



Variable climatic conditions and ongoing financial pressures were the hallmarks of the Australian grape and wine industry in 2023/24. Weather and economic factors contributed to another low vintage – the third out of the past five years below the long-term average. This trend of lower vintages suggests a likely step-change within our industry – one that will have significant flow-on effects for levy-funded R&D, marketing and other activities. Despite a challenging year for many, including AWRI, there continue to be a number of positive developments. As industry's own R&D organisation, AWRI remains focused on supporting Australian grape and wine producers to adapt to changing conditions and deal with current and emerging challenges.



## WINE AUSTRALIA PROJECTS

In this second year of the current Wine Australia investment agreement, projects continued under the three categories established the previous year – insights, impact and extension and adoption. Insights projects (the more traditionally structured research projects) made good progress, with highlights and details provided later in this report. Extension and adoption projects continued to deliver valued services to industry. Impact projects (co-designed projects, focused on commercialisation) successfully progressed from the initial scoping phases to commencement of five projects:

- Generating value from ferment carbon dioxide
- Single-step heat and cold stabilisation
- Smart surfaces for removing unwanted sulfur compounds from wine
- *Brettanomyces* diagnostics
- Smoke rapid test.

End-of-year reviews demonstrated positive outcomes across all five projects, supporting their continuation into 2024/25. Industry partners have engaged strongly with these projects, valuing in particular their practical focus on addressing key challenges.

## AFFINITY LABS – EXPANDING OUR NETWORK

Affinity Labs has continued to build its network of sample drop-off and pick-up points in Victoria and NSW. A key event during the year was the appointment of a dedicated staff member for the business's Merbein, Victoria facility in the Murray Valley, to support viticulture, wine and horticulture clients. Over the next year, it is anticipated that services offered out of Merbein will be expanded to include maturity testing, grapevine trunk disease diagnostics and virus diagnostic testing for other crops.

## SUSTAINABLE WINEGROWING AUSTRALIA

Membership of Sustainable Winegrowing Australia grew from 1,277 to 1,479 members in 2023/24. Members now represent 51% of Australia's vineyard area and 71% of the national crush. The proportion of members achieving certified status also grew, from 52% in 2022/23 to 60% in 2023/24. This growth is testament to the hard work and cooperation over several years of staff from the three organisations that govern the program – AWRI, Wine Australia and Australian Grape & Wine.



## TECHNICAL TRENDS FROM THE AWRI HELPDESK

Queries received by the AWRI helpdesk continue to provide essential insights into the issues affecting grape and wine producers across Australia. Each year viticultural queries tend to relate closely to the weather conditions experienced during the growing season. This year, while conditions were overall less challenging than the previous year, heavy rainfall, flooding, hail, severe winds and heatwaves affected various Australian wine regions at different times, resulting in queries on responding to weather events, disease pressure and agrochemicals. For winemaking, queries on packaging, storage and transport were the most frequent, with smoke taint also a common query topic.

## LOOKING TOWARDS VINTAGE 2025

Although the start of the 2024/25 growing season has been relatively dry across many of our growing regions, the Bureau of Meteorology is forecasting warmer and wetter conditions for the remainder of the growing season. This may increase concerns about disease pressure and possible flooding, but, depending on where and when the rainfall occurs, could also mitigate concerns about water availability that are affecting some regions. AWRI will continue to monitor both the climatic and economic conditions affecting our industry closely, to be able to deliver the most relevant and useful information and support to growers and winemakers across our industry.

## CUSTOMERS, CONSUMERS AND MARKETS

### HELPING PRODUCERS MEET NEW REGULATIONS

Following the introduction of new rules for wines exported to the EU to include energy and nutritional information on labels, internal research demonstrated that no additional analysis was needed to meet the requirements, saving costs and speeding up time to market for Australian wine. This work was communicated to producers via a series of webinars and seminars, in conjunction with Wine Australia.

### SUPPORTING WINE TRADE WITH INDIA

AWRI participated in the third in a series of trade delegations to India with Wine Australia, Australian Grape & Wine and the Australian Government Department of Agriculture, Forestry and Fisheries. The focus of the delegation was to meet with representatives from technical and training institutes within India and investigate opportunities for collaboration on grape and wine production.

### ASSISTANCE WITH VINEYARD RESTING

AWRI staff worked with chemical suppliers and PIRSA/SARDI scientists on the best way to use ethephon in vineyards for bunch removal. The APVMA permit was amended to allow a higher rate of ethephon to be used once in the season, rather than two applications at a lower rate. Advice was provided to growers considering this method of vineyard resting, with tips for most effective application, including timing, coverage and temperature.

### REGISTRATION OF NEW AGROCHEMICALS

The AWRI agrochemicals team worked with chemical companies on the registration of three new active constituents (BLAD, fenpropidin and indaziflam) for use in wine-grape production. Because the compounds had not previously been used in viticulture in Australia in circumstances where the active ingredients would contact grapevines, data on fermentation impacts, sensory effects and residues were required to assess their suitability.



## EXTENSION, ADOPTION AND EDUCATION

### RESPONSE TO CROWN GALL

A number of producers reported gall-like symptoms on grapevines this year, raising concerns about a possible outbreak of crown gall. An industry response group was formed, with representatives from AWRI, Australian Grape & Wine, Wine Australia, Vine Industry Nursery Association, South Australian Vine Improvement Association, State Government Departments, Vinehealth Australia and diagnostic laboratories. The AWRI produced and distributed a range of communications materials including a fact sheet, eBulletins and an information pack of resources.

### SEMINARS AND WORKSHOPS

Five seminar events and six workshops were delivered in 2023/24. The roadshow seminars presented the latest research outcomes across a range of grape and wine science topics, while the workshops covered aeration of ferments, foliar spraying to boost white wine flavour, drought resilience and undervine cover crops. Wines made by industry partners in regions across NSW, SA and Victoria who trialled foliar spraying in their vineyards were presented for tasting in three workshops.

### WEBINARS

Sixteen webinars were presented to a total of 1,340 attendees in 2023/24. Webinars covered a wide spectrum of topics across winemaking and viticultural research, as well as seasonal technical topics, updates on Sustainable Winegrowing Australia, the 2023 National Vintage Report and climate outlooks. The recordings of this year's webinars uploaded to the AWRI YouTube attracted a combined 8,000 views. Topics such as 'struck flint' aroma, greenhouse gas emissions, the use of non-*Saccharomyces* yeast in winemaking and malolactic fermentation were among the most popular.

### PODCASTS

To wrap up the viticulture-focused series two of 'AWRI decanted', two podcast episodes were recorded and released during the year. These episodes focused on the practice change theme of using nitrogen and sulfur foliar sprays in the vineyard to boost white wine flavour. All episodes of AWRI decanted are freely available via podcast apps and from the AWRI website.

### NEW INSTAGRAM ACCOUNT

An Instagram account for AWRI was launched in September 2023, with the audience growing to more than 1,400 followers by the end of the financial year. Instagram offers an opportunity to connect with stakeholders who may not access other AWRI platforms.

### VIDEOS

AWRI's YouTube channel provides access to webinar recordings and other AWRI video content. The channel gained almost 1,000 new subscribers during the year to reach a total of a total of 6,310 by 30 June 2024. There were 227,402 views of videos on the channel and a total watch time of 14,540.6 hours.

### HELPSDESK SUPPORT

In 2023/24, the AWRI helpdesk responded to 1,729 winemaking and viticulture enquiries and conducted 154 investigations. After a very high number of viticulture queries last year, numbers returned to close to the ten-year median, perhaps as a result of less extreme weather conditions than 2022/23. While it was not a major year for bushfires nationally, queries about smoke were still elevated, following fires in Victoria and WA. Other topics with high numbers of queries included sulfur dioxide use, filtration, bottling, the effects of temperature on bulk wine during shipping, managing disease, and dealing with a range of climatic conditions.

### LIBRARY SERVICES

AWRI's library services continued to see increased demand, with a 35% increase in the number of requests processed. In early 2024, the library joined a global network of libraries, which allows the contents of 754 university libraries to be made available to our industry without charge.

### EDUCATION FOR GROWERS AND WINEMAKERS

The AWRI delivered three Advanced Wine Assessment Courses, two Advanced Viticulture Courses, one Advanced Wine Technology Course and three GrowStrong Regional Viticulture Fundamentals Courses (for the Wine Grape Council of SA) during the year. These courses help growers and winemakers maintain and update their skills, supporting an innovative wine sector. Upcoming Advanced Viticulture Courses are expected to expand into new areas outside SA.

### NEW MONITORING AND EVALUATION FRAMEWORK

AWRI's behavioural scientist has developed a new monitoring and evaluation framework for assessing extension and practice change activities. The framework assesses changes in knowledge and behaviour at different time points, with follow-up evaluations helping to understand both barriers and drivers of change, influencing future activities. This framework has also now been successfully trialled outside the wine sector, after it was presented at an international extension conference.

### ENGAGEMENT WITH PUNJABI GROWERS

The AWRI extension team developed a new relationship with the Punjabi-speaking grower community in the Riverland, SA. Resources on irrigation were translated into Punjabi and a tailored workshop was presented, with assistance from a Punjabi translator.

### INVOLVEMENT IN ONE BASIN CRC

AWRI is a tier-three partner of One Basin CRC, a Cooperative Research Centre that supports collaborations between researchers and industry on a sustainable future for the Murray-Darling Basin. AWRI's role is to offer behavioural insights into potential projects that might benefit the wine industry.

### HORTICULTURAL APPS

Continuing to build on expertise developed in the AWRI's agrochemicals project, two new agrochemical apps were delivered for producers of apples and pears and stone fruit. Similar to the 'Dog book' for grapegrowers, these apps help horticultural producers comply with agrochemical residue requirements in their own industry. AWRI is now supporting six horticultural associations with management of agrochemical residues.

### SHOWRUNNER

Fifty shows totalling approximately 17,500 entries used the ShowRunner platform in 2023/24. This year also saw the launch of phase 1 of the benchmarking, evaluation and data analysis portal. This addition allows organisers to send results at the click of a button, gives exhibitors access to instant feedback from shows, and allows judges to access reports from events they have judged in.



**NEW TECHNIQUE FOR STUDYING MOUTHFEEL**

A technique known as ‘soft tribology’, which measures friction, was used to investigate the effect of tannin, proline and fructose on human saliva and to link this with sensory analysis of wine mouthfeel. Friction measurements were decreased by proline and increased by tannin, results that aligned with sensory studies showing increases in perceived viscosity in wines with added proline and increased astringency in wines with added tannin. Consumers were found to prefer high-proline wines with more viscous texture.

**‘FLINT’ AND ‘STRUCK MATCH’ FLAVOURS**

AWRI researchers published research on ‘flint’/‘struck match’/‘mineral’ aroma, highlighting the importance of 2-furylmethanethiol (2FMT) and phenylmethanethiol (PMT) in ‘struck flint’ aroma in Chardonnay wines. Recent laboratory-scale fermentations confirmed that lower grape must pH values promoted PMT formation, while the presence of metal ions decreased PMT concentrations in finished wines.

**BRETTANOMYCES DETECTION KIT PROTOTYPE**

Development of a winery-deployable detection kit for detecting *Brettanomyces* in wine has progressed significantly, including successful manufacturing of the kits by project partners. The next step is for these prototypes to be trialled in wineries.

**PUBLISHING SMOKE TAINT RESEARCH**

Two new papers on smoke taint research were published this year. One summarises recent research on sources and sensory assessment of smoky attributes in wine and provides an outlook on opportunities for managing excessive smoky characters. The other highlights the natural abundance of volatile phenols and phenolic glycosides in oaked commercial wines made from non-smoke-affected grapes, enabling confident identification of smoke-affected wine even when it has been in contact with oak.

**PROGRESS TOWARDS RAPID SMOKE TEST**

To ensure a robust path to market for a rapid test for smoke-affected grapes, evidence has been gathered about the market, supply chain and financial modelling, with the value proposition for an MIR-based test validated against competing approaches. Market insights have confirmed that the wine sector continues to see value in a diagnostic test for smoke-affected grapes that reduces turnaround times for results.



**PROTECTION AGAINST COLD INSTABILITY**

Recent AWRI research showed that monomeric anthocyanin provided protection against KHT crystallisation in red wines. Accelerated ageing experiments were conducted to see if changes to pigment composition over time might decrease this protective effect. While accelerated ageing did decrease cold stability and this effect was stronger in low-anthocyanin wines, the absolute changes in cold instability were minor. It was concluded that wine pigments retain some protective capacity against KHT crystallisation even when no longer in the monomeric form.

**ANALYTICAL CAPABILITY EXPANDED**

AWRI’s nanoparticle tracking analysis capability has been enhanced by adding fluorescence detection, increasing the ability to study molecular interactions in wine.

**APPLICATION OF CRISPR TECHNOLOGY**

CRISPR technology represents a significant advancement in genome editing, which can result in microorganisms that meet the requirements to be classified as non-genetically modified. AWRI researchers have now established a CRISPR-based workflow for commercial wine yeast. This workflow enables engineering, and subsequent combining, of multiple desirable traits into a single ‘trait-stacked’ yeast strain.

**EXPLORING SINGLE-STEP STABILISATION**

Work is underway to better understand the market for natural zeolite as a new stabilisation product that can address both heat and cold stabilisation and to build business models for the use of alternative stabilisation products in the future.

**NEXT STEPS FOR SMART SURFACES**

While the technical performance of smart surfaces that remove unwanted volatile sulfur compounds from wine has been demonstrated, there is work to be done to understand the market for this technology. There is potential for this type of surface to be integrated into a range of wine-related applications; however, there are cost barriers and market needs to be addressed before this technology can reach its full potential. Another type of nano-engineered surface was shown to effectively adsorb histamine and tyramine from model wine, potentially offering a new solution for controlling biogenic amines, which can currently only be removed from wine using bentonite.

**PROPAGATING MALOLACTIC BACTERIA**

A method for the propagation of malolactic bacteria was demonstrated at laboratory scale using non-*Saccharomyces* yeast to stimulate bacterial biomass accumulation to exceptionally high levels. This propagation method has promise as a tool for use in commercial wineries.

**IMPROVING NOLO WINE MOUTHFEEL AND FLAVOUR**

The CRC-P project on NOLO wines, led by Australian Vintage Ltd, commenced during the year, following formalisation of research agreements with industry partners. AWRI is delivering two of the pillars of this project, focused on improving mouthfeel and flavour of NOLO wines.

**ADOPTION OF TRUST MARK ON WINE LABELS**

Adoption of the Sustainable Winegrowing Australia trust mark has increased, with more than 700 wine labels bearing the mark and the equivalent of 96.1 million bottles of wine qualifying for trust mark use.

**RECYCLING YEAST LEES**

Winery lees, usually seen as a waste stream, were successfully transformed into a fermentation additive, highlighting an opportunity to reduce waste and contribute to achieving a circular economy within a winery. Addition of the processed lees was shown to reduce fermentation times in Chardonnay ferments.

**GENERATING VALUE FROM FERMENT CO<sub>2</sub>**

Investigation of the potential to create value from the carbon dioxide generated in wineries during fermentation is underway. This work is evaluating different options for capture and re-use of fermentation carbon dioxide, including assessment of their economic performance and solving technical challenges that are specific to wineries. This process could become increasingly important for wineries, as commercial supplies of CO<sub>2</sub> are often a by-product of industries strongly linked to fossil fuels, and availability may drop as the economy decarbonises.

**GENETIC DATASET FOR AUSTRALIAN GRAPEVINES**

A whole-genome dataset for more than 1,100 grapevine samples across 35 varieties has now been collated, representing the majority of commercial wine-grape clonal material available in Australia. By comparing genetic relatedness of samples using unique DNA fingerprints, cultivar-specific family trees have been produced that enable the clustering of samples into robust clonal genetic groups. This foundational dataset will now be used as a basis to investigate the practicality of providing a genetic test for grapevine clonal identity, through a Wine Australia-funded impact project.

**CONCLUSION OF CITIZEN SCIENCE PROJECT**

Over its three-year lifespan, AWR's citizen science project, 'Yeast Catchers' worked with more than 3,300 school students from across Australia to isolate yeasts from the environment. More than 6,000 individual yeast isolates obtained from over 750 positive samples were assessed to determine their species using DNA-based microbial profiling techniques. In total, 113 different yeast species were identified, across 5,503 isolates sourced from 951 independent samples.

**POSSIBLE FINING ALTERNATIVES TO PVPP**

Preliminary research indicates that graphene and carbon nanotubes could be effective alternatives to PVPP, potentially supporting efforts to discontinue use of single-use plastics in wine production.

**FOUNDATIONAL DATA AND SUPPORT SERVICES****AFFINITY LABS**

A total of 19,823 samples were submitted to Affinity Labs for routine, trace and microbiological analysis. This was a decrease compared with the previous year, reflecting the lower than average 2024 Australian harvest and the generally difficult market conditions for Australian grape and wine producers. Customer numbers grew by 144 during the year, a slightly higher increase than the year before, with the majority of these from the wine and grape sector.

**CO-BRANDED LABORATORY IN UK**

A new Campden BRI-Affinity Labs laboratory is being established in Surrey Technology Park, UK, with significant input from Affinity Labs. This forms part of the exchange of methods and knowledge between the two organisations, with Affinity Labs benefiting from Campden BRI's expertise in food production and analysis. The new laboratory will also provide important quality assurance services to Australian wine producers exporting wine to the UK.

**NEW TESTING OPTIONS**

Grapevine variety testing was made commercially available to industry by Affinity Labs, through a partnership with CSIRO. The test involves DNA typing using a single nucleotide polymorphism (SNP) panel made up of 48 SNP markers. This is then compared to the CSIRO grapevine variety SNP database, allowing the variety to be identified.

**USE OF NOLO TRIAL-SCALE FACILITY**

Eleven commercial clients have accessed the new NOLO facility, benefiting from the subsidy provided by the Government of SA. From these clients, 27 potential new products have been packaged as part of new product development activities.



Readers are encouraged to read the annual report in detail rather than relying on the brief details provided here. The full report can be found on the AWRI website: [www.awri.com.au](http://www.awri.com.au).

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