Travel to 14th Australian Wine Industry Technical Conference 2010



FINAL REPORT to

GRAPE AND WINE RESEARCH & DEVELOPMENT CORPORATION

Project Number: **GWT 1002**

Principal Investigator: **Mrs Linda Donachie**

Research Organisation: **Tasmanian Institute of Agricultural Research (TIAR)**

Date: **16 July 2010**

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Abstract

Linda Donachie attended the 14th Australian Wine Industry Technical Conference to present a poster entitled "An evaluation of the autolysis character of sparkling wines
using spectroscopy and multivariate data analysis", as part of the initial work for her PhD studies. The presence of some of Australia's leading winemakers, and representatives from professional organisations such as GWRDC, the AWRI and trade representatives, ensured a varied and interesting program, the content of which will be complementary to Linda's PhD on the oenological aspects of sparkling wine. Meetings, workshops and social engagements at this conference, provided an invaluable opportunity to gain knowledge from both academics and experts within the wine industry, particularly in the field of sensory research, of particular relevance to sparkling wine research.

Executive Summary

Linda Donachie attended the 14th Australian Wine Industry Technical Conference (AWITC) in July 2010. A poster entitled "An evaluation of the autolysis character of sparkling wines using spectroscopy and multivariate data analysis", was selected by the AWITC poster committee to be presented during the first dedicated poster session. This poster presents preliminary results for a series of sensory and instrumental analyses on cool climate sparkling wines, as part of Tasmania's first Oenology PhD, partly funded by the GWRDC. The results of this work show potential to be developed as an alternative wine analysis tool to those currently in use by industry.

A major outcome from the attendance of this conference in Adelaide, is the establishment of many valuable Australian and overseas contacts; these contacts will continue to be fostered in the interest of collaboration and the sharing of knowledge. Currently there is very little research into sparkling wines either viticulture or oenology based, in Australia, and many people expressed interest in the nature of the project, offering ongoing support in terms of where/how it could be provided. Some of the contacts are relevant not only to sparkling wine oenology, but offer potential to the sparkling wine viticulture project, currently being undertaken by researchers including Fiona Kerslake, and Joanna Jones, in Tasmania. The Tasmanian Institute of Agricultural Research (TIAR) are thanked for funding the stipend for this PhD scholarship, and the Grape and Wine Research and Development Corporation (GWRDC) are thanked for funding both a stipend top-up, and an operational budget. The GWRDC are thanked for funding travel to present the poster at the 14th AWITC in Adelaide.

This conference, with its varied program content and featured workshops , addressed numerous topics representing the key objectives and strategies of the GWRDC's research plan. Specifically the management and improvement of wine quality, and in particular the very cool climate sparkling wines of Australia relating directly to Linda's research project.

Background

Linda believed that the content of the symposia would provide important background information on the various disciplines of wine science. Participation in the scheduled workshops would also provide essential training in sensory analysis, a very important aspect of her research into sparkling wine quality.

Project aims and performance targets

Planned project outputs include publications arising from the AWITC proceedings. A certificate of 'best estimate thresholds' was provided for completion of the workshop entitled (W01) – Test Your Limits! A workshop aimed at detection thresholds for important flavour compounds.

Outcome/Conclusion

The opportunity to present a poster summarising Linda's initial work was very worthwhile in terms of the feedback that was received, particularly from winemakers. It was worthwhile to note that Linda's poster provided the only information on sparkling wine amongst over two hundred posters, and in the entire proceedings of the conference. This highlights the paucity of sparkling wine research currently being engaged in.

Linda was able to establish new contacts with many scientists and industry participants, including a number of highly experienced and knowledgeable ARWI sensory scientists. She was also able to re-establish contact with colleagues made on previous occasions.

New contacts include:

- Mark Downey – Senior Research Scientist – Viticulture and Oenolgy Department of Primary Industries, Victoria.
- Robert Learmonth – Associate Professor of Biochemistry, Department of Biological and Physical Sciences, University of Southern Queensland.

- Mark Krasnow – Senior lecturer at Eastern Institute of Technology (EIT) Hawkes Bay NZ – Discussed the possibility of cool climate research linkages. Current research linkage with EIT through Dr Richard Smart (currently not directly related to this project , but with potential for future development).
- Leigh Francis - Research Manager – Sensory Science Australian Wine Research Institute Ltd (AWRI), Urrbrae, South Australia.
- Helen Holt – Research Scientist – Sensory Science AWRI, Urbrae, South Australia.
- Ms Briony Liebich – Sensory technologist, from the South Australian Research Development Institute (SARDI).
- Armando Maria Corsi – Research Associate, Institute for Marketing Science, University of South Australia.
- Peter Dredge – Winemaker/Manager, Bay of Fires Wines, Pipers River, Tasmania.
- Leanne Webb – Climate Scientist, University of Melbourne
- Snow Barlow – Professor of Horticulture and Viticulture, University of Melbourne

During the conference, Linda also found it useful to reacquaint with other researchers/industry members such as:

- Natalie Fryar – Senior Winemaker, Yalumba Family Winery. Natalie is a large contributor of wines for this sparkling wine research project.
- Keith Hayes – Research and Development Program Manager, Grape and Wine Research and Development Corporation (GWRDC)
- Anna Pooley – Winemaker, Fosters Group– Anna expressed an interest in the Foster's corporation offering some support for sparkling wine research, in particular the sparkling wine oenology work.
- Nick Glaetzer – Winemaker, Frogmore Creek Wines, Glaetzer Family Wines
- Duncan Farquhar – National Extension Manager, National Wine and Grape Industry Centre

Recommendations

Linda would personally recommend that all new PhD researchers at introductory level, present a poster at an event such as the AWITC. She feels that it is a good way to introduce original research for candidates early into their PhDs. It gives candidates opportunity during a specified time, for

discussion and feedback on their work. It also provides potential contacts with a synopsis of the work currently undertaken by the individual and advertises the students particular affiliations.

APPENDIX 1: Communication

Following discussions on the project work, Linda has had a number of emails from people offering support in terms of wine, and information.

APPENDIX 2: Intellectual property

N/A

APPENDIX 3: References

N/A

APPENDIX 4: Staff

- Mrs Linda Donachie — PhD candidate, TIAR
- Dr Joanna Jones — PhD supervisor, TIAR
- Dr Robert Dambergs — Research supervisor, TIAR/AWRI
- Dr. Chris Curtin — Research Supervisor, AWRI

APPENDIX 5: Other

PDF copy of poster submitted to AWITC July 2010.

APPENDIX 6: Budget reconciliation

See Project Finanacial Statement document

Appendix 5

An evaluation of the autolysis character of sparkling wines using spectroscopy and multivariate data analysis.

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Abstract

In Australia, sensory evaluation has been the method of choice for characterising sparkling wines, with winemakers relying on their own sensory expertise to determine whether a wine is ready to be disgorged and marketed. Ultraviolet-visible (UV-Vis) spectroscopy was evaluated as a means of determining levels of autolysis character in a number of cold climate sparkling wines from various regions. The wines were qualitatively assessed using a fixed choice sensory profile technique, and Principal Component Analysis and partial least squares (PLS) regression were performed on the sensory and spectral data. The results reflect a correlation between the perception of autolysis and the spectra, suggesting that UV-Vis spectroscopy may provide a potential alternative method to traditional sensory analysis, in determining autolysis character. A more extensive study of cool climate sparkling wines is required, to provide further significant evidence of the potential usefulness of this methodology, in the prediction of autolysis character.

Introduction

Yeast autolysis is one of the most important factors in determining the organoleptic qualities of sparkling wine. The progression of yeast autolysis during sparkling wine production is very slow with aging on lees taking up to several years to produce many of the desirable sensory attributes. Sensory techniques have traditionally been employed to assess the autolysis character in these wines as they age on yeast lees, with winemakers relying on assessment by their own set of descriptors to evaluate the readiness of a wine for sale. By correlating the spectrum of autolysis characteristics determined by instrumental analysis, with conventional sensory evaluation, this work supports the development of a standardised approach to the evaluation of wines undergoing autolysis.

It can potentially be utilised to predict the onset, and the continuing development of autolysis character.

Materials and Methods

Sensory evaluation

Nine commercially available sparkling wines from various regions within Tasmania, Victoria and one French Champagne were qualitatively assessed by eleven panellists using a fixed choice sensory profile technique. The wines were identified by a 3 digit code, and were served in brown paper bags in random order in six flights of three wines each. Two additional wines and a blend of these two were used as a warm-up flight to acclimatize the palates of panellists. Tastings were conducted in a clean, naturally well lit, air-conditioned area, providing adequate space and comfort for the panellists. Wines were served as 30 mL servings in standard 230 mL (ISO X15) wine tasting glasses, at as close to 10°C as possible.

A simple 4 point rating system displayed in Table 1 was used to score the perceived levels of autolysis, with a set of descriptors derived from Anne Noble's Sparkling Wine Aroma Wheel. Samples were replicated and replicate scores were compared.

Spectral analysis and chemometrics

Fifty mLs of each wine was reserved in a sterile container and stored at minus 20°C prior to testing. Undiluted samples were scanned in transmission mode over a wavelength range of 243 – 540 nm in a Thermo Microdom Multispec. This instrument uses flow cells, in series, with 2 pathlengths (1 mm and 0.2 mm). Spectral data was collected with Bacchus software and exported to *The Unscrambler* software (Version 9.8, Norway) for chemometric analysis. Partial least squares (PLS) regression was used to predict autolysis scores from spectral data, using sensory panel data as a reference. Principal component analysis (PCA) was also performed.

Results and discussion

Table 1 AUTOLYSIS RATING KEY

Very strong autolysis	4
Strong autolysis	3
Moderate autolysis	2
Mild autolysis	1
Little/no autolysis	0

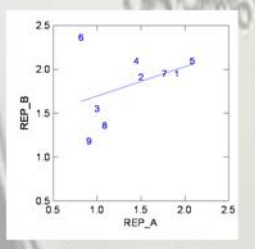


Figure 1. Average sensory score for replicate A vs replicate B. $R^2 = 0.16$, Std error = 0.43
- Sample 6 was a statistical outlier

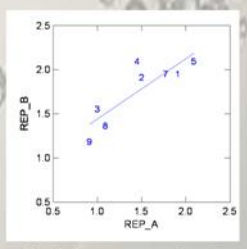


Figure 2. Average sensory score for replicate A vs replicate B. $R^2 = 0.73$, Std error = 0.25
- Outlier removed

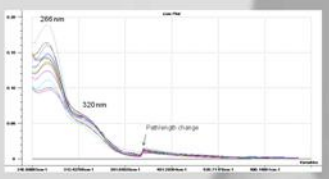


Figure 3. UV-Vis spectra of the samples used to prepare the PLS calibration. Pathlength change from 1mm to 0.2 mm is marked.
- A prominent peak is evident at 266 nm
- A broad peak at 320 nm is also evident
- At the pathlength used, the absorption in the visible region was low

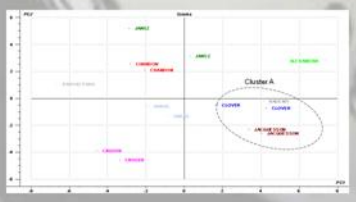


Figure 4. A plot of the first two scores from the PCA of the UV spectra (251- 366 nm) and the sensory scores.
- With this methodology similar wines will cluster
- Replicates tended to cluster
- Wines similar in style tended to group together, eg cluster A

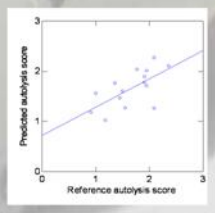


Figure 5. Reference autolysis score vs PLS predicted autolysis score. $R^2 = 0.66$, Std error= 0.25
- The standard error of the PLS calibration is similar to the reference method.
- The strongest positive spectral loadings for the PLS calibration were at 262 nm.
- The strongest negative spectral loadings were at 323 nm.

CONCLUSIONS:

The results reflect a correlation between profiles of autolysis characteristics, as determined by instrumental analysis, and conventional sensory appraisal.
They also suggest that UV-Vis spectroscopy could be developed as an objective alternative to traditional sensory analysis, in determining autolysis character of sparkling wines. UV-Vis spectroscopy could potentially be used to predict the onset, and the continuing development of autolysis character.

A more extensive study of cool climate sparkling wines is required, to provide further significant evidence of the potential usefulness of this methodology, in the prediction of autolysis character.



Acknowledgments

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