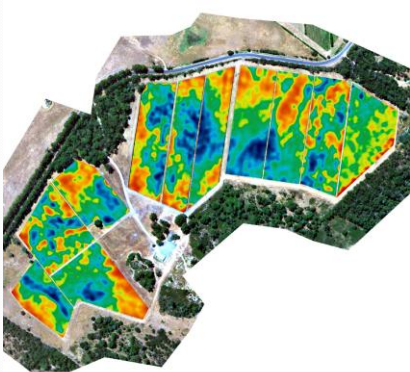


## MANAGING VINEYARDS TO IMPROVE WINE QUALITY BY USING MODERN AND OLD TECHNOLOGIES

## THE PHILOSOPHY

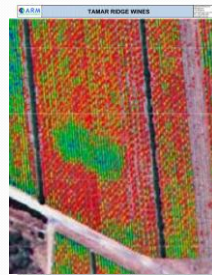
- Not all vineyard blocks are uniform
- This is because of soil variation primarily, especially in factors which affect the supply of water
- This has a direct effect on vine vigour, which in turn has a direct effect on wine quality
- So a vineyard block contains zones which produce grapes with different potential for wine quality
- Should we mix them by harvesting grapes together?



## *CORRELATION OF VINEYARD IMAGERY WITH PINOT NOIR YIELD AND VIGOUR AND FRUIT AND WINE COMPOSITION.*

Reuben Wells  
Dr Richard Smart  
Dr Steve Wilson

## Late season leaf health

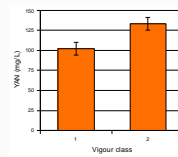


## Tamar Ridge Sauvignon blanc

- Differential harvesting used to improve quality
- Identification of burn zone



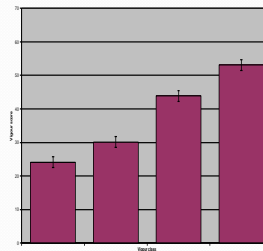
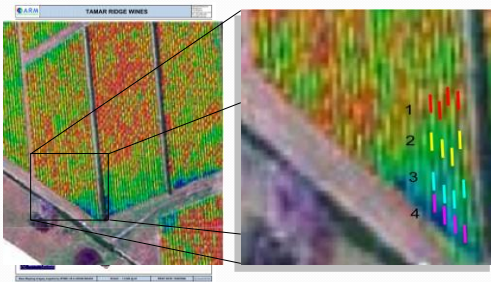
- Burn zone impact
  - Additive
  - Also a loss of topsoil from scalping around pile.



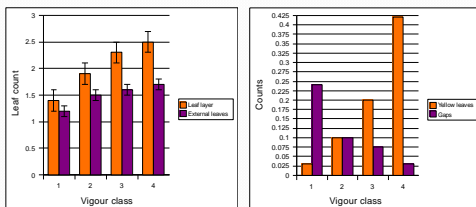
- Fruit from the burn zone had:

- Higher pH and lower TA
- Lower sugars
- Higher YAN

Vigour	Brix	pH	TA (g/L)
1	22.7 <sup>b</sup>	3.28 <sup>a</sup>	7.7 <sup>b</sup>
2	21.1 <sup>a</sup>	3.38 <sup>b</sup>	6.8 <sup>a</sup>

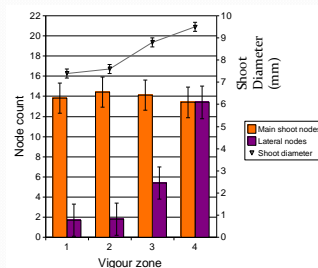


- Vigour scorecard
  - Assessed leaf layer number, leaf size, percent gaps, fruit exposure, leaf colour and leaf loss.
  - A higher score means more vigour.



- Leaf layer and external leaves

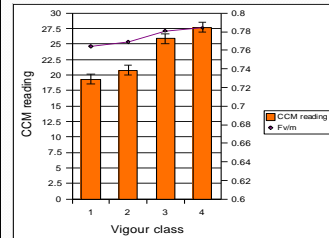
- Gap counts and yellow leaves



- Node numbers and shoot diameters

Vigour class	Cane wt	Pruning wt
1	38.44 $a$	3.59 $a$
2	45.3 $a$	4.49 $a$
3	64.4 $b$	7.26 $b$
4	91.7 $c$	10.18 $c$

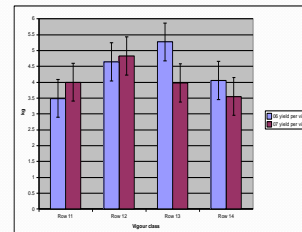
- Pruning weight also rose with vigour class



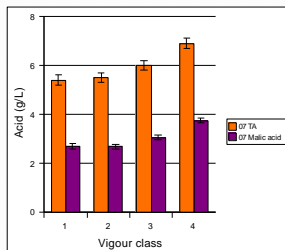
- Leaf health differences across the vigour zones

- So, as we expected, the PCD was very good at discriminating between different vigour classes.
- We then went on to assess the fruit differences across the vigour zones.

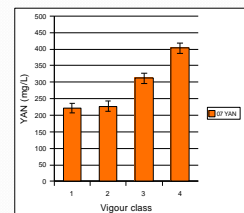
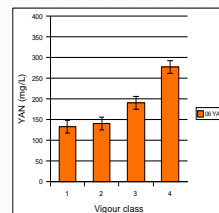
### Yield impact



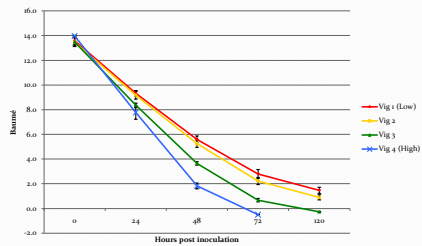
- In this situation vigour mapping cannot be classed as a de facto yield mapping.



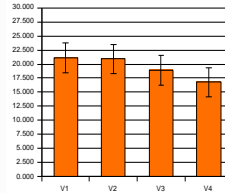
- No significant sugar differences
- No pH differences in 07
- Acid – notable increase in both years, probably due to malic acid.



Fermentation rates - 2006



Anthocyanin ionization 2008

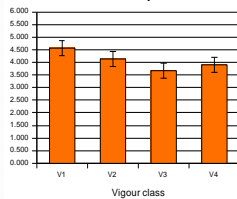


## Anthocyanin ionization

- A measure of the percent of anthocyanins visible in the wine

## Colour Density

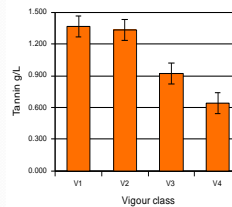
Colour density 2008



- There was no major differences in the colour density between vigour zones

## Tannin content

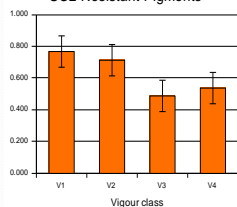
Tannin 2008



- A major difference in tannin content between vigour zones

## Colour Stability

SO2 Resistant Pigments



- There was also an increase in the colour stability of the wines from lower vigour zones.

## Wine colour

Vigour	Density	Hue
1	0.59 <sup>b</sup>	0.72 <sup>a</sup>
2	0.53 <sup>b</sup>	0.72 <sup>a</sup>
3	0.42 <sup>a</sup>	0.79 <sup>b</sup>
4	0.41 <sup>a</sup>	0.88 <sup>c</sup>

Low Vigour



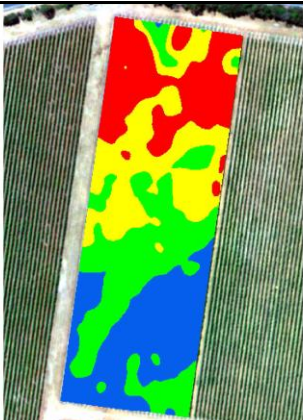
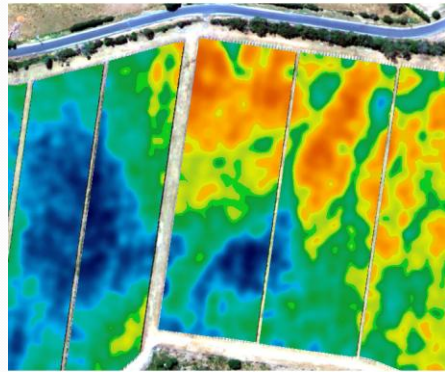
High Vigour



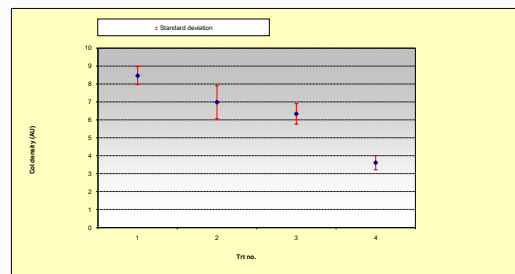
Low



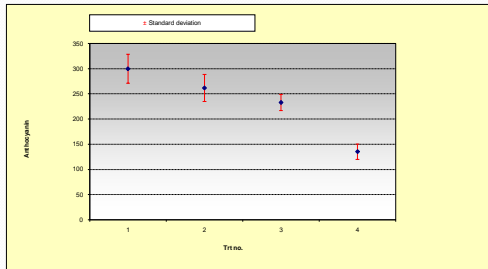
High



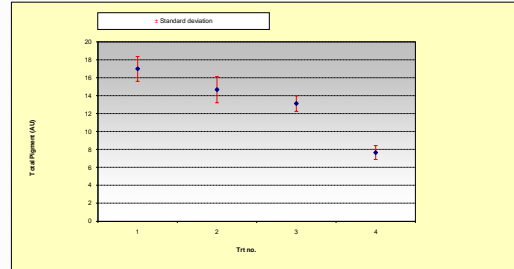
WINE COLOUR DENSITY



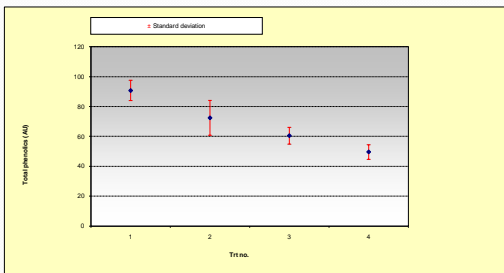
## ANTHOCYANIN



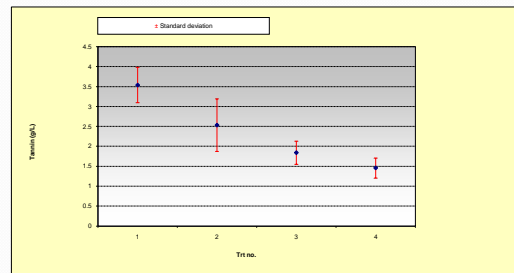
## TOTAL PIGMENT



## TOTAL PHENOLICS



## TANNIN



## Experiences from Raimat, Spain

Europe's largest vineyard 2,200 ha  
 Owned by members of Codorniu family  
 "Growers" are winery owners  
 Asked me in 2006 to develop a wine grape classification system to allow fair pricing and payment for quality.  
 Had to be science-based, transparent, verifiable  
 To be applied to 900 ha of Cabernet, Merlot, Tempranillo, Syrah

## Tools which I used

Aerial infrared imagery, Specterra WA, flown veraison  
 Vineyard monitoring, each 20<sup>th</sup> vine in 20<sup>th</sup> row  
   timing veraison, lignification  
 Growing tips at veraison  
 Sunlight into Wine scorecard  
 Leaf health and water stress  
 Microvinification with sensory and chemical analysis



## Classification

A	ultrapremium	€ 700
B	premium	€ 540
C	commercial	€ 400
D	reject because of high vigour	
E	reject because of high variability (or differential harvest)	



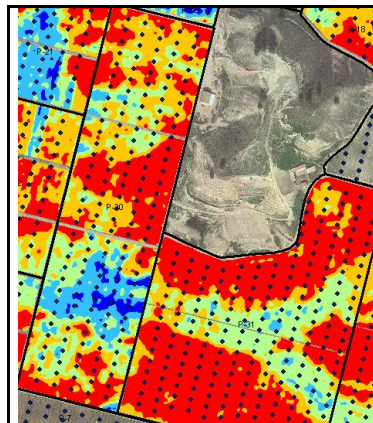
## How did it work in 2006?

Winery reported substantial improvement in quality  
 Due to much better irrigation using growing tips as a guide  
 Due to differential harvesting  
 Evaluated microvins by chemical and sensory analysis

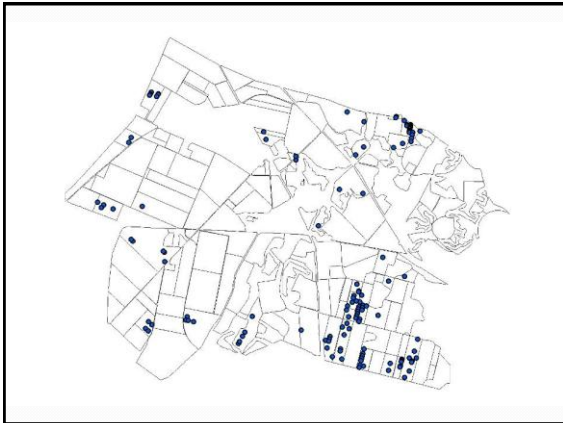
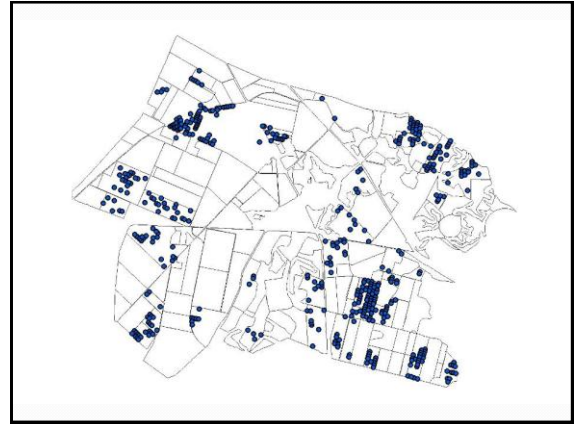
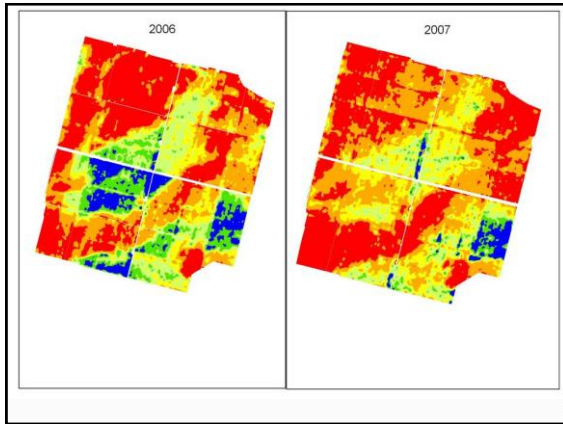
## Example Cabernet

Most useful attributes:

- Shoot length
- Shoot spacing
- Canopy gaps
- Leaf layer number
- Mean and SD of PCD
- Growing tips
- Lignification
- Rate of veraison







VARIABILIDAD STD PCD	PUNTAS CRECIMIENTO % s/BROTOS	VIGOR PCD	CLASIFICACION
ALTA STD PCD>40			E
MEDIA 40>STD PCD>30	>10% PUNTAS		D
	<10% PUNTAS	VIGOR >145	C
		145> VIGOR >80	B, C
BAJA STD PCD<30	>10% PUNTAS		D
	<10% PUNTAS	80> VIGOR	B, C