Canopy management for sparkling grape production

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The starting point

Online survey

• Viticultural management practices

• Winemaking methods

• Helped develop trial methodology both in the vineyard and in the winery
Tasmanian online survey results

Clones
• Pinot Noir
  - D5V12 (77.3 %)
• Chardonnay
  - Penfolds (58.8 %)
  - I10V1 (41.2 %)

Rootstocks or own roots?
• 96% of vines are grown on own roots

Designation of parcels of fruit for sparkling production
• 45.5% designated sparkling blocks based on previous years
• 31.8% decision is made by the winemaker annually (ad hoc)
• 22.7% decide at pruning
• 18.2% decide close to harvest
• 4.5% decide when the crop load is known to be too high for table wine production.
Tasmanian online survey results

Pruning
  • Cane pruning preferred
    • 95 % of Chardonnay cane pruned
    • 91 % of Pinot Noir cane pruned

Bunch removal
  • 40 % Chardonnay
  • 52 % Pinot Noir

Shoot thinning
  • 47 % Chardonnay
  • 46 % Pinot Noir

Leaf removal
  • 38 % Chardonnay
  • 47 % Pinot Noir
Project methodology

Further investigation of common viticultural management practices in dedicated sparkling vineyards:

• Timing of leaf removal
  - Anecdotal evidence of impact on phenolics

• Crop load/target yield (pruning level)
  - Where is the yield ‘sweet spot’

• Pruning method (cane or spur pruning)
  - Some moves to mechanisation (larger plantings)

Measure fruit and base wine parameters, including phenolic profiles

Sparkling wine small scale (12 kg), standard vinification

Base wines also tiraged on a small scale
Leaf removal

2 locations

- Southern Tasmania, Coal River Valley, Tolpuddle Vineyard
- Northern Tasmania, Tamar Valley, Tamar Ridge Estates, Kayena Vineyard

2 varieties

- Pinot Noir (D5V12) and Chardonnay (I10V1)

3 treatments + control (4 replicates)

- Leaves removed pre-flowering
- Leaves removed at pea size
- Leaves removed at 50% veraison
Leaf removal at pea-size
Juice preparation:
Flat bed water-bag press
Pinot Noir basic fruit analysis

Southern and Northern 2010 grape analyses
  • No significant differences
    • TSS
    • TA
    • pH
    • Yield
    • Bunch number
    • Berry weight
    • Bunch weight
    • Grape total phenolics

Southern 2011 grape analyses
  • Leaf removal increased TA (lower K+ with exposure?)
  • No other significant differences

Northern 2011 grape analyses
  • No significant differences
Southern Chardonnay fruit analysis

2010 grape analyses
  ➢ No significant differences
    • TSS
    • TA
    • pH
    • Yield
    • Bunch number
    • Berry weight
    • Bunch weight
    • Total phenolics (A280)

2011 grape analyses
  ➢ TSS and TA increased by leaf removal
  ➢ No significant differences
    • pH
    • Yield
    • Bunch number
    • Berry weight, Bunch weight
    • Total phenolics (A280)
However .... UV spectral fingerprints of base wines show differences !!!

UV spectra 250-500 nm, 2010 Southern Chardonnay base wines
2010 Southern Chardonnay base wines – PCA clustering with UV spectra

Wine making repeatability

Veraison leaf removal had strongest treatment effect and clustered on PC2

Control separated from the other treatments
2010 Southern Chardonnay base wines – UV wavelengths that show treatment effects

- **280 nm**
  - Classical measure of total phenolics
  - Neutral
  - No importance

- **310 nm** and **330 nm**
  - Positive loading peaks
  - Hydroxycinnamates?

- **260 nm**
  - Negative loading (identity???)
2011 Southern Chardonnay base wines – Pre-flowering leaf removal had the strongest effects
Wine shows stronger treatment effects than juice?
Timing of leaf removal treatment summary

• Little fruit composition effect or traditional measure of total phenolics

• Spectral fingerprinting of juice and base wines indicates individual phenolic compounds are affected by the leaf removal treatments

**Varietal effect** – leaf removal had more impact in Chardonnay than Pinot

**Regional effect** – leaf removal had more impact in Southern Tasmania than Northern Tasmania

**Seasonal effect** - In the same vineyard leaf removal timing effects vary with season
Pinot Noir crop load
(pruning level)

3 treatments – cane pruned, 114 (8418)
• Low – 10 nodes/vine
• Medium – 40 nodes/vine
• High – 60 nodes/vine
## Pinot crop load (pruning level)

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
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<th>2011</th>
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<tbody>
<tr>
<td></td>
<td>Yield (t/ha)</td>
<td>TSS (°Be)</td>
<td>pH</td>
<td>TA (g/L)</td>
<td>Total phenolics (mg/g)</td>
<td>Yield (t/ha)</td>
<td>TSS (°Be)</td>
<td>pH</td>
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<tr>
<td>Low</td>
<td>4.1 a&lt;sup&gt;x&lt;/sup&gt;</td>
<td>10.5 b</td>
<td>2.97</td>
<td>13.05</td>
<td>1.83 a</td>
<td>6.0 a</td>
<td>10.9 b</td>
<td>3.27 b</td>
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<tr>
<td>Medium</td>
<td>7.7 b</td>
<td>10.6 b</td>
<td>2.98</td>
<td>11.87</td>
<td>1.95 ab</td>
<td>7.4 a</td>
<td>10.9 b</td>
<td>3.18 a</td>
</tr>
<tr>
<td>High</td>
<td>9.8 b</td>
<td>10.0 a</td>
<td>2.96</td>
<td>12.60</td>
<td>2.09 b</td>
<td>13.6 b</td>
<td>10.2 a</td>
<td>3.17 a</td>
</tr>
</tbody>
</table>

<sup>x</sup> Data shown are means of four replicates. Data with the same letter are not significantly different at 5% probability when analysed by Fisher’s Protected L.S.D. test.

With high bud number, slightly lower TSS and higher total phenolics in 2010
With high bud number, slightly lower TSS and pH in 2011
2010 Pinot Noir base wines – treatment effects can be seen in the UV spectra.
2010 Pinot Noir base wines – Similar wavelength feature again!!

Loadings

Strongest effects with 310 and 330 nm

X-variables (PC-1) (93%)
Pinot Noir crop load summary

• Delayed rate of maturation as a result of increased crop load from winter pruning (TSS)

• Juice and base wine phenolic profiles are linked with crop load

• As winter pruning occurs before we know the seasonal weather, most likely that crop thinning may need to be utilised as well to achieve the desired phenolic profile in the base wines
What do the effects mean?

- 330 nm peak is high in first press fractions.
- 260 nm peak is high in second press fractions.
- 280 nm peak is not affected.

Similar effects for both Chardonnay and Pinot Noir.
Take home messages

• Juice and wine phenolic profiles are influenced by exposure and crop load

• Timing of exposure effects is both site and season dependant

• Traditional methods for measuring total phenolics are of little use with the low extraction rates used to prepare sparkling juice

• We may be able to develop a new simple assay for readily extractable phenolics