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
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
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

Date in December

Phenolics

Total phenolics and date of flowering
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
<table>
<thead>
<tr>
<th>Clone</th>
<th>Anthocyanin Ionization %</th>
<th>Total anthocyanin mg/L</th>
<th>Colour Density</th>
<th>Colour Density SO2 corr</th>
<th>Hue</th>
<th>Total Phenolics</th>
<th>Tannin (g/L)</th>
<th>Total Pigment</th>
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</thead>
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<tr>
<td>115</td>
<td>17.67</td>
<td>160.43</td>
<td>3.60</td>
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<td>292</td>
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<td>37.62</td>
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<td>0.68</td>
<td>32.57</td>
<td>0.64</td>
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<td>BEST</td>
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<td>167.66</td>
<td>4.03</td>
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<td>30.61</td>
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<td>Average</td>
<td>17.66</td>
<td>186.90</td>
<td>4.23</td>
<td>5.01</td>
<td>0.68</td>
<td>30.74</td>
<td>0.81</td>
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</table>
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, microfermentation, 7 replicates
- Low vigour yield 1.6 kg/vine, high vigour yield 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
Tannin (g/L) ± Standard deviation
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

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>WINE pH</th>
<th>TANNINS</th>
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</thead>
<tbody>
<tr>
<td>1 CONTROL</td>
<td>3.08</td>
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<tr>
<td>2 THIN GR</td>
<td>3.14</td>
<td>1.25</td>
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<td>3 FERM GR</td>
<td>3.11</td>
<td>1.75</td>
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<tr>
<td>4 FERN R</td>
<td>3.16</td>
<td>1.28</td>
</tr>
<tr>
<td>5 THIN GR</td>
<td>3.22</td>
<td>1.46</td>
</tr>
</tbody>
</table>
At the berry level.....

**Berry size**....no effect

**Shriveling** ..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
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.....