Early Vine Nutrition, Training, and Canopy Management

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“The Wine is made in the Vineyard”

Canopy Management Basics

Early Vine Training

• Straight up!
• Keep graft union above ground
• Keep off ground
• Tie to stake
• 2 trunks
• Trim off suckers and clusters
• Eliminate weed competition
Canopy Management Basics

Remove young clusters
Canopy Management Basics

Grow Tubes

Benefits
• Animal damage
• Moisture
• Herbicide
• Growth rate
• Replaces stake
• Physical protection

Limitations
• Cost
• Growth rate
  Trunk “twist”
• Promotes single trunk
• Diseases, insects
• Removal
• Winter damage

The use of milk cartons is a good, low cost alternative.
• It can disintegrate by the end of the season
• Larger space allows for less humidity/moisture
• >1 trunk
Canopy Management Basics

Train multiple trunks  Train 2 trunks
**Canopy Management Basics**

**Young Vine Training**

**GRAPEVINE NUTRITION**

- First-year vine nutrition
  - Mineral nutrients + organic matter and CEC

- Avoidance and correction of common nutrient deficiencies in mid-Atlantic vineyards - a 3-part process
  - Soil testing - important in both pre-plant and in vineyard maintenance
  - Visual assessments - nutrient deficiency symptoms
  - Plant tissue analysis - nutrient concentrations

**Newly-planted vines**

- Most new vineyards DO NOT require a fertilizer application.
  - Apply only as needed to maintain growth
  - Do not mistake need for water vs. need for nitrogen
  - On high sand soils, a small (10-20 pounds of actual N) nitrogen application may advance vine development in the first year.
  - If needed apply a nitrogen based fertilizer – not a complete fertilizer.
  - Applying small amounts and splitting applications via drip irrigation is very desirable.
PLANT TISSUE ANALYSIS

Tissue: leaf petioles from leaves opposite cluster (VA)

Timing: Bloom, 70-100 days post-bloom (if miss bloom)

Number: 75-100 (size of petiole)

Labs: Multiple (see last slide)

Interpretation: Diagnostic samples related to nutrient sufficiency ranges that have been generated from similar tissues. There is some lab-to-lab variation in sufficiency ranges used.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Soil</th>
<th>Bloom petiole</th>
<th>Late-summer petiole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>0.5-2.0 ppm</td>
<td>0.17-0.30 %</td>
<td>0.14-0.30 %</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>20-50 ppm</td>
<td>1.5-2.5 %</td>
<td>1.2-2.0 %</td>
</tr>
<tr>
<td>Potassium</td>
<td>50-200 ppm</td>
<td>1.6-3.6 %</td>
<td>1.0-2.0 %</td>
</tr>
<tr>
<td>Magnesium</td>
<td>100-250 ppm</td>
<td>0.3-0.5 %</td>
<td>0.35-0.75 %</td>
</tr>
<tr>
<td>Boron</td>
<td>0.3-2.0 ppm</td>
<td>25-50 ppm</td>
<td>25-50 ppm</td>
</tr>
<tr>
<td>Zinc</td>
<td>2 ppm</td>
<td>30-100 ppm</td>
<td>30-100 ppm</td>
</tr>
<tr>
<td>Copper</td>
<td>5 ppm</td>
<td>5-15 ppm</td>
<td>5-15 ppm</td>
</tr>
<tr>
<td>Aluminum</td>
<td>&lt; 100 ppm</td>
<td>30-60 ppm</td>
<td>30-60 ppm</td>
</tr>
<tr>
<td>Organic matter</td>
<td>3-5 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Target values for soil, bloom petiole, and late-summer petiole samplings

Nutrient is not normally evaluated for vineyards.

* Multiply ppm by 2 for the lb/acre equivalent (mg/kg = mg/g = ppm).

NUTRIENTS ESSENTIAL FOR NORMAL GRAPEVINE GROWTH AND DEVELOPMENT

Obtained from air and water

Macro-nutrients

- Carbon (C)
- Hydrogen (H)
- Oxygen (O)
- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)
- Calcium (Ca)
- Magnesium (Mg)

Micro-nutrients

- Iron (Fe)
- Manganese (Mn)
- Copper (Cu)
- Zinc (Zn)
- Boron (B)
- Molybdenum (Mo)
- Others (?)
NITROGEN ISSUES

• Assessing need
  – Visual means (vine size, leaf color, trellis fill)
  – Tissue analysis (timing, tissue, relationship to standards (total N assessed at bloom-time - sufficiency at 1.2 to 2.1% N with this timing)
  – Cane pruning weights (e.g., < 0.2 lbs/ft canopy)
  – Crop history

• Other vigor-affecting factors
  – rootstock (very little difference in VA)
  – soils (depth and organic matter)
  – irrigation - weed and cover crop competition

Boron

• Critical nutrient for fruit set
  – Deficiency causes “shot berry”
  – Needed frequently on high sand and low organic matter soils
  – Tissue test critical!
  – Split applications (1lb/A max!)
    Fall – ½ rate
      – granular on soil – root update
    Spring – ½ rate - 2 weeks pre-bloom
      – Foliar spray
      – Can add to pesticide application
  – Grapevines very sensitive to over application (toxicity)
    Toxicity symptoms similar to deficiency

Canopy Management Basics

The Goal = “Ripe grapes”
Key Viticultural Goals

- Balanced vine
- Uniformly, fully mature, pest free grapes
- Ripen wood to maximum maturity for cold hardiness

Canopy Management Basics

“Sunlight into Wine”
Good Fruit Exposure

Canopy Management Basics

Light Exposure
“Air” Exposure
Pesticide Exposure
Canopy Management Basics

Benefits of Proper Canopy Management

- Fruit Exposure
- Uniform Ripening
- Decreased Disease
- Increased Color
- Decreased Acidity
- Increased Volatiles
- Vine Balance
- Vigor management
- Bud Fruitfulness
- Uniform Bud Break
- Uniform Shoot Vigor
- Ease of harvest

Canopy Management Basics

Balance of vegetative and reproductive vigor

FIGURE 18-5 Calendar showing when the stages in the growth and flowering in a vineyard grapevine occur. (Adapted from Frati 1971, Used by permission)
**Canopy Management Basics**

**Training System Terms**

- Vertical Varietal growth habit
- Lateral

**Canopy Management Basics**

**Training System Types**

- Single Canopies
- “VSP” Vertical Shoot Positioning
- High Cordon Training
- Split Canopies Vertical
  - Smart-Dyson
  - Scott-Henry
- Split Canopies Horizontal
  - Lyre
  - Geneva Double Curtain “GDC”
Canopy Management Basics

**Smart-Dyson; Scott Henry**

- Manage high vigor
- Higher yield
- Maintain high quality
- Less shoot positioning and leaf pulling
- Good for fruit exposure
- Easy to harvest, hand or mechanical
Canopy Management Basics

Open Lyre; Geneva Double Curtain

• Manage very high vigor
• High yields
• Maintain high quality
• Good for fruit exposure
• Can be mechanized

Canopy Management Basics

Geneva Double Curtain (GDC)
Canopy Management Basics

Reactive - Leaf pulling

Increased light and temperature helps fruit to mature

Shaded fruit … 2 weeks later maturity
Benefits of Proper Canopy Management

- Fruit Exposure
- Uniform Ripening
- Decreased Disease
- Increased Color
- Decreased Acidity
- Increased Volatiles
- Vine Balance
- Vigor management
- Bud Fruitfulness
- Uniform Bud Break
- Uniform Shoot Vigor
- Ease of harvest

“Wine makes daily living easier, less hurried, with fewer tensions, and more tolerance.”

Benjamin Franklin

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