



A Guide to Using Precision Viticulture (PV)

Case Studies from the Grampians and Yarra Wine Regions

What is Precision Viticulture (PV)?

Precision Viticulture (PV) is precision farming applied to optimize vineyard performance, in particular ensuring proportionate grape yield and maximum quality while minimizing environmental impacts and risk. This is accomplished by measuring local variation in factors that influence grape yield and quality (soil, topography, microclimate, vine health, etc.) and applying appropriate viticulture management practices (pruning, fertilizer application, irrigation, timing of harvest, etc.). PV is based on the premise that high in-field variability for factors that affect vine growth and grape ripening warrant intensive management customized according to local conditions. It relies on technologies such as Global Positioning Systems (GPS), environmental sensors, satellite or airborne remote sensing and Geographic Information Systems (GIS) to assess and respond to variability.

PV is using technology to address agronomic challenges and encourage informed management

Right action, Right place, Right time – more often!

What can PV be used for in my vineyard?

Precision Viticulture uses a broad set of technologies to observe and respond to variability:

- Remote sensing: Aerial PCD or satellite PCD\NDVI imagery
- Proximal sensors: Active sensor such as Greenseeker or Crop Circle NDVI,
- Soil and elevation surveys: EM38, Gamma Ray Spectrometry and Ground Penetrating Radar
- Yield monitors: Mapping yield and aiding selective harvesting
- GIS with GPS Systems: Geo-tagging images and observations to points in the vineyard

Observations are presented in a Geographic Information System (GIS), which are becoming increasingly accessible and easy to use with the rapid development of mobile phone and tablet platforms.

Getting started!

An accurate survey of a vineyard's boundary with a differential (dGPS) unit is undoubtedly a valuable first step in preparation for any future PV endeavors! Team up with a neighbour or your local grower body to subsidise the cost of hiring a unit and do multiple surveys at once.

For some surveys or depending upon your use of PV, a quick and easy way to establish property boundaries or share data could be by the use of functions found in Google Maps. Below is a step by step guide to establishing a Google profile, digitizing a property boundary and loading simple point data. However, whilst convenient and a handy starting point, establishing a property boundary in this manner cannot remove the need for a dGPS boundary survey at some stage.

How to create a boundary

Step 1: Go to <https://maps.google.com.au/> and select “sign in” and/or “sign up”!

Step 2: Follow the prompts to your Google (Maps) account & Login

Step 3: Select “My Places”

Step 4: Select **CREATE MAP**

Step 5: Give the map a title and select a sharing option (generally “unlisted”)

Step 6: Select the “Shape” button and digitize around an image of your property

Step 7: Save the Shape by clicking **Done**



Google functionality can be used to share this shape, by selecting the “collaborate” function. In this way you can share your property boundary or observation with your agronomist, service provider or consultant.

The Potential of PV: Shared experiences

The following case studies provide images and critical details from regional applications of PV in the Yarra Valley.

Case Study 1: Seppelts Great Western – Use of PCD to determine zones of High, Medium & Low vigour

PV tools such as EM38 soil Mapping and Plant Cell Density Mapping (PCD) have been used for several years. Use of PCD has enabled the following zones to be identified:



Figure 1. Demonstration of NDVI sensor technology

Use of PCD has enabled:

- Identification of parcels of fruit to keep separate at harvest, and
- Identification of zones of lower quality fruit where differential management, such as cover crops or irrigation, could be implemented to improve fruit quality before harvest

Case Study 2: Saville Estate – Use of PCD to find what determines quality

Seville Estate is a vineyard and winery operation of 8ha which while only producing a small volume, aims to produce a high – end product. As part of the Yarra Valley Precision Viticulture (PV) project, winemaker Dylan McMahon has used PCD imagery in conjunction with soil pit mapping to help him define what is driving quality in the vineyard. Given the size of the vineyard, it is most important for Dylan to minimize variability to increase the amount of premium fruit and to ensure the longevity of the vineyard.

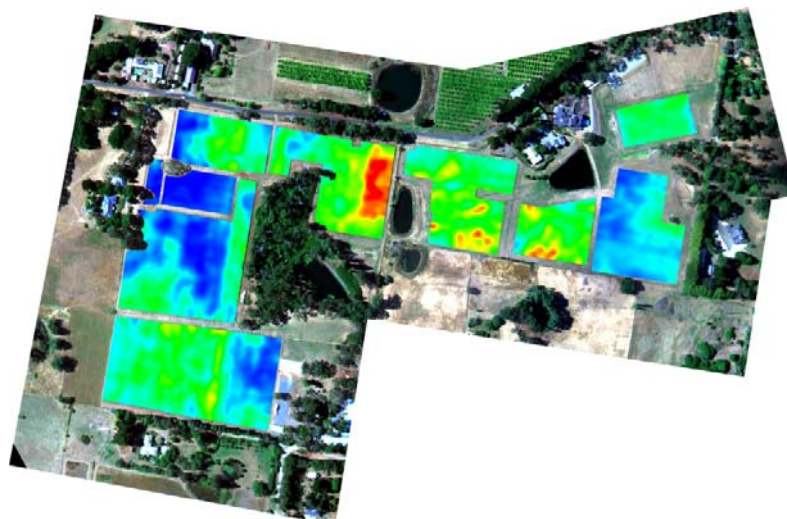


Figure 2: PCD maps of Saville Estate

Case Study 3: Mt. Langi Ghiran – Use of Precision Viticulture to map quality attributes.

The combined use of EM38 soil sensing, PCD mapping, temperature data loggers and the identification of spatial trends in the distribution of the grape compound rotundone, has led to the production of one of the world’s first grape attribute/quality maps. This study aimed to identify the environmental factors which contributed to fruit quality, in the hope of identifying further “quality” zones and increase the potential production of the iconic Langi Shiraz. Cheers to that!



Figure 3: Vineyard zones of the experimental block at Mount Langi Ghiran

How much does PV cost?

PV service	What time of the year do I collect this info?	Approximate Price/ hectare*
Boundary surveys	Anytime; at the start of all operations	Variable (cost of hiring a dGPS unit. or paying for service)

Elevation mapping	Easily performed in conjunction with any dGPS related mapping	Included with EM38 surveys or option with dGPS NDVI survey
PCD imagery	Flowering or Veraison (most common)	Approx \$35/ha
NDVI	Anytime	From \$850 per property (dependent on size).
EM38 surveys	Winter, with wet profile	~\$250/hr with approx. 15ha mapped per hour.
Ground truthing (a) soil sampling (b) petiole sampling (c) maturity testing	Winter Pre - flowering Weeks leading to harvest	(a) \$150/season (<10ha) (b) \$120/season (<10ha)

*Correct as of July 2013 (ground truthing costs supplied by Landmark)

Useful Contacts:

The following people and businesses were engaged in this project to help you achieve PV in your vineyard

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COUNTRY

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