Australian Government

Australian Grape and Wine Authority

# Australia – Italy Grape and Wheat Symposium



## FINAL REPORT to
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**Australia – Italy Grape and Wheat Symposium**

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Symposia (Grape and Wheat, Canberra; Grape and Wine, Adelaide) held December 2015

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## Contents

**Abstract . . . . . 1**

**Executive Summary . . . . . 2**

**Australia – Italy Grape and Wheat Symposium . . . . . 3**

**Australia – Italy Grape and Wine Symposium . . . . . 4**

**Visits to Vineyards and Wineries . . . . . 6**

**Associated activities . . . . . 8**

**Acknowledgements . . . . . 9**

**Appendix 1: Program Grape and Wheat Symposium. . . . . 10**

**Appendix 2: Program Grape and Wine Symposium . . . . 13**

**Appendix 3: Budget reconciliation . . . . . 15**

**Abstract**

With funding from the Embassy of Italy, National Research Council of Italy, Wine Australia and Grains Research and Development Corporation (GRDC) and with significant in-kind input from CSIRO, two Symposia were held, one in Canberra (Grape and Wheat Symposium) and one in Adelaide (Grape and Wine Symposium), both in early December 2015. The Symposia were well attended and achieved the goal of strengthening existing collaborations and establishing new collaborations between Italian and Australian researchers. The Symposia were supplemented by visits to the Canberra and McLaren Vale Wine Regions. This provided an opportunity to view Italian grapevine varieties and their adaptation to Australian conditions. Wines of the Australian-grown Italian varieties were tasted. Meetings were also held between the visiting Italian scientists (three wheat and four grape and wine) and CSIRO and other agency scientists. A dinner was held at the Embassy of Italy for all invited speakers at the Canberra Symposium and invited guests. Wine Australia and industry representatives attended the Adelaide Symposium. Peter Hayes, former President of the OIV (Organisation International de la Vigne et du Vin) and current Deputy Chancellor of Charles Sturt University, attended the McLaren Vale vineyard and winery tour with the visiting Italian grape and wine scientists. A report on the Symposia and associated activities has been prepared and will be provided to an Australian Wine Industry Journal for future publication.

**Executive Summary**

The initial concept for the Australia – Italy Grape and Wheat Symposium was proposed by Professor Oscar Moze, Scientific Attaché, Ministry of Foreign Affairs and International Cooperation, Embassy of Italy, Canberra. The aim was to invite Italian scientists with specialist expertise in wheat and viticultural research to visit and participate in Symposia and meetings and to strengthen existing and build new collaborations between Australian and Italian scientists.

The invited Italian scientists included:

- Professor Mario Pezzotti, Vice-Rector for Research, University of Verona, Italy.
- Professor Fulvio Mattivi, Department of Food Quality and Nutrition, Research and Innovation Centre, Edmund Mach Foundation, San Michele all'Adige, Italy.
- Dr Giorgio Gambino, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy.
- Dr Anna Schneider, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy.
- Dr Domenico Lafiandra, Tuscia University, Viterbo, Italy.
- Dr Annamaria Castrignano, Agricultural Research Council: Unit for Cropping Systems in Dry Environments, Bari, Italy.
- Dr Ilaria Marcoteli, Genetics and Plant Breeding, University of Bari, Italy

Two Symposia were held:

- A Grape and Wheat Symposium in Canberra on 3-4 December 2015, with invited presentations from three wheat researchers from Italy, three wheat researchers from Australia, four grape and wine researchers from Italy, and four grape and wine researchers from Australia. Dr Tony Fischer was invited to present an overview of Italian/Australian research collaborations and Tony Battaglene, General Manager, Strategy and International Affairs, Winemakers' Federation of Australia, was invited to present an overview of the Australian Wine industry.
- A Grape and Wine Symposium in Adelaide on 7 December 2015, with presentations from the four invited Italian grape and wine researchers and presentations from Dr Christopher Davies (CSIRO Agriculture) and Dr Markus Herderich (Australian Wine Research Institute).

**Cover Photo**:
Attendees at the Grape and Wheat Symposium held at the CSIRO Laboratory at Crace, Canberra.

**Australia- Italy Grape and Wheat Symposium**




*Figure 1: Opening of the Grape and Wheat Symposium by the Italian Ambassador to Australia, His Excellency, Pier Francesco Zazo.*

The Symposium took place over two days, from 3-4 December 2015 at the CSIRO Conference Centre, Crace, Canberra. The Symposium was opened by the Italian Ambassador to Australia, His Excellency Pier Francesco Zazo. There were 14 speakers across four themes (Program is provided in Appendix 1):

- Molecular Approaches and Tools
- Physiology, Pathology and Agronomy
- Crop Improvement
- Product Quality

The first theme highlighted the importance of understanding the extent to which key traits were regulated by genotype or environment. The presentation demonstrated how genomic approaches could be applied to dissect the genotype by environment interaction in grapevine. This was followed by a presentation detailing how an understanding of key genes in the flavonoid pathway could be used to manipulate the colour and tannin composition of grapes. This in turn was followed by overviews of tools, approaches and advances in durum wheat breeding in Italy and Australia.

The second theme covered tools used to investigate the interactions between grapevine genetic biodiversity, pathogens and environment, with special reference to grapevine-virus interactions. Grapevine rupestris stem pitting-associated virus (GRSPaV) was used as an

example to demonstrate how grapevine response to environmental cues was impacted by viral infection. Progress towards understanding the genes in grapevine that control resistance to root knot nematode was also outlined. Examples of how sensing and precision agriculture tools can be used to improve durum and grape production were presented. Further examples were presented to demonstrate how an understanding of the genes controlling sodium exclusion can lead to improved performance of wheat and potentially also for grapevine under saline conditions.

The session on crop improvement included an outline of the morphological and molecular approaches to determining identity of grapevine varieties and the European data bases that document varieties and the synonym names that many varieties are also known by. Data were also presented from a comprehensive four year study of over 500 varieties in the CSIRO grapevine variety collection, including a range of Italian grape varieties and how these may present useful options in adapting to climate change.

The final session on product quality commenced with an insight into the powerful new analytical tools that are available to wine chemists and an overview of the regional features of North Italian sparkling wines identified using solid-phase micro-extraction and comprehensive two-dimensional gas chromatography, coupled with time-of-flight mass spectrometry. The importance of objective measures of grape composition to predict wine quality was outlined including the use of principal component analysis to highlight differences between wines of different age and from different regions. The session concluded with presentations detailing the application of innovative molecular analysis to increase the potential nutritional value of wheat and the approaches being taken at CSIRO to modify and improve cereal quality traits

**Australia – Italy Grape and Wine Symposium**





*Figure 2: McLaren Vale Vineyard and Winery Tour: Left, L to R, Professor Fulvio Mattivi, Professor Mario Pezzotti, Dr Harley Smith, Dr Anna Schneider, Dr Giorgio Gambino, Dr Christopher Davies, Dr Rob Walker, Peter Hayes, Dr Mandy Walker and Peter Clingeleffer. Right, L to R, Professor Fulvio Mattivi, Dr Anna Schneider, Dr Giorgio Gambino, and Professor Mario Pezzotti.*

A copy of the Program for the Grape and Wine Symposium is provided in Appendix 2.

Wine Innovation Cluster, the partnership on Waite Campus, Adelaide, involving CSIRO, AWRI, SARDI and University of Adelaide, hosted the Grape and Wine Symposium which was held on the afternoon of Monday 7 December. There were six presentations, one each from the four visiting Italian grape and wine scientists and two from Wine Innovation Cluster scientists. A summary of the presentations follows:

- Professor Mario Pezzotti presented an overview of the ripening process in fruits, including the genes involved, highlighting examples from grape and tomato. Genes that were discussed included MYBA2, MADS box AGAMOUS-like and NAC genes.

- Dr Christopher Davies (CSIRO Agriculture) followed-up with an outline of the growth regulators that affect the grape ripening process, for example, abscisic acid (an accelerator of ripening) and auxins (that delay grape ripening), the pathways and genes involved and the interactions that occur between growth regulators such as auxin and ethylene.

- Dr Giorgio Gambino spoke on the molecular and biological interactions between grapevine, virus and environment. It was noted that viruses such as Grapevine rupestris stem pitting-associated virus (GRSPaV) can occur in distinct variants which may interact differently with the grapevine and the environment.

- Professor Fulvio Mattivi outlined the application of untargeted metabolomics for studies on the effects of storage temperature and oxygen levels at bottling on wine composition.

- Dr Markus Herderich (AWRI) followed-up with an outline of the plasticity of the grape berry metabolome and how this can be applied towards a scientific interpretation of the terroir concept.

- Dr Anna Schneider outlined some of the reasons why grapevine variety nomenclature is a challenging topic due to cultivation of grapevines for thousands of years, early migration of cultivars from ‘east’ to ‘west’ and different approaches to naming between countries and regions resulting in numerous synonym names for some varieties. Examples of naming errors were provided, e.g. Refosco / Mondeuse and Primativo / Zinfandel / Crjenack ka-telanski. Molecular markers (SSRs and SNPs) were discussed and the importance of using both molecular markers and morphological methods was outlined.

The Symposium was attended by over 60 people, including staff from each of the Wine Innovation Cluster organisations, representatives from Wine Australia and from industry. Chairman of Wine Innovation Cluster Leadership Committee, Peter Dawson, thanked all for attending.

## Visits to vineyards and wineries

### *(a)* ***Canberra Wine Region***

Included within the Canberra Symposium program was an opportunity to taste wines from Barton Estate Winery. The post Symposium tour included visits to CSIRO's Ginanderra Experimental Research Farm, Clonakilla Estate Winery and Poacher's Pantry. This included vineyard tours (Clonakilla and Poacher's Pantry) and a winery tour (Clonakilla), with a brief history of the Canberra wine region provided by Tim Kirk (Clonakilla Estate).



*Figure 3: Left: Tim Kirk, Clonakilla Estate Wines, addressing tour participants on varieties and vine management systems in the Clonakilla Vineyard. Right: Dr Tony Condon (CSIRO) addressing tour participants at Ginanderra Experimental Farm on CSIRO field phenotyping equipment and strategies.*

### (b) ***McLaren Vale Wine Region***



*Figure 4: Left: Professor Fulvio Mattivi and Peter Hayes. Right: Peter Hayes explaining features of the McLaren Vale wine region.*

The McLaren Vale tour was conducted on Sunday 6 December. Peter Hayes, former President of the OIV (Organisation International de la Vigne et du Vin) and current Deputy Chancellor of Charles Sturt University, joined the tour. He provided valuable insights from an industry perspective of the wine region, its varieties (signature and alternative), soils (three main types – examples of these were viewed at the McLaren Vale Wine Information Centre), climate, terroir including coastal aspect and the importance of reclaimed water as an irrigation resource for the region.

Visits were made to d'Arenberg vineyard and winery and Serafino vineyard and winery. Italian grapevine varieties included Montepulciano, Negro Amaro, Sagrantino and Graciano. Wines of the Italian varieties were tasted along with a range of other varieties. Top-working was used as a means to speed up evaluation of promising alternative varieties combined with small batch winemaking to evaluate the wines.



*Figure 5: Vineyard visit at McLaren Vale: Top left, Professor Mario Pezzotti. Top right, Professor Fulvio Mattivi. Bottom left, Dr Anna Schneider with Giulio Dimasi (right) (d'Arenberg Wines). Bottom right, Dr Giorgio Gambino.*

**Associated Activities**

Monday 7 December involved tours of key facilities at Waite Campus, including those at CSIRO, AWRI and SARDI, and a visit to the Plant Accelerator, which is part of the Plant Phenomics Centre.

Tuesday 8 December involved meetings with interested staff of the Wine Innovation Cluster Organisations to progress the aim of strengthening existing and building new collaborations. All four visiting Italian grape and wine scientists enjoyed a full day of meetings with interested staff.

**Acknowledgements**

Firstly and most importantly, thanks to the sponsors, Wine Australia, Embassy of Italy, National Research Council of Italy and Grains Research and Development Corporation for financial support. Wine Australia funds were invaluable in assisting with travel costs of the Italian scientists to Adelaide and for the running of the Adelaide component. The time input of key staff, support and encouragement of CSIRO was also invaluable in making the event a success.

Special thanks go to Professor Oscar Moze, Science Attaché, Embassy of Italy, and Tony Agostino, Honorary Fellow, CSIRO Agriculture, both of whom contributed substantial time and effort to making the meetings an outstanding success. Thanks also to Dr Richard Richards for his role in organising the wheat component of the Grape and Wheat Symposium. For the Adelaide component, special thanks go to Jane Dewar (CSIRO Agriculture) and Carolyn Gadd (University of Adelaide, Executive Officer Wine Innovation Cluster) for their role in making the Grape and Wine Symposium a success. Thanks also to Trang Than (CSIRO Agriculture) for her input to planning, and to Mandy Walker, Ian Dry and Peter Clingeleffer (CSIRO Agriculture) for their input to organising the Adelaide component. Special thanks also to Peter Hayes for taking the time to help arrange and for joining the McLaren Vale vineyard and winery tour. Thanks also go to Tim Kirk (Clonakilla Estate), Bob Furbank (Barton Estate), Giulio Dimasi (d'Arenberg) and the friendly staff at Serafinos.

**Appendix 1: Program: Grape and Wheat Symposium**.

## Australian / Italian Collaborative Research in Agriculture

Scientific Symposium in Grape and Wheat Research: 3rd/ 4th December
CSIRO Agriculture, Crace Seminar Room, 44 Bellenden St, Crace, CANBERRA

| Thursday 3rd December 2015 | |
|---|---|
| 8.30am – 9.00am | Registration / Coffee– CSIRO Crace Seminar Room, 44 Bellenden St, Crace, Canberra |
| 9.00am – 9.20 am | Official Opening<br>(Chair, Professor Oscar Moze, Science Attaché, Embassy of Italy, Canberra)<br>HE Pier Francesco Zazo : Italian Ambassador to Australia<br>Professor Steve Swain : Research Director, CSIRO Agriculture |
| 9.20am – 9.45am | Dr Tony Fischer**,** Honorary Fellow, CSIRO Agriculture**,** Canberra<br>**Italian/ Australian Research Collaborations (Evolving trends/markets/new opportunities)** |
| | Session 1: Molecular Approaches and Tools Chair Dr Rob Walker |
| 9.45.00am - 10.15am | **1.** Professor Mario Pezzotti, Department of Biotechnology, University of Verona, Verona, Italy. **The genomic approach to dissect G x E in grapevine**. |
| 10.15 – 10.45 am | **2**. Dr Mandy Walker, CSIRO Agriculture, Adelaide, Australia. **Manipulating flavonoids (colour and tannin) in grapevine.** |
| 10.45am – 11.15am | Morning Tea |
| 11.15– 11.45am | **3**. Dr Domenico Lafiandra, Tuscia University, Viterbo, Italy**, Research activity on durum wheat at the University of Tuscia** |
| 11.45am -12.15 pm | **4.** Dr Gururaj Kadkol, NSW Department of Primary Industries, Tamworth, Australia. **Durum Wheat Breeding in Australia** |
| 12.15pm -1.15pm | Lunch |
| | Session 2: Physiology, Pathology and Agronomy Chair Dr Richard Richards |
| 1.15pm – 1.45pm | **5**. Dr Giorgio Gambino, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy. **Tools for investigating interactions between grapevine genetic biodiversity, pathogens and environment.** |
| 1.45pm -2.15pm | **6.** Dr Harley Smith, CSIRO Agriculture, Adelaide, Australia. **Using a genotype-by-sequence approach to identify candidate molecular markers that predict resistance to root knot nematode in grapevine rootstocks.** |
| 2.15pm -2.45pm | **7**. Dr Annamaria Castrignano, Agricultural Research Council: Unit for Cropping Systems in Dry Environments, Bari, Italy. **Sensing and Precision Agriculture tools to improve durum and grape production**. |

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| 2.45pm – 3.15pm | **8.** Dr Rana Munns, CSIRO Agriculture, Canberra, Australia. **Durum physiology and germplasm development.** |
| 3.15pm – 3.45pm | Afternoon Tea |
| | Session 3: Crop Improvement Grapes Chair Dr Rob Walker |
| 3.45pm – 4.15pm | **9.** Dr Anna Schneider, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy. **Grapevine genetic resources: use and potential in a European-Australian perspective**. |
| 4.15pm – 4.45pm | **10.** Peter Clingeleffer, CSIRO Agriculture, Adelaide, Australia. **Adapting to climate change: a role for Italian varieties in Australian wine production.** |
| 4.45pm – 5.40pm | Tasting of Local Region Wines – Barton Estate, Bob Furbank |
| 7.30pm | Dinner Hosted by the Italian Ambassador – Invitation only to speakers and other invited guests (Ambassador's Residence) |

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| | Friday 4th December 2015 |
| 8.30am – 9.00am | Industry Talk: Tony Battaglene, General Manager, Strategy and International Affairs, Winemakers Federation of Australia. **Evolving trends/markets/new opportunities**. (Introduced by Dr Rob Walker) |
| | Session 5 : Product Quality : Grapes Chair Mr Tony Agostino |
| 9.00am – 9.30am | **11**. Professor Fulvio Mattivi, Department of Food Quality and Nutrition, Research and Innovation Centre, Edmund Mach Foundation, San Michele all'Adige, Italy. **Regional features of North Italian sparkling wines identified using solid-phase micro extraction and comprehensive two-dimensional gas chromatography, coupled with time-of-flight mass spectrometry.** |
| 9.30am – 10.00am | **12**. Dr Paul Boss, CSIRO Agriculture, Australia. **The search for grape chemical markers of wine quality.** |
| 10.00am – 10.30am | Morning tea |
| | Session 5 : Product Quality : Wheat Chair Mr Tony Agostino |
| 10.30am -11.00am | **15** Dr Ilaria Marcoteli, Genetics and Plant Breeding, University of Bari, Italy. **Increasing the potential nutritional value of wheat through innovative molecular analysis**. |
| 11.00am – 11.30am | **16** Regina Ahmed, CSIRO Agriculture, Canberra Australia. **Modification of Cereal Quality Traits at CSIRO.** |
| 11.30am – 11.45pm | Dr Lynne McIntyre, Research Director, CSIRO Agriculture, Brisbane, Australia. **Summing up and Closure** |
| 11.45am - 12.20pm | LUNCH |
| 12.20pm – 1.35 pm | Visit to CSIRO Ginninderra Experiment Station, Talks by JP Ral, Tony Condon on wheat research at GES. David Deery- Phenomics Tools and Research. |

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|---|---|
| 2.00 pm- 3.15pm | Tour of Canberra Region Wineries (Tim Kirk: Clonakilla, Bob Furbank, Barton Estate) **Tim Kirk , Clonakilla, Murrumbateman, NSW** |
| 3.30pm – 4.15pm | Afternoon Tea – Murrumbateman Region – Poachers Pantry |
| 4.15pm – 5-00 pm | Return to Canberra – Hotel then airport |
| | |

Symposium Supported by:

**Appendix 2: Program: Grape and Wine Symposium**.

wineinnovationcluster.com
Synergy in grape & wine research



# Australia – Italy Grape and Wine Symposium



## Monday 7 December
## Plant Research Centre Auditorium, Waite Campus

### PROGRAM

| | |
|---|---|
| 13.15 | Welcome and introduction |
| 13.20 | Professor Mario Pezzotti, Department of Biotechnology, University of Verona, Verona, Italy **To ripen or not to ripen: that's the question.** |
| 13.50 | Dr Christopher Davies, CSIRO Agriculture, Adelaide, Australia<br>**Grape berry ripening – Who's in control?** |
| 14.20 | Dr Giorgio Gambino, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy<br>**Molecular and biological interactions between grapevine, virus and environment** |
| 14.50 | Questions |
| **15.00** | **Afternoon tea** |
| 15.30 | Professor Fulvio Mattivi, Department of Food Quality and Nutrition, Research and Innovation Centre, Edmund Mach Foundation, San Michele all'Adige, Italy<br>**The changes of wine composition depending on storage temperature and of oxygen levels at bottling, measured via untargeted metabolomics** |
| 16.00 | Dr Markus Herderich, Australian Wine Research Institute, Adelaide, Australia<br>**Towards a scientific interpretation of the terroir concept: plasticity of the grape berry metabolome** |
| 16.30 | Dr Anna Schneider, Institute for Sustainable Plant Protection, National Research Council of Italy, Turin, Italy<br>**Grape varietal identification: the role of molecular markers and morphology** |

17.00 Questions

17.10 Concluding comments

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## Appendix 3: Budget Reconciliation

This is provided separately.