Pruning for Vine Balance

From the writings of

Paul Verdegaal

Plus the experience and teaching of

Craig Macmillan

Craig D. Macmillan, Ph.D., Technical Program Manager

What is Vine Balance?

What are We Balancing?
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Vegetative Growth to Reproductive Growth
What is Vine Balance?

What are We Balancing?

*Vegetative Growth to Reproductive Growth*

...or are we really balancing...
What is Vine Balance?

What are We Balancing?

*Vegetative Growth to Reproductive Growth*

...or are we really balancing...

*Tonnage to Wine Quality*
What is Vine Balance?

What are We Balancing?
   \textit{Vegetative Growth to Reproductive Growth}
   ...
or are we really balancing...
   \textit{Tonnage to Wine Quality}
   ...
   which is really...
What is Vine Balance?

What are We Balancing?

*Vegetative Growth to Reproductive Growth*

...or are we really balancing...

*Tonnage to Wine Quality*

...which is really...

*Grower Revenue to Winery Revenue*
Finding a Balance

Green is fruit and canopy; Purple is wine quality
Over cropped or over vigorous vines lead to poor wine quality.
Finding a Balance

Some belief that less fruit and less canopy lead to better wine quality. This is true to a point, but it is hard for the grower to make a profit when yields are too low.
The goal is balance. Balanced vines produce an economically viable quantity of fruit and high quality wines.
Evolutionary Strategies of *Vitis Vinifera*

Primary goal: Survival
- Individual organism
- Genes of species

- Increase storage capacity (Woody tissue)
- Physically colonize space (Shoots)
- Spatial dispersal of genes (Fruit)
Vine Self-Regulation

Vine self-regulates to achieve the most advantageous outcome.

*Storing Resources*

*Capturing Resources*

**Signs of Self-Regulation: Resources Plentiful**

- Long shoots
- Large leaves
- Laterals
- Explosive growth after green pruning
- Large berries/clusters
- Second crop
- Buds pushing mid-season

**Signs of Self-Regulation: Resources Scarce**

- Short shoots
- Small leaves
- Struggles after green pruning
- Small berries/clusters
- Downward spiral
Pruning and Vine Balance

“Most of this is fairly common sense and has been learned by all grape growers at one time in their life. The reason it’s worth mentioning is that sometimes basic principles go by the wayside during particularly good times or especially bad times.”

From:
“Pruning and Vine Balance”
by Paul Verdegaal, San Joaquin County Farm Advisor
In LWWC Research/IPM Program Update, December 2003
How is Vine Balance Achieved?

• Trellising
• Training
• Dormant Pruning
• Canopy Management?
• Green Pruning?
Pruning versus Sanitation

- Pruning is removing living tissue to affect physiology.
- Dead (or diseased) tissue removal is sanitation.
Capacity and Vigor

• *Capacity* is the **total possible growth** and production of the vine during the growing season.

• *Vigor* is the **rate** of growth.

• What we call “vigorous” is the overproduction of shoots and leaves in relation to crop load.
Capacity and Vigor

• In-season assessment
  – Shoot growth rate
  – Shoot length
  – Percent active shoot tips at veraison
Capacity and Vigor
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Capacity and Vigor

“If a vine is in balance, it has just enough shoot growth to produce the crop level the grower needs, while providing the quality the winemaker wants.

A very general guideline would be about 42 inches of shoot, give or take 6 inches.”

From:
“Pruning and Vine Balance”
by Paul Verdegaal, San Joaquin County Farm Advisor
In LWWC Research/IPM Program Update, December 2003
Measuring Pruning Ratios

- Select 3 to 5 representative vines (minimum) in the block
  - Weight the prunings
  - Calculate average weight of prunings per vine
  - Calculate average crop yield per vine
  - Divide average crop yield by average pruning weight

- Forward looking or backward looking?
Measuring Pruning Ratios

“From the work done by Dr. Mark Kliewer and others it appears a reasonable ratio of crop yield to pruning weight lies in the range of 5 to 7.”

“Some viticulturists believe a ratio of 3 to 5 is even better for assuring the highest quality.”

“A ratio less than 3 would most often indicate under cropping, while a ratio greater than 9 would mean severe over-cropping.”

From:
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In LWWC Research/IPM Program Update, December 2003
## Pruning Ratio Calculations

<table>
<thead>
<tr>
<th>Vine #</th>
<th>Prunings (lbs)</th>
<th>Total tons</th>
<th>47</th>
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<tbody>
<tr>
<td>1</td>
<td>2.08</td>
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<tr>
<td>2</td>
<td>2.32</td>
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<tr>
<td>3</td>
<td>2.73</td>
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</tr>
<tr>
<td>4</td>
<td>3.10</td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>2.23</td>
<td></td>
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</tr>
<tr>
<td>AVERAGE</td>
<td>2.49</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Total acres</th>
<th>11</th>
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<tbody>
<tr>
<td>Tons per Acre</td>
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<tr>
<td>Lbs. / Acre</td>
<td>8545.45</td>
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</tr>
<tr>
<td>Vine / Acre</td>
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<tr>
<td>Lbs. / Vine</td>
<td>7.85</td>
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</tbody>
</table>

Pruning Ratio = \( \frac{7.85}{2.49} = 3.15 \)
Using Bud Counts

Decision should be based on Pruning Ratios

- To raise the ratio, leave more buds
- To lower the ratio, leave fewer buds

Where the Steel Meets the Cordon

Actual pruning decisions are hard!

- Three bud spurs, anyone?
- Blind buds
- Current trellis system
- Current training
- Vine variation
- TRUNK DISEASE
Grower-Winery Balance

- Requires true experimentation
- Statistically valid design and methods
- Reliable measures
- Valid evaluation
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