

PINOT NOIR RESEARCH IN THE VINEYARD FOR HIGH QUALITY PRODUCTION

(Or, Understanding the Provenance of Pinot
Noir...at the level of regions, vineyards, vines,
bunches and berries)

By **Dr Richard
Smart**

Thanks to Angela Sparrow
and Bob Dambergs and
Tamar Ridge









EXPERIMENTAL MICRO-VINIFICATION FACILITY

"Supporting the Tasmanian wine sector through research into wine quality"
Opened March 16th 2007

FUNDED BY:

- Guinn Limited
- Tasmanian Department of Economic Development
- Tamar Ridge Estates
- Tasmanian Institute of Agricultural Research















What we studied

- Berries

size, **shrivel**, **Botrytis** and
sun exposure

Bunches

phenology and **UV exposure**

Vines

vigour, **clone** and virus
infection

Berry level

- **Berry size** Clone 114, 20 microferment replicates
- Sorted berries, large 1.6 g, smaller 1.0 g
- Larger 23.2 Brix, smaller 24.1 Brix
- No effect on wine colour, phenolics and tannin

Berry level

- **Berry shrivel** 0.6 g, mix 0%, 10%, 30% with large, 3 reps
- Increased Brix 10%, pH, hue, total phenolics 40% and tannins 120%
- No effect on wine colour



Botrytis, very big impact

- Clone G5V15, 15 L ferments, mixed 0, 1, 2.5, 5, 10, 50% Botrytis berries with “clean” fruit.
- Botrytis can be detected on nose and palate at 1-2.5%!
- Botrytis increases Brix 11% , TA 36% and pH 3%
- Botrytis increases hue 39% and reduces anthocyanin -46% and total pigment -43%

Berry exposure

- Compared berries on bunches facing “outwards” and “inwards” for bunches on east and west sides of canopy.
- Clone G5V15 Wadenswil, 20 reps, half bunch plots
- Only significant effect was on pH, higher for east side +4%, and exterior +5%
- Tendency for lower brix, wine colour, anthocyanin, total phenolics and tannin with interior berries
- Tendency for reduced berry weight, wine colour, total pigment, total phenolics and tannin on west side



UV





Bunch exposure to UV radiation

- Compared bunches with and without UV exposure by filtering, and with less or more natural leaf shading from early veraison onwards
- Clone 114, microferments, single bunches, 10 replicates
- No UV dramatically increased Botrytis bunch rot +45%

Bunch exposure to UV radiation

- No UV caused substantially reduced sugar -6%, pH -4%, wine colour -30%, anthocyanins and total pigments -43%, total phenolics -46% and tannin -67%.
- Similar effect of **bunch shading** to lack of UV but generally less dramatic

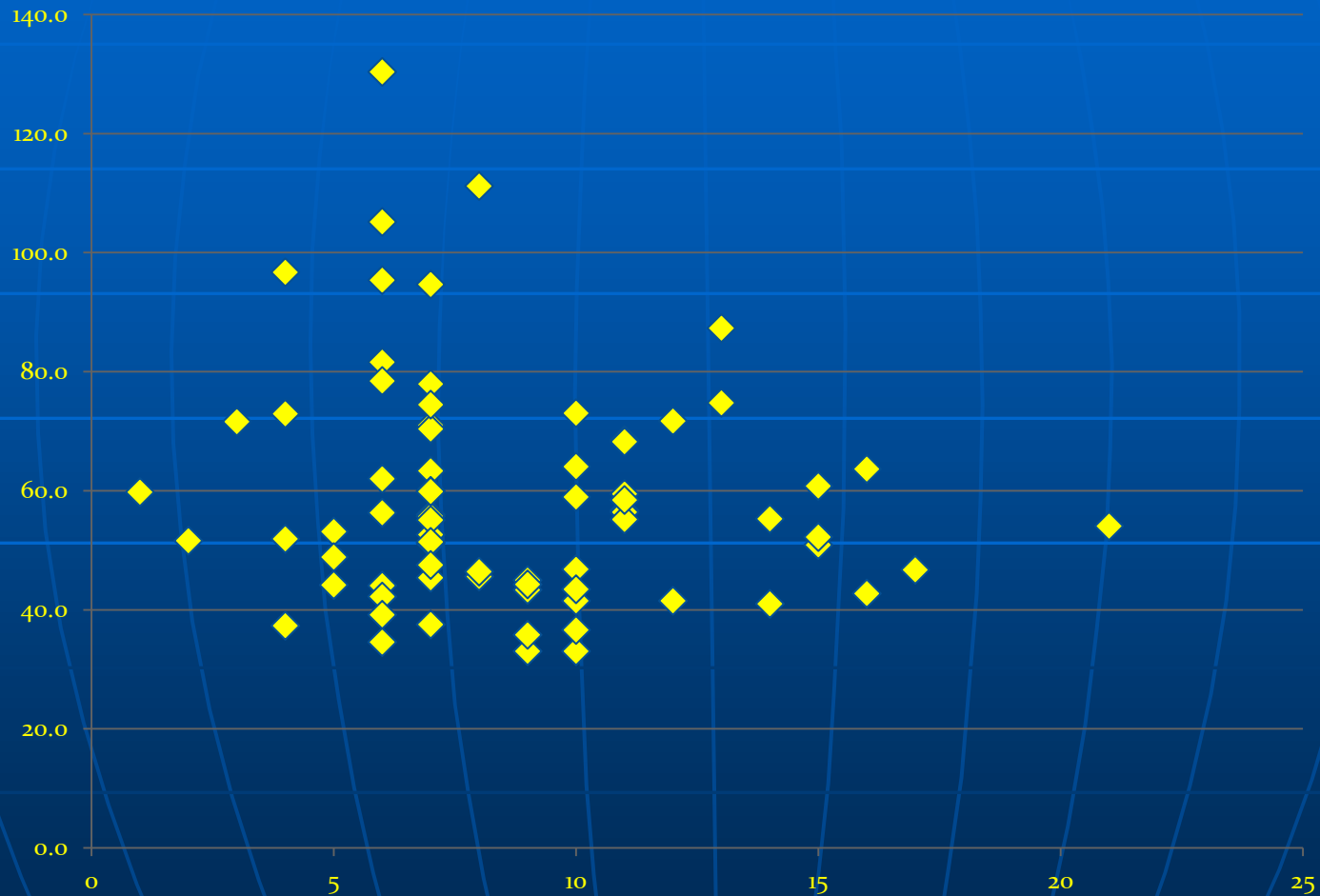


Bunch phenology

- Longer bunches flower earlier
- Earlier bunches to flower have longer flowering duration
- Earlier flowering bunches move into veraison earlier
- Earlier flowering bunches tend to have higher sugar, pigments, phenolics and tannin

Total phenolics and date of flowering

Phenolics



Date in December

Leafroll virus GLRaV-9 mild strain

- Clone D4V2 Pommard, 2008 vintage, 5 replicates
- Limited effect on fruit composition
- Virus **increases** total pigment +29%, total anthocyanin +44% and pH +3%
- 2007, 30 paired vine samples, virus **decreases** vine yield 14% and **increases** sugar 3%.

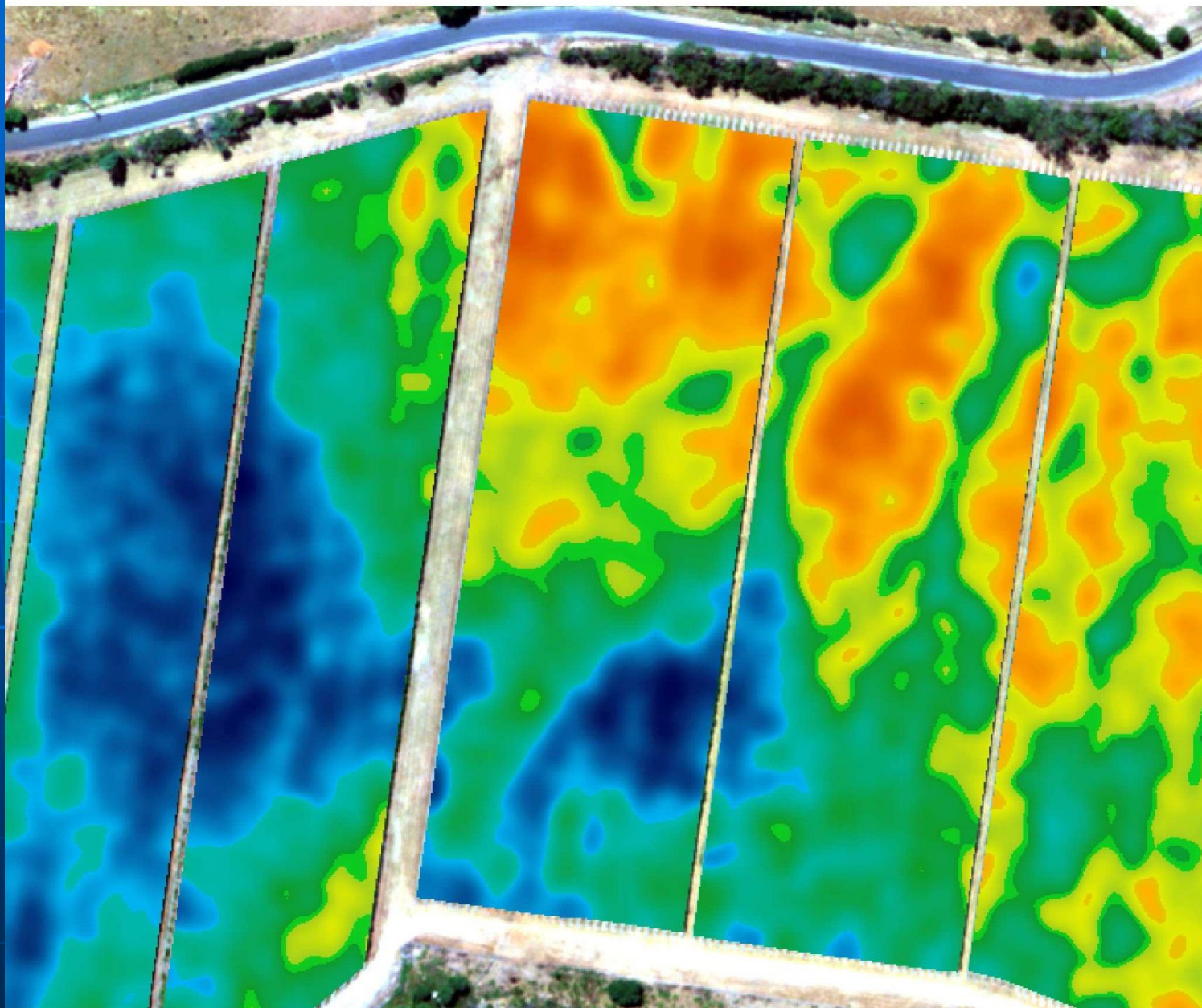
Clonal evaluation and selection at Tamar Ridge

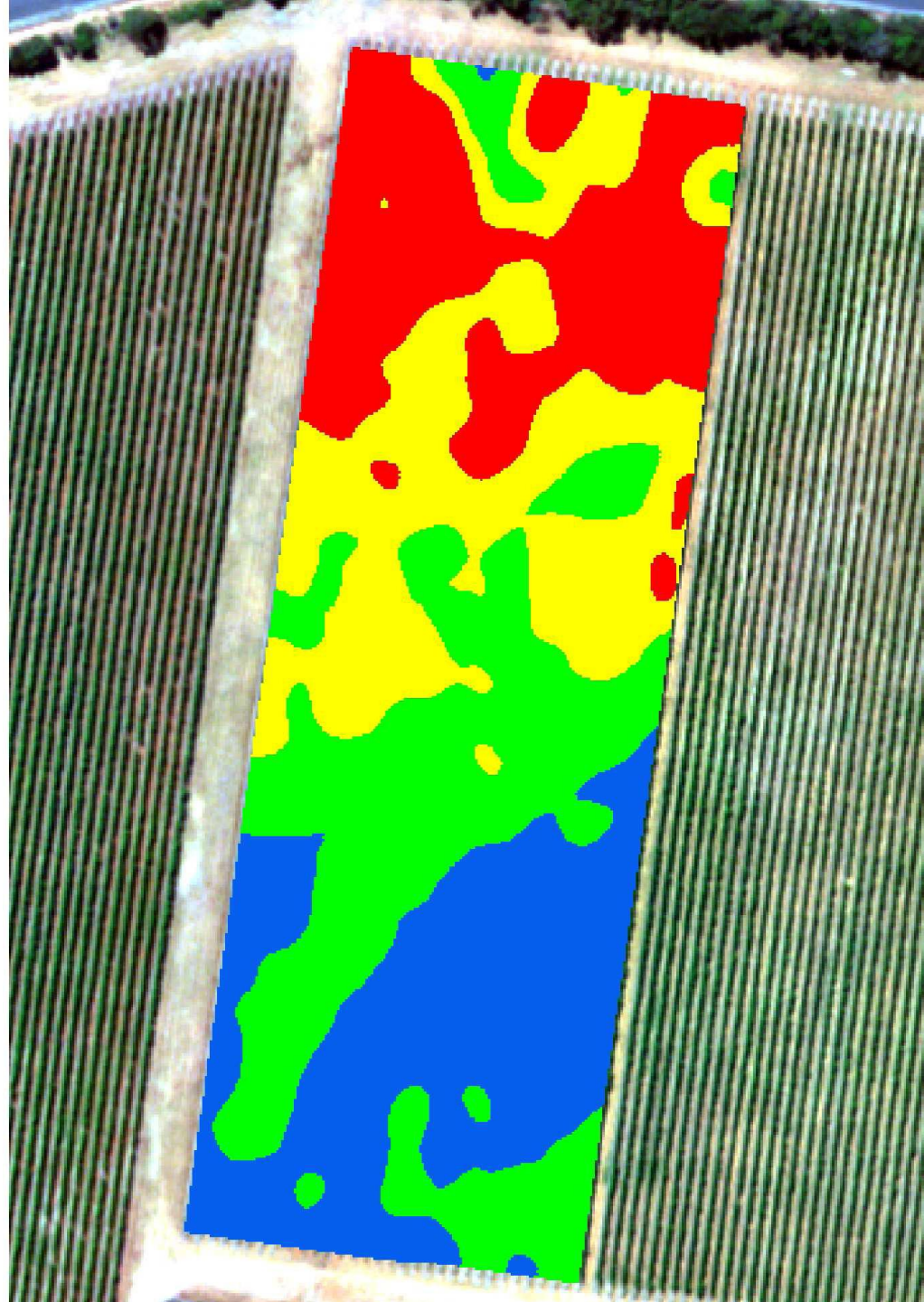
- Preferred clones D4V2
Pommard, 521, 115, 462,
D5V12, MV6, 292, G9V15 by
industry tasting
 - Made clonal selections
D4V2, MV6 at Tamar Ridge

Clones and composition

| Clone | Anthocyanin ionization % | Total anthocyanin mg/L | Colour Density | Colour Density SO2 corr | Hue | Total Phenolics | Tannin (g/L) | Total Pigment |
|---------|-----------------------------|---------------------------|----------------|-------------------------------|------|--------------------|--------------|---------------|
| 115 | 17.67 | 160.43 | 3.60 | 4.25 | 0.71 | 29.87 | 0.66 | 13.18 |
| 292 | 14.65 | 289.65 | 5.06 | 6.36 | 0.63 | 37.62 | 0.54 | 11.95 |
| 373 | 19.49 | 219.34 | 5.72 | 6.60 | 0.65 | 36.29 | 0.73 | 8.42 |
| 462 | 17.46 | 174.90 | 3.83 | 4.60 | 0.70 | 32.84 | 0.89 | 9.06 |
| 521 | 18.13 | 232.78 | 5.32 | 6.24 | 0.66 | 35.24 | 0.92 | 13.46 |
| 583 | 20.31 | 155.44 | 3.91 | 4.39 | 0.67 | 30.07 | 0.78 | 9.89 |
| 777 | 18.44 | 194.19 | 4.83 | 5.57 | 0.68 | 32.57 | 0.64 | 9.01 |
| BEST | 17.38 | 167.66 | 4.03 | 4.84 | 0.72 | 30.61 | 0.92 | 9.95 |
| D2V5 | 17.87 | 145.97 | 3.37 | 3.89 | 0.72 | 26.91 | 0.56 | 9.01 |
| D4V2 | 17.39 | 169.04 | 3.95 | 4.55 | 0.70 | 28.84 | 0.96 | 12.60 |
| G5V15 | 17.62 | 154.31 | 3.53 | 4.29 | 0.65 | 23.73 | 0.86 | 16.12 |
| G8V7 | 15.88 | 158.76 | 3.24 | 3.90 | 0.70 | 23.00 | 0.97 | 4.77 |
| MV6 | 17.23 | 207.24 | 4.56 | 5.60 | 0.67 | 32.04 | 1.04 | 13.46 |
| Average | 17.66 | 186.90 | 4.23 | 5.01 | 0.68 | 30.74 | 0.81 | 10.84 |







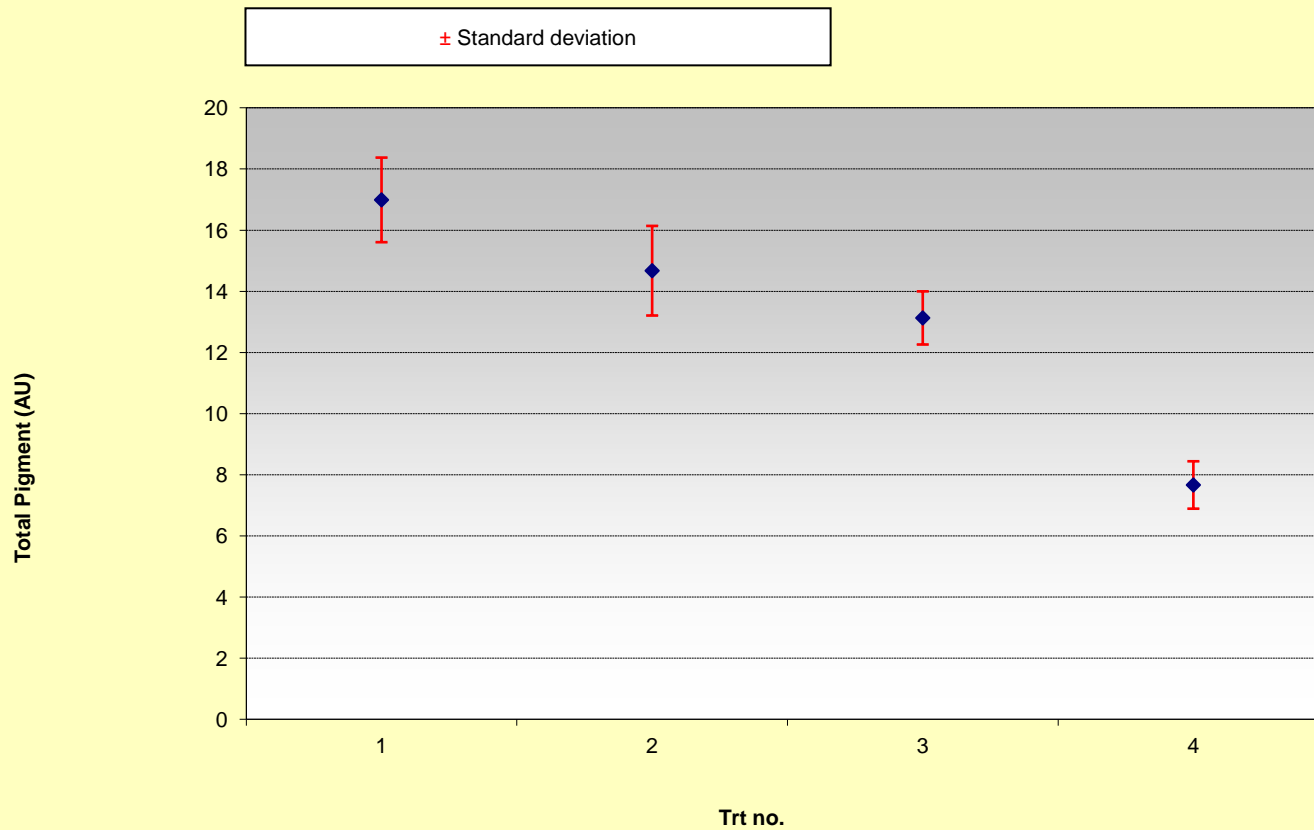
Vine vigour effects

- Goaty Hill vineyard, unknown clone, 1.82 ha, producing 10.6 t, variable top soil depth
- Aerial infrared image at veraison, divide into 4 vigour zones, wine made from bunch samples from each zone, microferment, 7 replicates
- Low vigour yield 1.6 kg/vine, high vigour 2.9 kg/vine

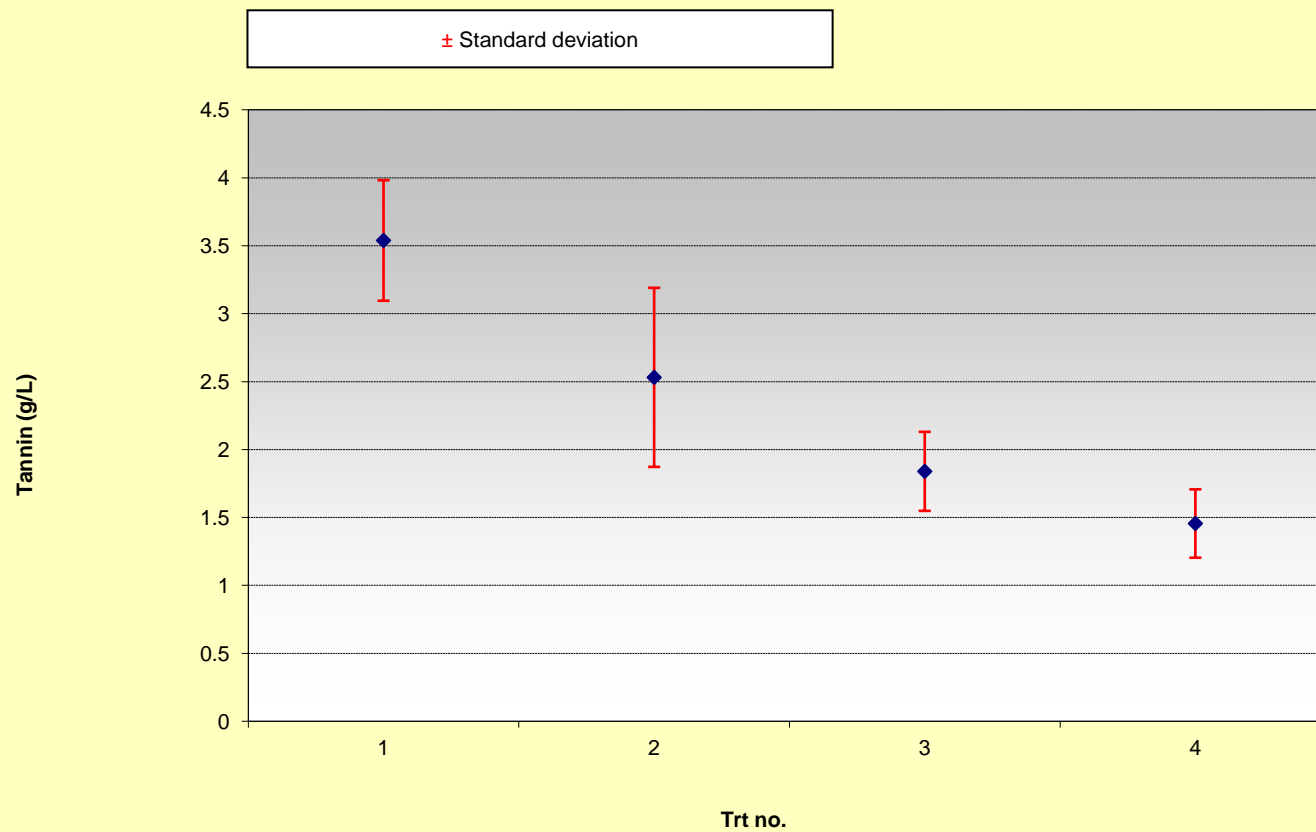
Vine vigour effects

- High vigour causes reduced Brix -8% and pH -3%, higher acidity +51%
- High vigour causes substantially reduced wine colour, anthocyanins, total pigments, total phenolics, and tannins, and increased hue

TOTAL PIGMENT



TANNIN





Thinning trial

- Clone G5V15, large bunches, high yield, 1999 planting
- 2.25 x 1.5 m, 2962 vines/ha, 7.6 t/ha 2009, 30 bunches/v
- Treatments, applied veraison, 50% thin
 - 1. Control, no thinning CONTROL
 - 2. Commercial, thin green fruit, THIN GREEN
 - 3. No thin, mark, ferment green fruit FERMENT G
 - 4. No thin, mark, ferment red FERMENT R
 - 5. Thin, remove red THIN RED

Applied to both Scott Henry, VSP, no difference

WINE COMPOSITION

No effect on:

Wine colour density

Total pigment

Anthocyanins

Hue

Total phenols

WINE COMPOSITION

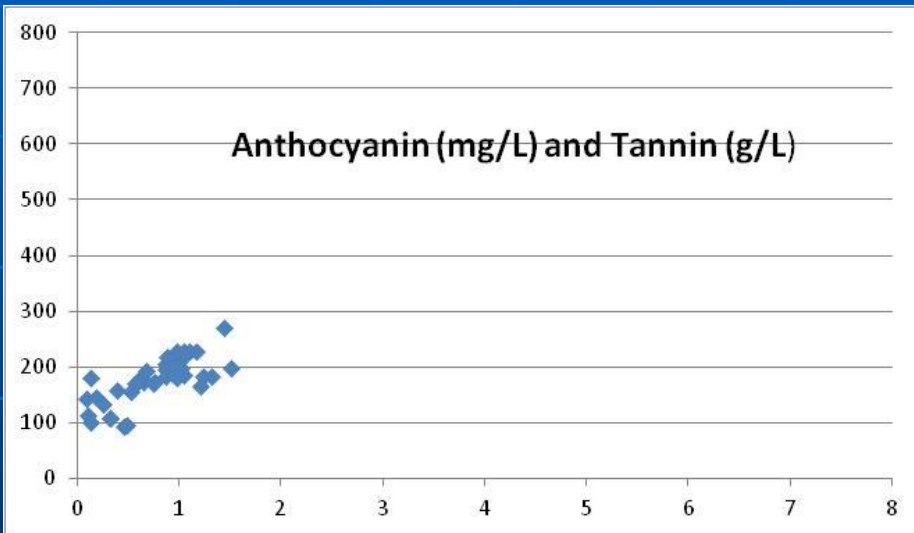
| TREATMENT | WINE pH | TANNINS |
|-----------|---------|---------|
| | | |
| 1 CONTROL | 3.08 | 1.55 |
| 2 THIN GR | 3.14 | 1.25 |
| 3 FERM GR | 3.11 | 1.75 |
| 4 FERN R | 3.16 | 1.28 |
| 5 THIN GR | 3.22 | 1.46 |

At the berry level.....

Berry size....no effect

Shrivel ..increased phenolics and tannins

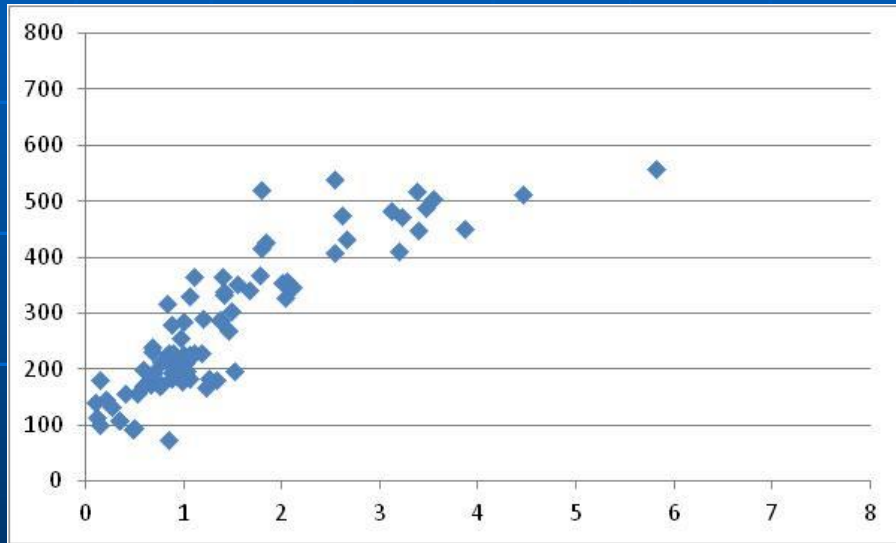
Berry backs more anthocyanin, less tannin



At the bunch level

Ultraviolet radiation

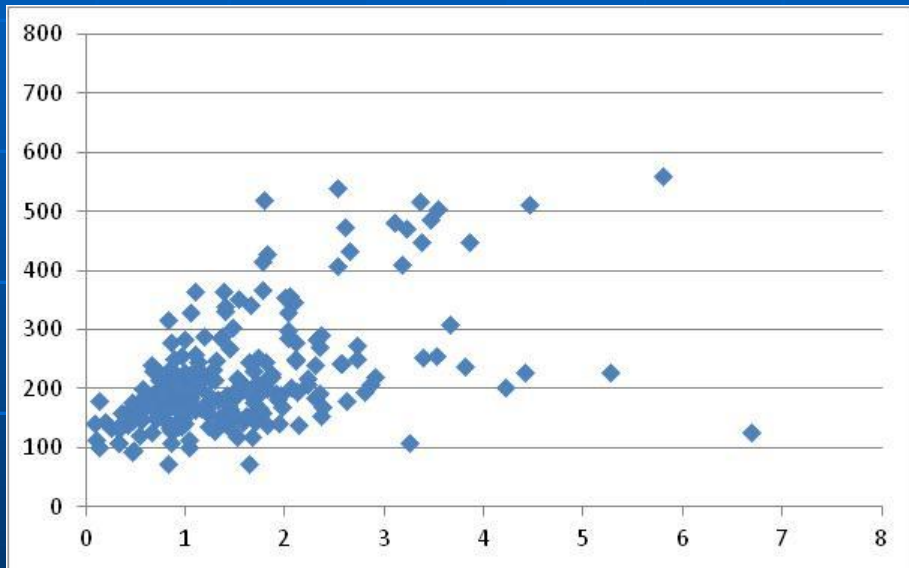
no UV increased
Botrytis, reduced
anthocyanins and
tannins



At the bunch level

**Bunches are
very
variable....**

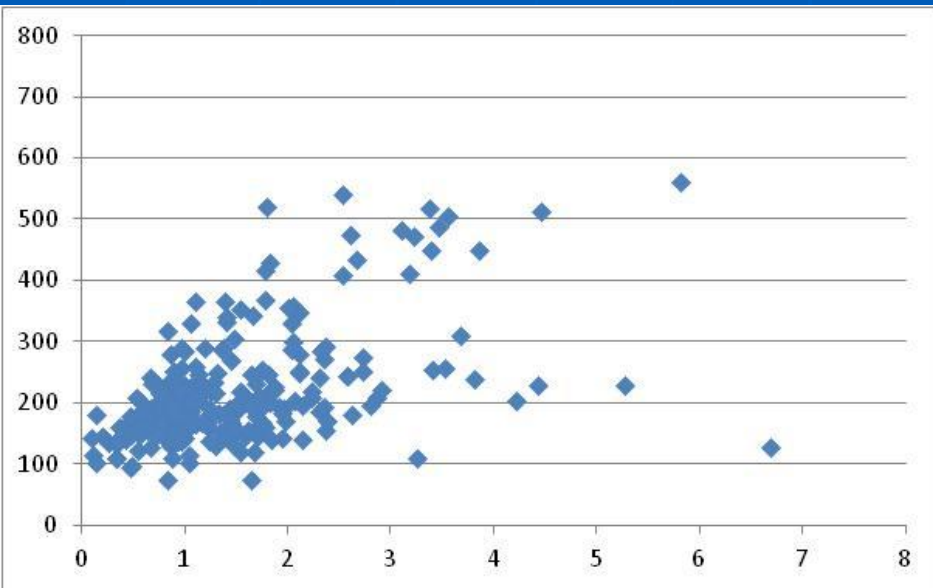
Related to bunch
size, and likely
primordial
development in
preceding
summer...and
winter



At the vine level

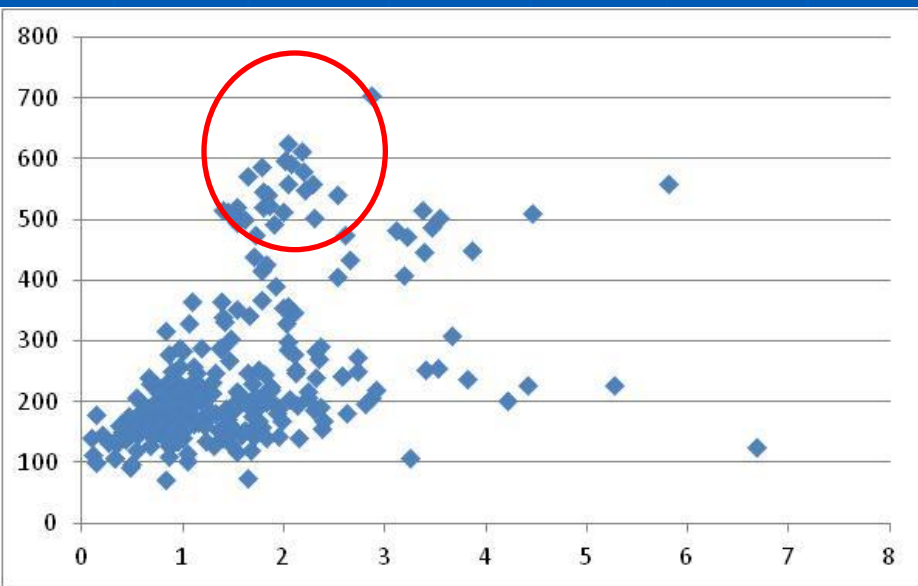
Evaluation of 13
commercial
clones.....

NO CHANGE



Vine level (cont'd)

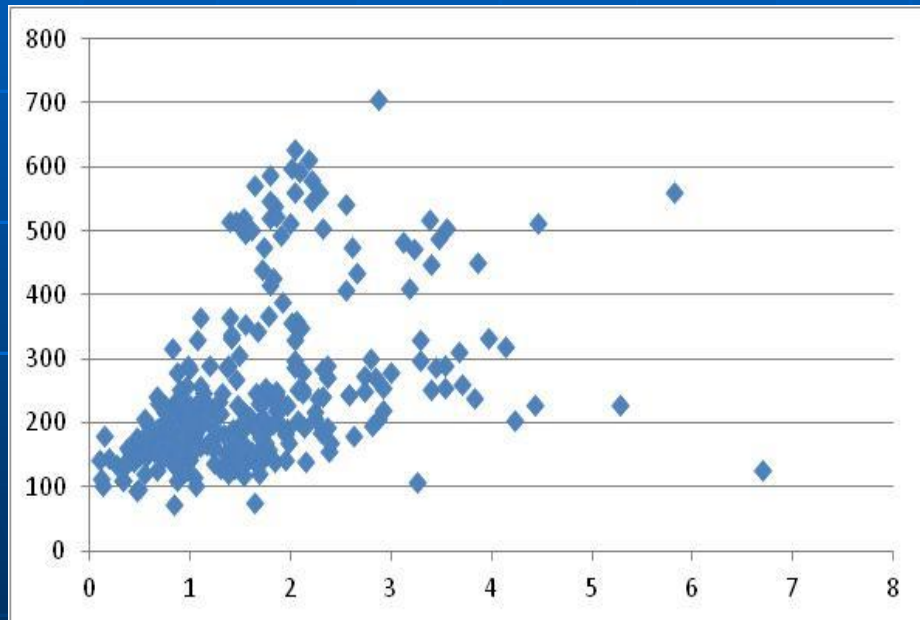
Selected 28 clones
within D4V2
"Pommard"
clone by Richard
Smart at Tamar
Ridge....



**TASMANIA'S
OWN
CLONES**

Vine level (cont'd)

Vine vigour



Not much
change....

CONCLUSION

- Very large variation due to Botrytis, somewhat smaller due to shrivel, forget berry size
- Bunch exposure is important, and UV is very significant
- Variation in vine vigour is very significant, and of all is easiest to manage
- Bunch variation is greatest, but difficult to understand and manage

Acknowledgements

- **Gunns**
- Tamar Ridge,
- and more recently Brown Bros,
- And Tasmanian Department of Economic Development, Ausindustry
- And last but not least,
- “the Pilot Winery Family” who did the work.....