Australian Government

Australian Grape and Wine Authority

Investigation & information transfer from the European network about **thermovinification** technology for process efficiency & quality control in Australian red winemaking



FINAL REPORT to
AUSTRALIAN GRAPE AND WINE AUTHORITY

Project Number: **GWT 1415**

Principal Investigator: **Dr Anna L Carew**

Research Organisation: **Tasmanian Institute of Agriculture**

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Abstract Thermovinification offers winemakers an option for rapid phenolic extraction in red winemaking. This process is widely used in Europe, particularly Germany, but has not been widely adopted in Australia. Dr Anna Carew travelled to Italy to present a thermal maceration poster AGWA-funded microwave maceration (UT1301) research at the In Vino Analytica Scientia meeting in Trentino, Italy. Dr Carew also visited in Germany, Italy, France and UK to learn about thermovinification practices and research, winemaking innovation, and to develop a research network in Europe. Key outcomes from the travel were: extensive tour of winery operations and innovation at Schloss Affaltrach (Obersulm, Germany) and 7xwinery tours in Southern Germany, Northern Italy, United Kingdom; an EOI submitted for the 16th AWITC on thermovinification; development of 2xdraft proposals for joint international research ('Thermovinification – Australia/Germany'; 'Pinot noir Provenance – ~6xcountries'); and an invitation for oral presentation and a microwave wine tasting booth at the 2016 ICCWS (Plumpton, UK).

Executive Summary

Thermovinification offers winemakers an option for rapid phenolic extraction in red winemaking. This process is widely used in Europe, particularly Germany, but has not been widely adopted in Australia due to perceptions of impacts on the style and quality of wine produced in this way.

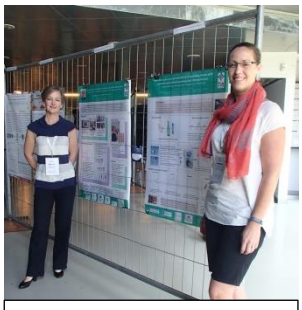


Fig 1: Drs Carew and Kerslake at IVAS 2015

Dr Anna Carew travelled to Italy to present a thermal maceration poster at In Vino Analytica Scientia in Trentino, Italy titled 'Options for controlling Pinot noir wine aroma and phenolic profile: microwave-mediated thermal maceration, pomace re-addition and fermentation vessel cover'. The poster was well received and described methods to manage and modify phenolic and aroma outcomes in thermal maceration wine making (AGWA-funded research UT1301) research (Figure 1). There was a strong Australian contingent contributing socially and intellectually to the success of the IVAS conference, showcasing the strength of our research contribution (Figure 2).

Dr Carew visited wineries and research institutes in Germany, Italy, France and UK to learn about thermovinification practices and research, innovation in winemaking, and to develop a research network in Europe. A highlight was extensive tour and discussion over two days at the Baumann Family's Schloss Affaltrach Winery (Obersulm, Germany). Herr and Frauline Baumann explained the strengths, limitations and processing of their thermovinification operation, and



Fig 2: The Australian and quasi-Australian contingent at IVAS, Trentino, Italy, July 2015.

also shared several winery specific innovations with potential application in Australia. Figure 3 shows one of the Baumann's thermovinification units with counter-current heat exchanger to pre-heat must, thereby conserving energy. Must is cooled to approximately 45°C by counter-current exchange immediately after thermal treatment , and left to extract at this temperature for a range of time periods, prior to press-off and fermentation in the liquid phase.



Fig 3: Thermovinification Schloss Affaltrach.



Fig 4: Pump and housing for TSS assessment at Schloss Affaltrach.

A custom-designed by-pass on the weigh bridge at Schloss Affaltrach Winery allows real-time assessment of TSS, and the Baumann's report this has significantly streamlined operations (Figure 4). This by-pass set up and housing may suit assessment of phenolic pick-up for Australian white and sparkling wine making, given appropriate instrumentation (eg. reflectance NIR) and algorithms to interpret data. This may compliment the recently completed work by AWRI on fermentation sensing for sugar levels (AWR 1401). The Baumanns also align with Germany's focus on sustainable operations by practicing bottle recycling and refilling, and recapture, scrubbing and reuse of CO_2. As Herr Baumann observed 'why pay for CO_2 when I make it anyway?'.

Dr Carew showcased Australian research by providing seminars at Plumpton College UK and Weincampus Neustadt (Figure 5). These seminars attracted ~60 attendees in total and have resulted in social media activity, email enquiries and correspondence from both locations. Dr Carew has also been selected to provide an oral presentation and tasting booth at ICCWS, which will be held a Plumpton College in 2016.



Fig 5: Drs Durner and Carew (standing) and Prof Fischer (seated) at Neustadt, July 2015.



Fig 6: WIFI corks for fermentation

Apart from technology assessment and network development, the unanticipated benefits of this travel were numerous. In Trento, Dr Carew was shown locally-developed 'WIFI corks' for non-destructive monitoring of the rate and completion of secondary fermentation for sparkling winemaking (Figure 6). Custom-designed cool/warm rooms at Plumpton Collage, UK offered ideas about redevelopment of TIA infrastructure to support both viticultural and winemaking/fermentation research. Mr Tony Milanowski (winemaking lecturer) explained the lighting, humidity and temperature control regimes which had been designed to support diverse research and teaching activity.



Fig 7: German Rieslings – 2014 to 1976.

The issue of TDN (petrol aroma) development in Australian aged Rieslings was discussed in-depth at IVAS and Neustadt, and the dominance of acetaldehyde-driven honey character in German aged Rieslings was clearly appreciable in a vertical tasting to 1976 at the winery of Frau Weegmüller (Neustadt, Germany; Figure 7). Dr Carew also learned why vineyard delivery of fungicide in vineyards via fixed lines and in-canopy sprinklers was concluded by researchers at Laimburg Research Centre (South Tirol, Italy) to be both expensive and somewhat impractical (Figure 8). These included: volume of fungicide committed to fill the lines; stability of fungicides over time and with heat (it was 38°C when we toured this vineyard); cost to establish lines (approximately 20,000 Euro/Ha); compatibility of fixed lines and heads with machine harvesting; potential for damage/release of fungicide during harvest vs. need to drain lines and discard fungicide prior to harvest. The researchers concluded drones for sensing and spot spraying were likely a more viable option.



Fig 8: In-canopy fixed fungicide delivery.

Next Steps

Dr Carew will continue to build research links with new European colleagues. In particular, for supporting research development and extension activity associated with use of thermovinification, and with colleagues at Plumpton College to share developments in cool climate wine making.