Growing your blend

2018 Georgia Wine Producers Conference

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Cain Hickey
Why blend?

• Single cultivar does not have the desired:
  
  • **Composition**
    • Therefore, sensory features and microbial stability (i.e. pH)
    • Vintage-dependent?
  
  • **Name**
    • i.e. Hybrids, American cvs.
Why blend?

• Regardless of definition of “quality”, blending:
  • Increases wine quality
  • Increases wine complexity

• Makes a good wine great
• Makes two (three, four...) bad wines into a good wine
Vineyard considerations - “Growing Your Blend”

• **CULTIVARS** – greatest effect on sensory attributes (duh)
  • Clone?

• **MANAGEMENT**
  • Planting site (block, region)
  • Harvest decision
  • Canopy management
  • Crop thinning
  • Rootstock

• **VINTAGE**

• **CASE STUDIES**
cultivars
Why grow different grape cultivars?

• In the case of this talk...
  • ... to make wine blends

• Differences in traits can be advantageous:
  • Phenology
    • Bud break (i.e. spring frost risk)
    • Harvest
  • Cold hardiness
  • Required inputs (i.e. disease tolerance)
  • Tonnage (quantity)
  • Fruit composition (quality)
Phenology

• “Hedging your bets”
  • Spring frost risk
    • Whites
      • earlier bud break compared to reds
  • Hurricane season
    • Whites
      • Harvested before wet weather arrives

• “Spreading your work”
  • Harvest work load
    • Reds
      • harvested later than whites

Relative Dates of Bud Burst of Selected Grape Cultivars

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Time of Bud Burst (days)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chenin blanc, Chardonnay</td>
<td>0</td>
</tr>
<tr>
<td>Gewürztraminer, Viognier</td>
<td>1</td>
</tr>
<tr>
<td>Pinot blanc</td>
<td>2</td>
</tr>
<tr>
<td>Pinos gris, Pinot noir, Merlot</td>
<td>3</td>
</tr>
<tr>
<td>Petite Verdot, Tannat</td>
<td>5</td>
</tr>
<tr>
<td>Riesling, Cabernet Franc, Semillon</td>
<td>6</td>
</tr>
<tr>
<td>Grenache, Muscat Ottonel</td>
<td>7</td>
</tr>
<tr>
<td>Sauvignon blanc, Syrah, Tempranillo</td>
<td>8</td>
</tr>
<tr>
<td>Carignan, Marsanne</td>
<td>10</td>
</tr>
<tr>
<td>Counoise</td>
<td>13</td>
</tr>
<tr>
<td>Cabernet Sauvignon, Mourvedre</td>
<td>14</td>
</tr>
</tbody>
</table>

*Relative dates of bud burst based on 38 year average at INRA Vassal Station - Languedoc (ENTAV-INRA, 1995).
Cold hardiness

• Differences in cold hardiness across genetically-distinct grapevine “groups”:

  American cvs. (< -15°F) 
  > 
  French hybrids (< -10°F) 
  > 
  *vinifera* (< -5°F)
  • Cabernets > Viognier, Merlot

Figure 1. Vine Acclimation from Fall thru Spring
Does crop value exceed production costs?

- Production costs:
  - *vinifera* bunch grapes
  - Hybrid bunch grapes
  - American cvs.

- Crop value (per unit weight):
  - *Vinifera* bunch grapes
  - Hybrid bunch grapes
  - American cvs.

An independent grower will look at this differently than a vineyard/winery enterprise...
Required inputs
(mainly speaking about pesticides)

- Differences in required inputs:

  * *vinifera* > French hybrids > American cvs.*
Tonnage

- An extremely practical and economical consideration

- High tonnage producers DO NOT have less favorable composition and wine quality potential

- Crop yield can be limited by trellis system employed
  - VSP vs. GDC

- Chambourcin, Chardonel, Vidal blanc, Norton
  - Bordeaux reds
  - Chardonnay, Sauvignon blanc, Albariño
  - Viognier, Petit Manseng
Fruit composition

**PRIMARY:**
- Sugar
  - alcohol potential and RS potential
  - “hotness” and “roundness”
- Acid
  - astringency, structure
- pH
  - wine stability, color stability and intensity

**SECONDARY:**
- Aromatics
  - norisoprenoids, methoxypyrazines, terpenes, thiols
- Phenolics
  - Color (anthocyanins and co-pigments)
  - Mouthfeel (tannins and co-pigments)

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**Components of Red Wine Mouthfeel**

The following is an outline of a presentation given at Wineries Unlimited, 2004, on mouthfeel issues. Additional information on this subject can be found under *Enology Notes*.

The balance of mouthfeel components can be viewed as a wine quality measure. Indeed, balance and harmony are two descriptors used to denote wine quality.

The importance of balance and harmony was certainly highlighted during the 2003 and 2004 grape growing seasons in Virginia.

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**Palate Balance Equation**

\[
\text{Sweet} \quad \equiv \quad \text{Acid} \quad + \quad \text{Phenolics}
\]

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Organic acids</th>
<th>Skin, seed, and stem phenols</th>
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<tbody>
<tr>
<td>Polysaccharides</td>
<td>Enological tannins</td>
<td>Barrel phenols</td>
</tr>
</tbody>
</table>
| Ethanol | Volatile phenols | }

*EX: Petit Manseng*
Choosing cultivars to make blends

• Main consideration:
• WHAT DO YOU WANT TO PRODUCE (what is your market)?
  • Meritage blends
  • All-
  • Hybrid-
  • American-Hybrid-
  • Muscadine blends

https://doubleavineyards.com/chardonel
Must consider what each variety offers...

• Reds:
  • Chambourcin, Norton
    • tonnage/volume, balanced primary chemistry, color
  • Bordeaux reds
    • tannins, structure, color and aroma

• Whites
  • Chardonel, Vidal blanc
    • tonnage/volume, balanced primary chemistry
  • Petit Manseng
    • acidity and strong aromatics
  • Muscat Ottonel, Sauvignon blanc, Albariño
    • strong aromatics

• Sample “white blend” thought process:
  • Vidal blanc - tonnage and “balanced” primary chemistry
  • Petit Manseng - aromatics and acidity, but less tonnage
Think about the “robustness” across vintages

• Tried and true:
  • Chambourcin, Chardonel, Vidal blanc, Traminette, Petit Verdot, Cabernet franc, Petit Manseng, Norton

• More vintage-dependent:
  • Cabernet Sauvignon, Merlot, Viognier, Chardonnay, Malbec, Sangiovese, Tannat

https://www.virginiawine.org/varietals/chambourcin
How much of each cultivar should I plant?

• Enough to:
  • Be a viable independent grower and/or not be “pesky” in winery
    • At least a half of an acre for blended cultivars
    • At least one acre for non-blended cultivars

Consider tonnage per acre (may need less acreage of high-yielding cultivars...)

• Meritage:
  • 80-85% (total) - Cabernet franc, Cabernet Sauvignon, Merlot
  • 15-20% - Petit Verdot
What about clones?

- **Clones are genetically-distinct**
  - High probability of differences in fruit composition (acids, sugars, aromas)

- Assumption (that is probably true):
  - Field blending of more than one clone creates a more complex wine.

- “More complex” DOES NOT mean “more preferred”.

<table>
<thead>
<tr>
<th>Two Cabernet franc clones in 2017</th>
<th>Soluble solids (Brix)</th>
<th>pH</th>
<th>TA (g/L)</th>
<th>Berry weight (g)</th>
<th>Crop yield (t/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>214</td>
<td>22.8</td>
<td>3.66</td>
<td>3.66</td>
<td>1.47</td>
<td>4.6</td>
</tr>
<tr>
<td>327</td>
<td>22.4</td>
<td>3.72</td>
<td>3.53</td>
<td>1.55</td>
<td>4.6</td>
</tr>
</tbody>
</table>
Considering our regional climate trends...

Temperature < or = -12.2°C contour lines
1972-1997 (25-year average)
- 1 day (very high risk areas to the South and East)
- 2 days (high risk areas to the South and East)
- 3 or more days (moderate risk areas to the South and East and low risk areas to the North and West)

1972-1997
- Pierce’s disease positive sites
- Pierce’s disease negative sites

1997-2005
- 1 day (very high risk areas to the South and East)
- 2 days (high risk areas to the South and East)
- 3 or more days (moderate risk areas to the South & East and low to no risk areas within boundary)
- Pierce’s disease positive sites
- Pierce’s disease negative sites
management
Planting site

• Block
  • North- vs. south-facing
  • Slope vs. flat
    • Both of these situations could be used to increase complexity
      • From one or several varieties

• Region
  • Local climate as it relates to fruit composition
    • Cool/rainy – low sugar, high acid
    • Warm/dry – low acid, high sugar
Harvest decision

• Blending allows some hedging of bets...
  • Can be “conservative” on some harvests
    • Merlot vs. other Bordeaux cultivars

• Sauvignon blanc, Blanc du Bois, Petit Manseng, Muscat ottonel, Albariño?

• Some metabolites are easier to adjust than others
  • Easy: Primary chemistry (sugar, acid)
    • Brix can be purchased at Costco
  • Difficult: aromatics, structural
Harvest decision – sometimes difficult to get “ideal” composition and low rot severity...

- 2016 vs. 2017
- Blanc du Bois
- Merlot
Canopy management – used to manipulate secondary metabolites

• Shoot positioning and hedging
  • Increasing exposed leaf area / limiting canopy shading
    • SHOULD increase sugar accumulation

• Fruit-zone leaf and lateral removal
  • Well-exposed fruit typically has more varietal character expression
Fruit-zone exposure

- Fruit-zone management can be used as a tool to change composition, and thus blending components

- Exposed:
  - Lower acidity, greater character, ability to hang if desired (lower rot)

- Shaded:
  - Greater acidity, less “hang-time” potential
### Fruit-zone leaf removal – color and phenolics

Leaf removal and canopy side effect on berry weight and total berry phenolics and anthocyanins.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Berry weight</th>
<th>TBA (mg/g berry)</th>
<th>TBP (au/g berry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB-NO</td>
<td>1.47 a</td>
<td>0.83 b</td>
<td>62.99 c</td>
</tr>
<tr>
<td>PB-4</td>
<td>1.37 a</td>
<td>1.00 a</td>
<td>78.45 b</td>
</tr>
<tr>
<td>PB-8</td>
<td>1.17 b</td>
<td>1.02 a</td>
<td>86.33 a</td>
</tr>
</tbody>
</table>

**Canopy side**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST</td>
<td>n/a</td>
<td>0.94</td>
<td>75.75</td>
</tr>
<tr>
<td>WEST</td>
<td>n/a</td>
<td>0.95</td>
<td>76.11</td>
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**Components of Red Wine Mouthfeel**

The following is an outline of a presentation given at Wineries Unlimited, 2004, on wine mouthfeel issues. Additional information on this subject can be found under Enology Notes.

The balance of mouthfeel components can be viewed as a wine quality measure. Indeed, balance and harmony are two descriptors used to denote wine quality.

The importance of balance and harmony was certainly highlighted during the 2003 and 2004 grape growing seasons in Virginia.

**Palate Balance Equation**

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<th>Acid</th>
<th>Phenolics</th>
</tr>
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<tr>
<td>Carbohydrates, Polysaccharides, Ethanol</td>
<td>Organic acids</td>
<td>Skin, seed, and stem phenols, Barrel phenols, Enological tannins, Volatile phenols</td>
</tr>
</tbody>
</table>
# Fruit-zone leaf removal – acidity

## Leaf removal effect on titratable acidity

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Titratable acidity (g / L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PB-NO</td>
<td>7.96</td>
</tr>
<tr>
<td>PB-4</td>
<td>7.42</td>
</tr>
<tr>
<td>PB-8</td>
<td>7.01</td>
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</tr>
<tr>
<td>Ethanol</td>
<td></td>
<td>Enological tannins</td>
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</tbody>
</table>

Volatile phenols
### Fruit-zone leaf removal - acidity

<table>
<thead>
<tr>
<th></th>
<th>TA (g/L)</th>
<th>Tartaric</th>
<th>Malic</th>
<th>Citric</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>10.11 a</td>
<td>4.38</td>
<td>5.74</td>
<td>0.39</td>
</tr>
<tr>
<td>PFS-4</td>
<td>9.02 b</td>
<td>4.43</td>
<td>5.43</td>
<td>0.41</td>
</tr>
<tr>
<td>PFS-6</td>
<td>8.50 b</td>
<td>4.35</td>
<td>4.96</td>
<td>0.36</td>
</tr>
</tbody>
</table>
Fruit-zone leaf removal – aromatic potential
Fruit exposure is an important tool to increase aromatics
Fruit zone leaf removal vs. clone effect

Two Cabernet franc clones in 2017

<table>
<thead>
<tr>
<th></th>
<th>Soluble solids (Brix)</th>
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<tr>
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<td>3.53</td>
<td>1.55</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Leaf removal effect in Cabernet franc clone 214 in 2017

<table>
<thead>
<tr>
<th></th>
<th>Soluble solids (Brix)</th>
<th>pH</th>
<th>TA (g/L)</th>
<th>Berry weight (g)</th>
<th>Crop yield (t/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>22.9</td>
<td>3.66</td>
<td>3.77 a</td>
<td>1.50</td>
<td>4.6</td>
</tr>
<tr>
<td>PB-SIX</td>
<td>23.1</td>
<td>3.70</td>
<td>3.50 b</td>
<td>1.45</td>
<td>4.4</td>
</tr>
<tr>
<td>PFS-SIX</td>
<td>22.5</td>
<td>3.61</td>
<td>3.71 ab</td>
<td>1.45</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Leaf removal effect in Cabernet franc clone 327 in 2017

<table>
<thead>
<tr>
<th></th>
<th>Soluble solids (Brix)</th>
<th>pH</th>
<th>TA (g/L)</th>
<th>Berry weight (g)</th>
<th>Crop yield (t/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>22.2</td>
<td>3.68 b</td>
<td>3.78</td>
<td>1.60</td>
<td>5.0</td>
</tr>
<tr>
<td>PB-SIX</td>
<td>22.8</td>
<td>3.76 a</td>
<td>3.29</td>
<td>1.54</td>
<td>4.2</td>
</tr>
<tr>
<td>PFS-SIX</td>
<td>22.1</td>
<td>3.72 ab</td>
<td>3.51</td>
<td>1.49</td>
<td>4.5</td>
</tr>
</tbody>
</table>
Crop thinning – will change leaf area: fruit weight... ... and Brix levels... maybe
Crop yield vs. Brix

Take home on Crop yield vs. Brix:

--Don’t shoot yourself in the foot

--Set your crop by shoot thinning

--Crop thin when necessary (i.e. touching clusters)
Trellis – especially re: tonnage

- The most ubiquitous trellis system – VSP
  - Easy
  - Cost effective

- Limits
  - Fruit production confined to single, linear zone
  - Leaf area confined between two tight catch wires
Rootstock choice

• Rootstock effects on crop yield and fruit composition

  • Likely indirect effects of
    • water and nutrient translocation
    • fruit set and berry weight
    • and canopy architecture

<table>
<thead>
<tr>
<th>Rootstock effect in Cabernet Sauvignon, 2010-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop yield (kg / vine)</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>101-14</td>
</tr>
<tr>
<td>420-A</td>
</tr>
<tr>
<td>Riparia</td>
</tr>
</tbody>
</table>
vintage
field and winery blending
**Vintage effect on blending**

- **Eastern US has some dramatically different vintages...**
  - Different cultivars used to blend
  - Different proportions of same cultivar

- **Do you blend to?:**
  - make the best wine ever produced
  - “save” a vintage
  - make balanced wines

- **Non-vintage blends**
  - 2010 vs. 2011 in Virginia
  - 2016 vs. 2017 in northern Georgia

<table>
<thead>
<tr>
<th></th>
<th>Harvest date</th>
<th>Brix</th>
<th>pH</th>
<th>TA</th>
<th>Rot</th>
<th>Color</th>
<th>Phenolics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Sep 10</td>
<td>25</td>
<td>3.42</td>
<td>5.39</td>
<td>NONE</td>
<td>39.8</td>
<td>31.3</td>
</tr>
<tr>
<td>2011</td>
<td>Oct 10</td>
<td>21</td>
<td>3.41</td>
<td>5.47</td>
<td>LOTS</td>
<td>38.7</td>
<td>33.2</td>
</tr>
</tbody>
</table>
Considerations for field vs. winery blending

**Field:**
- Extensive pre-planning required
  - differences in harvest date and phenology, both impacted by vintage
- Maybe best reserved for clones
- Less “control” than winery
- Interplanting missing vines with different cultivar
  - Consider phenology differences
Considerations for field vs. winery blending

• **Winery:**
  • Bench blending is a “reserved tool” to craft and create final wine
  • Can use several different cultivars
  • Post-fermentation vs. pre-bottling
    • Pros / cons?
case studies
Meritage blend
Hodder Hill (Glen Manor, VA)

*Varietals*

**2009**  63% Cabernet Sauvignon, 25% Merlot, 6% Petit Verdot and 6% Cabernet Franc

**2010**  69% Cabernet Sauvignon, 21% Merlot, 10% Petit Verdot

**2012**  64% Cabernet Sauvignon, 18% Merlot, 14% Petit Verdot, 4% Cabernet Franc

https://www.virginiawine.org/governors-cup-2012/awards#Gold
Hybrid-<i>vinifera</i> red wine blend
Three Captain’s Red (Zephaniah, VA)

- Chambourcin (45%)
  - ~8-9 tons / acre
  - High wire

- Cabernet franc (45%)
  - ~6-7 tons per acre
  - Ballerina

- Cabernet Sauvignon (10%)
  - ~4-5 tons per acre
  - VSP
Hybrid-vinifera white wine blend
Steamship White (Zephaniah, VA)

• Chardonel

• Chardonnay

• Whole cluster-pressed Cabernet Sauvignon
Hybrid-\textit{vinifera} rosé
Rosé (Zephaniah, VA)

- Bled Chambourcin
- Bled Cabernet franc

[Link to article](http://www.winethirtyflight.com/blog/2016/11/14/zephaniah)
Hybrid-\textit{vinifera} white wine blend

ZUSA (Crane Creek, GA)

\begin{itemize}
  \item Gruner Veltliner (75-80%)
  
  \item Traminette and Riesling (20-25%)
\end{itemize}

http://heelsfirsttravel.boardingarea.com/2016/06/30/best-north-georgia-winery/
American-*vinifera* red wine blend
Hellbender Red (Crane Creek, GA)

• Norton (~80-85%)
• Cabernet franc (~15-20%)

• Age for 3.5 years in American oak
  • Attenuates Norton astringency
    • Could use fining agents... may knock some of the desired attributes from Norton
Take home

• Know your market
  • It’s fiscally responsible

• Target blends that satisfy you
  • More importantly, satisfy customers

• Choose cultivars wisely
  • that allow you to make targeted blends
  • that work well in our challenging region
  • That balance tonnage and composition

• Use tools (site selection, management practices) to further dial in the desired composition from your blending components
  • Fruit zone management has greater impact on compositional attributes than crop thinning.
Thank you.

Tremain Hatch, Stephen and Joyce Rigby, Eric Seifarth, Nate Walsh, Bruce Zoecklein