulture

The University of Adelaide  
The National Wine and Grape Industry Centre  
(Charles Sturt University, NSW Agriculture)  
The Australian Wine Research Institute  
CSIRO  
Department of Primary Industries, Victoria  
Primary Industries & Resources, SA  
The Australian Dried Fruits Association Inc.  
Winemakers' Federation of Australia Inc.  
Grape and Wine Research and Development Corporation  
Horticulture Australia Limited  
Wine Grape Growers' Australia

## Message from Chairman and CEO

### CRCV Impact on Industry 1999–2006



Tony Martin, Chairman (pictured left) and Jim Hardie, CEO, CRCV.

Since 1992 and in a period spanning two successive terms of the CRC for Viticulture, Australian wine production has grown from 400 to 1471 million litres – a 3.7-fold increase and Australia has moved from 10th to 7th largest wine producing nation in the world.

Many challenges now face grape and wine producers, as international competition increases and wine distribution channels continue to be dominated by a smaller group of companies.

These challenges serve as a reminder of the continuous need for technical innovation to improve vineyard sustainability and grape and wine quality.

As the CRCV enters its Wind-Up phase, leading to formal termination on 30 June 2007, this newsletter captures significant features and contributions of the CRCV during the period 1999–2006. The CRCV is also preparing an Impact Statement to provide the industry and its stakeholders with an account of achievements of its cooperative approach to research and development.

Knowledge generated by the CRCV's scientific research is already being used

by industry to confront the challenges and respond to the opportunities to build stronger and profitable viticultural-related businesses.

In this newsletter we briefly outline some examples of how CRCV-generated knowledge is being, and will be, used to drive innovation.

In our parting message to the industry, we would like to acknowledge the contribution of our stakeholders – research organisations and their people, industry people, particularly those involved in developing the CRCV vision and mission, CRCV reference groups and project reviews, our regional collaborators, wine industry suppliers, supporting participants, the Grape and Wine Research and Development Corporation, Horticulture Australia and the Australian Government.

There are of course many others who have assisted the CRCV in achieving its objectives. We sincerely thank you.

All of these people have made it possible for the CRCV to reach some impressive viticultural achievements for Australia.

**Tony Martin**  
Chairman

**Jim Hardie**  
CEO

## Research Success Stories

### Sub-Program 1 – Vineyard Management To Meet Grape Quality Specifications PROGRAM MANAGER – LIZ WATERS

CRCV researchers in this Program have achieved much in the development of fast and reliable analytical methods for measuring colour, flavour, tannin, fungal contamination and pesticide residues in grapes and wine.

#### *Identifying Key Flavour and Aroma Compounds*

Research in this Sub-Program focused on the identification of key flavour and aroma compounds – a demanding task given the vast number of volatile compounds that exist in wine, the complex interactions that occur among them, and the fact that other non-volatile compounds in the wine also influence aroma perceptions. Nevertheless, it now appears that a relatively small number of key compounds can direct wine flavour. **Laboratory procedures and analytical standards have been developed for a range of these compounds.** We are now in a position to measure the flavour and aroma compounds of importance and understand their relationship with grape composition and to link this information to consumer preference data. **A hitherto unknown wine flavour compound was identified as 2,3,6-trimethylbutadiene (TPB): one of the post potent wine flavour compounds known.**

#### *Tannin Assay Measures Total Tannin Concentration*

CRCV researchers developed a **tannin** assay to measure total tannin concentration in grape and wine samples. The assay will not only be used by researchers but also for wineries to aid fruit-streaming and wine style decisions, and determine processing options.

#### *The Mouthfeel Wheel*

A CRCV team developed a standard ‘language’ for ‘sensory analysis’. Known as the ‘**mouthfeel wheel**’, the tool is now used by sensory panels, winemakers and students. It lists 53 terms to describe a complex range of mouthfeel sensations associated with red wine.

#### *DNA-Method Detects Powdery Mildew*

The role of two fungal contaminants in diminishing the quality of grapes for wine production was addressed. Researchers successfully described the impact of powdery mildew on the sensory properties of wine and quantified the relationship between those effects and the level of powdery mildew infection. This work has provided a **scientifically objective basis for the inclusion of powdery mildew infection in grape quality specifications.** The project team also developed a **sensitive DNA-based method for the detection and measurement of powdery mildew in grape samples.** With further development this method has potential to replace current methods of visual assessment with one that is less subjective.

#### **Practical and affordable colour measure**

The rapid measurement of red grape colour and other quality parameters with Near Infrared Spectroscopy (NIR) throughout the wine industry has been restricted by the expense of the equipment needed to perform this measurement and the availability of reliable calibrations.

The CRCV partnered with Sydney-based Integrated Spectronics to develop the portable instrument that will measure colour (total anthocyanins) as well as pH and total soluble solids in red winegrapes.

The equipment is especially suited for smaller wineries who don’t have a large laboratory but want to assess their own fruit for winemaking, to make informed decisions about their branding and bottle price point.

The instrument will fit easily on a bench-top and will be plugged into a PC for the data to be analysed and stored.

The release of this instrument for market testing was met with great anticipation by industry. Wineries that participated in testing the product have reported increased efficiency and reduced costs within the laboratory as key benefits of the instrument. A retail price set to be less than \$20,000 will ensure the instrument is within reach for many small-medium wineries.

For more information contact **Bridget Ransome** on (08) 8303 9663 or email [bridget.ransome@crcv.com.au](mailto:bridget.ransome@crcv.com.au).

## Newsletter

The Cooperative Research Centre for Viticulture Newsletter is produced bi-monthly. All contributions are welcome, especially reports from conferences, seminars and international trips.

Editorial: **Olivia Jones**

Fuller Communications

58 Rundle Street, Kent Town SA 5067

Phone: (08) 8363 6811

Fax: (08) 8363 6822

Email: [olivia.jones@fuller.com.au](mailto:olivia.jones@fuller.com.au)

Published by: The Cooperative Research Centre for Viticulture, Plant Research Centre,

Hartley Grove, URRBRAE SA

Phone: (08) 8303 9405

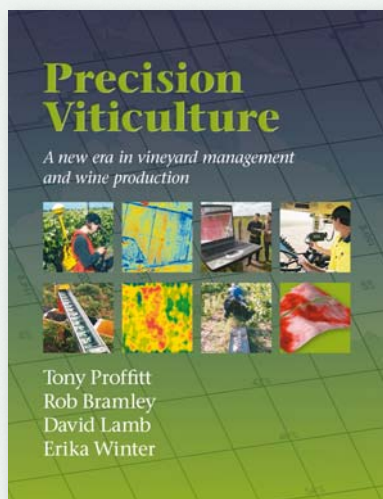
Fax: (08) 8303 9449

## Research Success Stories

## Sub-Program 1 – Vineyard Management To Meet Grape Quality Specifications

PROGRAM MANAGER – LIZ WATERS

### World First Book on Precision Viticulture Released



In October 2006 the CRCV released a world first book on Precision Viticulture. Through Sub-Program 1 the CRCV introduced the concept of **Precision Viticulture** to both the wine and dried vine fruit sectors of the Australian industry in 1999. The use of the tools of Precision Viticulture such as harvest yield monitoring and yield mapping as a basis of selective mechanical harvesting has demonstrated very significant increases in the value of wine produced from medium-large size vineyards. It is estimated that benefits of this type are achievable from up to 60% of Australia's vineyard area. The publication has been compiled and guided by the Australian pioneers of the application of precision technologies in vineyards and is a fitting demonstration of Australia's technical leadership in this field. For a copy of the book phone Winetitles on (08) 8292 0888 or visit [www.winebiz.com.au](http://www.winebiz.com.au).

### *Minimising Ochratoxin A Infection*

Research on the impact of infection of grapes by the fungal pathogen, *Aspergillus*, on wine quality – in this case its potential to produce the mycotoxin, ochratoxin A, in excess of strict international limits – showed that in Australia one species of *Aspergillus*, *A. carbonarius* consistently produces ochratoxin A but that the more common *A. niger* rarely produced the mycotoxin. Infection is generally confined to physically-damaged grapes under wet conditions. Vineyard management practices to minimise potential infection were identified. A survey of a broad range of Australian wines showed that all were well below international limits on the contaminant.

### *Molecular Imprinted Polymers Detect Pesticide Residues*

In collaboration with the CRC for Microtechnology, CRCV researchers reached the **proof of concept stage in the application of molecular imprinted polymer technology for the rapid detection and measurement of pesticide residues** in grape juice and wine. Work is continuing to combine the technology with an acoustic wave sensor for commercial application.

### *Maintaining Colour Stability of Dried Fruit*

Light colour is an important quality attribute of dried vine fruit. CRCV research showed that **growers of dried Sultana fruit can supply sufficient N** (i.e. approximately 40kg N/ha/season) **to meet vine N needs and not influence colour stability in storage**. The nutrition section of the ADFA Dried Fruit Manual has been updated accordingly.

### *World First Book on Growing Quality Grapes to Winery Specifications*

Another “first” achieved by this Sub-Program was the book “**Growing Quality Grapes to Winery Specifications – quality measurement and management options for grapegrowers**”. Studies conducted in association with this publication identified improved grape sampling procedures.

### **Enhanced Wine Colour Measurement**

CRCV PhD researcher **Maria Birse** has developed two fast, simple and accurate methods to measure and characterise the colour of red wine. Using Maria's “High Pressure Liquid Chromatography (HPLC) postcolumn adjustment” and “HPLC CIELab” methods, the colour values of many pigments can be determined in a short time with a typical HPLC analysis taking one hour and data extraction and conversion into CIELab values taking about half an hour.

Maria's “HPLC-CIELab” method takes the conventional HPLC data a step further by converting it in to CIELab colour values which are directly related to the way we perceive colour, providing an objective measure of wine colour. The CRCV in collaboration with Supporting Participant, Future Solutions Media has transferred the method into a computer program and it is undergoing final testing. For more information contact **Bridget Ransome** on (08) 8303 9663 or email [bridget.ransome@crcv.com.au](mailto:bridget.ransome@crcv.com.au).

## Research Success Stories

### Sub-Program 2 – Sustainable Vineyard Systems

PROGRAM MANAGER – ROB WALKER

Researchers in this Program focused on the complex relationships between vineyard management practices.

#### *Water Use for Premium Wine Production Reduced by Half*

Although we can learn a lot from a research perspective by looking at irrigation, for example, in isolation, this is not the commercial reality. Several PhD researchers assessed the interactions between irrigation strategies, vine canopy management, nutrition and disease management. Their studies were conducted in Griffith, Barossa Valley and Sunraysia and have given us new insights about best practice viticulture and the challenging balancing act that is required. These studies, together with others that focused on the efficiency of water use have conclusively shown that the amount of water required per hectare for premium wine production in Australia's warm, inland areas is about half that allocated in 1999 when the research began. Water savings have allowed further growth of the industry, environmental flows and transfer to other uses. Associated benefits include improvement in grape and wine quality, reduced off site drainage and improved salinity management.

#### *Vine Water Use Efficiency Methods Identified*

Related to our work on efficient use of irrigation water, we investigated the physiological aspects of vine water use and the impact of irrigation on soil water availability and root growth. Our work showed that **carbon isotope discrimination is a useful method for distinguishing differences in water use efficiency between grape varieties and rootstocks**, and provided new insights into the role of abscisic acid

and aquaporins in regulating vine water use. Paired-site investigations (drip irrigated versus non-irrigated) showed marked differences in surface soil properties relative to sub-soil properties. Use of the Integral Water Capacity measure as an index of available water appears to be much more effective than the industry standard, Readily Available Water, in terms of describing the soil environment for root growth.

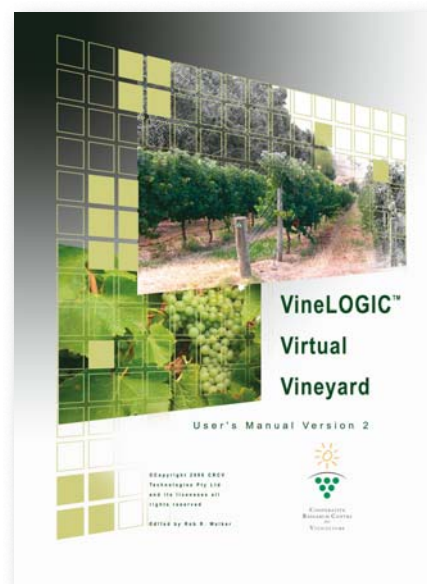
Salinity continues to be an important issue in some Australian regions. CRCV research on the ability of rootstocks to exclude salt and sustain the capacity over the longer term indicated that the deterioration in the chloride excluding ability of Ramsay and 1103 Paulsen over time relative to 140 Ruggeri is due to their lower ability to withstand consistently high soil salt loads.

#### *Hot Water Treatment Beats Petri Disease*

An outstanding feature of another project was that of the team working on Petri disease, formally known as Black Goo was little understood, both in Australia and overseas at the commencement of the research. The CRCV team identified the fungal organism responsible (*Phaeoemoniella chlamydospora*) and demonstrated its presence in germplasm sources and how it could be managed in the propagation process and the vineyard. In the course of the work the team demonstrated significant improvements in the process of hot water treatment of vine cuttings and rootlings in general. These improvements significantly increase the survival rate of vine cuttings and rootlings that are hot water treated to control vine pests and pathogens. We now know that young vines will

recover from symptoms if management strategies that minimise stress are used e.g. bunch thinning, use of mulch, extra water and nutrients. It is also now clear that the effects of water stress on infected vines are more severe than the effects on uninfected vines.

#### *VineLOGIC™ Software Models Environmental Impacts*



This information has been actively communicated to industry and has also been captured in our **VineLOGIC™ software application**. VineLOGIC™ allows students and vineyard managers to learn about the impact of management practices by conducting simulations from their computers. It is now being used by other groups to model environmental impacts such as salinity, land-use planning and global warming.

## Research Success Stories

### Sub-Program 2 – Sustainable Vineyard Systems

PROGRAM MANAGER – ROB WALKER

#### *DNA-Based Test for Eutypa Dieback*

Our research on Eutypa dieback has led to greatly improved knowledge of the epidemiology, management and diagnosis of eutypa dieback.

**Carbendazim has proved to be the most useful of the many pruning wound treatments evaluated to prevent infection.** Cutting-back to remove infested tissues (called remedial surgery) has been shown to be effective in restoring productivity in the short term. **Rapid identification and detection methods have been developed for E.lata using polymerase chain reaction and southern hybridisation techniques to generate specific DNA markers.**

These markers have been used to detect the pathogen in infected wood.

**CRCV researchers also developed a DNA-based soil test for detecting and measuring nematodes.**

#### *Early Detection of Phylloxera*

Our phylloxera research assessed phylloxera-specific detection methods and the use of spectro-optical and chemical fingerprinting for the early

detection of this vineyard pest. **DNA primers for phylloxera-specific detection method have been developed and their specificity has been confirmed after thorough screening using a wide range of vineyard organisms and aphid genera.** Results of preliminary testing indicate that the primers are both robust and sensitive enough to proceed to a thorough field testing stage aimed at comparing this technology to conventional ground truthing methods. This has been an exciting development.

#### *Vineyard Management for Consistent Quality*

Other work identified two vineyard management practices which potentially provide growers with further tools to improve the consistency of grape quality, at least for red wine production. **Firstly, the results with a deficit irrigation treatment called Prolonged Deficit show that extended pre-veraison water deficits enhance berry colour, particularly in seasons with low potential colour caused by high temperatures in late December and early January.** Secondly, the

application of a kaolin-based film, called Particle Film, to reduce leaf temperature and minimise weather-related stresses or water deficits appears to be a very effective tool for growers to increase sugar levels and grape colour without the losses in yield associated with deficit irrigation practices.

#### *Best Practice Guidelines for Driedgrapes*

The CRCV also conducted several research projects specifically related to the production of driedgrapes. To communicate the findings to the industry the CRCV provided assistance to core participant the Australian Dried Fruits Association (ADFA) to update its grower manual to reflect CRCV outputs and other new information. The result is a **comprehensive manual outlining best practice for all aspects of management of dried vine fruit production.** The manual has recently been provided to all ADFA grower members and is also available for sale to non-members.

For a copy of the manual contact the ADFA (03) 5023 5174.

#### **Vineyard Management Goes Online**

**A** successful component of the CRCV's activities has been the integration of a range of useful vineyard management information into software applications that are being used by industry. **The software applications include PAM AusVit™ Vineyard Management Software, Viticare™ Environmental Risk Assessment (VERA™), Australian Viticultural investigator (AVi™), VineLOGIC™ Pest and Diseases Virtual Vineyard and the AusVit™ Chemical database.**

In 1999, the CRCV led the introduction of **environmental management of vineyards Australia-wide.** The VERA™ software, along with the **Best Environmental Management Practice guides** have been widely accepted across the industry. An associated

highlight has been our work on insect biodiversity in the vineyard. Within the Program another team developed **tools to measure biodiversity of invertebrates in vineyards.** Use of those tools has demonstrated the impact of irrigation, ground cover, adjacent vegetation and pesticides on the range of beneficial insect inhabitants of vineyards. The work also showed that the pesticide ratings of the **International Organisation for Biological and Integrated Control** provide a useful guide to the selection of low impact vineyard pesticides. We have also taken on the challenge of measuring agrichemicals in the environment, including spray drift, drainage water and in vineyard soil. **Environmental risk management is now a well-entrenched element of sustainable vineyard management.**

Research Success Stories

**Sub Program 3 – Improved Grapevine Performance and Fruit Quality Through Gene Technology** PROGRAM MANAGER – SIMON ROBINSON

Sub-Program 3 focused on building our understanding of the functions of grape genes and using this knowledge to develop new management strategies and improved grapevines.

This research has provided tools for studying how grapes develop, the complex interactions of the genes that control development and ripening of grapes and the metabolic pathways that determine grape quality attributes including sugar, colour, flavour, acid and tannin levels.

***The Power of Two Genes***

In the past year our researchers discovered that **white grapes are the result of mutations in two genes that produce red pigment** (anthocyanin) in the berry skin. The mutation happened thousands of years ago and has given rise to white winegrape varieties.

By looking for the two genes that control grape colour, **researchers produced a marker that can be used in vine breeding to predict colour in the next generation of vines, without waiting for the vines to produce fruit.**

This important discovery could also lead to the production of new grape varieties with enhanced colour in the fruit.

***Tannin Production Genes Identified***

Researchers pinpointed two separate tannin production genes that are responsible for the production of two different types of tannins. They also revealed when tannins are made during grape development.

***Tartaric Acid Manipulation Made Possible***

CRCV researchers in collaboration with a team at the University of California, Davis isolated an enzyme critical for tartaric acid production in grapes and the gene responsible for its synthesis. Prior to this work little was known about the biochemical processes that cause grapes to make and accumulate tartaric acid during early berry development. Their work showed how tartaric acid develops and has corrected previous misconceptions about this process. The discoveries provide the possibility of manipulating tartaric acid levels through gene expression.

***Grapes on Steroids***

Research by the CRCV in collaboration with the University of Tasmania has demonstrated that steroidal hormones essential for plant growth and development, known as brassinosteroids, have an important role in the ripening process in grapes.

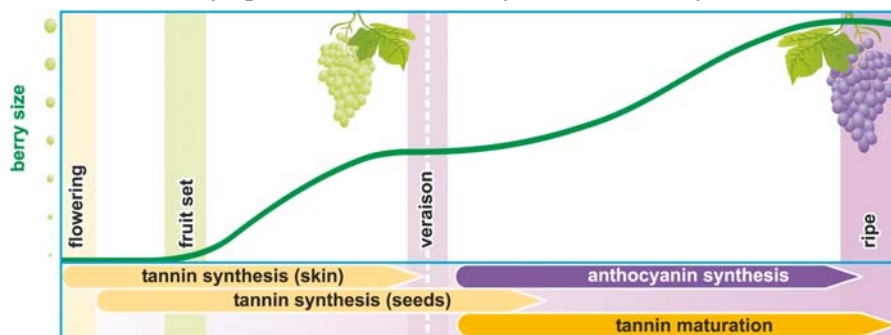
***Genetic Resistance to Powdery and Downy Mildew***

A major focus of the work in this Sub-Program developing vines with natural resistance genes to Powdery Mildew. This has the potential to save growers millions of dollars annually and benefit the environment through reduced chemical use. CRCV researchers, worked to isolate a resistance gene originally from American *Muscadinia* grapevines. A large DNA insert bacterial artificial chromosome library has been prepared from grapevine and in collaboration with INRA in France, we established the location of a large number of genetic markers on a physical map of the grapevine genome. We have identified genetic loci for resistance to both powdery and downy mildews and extensive DNA sequencing has been carried out in this region of the grapevine genome. The sequence data indicates the presence of a single cluster of resistance gene analogues that are likely candidates for resistance to powdery and downy mildews. Functional testing of these grapevine candidate genes is now underway by transformation into susceptible grapevine cultivars and the transformed plants will be tested for resistance to mildew infection.

***Grapevine Gene Map***

CRCV researchers collaborated in the International Grape Genome Program to produce a detailed map of grapevine gene location and function. So far over two-thirds of the 25,000 or so genes in the grapevine genome have been characterised. Once complete the project has the potential to substantially speed up grapevine gene research.

Grapevine Flavonoid Biosynthetic Pathway



Potential to modify colour and tannin composition.

## New software for growers

### *Easy Pest and Disease Management with AVi™*

# AVi



Australian Viticultural Investigator (AVi™) – Pests and Diseases software is a new product that provides a CD multimedia package of comprehensive disease and pest information for professionals in the Australian and New Zealand grape production industry.

With AVi™, grapegrowers can easily identify diseases and pests using a built-in pictorial key, and can import their own digital vineyard images into the software in order to compare specimens contained within the AVi™ database. A new “x-ray” tool is included which allows growers to drill down and further investigate the images from their own vineyard.

AVi™ also provides management options and monitoring techniques for a variety of grape diseases and pests.

“Users will find great flexibility and ease of use with AVi™, as it takes the concept of disease and pest management a step up into the future,” said **Susan Cole**, Senior Consultant at Future Solutions Media.

“The Program helps the grapegrower explore and experiment with solutions to manage diseases and pests in an easy, integrated system that’s relevant to everyday vineyard management,” Susan said.

Other features include a video component for software ease of use, and access to web-based updates where the integrity of technical information is maintained at all times.

All information sources and contact details for contributing specialists are also included in the CD.

Product packaging options are available, including a version that incorporates the AusVit™ Chemical Database. AVi™ is currently available from Future Solutions Media on (08) 8211 6593 or by visiting [www.futuresolutions.com.au](http://www.futuresolutions.com.au).

### *Update Your Essential Chemical Database*

The popular AusVit™ Chemical Database, an invaluable tool for growers, has been updated to include the most recent changes for chemical use in Australian and New Zealand vineyards.

Key viticulture resources have been used in this update to ensure growers receive the most relevant and up-to-date chemical information.

Improvements to the AusVit™ Chemical Database include the addition of a new organic products component. As a result of industry growth, for the first time ever AusVit™ provides recommended organic controls for pests and diseases as well as valuable organic management information.

Each organic product or treatment is comprehensively outlined and contains legal label information.

The new organic management section includes content about:

- Pheromone ties
- Pest traps
- Soil conditioners
- Botanical oils
- Compost teas
- Organic fertilisers

The AusVit™ Chemical Database also includes:

- Registration of product details and information
- Active constituents
- Chemical grouping information
- Company information
- Pests/hazards
- Modes of action
- Winery withholding periods
- Maximum Residue Levels and notes

The new AusVit™ Chemical Database is available via a range of products from the following suppliers:

- AVi™ CD – Future Solutions Media at [www.futuresolutions.com.au](http://www.futuresolutions.com.au) or (08) 8211 6593
- PAM AusVit – Fairport Technologies at [www.fairport.com.au](http://www.fairport.com.au) or (08) 9367 5814
- VineAccess – Morton Blacketer at [www.mortonblacketer.com.au](http://www.mortonblacketer.com.au) or (08) 8357 9500.

## Brief News

### CRCV December 2006 – June 2007 Arrangements

Arrangements are now formally in place to extend the Cooperative Research Centre until 30 June 2007. During this period the CRCV is implementing its Wind-Up Plan. Under the Plan the Head Office staff will remain until 31 December this year with the outstanding matters to be completed by a Wind-Up Agent under the supervision of the CRCV Board.

### Viticare eNews

The Australian Society of Viticulture and Oenology (ASVO) will keep the Viticare eNews alive. ASVO will continue to develop and distribute the monthly eNews with **Philippa Myers** stepping into **Ian Atkinson's** shoes as the new point of contact. Please send any industry events, news or updates to Philippa at [business@asvo.com.au](mailto:business@asvo.com.au).

### CRCV Website

The CRCV website will continue at [www.crcv.com.au](http://www.crcv.com.au). This has become a popular source of information and arrangements are being made for the site to be actively maintained.

### Unfinished Projects

Several CRCV projects are due for completion in 2007. After 31 December information about these projects will be available in the Research Programs section on the website [www.crcv.com.au](http://www.crcv.com.au).

### Research to Practice Workshops

The CRCV Research to Practice workshops will be continued through several licensed training providers. To find out the licensed training providers in your area, visit [www.crcv.com.au/education/rtp/](http://www.crcv.com.au/education/rtp/).

### New Gene Technology Brochure

The CRCV has released a new gene technology brochure. The brochure, Gene Technology – and the Australian Grape Industries – growing grapes to specification, is the fourth in a series. The brochure provides four examples of how genes affect grape and wine quality and a summary of where this important research is headed. To download a copy of the brochure go to <http://www.crcv.com.au/resources/Gene%20Technology/>.

## Diary Dates

**Thursday 14 December 2006**  
4pm – 7pm

### Invitation

**CRCV Wind-Up BBQ**  
1992 – 2006

After 14 years of hard work and achievements, it's time to celebrate. The CRCV invites all those associated with it to join in the festivities.

Lawn area behind the Plant Research Centre, Gate 2B Hartley Grove, Urrbrae.

For catering purposes please RSVP Bronwyn Weeks, CRCV – Phone (08) 8303 9405, email [bronwyn.weeks@crcv.com.au](mailto:bronwyn.weeks@crcv.com.au) by 1 December 2006.

**Thursday 16 November 2006**  
9.10am to 12.00am

### Colour analysis of red wine workshop

Are you a winemaker, or wine researcher? Curious about what makes red wine “red”? Interested in techniques for measuring the pigments in red wine? CRCV PhD researcher Maria Birse is facilitating an interactive workshop to demonstrate techniques she has developed for separating and measuring the colour of pigments. The workshop will be held at Charles Hawker 129 Computer Suite 2, Adelaide University (Waite Institute, Urrbrae). Cost is \$20 (inc GST) per person. Fee must be paid ahead of the workshop to secure your position. Bookings are limited and will be on a “first come” basis. Phone inquiries to **Di Frahn** at River Murray Training on (08) 8582 3658. Please email [admin@r-m-t.com.au](mailto:admin@r-m-t.com.au) to reserve your place, including your address and contact details for invoicing.

## Your CRCV

The Cooperative Research Centre for Viticulture is a joint venture between Australia's viticulture industry and leading research and education organisations.



It promotes cooperative scientific research to accelerate quality viticultural management from vine to palate.

Australian grapegrowers and winemakers are key stakeholders in the CRCV, contributing levies matched by the Australian Government and invested by the Grape and Wine Research and Development Corporation in the Centre.

## Newsletter Disclaimer

While every effort has been made to ensure the accuracy of the information in this newsletter, the Cooperative Research Centre for Viticulture cannot accept responsibility for the consequences of the use of this information. The document provides you with an explanation of research in progress and is a guide only.