



The role of precision viticulture in quality assessment and management

Bethany Collins



TREASURY
WINE ESTATES

Agenda

1. Managing variability at harvest
2. Managing variability before harvest
3. Using PV to enhance trial outcomes
4. Using PV to improve monitoring



Background

Why do we use PV in quality assessment and management?

To increase production of high quality fruit from company vineyards by:

1. Identifying parcels of fruit for split picking at harvest and,
2. Identifying blocks where differential management could be implemented to minimise variation in fruit quality before harvest.

Why PCD and what does it represent in the vineyard?

- Sensory wine attributes different from high and low yielding/vigour zones
- PCD maps used to characterise vine vigour
- High resolution, seasonally relevant and low cost information source
- Allows vigour zoning at a vineyard and block level



Managing variability at harvest



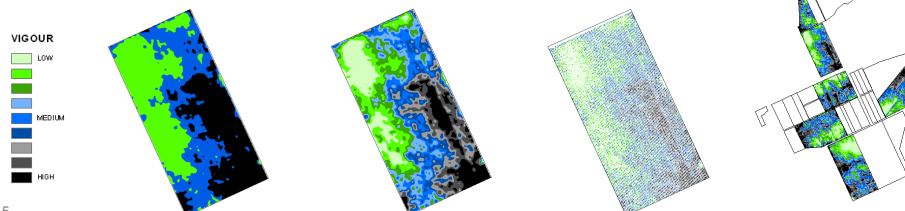
PCD block selection and mapping

Targeted block selection

Only blocks that fit the following criteria are included for PCD mapping:

- Blocks that produce fruit of variable quality with detectable differences in either quality or style (i.e. potential for split picking)
- Increasing production of high quality fruit by reducing vineyard variability (where cause is identifiable and reducing fruit quality)
- Trials

2 levels of maps, 3 increasing levels of detail (optional)

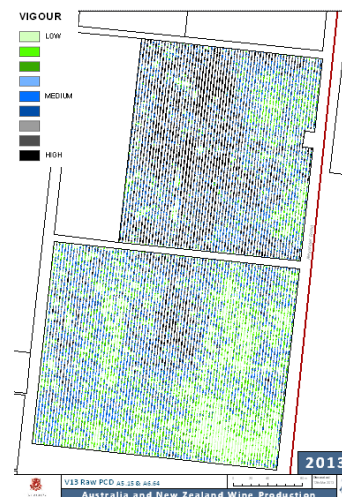


5

Berry sensory assessments using PCD maps

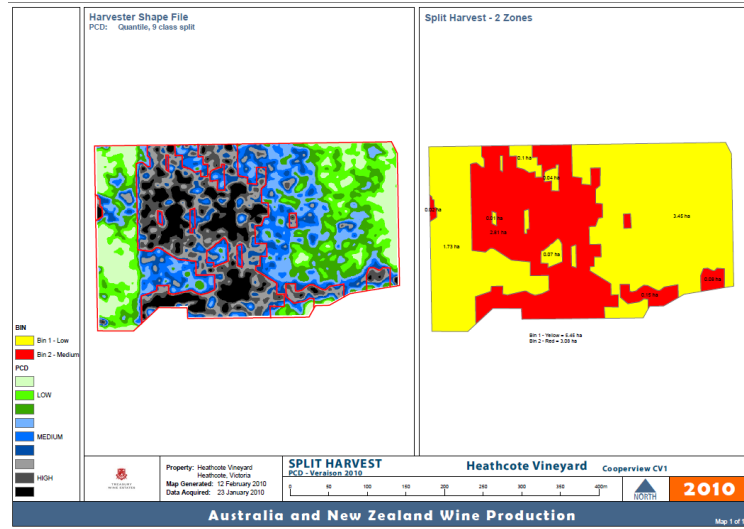
Our tool of choice: winemakers!

- Characterisation of differences between wines derived from fruit parcels is left to winemakers
- Field calibrated, familiarised with range of product styles and end use specifications
- PCD maps as a guide to taste across the range of vigour zones and identify changes in fruit quality
- Differences may be due to style or quality
- This information is used to develop 'mud maps' of where the change in fruit quality occurs



6

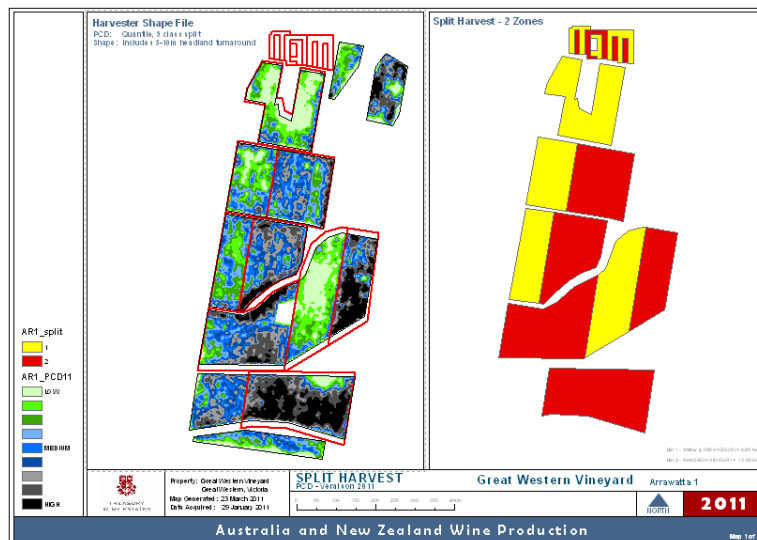
Split picking by quality



7



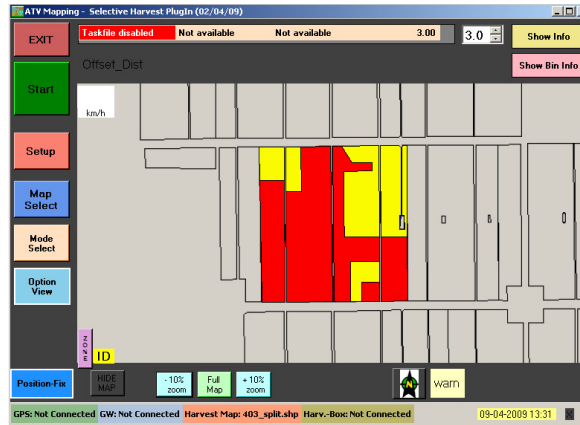
Split picking by wine style or maturity



8



Semi-automated split picking



9



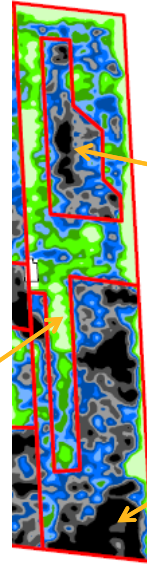
Managing variability before harvest



Implementation of differential management

Key goal: increasing production of higher fruit quality by managing cause of lower quality fruit parcels

- Identifying cause/s for lower quality fruit production crucial to managing it!
- Management of cause (proactive)
- Management of symptom (reactive)
- Each method needs to be assessed on the basis of optimising production efficiency



11

Managing the cause

Proactive management tools

- Splitting irrigation to enable differential irrigation scheduling
- Soil amelioration (ripping, mounding)
- Soil ameliorants (compost, fertiliser, gypsum)
- Mulch
- Cover crops
- Under vine mowing



12

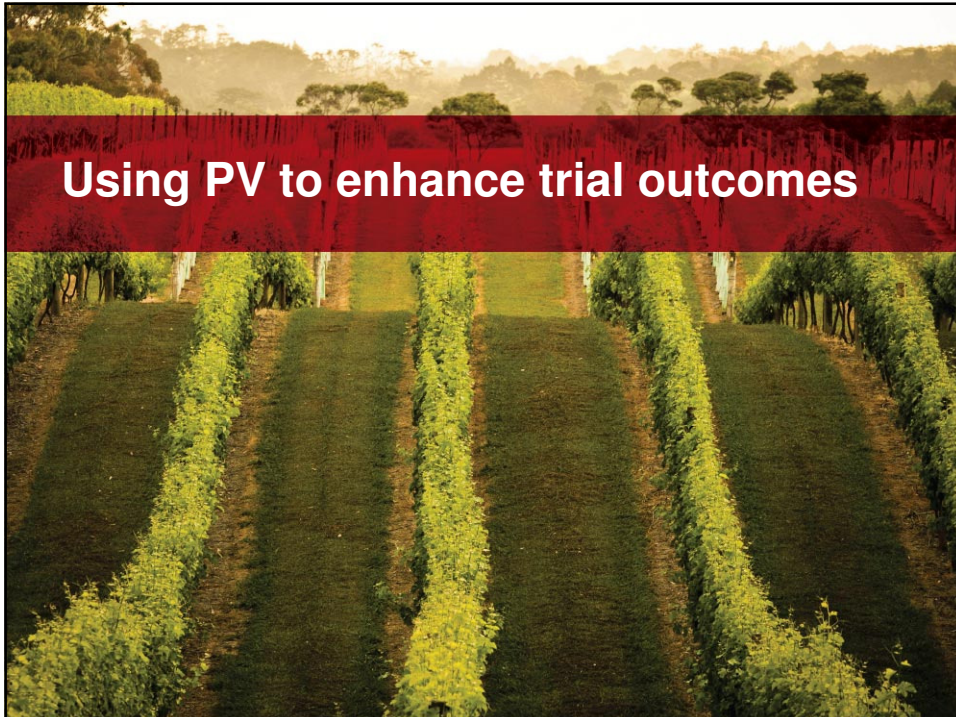
Managing the symptoms

Reactive management

- Bud numbers
- Sacrificial canes
- Shoot positioning
- Shoot thinning
- Bunch thinning
- Leaf plucking
- Early trimming
- Irrigation management



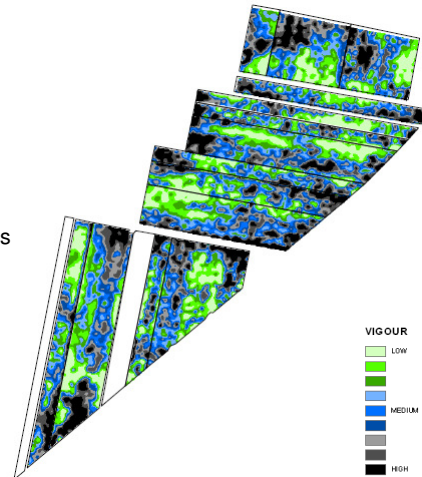
Using PV to enhance trial outcomes



Using PV to enhance trial outcomes

Putting trial results into context

- Allows assessment of spatial variation in treatment responses
- Optimisation of management to variation
- Whole-of-block approach (Panten et al. 2011)
- Maximisation of resource use efficiency in outcomes (e.g. differential rates of applications of compost)



Panten et al. 2011 *Precision Ag* 11: 198-213

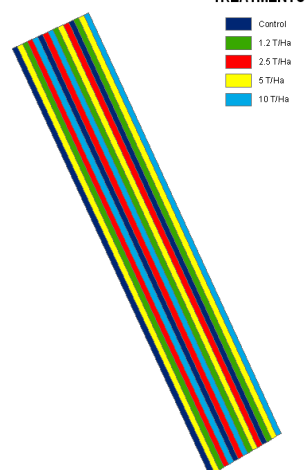
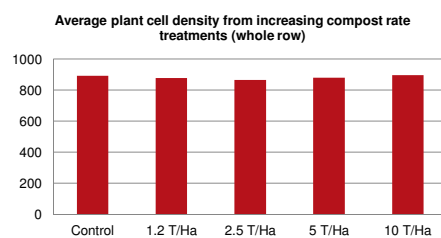


15

Assessing vine response to increasing compost rates

Aim: To assess the effect of increasing application rates of compost on vine performance and soil health

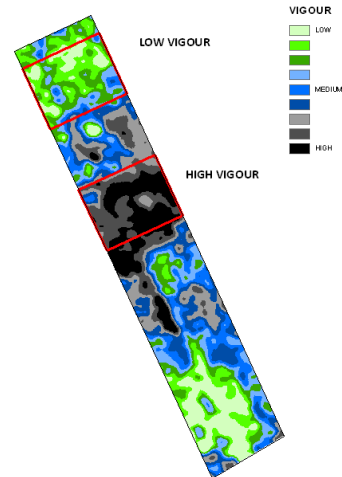
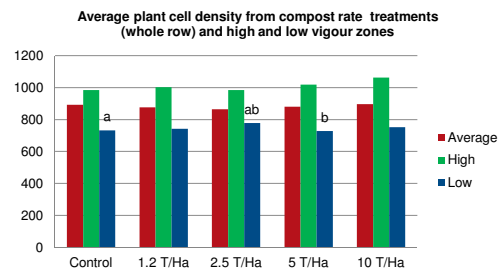
- 4 different rates of compost applied and compared to a control (no compost)
- Each rate was compared to the control using data from the whole length of the block (all measurements)
- Vigour responses to different rates were also compared in 70 metre sections of high vigour and low vigour to assess whether differential applications of compost were viable



16

Assessing vine response to increasing compost rates

- Identification of low and high vigour sections in the trial have allowed comparisons to be made about the different responses of inherently high and low vigour vines to the different compost rates.
- Shows that vines in the low vigour section respond differently to compost rates compared to vines in the high vigour zones.

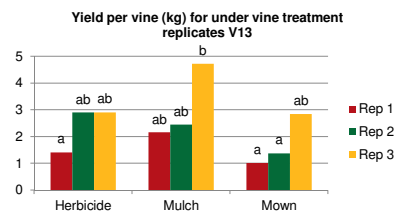
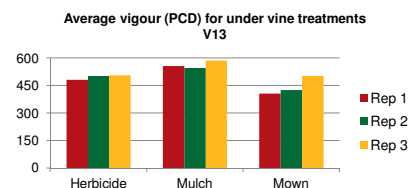
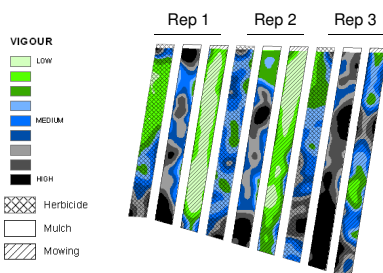


17

Under vine management trial

Aim: To assess the impact of under vine mowing on grapevine growth and yield

- 3 treatments: mulch, herbicide, mowing
- PCD results at replicate level indicate replicate 3 block has higher inherent vigour level than other replicates – better indication of response to treatments higher vigour section?

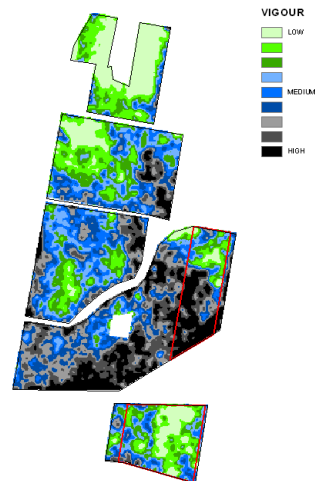


18

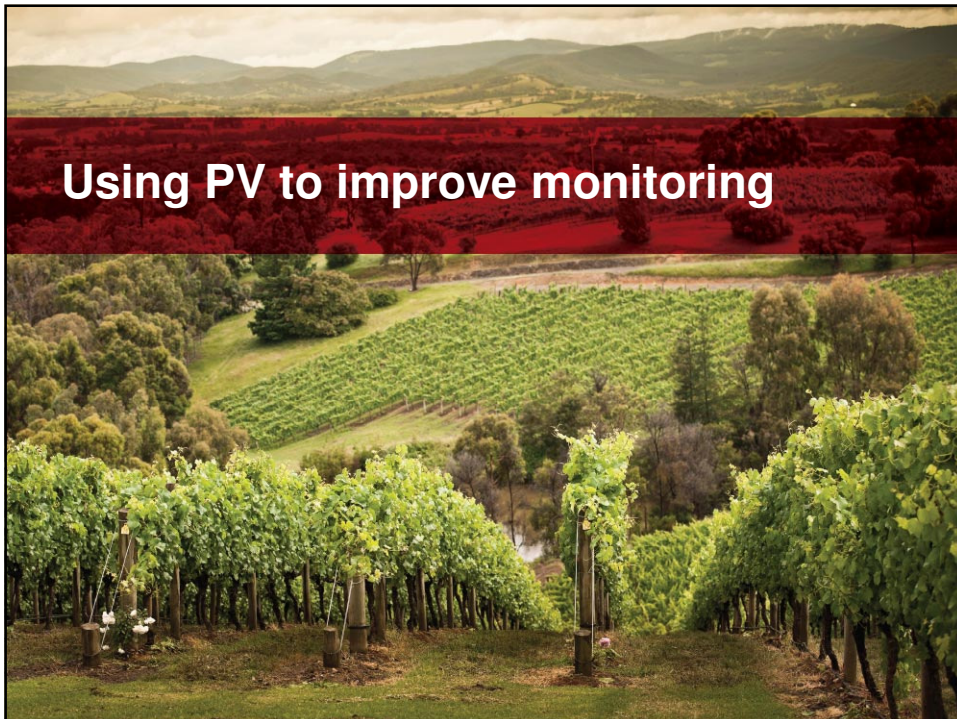
Under vine management trial

Outcomes from results so far:

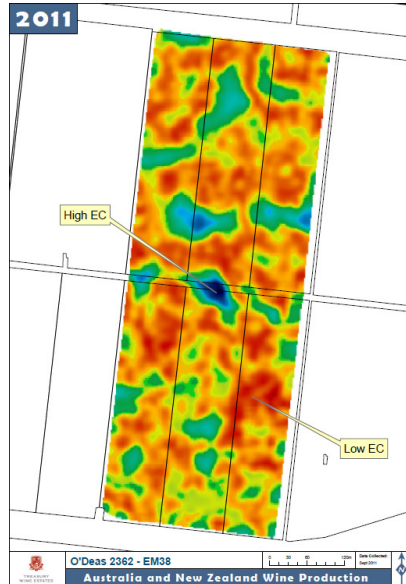
- Mulch - good for increasing vigour and yields in lower vigour parts of the vineyard
- Under vine mowing does not significantly reduce vigour or yield (statistically) in comparison to herbicide
- Trial site in inherently low vigour area
- Trial to be replicate in high vigour zone to assess potential as vigour management tool



Using PV to improve monitoring



Using PV to improve monitoring



Two approaches:

- Optimising vineyard sampling
- Improving representation of variation

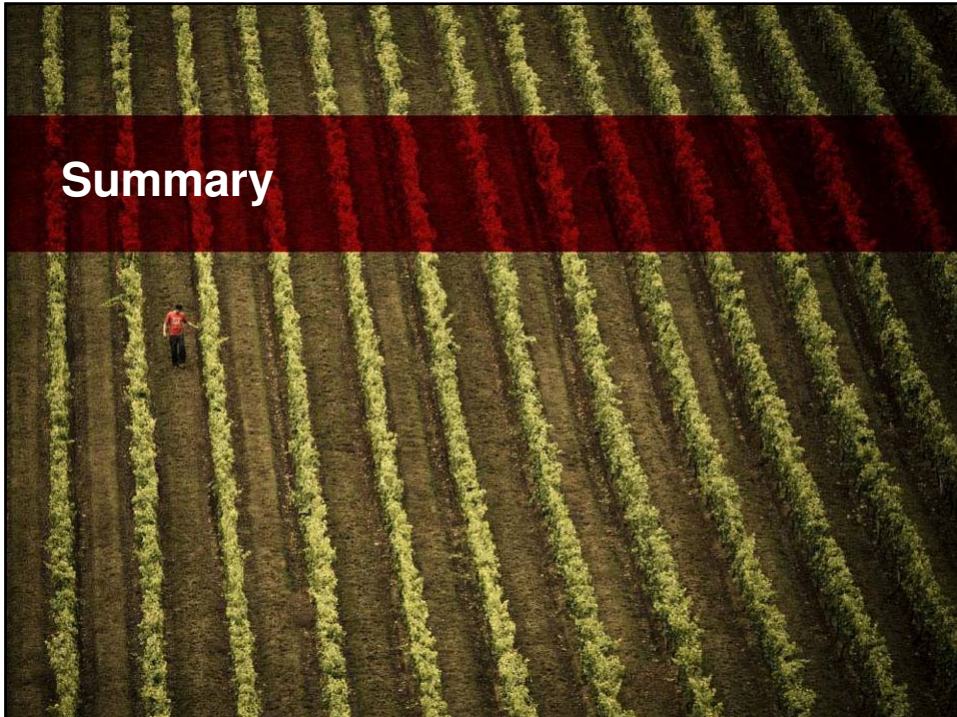
Example: Soil water monitoring

- PCD and EM38 aggregated into classes corresponding to different conditions of soil and vigour
- Soil monitoring systems located in each class of soil/vigour
- Allows improved monitoring of irrigation scheduling and assessment of soil response to watering



21

Summary



Summary

Select blocks with potential for achievable improvement

Maximise usage of high resolution data sets through:

- Management at harvest – split picking
- Management before harvest – identification and management of causes of lower fruit quality
- Enhancement of trials – optimisation of management to variation
- Improvement in monitoring – maximising resource efficiency

Most difficult issue for the industry to overcome is having sufficient capacity to supply the skills, training, and advice to make PV work commercially.