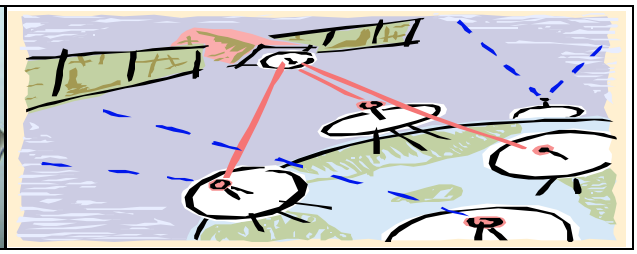
S E M I N A R

N E W Z E A L A N D W I N E G R O W E R S

BRANCOTT - Montana Wines SH 1 Riverlands
Monday 21st November 1.30 pm – 5.00 pm

FROM GUMBOOTS TO SATELLITES - measuring and managing vineyards



1.30 **INTRODUCTION** *Philip Manson* – Science Innovation Manager New Zealand Winegrowers.

1.35 **UNDERSTANDING VINEYARD VARIABILITY** Rob *Bramley* - Group Leader CSIRO, Sustainable Ecosystems Adelaide Australia.

2.05 **APPLYING PRECISION VITICULTURE IN VINEYARDS AND POSSIBLE BARRIERS TO ITS ADOPTION** *Tony Proffitt* – Viticultural Consultant, Western Australia.

2.30 **REMOTE SENSING IN THE VINEYARD – from satellites or 4WD** *Mike Tuohy* – Senior Lecturer, Institute of Natural Resources Massey University.

3.00 **AFTERNOON TEA**

3.20 **MARLBOROUGH WINE RESEARCH CENTRE PROGRAMME** - relating above and below ground to wine quality *Mike Trought* - Research Leader Marlborough Wine Research Centre.

3.40 **INDUSTRY EXPERIENCE WITH REMOTE SENSING** *Peter Hackworth* – Executive Officer Phylloxera and Grape Industry Board of South Australia.

4.05 **USING PRECISION VITICULTURE IN PRACTICE** *Richard Hamilton* – Technical Viticulturalist, Foster Wine Estate South Australia.

4.30 **SUMMARY OF THE DAY** *Andy Frost* – Winemaking Research and Technical Manager, Allied Domecq Wines New Zealand.

New Zealand Wine
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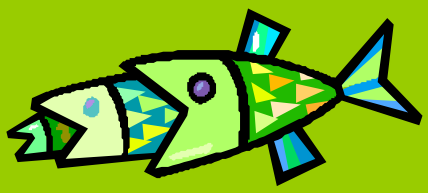
A forum for discussion with those, who provide or have used Precision Viticulture Techniques



FROM STATELLITES TO GUMBOOTS

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- When do we start with PV?
  - PV techniques are a moving target with new methodologies being developed using on the ground, aerial and satellite technologies. But you have to start somewhere.
    - Where do you get the best return for effort?
    - What technologies are best implemented first?
    - How do we characterize and assess the variability?

- What are the current limitations to PV technology?
  - What is it that we want to know about the vineyard and under what time frame (the information: response ratio?). Do we want information now to respond to immediately e.g. controlling sprayer technology or information now for decisions soon eg? Infra-red data for irrigation management or information now for decisions next year e.g. EM survey for planting a vineyard?

- What are the limitations to the adoption of current PV technology?
  - Some technologies have been available for 5+ years but are not being used in practice. Why?

- Justification for using the technology
  - What are the benefits we are anticipating from the adoption of PV? Cost: benefit analysis.
  - Who might provide the technology – commercial opportunity

- Future
  - Given the above, what are the research, technology and information needs for the next 5-10 years?
  - What areas of collaboration and synergy can be looked at?

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A B S T R A C T S

UNDERSTANDING VINEYARD VARIABILITY

Rob Bramley - Group Leader CSIRO, Sustainable Ecosystems, Adelaide, Australia.
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Vineyards are variable. Of course, both grapegrowers and winemakers have known this for as long as they have been growing grapes and making wine. But without methods for observing or reacting to the variation, they have had to treat it as 'noise', and so have managed large blocks as though they were uniform. However, recent research has demonstrated that uniform management is clearly not an optimal strategy; it does not promote control over a variable production system which is inherently uncertain as a result.

Precision Viticulture (PV) seeks to gain control over the production system by recognising that different areas are indeed different, providing the means by which they can be treated differently, and so increasing the likelihood that the outputs from the production system are the desired ones. It does this through the use of some key enabling technologies (the global positioning system (GPS) and geographical information systems (GIS) are the most important) coupled with tools for measuring and monitoring vineyards at high spatial resolution (e.g. remote sensing, yield monitors, high resolution soil survey, etc…).

This talk will provide a brief review of vineyard variability research conducted over the last 6 years by CSIRO and the Cooperative Research Centre for Viticulture, and discuss contrasting examples of the practical application of the tools of PV.

APPLYING PRECISION VITICULTURE IN VINEYARDS AND POSSIBLE BARRIERS TO ITS ADOPTION

Tony Proffitt – Viticultural Consultant, Western Australia.
tony@ahaviticulture.com.au

With the increasing use of a range of information technologies, collectively referred to as Precision Viticulture (PV), it is becoming increasingly apparent that vineyards vary substantially in both the quantity and quality of wine-grapes being grown.

The emergence of global positioning systems (GPS) allows the traditional measures of vine productivity to be easily linked to specific locations within the vineyard. Recent advances in observation tools such as grape yield monitors, airborne optical remote sensing and soil-sensing instrumentation means that spatial data can now be more easily collected and recorded. These layers of information enable the viticulturist or vineyard manager to make more informed decisions related to desired productivity outcomes.

Obtaining information on vine parameters across a whole vineyard is both difficult and expensive. However, vines, like any plants, are likely to integrate the effects of their local environment (eg. climate, soil properties, and disease, nutrient and water pressures) and express them through their canopy characteristics (Wiegand and Richardson 1984).

Airborne remote sensing provides a means by which information on vine characteristics such as canopy status can be easily collected, and, as an emerging technology, has been the subject of recent PV research (Hall et al. 2002; Dobrowski et al. 2003; Lamb et al. 2004).

Typical remotely-sensed images identify relative differences in vine canopy status across the vineyard as opposed to absolute differences, thereby making comparisons between different data-sets difficult.

REMOTE SENSING IN THE VINEYARD – from satellites or 4WD

Mike Tuohy – Senior Lecturer, Institute of Natural Resources Massey University.
m.tuohy@massey.ac.nz

Remote sensing is becoming an important ingredient in the mix of precision agriculture. How do you chose which imagery is best for your purpose? Of course this will depend upon whether you want to estimate carbon credits in a forest or monitor weed infestation in a five-hectare paddock. Mapping soils over a whole farm requires imagery of a different scale to that necessary for determining possible nutrient deficiencies in a maize crop. What about identifying poorly-producing trees in an apple orchard, or moisture stress in a vineyard, or blight in a crop potato crop.

Remote sensing can be applied to a wide range of projects.

MARLBOROUGH WINE RESEARCH CENTRE PROGRAMME - relating above and below ground to wine quality.

Mike Trought - Research Leader Marlborough Wine Research Centre.
miket@wineresearch.co.nz

Mike Trought[1], Robyn Dixon[1,2], Tim Mills[1,3], Joanne Brady[1], Marc Greven[1,4], Rob Agnew[1,4], Dave Rankin[5], John-Paul Praat[6]

[1]Marborough Wine Research Centre,
[2]Lincoln University, MSc Student,
[3]Auckland University MSc student,
[4]HortResearch,
[5]Indigo-Systems Ltd,
[6]Lincoln Ventures

Marked changes in soil texture can be observed on the Wairau Plains over short distances. These changes reflect the historical braided nature of the Wairau River, and often run at right angles (east-west) to the north-south orientation of vineyard rows. Preliminary results will be presented to describe the extent to which these changes in soil type can cause marked differences in vine growth and fruit development, in particular vine vigour (trunk circumference, pruning weight and canopy density), root distribution (root growth generally occurring in parts of the soil profile dominated by gravels) and fruit development (time of flowering and veraison is generally earlier, soluble solids higher and titratable acidity lower where vines are growing on stony soils, when compared to deep silt). The potential impact of differences in soil texture on vineyard fruit composition, and how this may be modified by vine management will be discussed.

INDUSTRY EXPERIENCE WITH REMOTE SENSING

Peter Hackworth - Executive Officer, Phylloxera and Grape Industry Board of South Australia.
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South Australia produces nearly 50% of Australia's wine-grape. The Phylloxera & Grape Industry Board is an industry-funded organisation responsible for keeping phylloxera and other major pests and diseases out of the state. In 2001, PGIB commenced collecting aerial imagery of its wine regions and processing it using standard plant indices to identify vines with canopy symptoms that might be caused by phylloxera. These vines are then inspected by ground teams. Imagery of over 70,000ha of vines has been captured. All grape-growers receive a colour and NDVI hard copy aerial image of their vineyard, with information on their application to precision viticulture. Demand for the imagery in digital format is increasing; in 2005, PGIBSA will supply digital format imagery of 15,000ha of vines to vineyard owners and wine companies. Economies of scale created by capturing 15,000+ha per annum are facilitating this demand. The imagery has also been used to develop a GIS database the state's vineyards, which is being used as a tool for pest and disease management, to map vineyard regions, communicate with wine-grape producers and as an aid to viticulture research.

USING PRECISION VITICULTURE IN PRACTICE

Richard Hamilton – Technical Viticulturalist, Foster Wine Estate South Australia.
Richard.Hamilton@southcorp.com.au

The key to the practical application of precision viticulture lies as much in how the tools are used as in the nature of the tool itself. Ground-truthing of all data is essential and this will be reinforced in every example discussed.

Potential users need to understand that the methods are not "instant solutions" but rather offer opportunity to gain additional returns on viticultural enterprises following judicious interpretation and response to viticultural opportunities. A number of examples will be presented including

- *Zoning using remote sensed and yield monitor data.*
- *Yield monitors as proof of concept tools.*
- *The dangers of failing to ground truth GIS data layers*
- *Graphical opportunities with Geographic information systems*

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