Fundamentals of Vine Management
(vine training, trellis, planting, early vine training, nutrition, canopy management & crop management)

Tremain Hatch
Viticulture Research/Extension Associate
Thatch@vt.edu
What is a Vine Training System?

The **system** or **form** in which a vine is cultivated

- Large area of healthy leaves exposed to sunlight
Training Systems Vary in:

- Applicability to a situation
  - Site & variety & goal = situation
- Quality
  - Quantity
  - Wine quality potential
- Labor
  - Shoot positioning, leaf pulling, pruning, etc.
- Suitability for varieties
  - Upright or trailing shoot growth
- Suitability for climates
  - Wet, dry, cold, hot
- Cost of establishment
Varietal growth habit

Upright

Varietal growth habit

Trailing
Canopy
• Growing upward
Canopy

Growing downward
A Review of Some Common Vine Training Systems
Single Canopy
Vertical Shoot Positioning (VSP)

- A “standard” system
- One fruiting zone
- Can lead to congested canopies
Canopy division
horizontal
Vertical Division
Divided Canopies

Geneva Double Curtain

Lyre

Smart-Dyson
Smart-Dyson Pros

✓ Increase leaf area –
  ✓ Yield increases of about 50-70% over non-divided VSP

✓ Suitable to most high-vigor situations

✓ Easy to convert from VSP...as long as fruit wire >40”
Some Common Training Systems

Geneva Double Curtain

GDC

Photo: T.K. Wolf
Trellis Construction

- 25 years of abuse
- Think though work before you begin
- Use Only Highest Quality Materials Available
- Wire Source – packed and wound under tension
- Posts – Line and End: deep enough, tall enough, pound in, do not auger in
- Right Equipment for Installation
- Install before or after plants? Irrigation? Drain tile?
- Wire Positions
- End Assemblies
- Contract with a fence builder?
Trellis options
Not all posts are created equal.
Wire catches & line post extensions
Figure 11-22 Screw Anchor Deadman Assembly

(Guyot Training, 9 ft. Line Posts)
H-Brace End Post System

Required for rows over 600 ft

- 3-4” x 8’ line post
- Brace post
- 5-6” x 9-10’ end post
- Brace pin
- Brace wire
- 2’ deep
- 3-4’ deep
- 6’ tall

Requires 4 additional posts per row to construct the braces.

Paul Domoto
Dept. of Horticulture
Iowa State University
End post position & Anchors
Irrigation lines
Nurseries and Vines

• # of Vines to Order
• Nurseries
• When to Order
• What to Order
  • Rootstocks
  • Varieties
  • Clones
• Delivery
• Storing Plants
  • Damp
  • Cool
  • Dark
Site layout for planting

Soil preparation
Water before and after planting!
Layout and Marking the Field

• Hire a Professional Surveyor or Do It Yourself
• Transit, Distance Wheel and Marking Flags
• Marking Lines
• A Good Eye
Training new vines

- **Primary Goal:**
  - Develop a canopy that can produce and ripen fruit
  - Develop the vine’s permanent features i.e. trunks; to facilitate management of the vineyard
Newly Planted Vines
Trained to the stake!

Pruning decisions!
Early vine training

Two trunks, narrow angle for future cordons
Fill trellis to produce a crop
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
If your grapes are grafted, make sure the graft union is placed above the soil line at planting.
Grow Tubes

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

Limitations
• Visibility
• Cost
• Spindle growth
• Diseases, insects
• Removal
• Winter damage
Milk Cartons and Grow Tubes
• Training for two or three trunks is insurance against winter damage that could completely kill the vine.

• When the vine reaches the cordon wire, it will be trained/tied horizontally.

Train 2 trunks
Grapevine Nutrition

- **Pre-plant**
  - Soil pH and OM
- **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**
  - Visual assessments – nutrient deficiency symptoms
  - Soil testing - important in both pre-plant and in vineyard maintenance
  - Plant tissue analysis – nutrient concentrations
Essential Grapevine Nutrients needed for plant life – not replaceable – role in plant function

<table>
<thead>
<tr>
<th>Obtained from air and water</th>
<th>Macro-nutrients</th>
<th>Micro-nutrients</th>
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<tbody>
<tr>
<td>Carbon (C)</td>
<td>Nitrogen (N)</td>
<td>Iron (Fe)</td>
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<td>Hydrogen (H)</td>
<td>Phosphorus (P)</td>
<td>Manganese (Mn)</td>
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<td>Oxygen (O)</td>
<td>Potassium (K)</td>
<td>Copper (Cu)</td>
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<td>Calcium (Ca)</td>
<td>Zinc (Zn)</td>
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<td>Magnesium (Mg)</td>
<td>Boron (B)</td>
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<td>Sulfur (S)</td>
<td>Molybdenum (Mo)</td>
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How Soil pH Affects Availability of Plant Nutrients

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<th>Strongly Acid</th>
<th>Medium Acid</th>
<th>Slightly Acid</th>
<th>Very Slightly Acid</th>
<th>Very Slightly Alkaline</th>
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- Nitrogen
- Phosphorus
- Potassium
- Sulfur
- Calcium
- Magnesium
- Iron
- Manganese
- Boron
- Copper & Zinc
- Molybdenum
**Tissue:** leaf petioles from leaves opposite cluster

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

**Number:** 75-100 (size of petiole)

**Labs:** Penn State [http://www.aasl.psu.edu/plant_tissue_prog.html](http://www.aasl.psu.edu/plant_tissue_prog.html), A and L Lab, Richmond [http://al-labs-eastern.com/index.html](http://al-labs-eastern.com/index.html)

**Interpretation:** Diagnostic samples related to nutrient sufficiency ranges that have been generated from similar tissues.
Key Viticulture Goals

- Balanced vine
  - Healthy, active, exposed canopy
- Uniform, fully mature, pest free grapes
- Ripen wood to maximum maturity for cold hardiness
Methods of Canopy management

**Direct:** Methods that alter the arrangement of leaves and clusters

- Trellis system
- Dormant pruning (spur v. cane) and severity
- Summer pruning (hedging)
- Shoot thinning
- Shoot positioning
- Shoot, leaf and / or bunch removal
<table>
<thead>
<tr>
<th>Canopy feature</th>
<th>Optimal value or range</th>
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<tbody>
<tr>
<td>Leaf layers</td>
<td>1.0 to 1.5, on average; somewhat more on West; but requires either PQA or experience to assess</td>
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<tr>
<td>Shoot density</td>
<td>3 – 4 shoots per foot of canopy</td>
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<tr>
<td>Shoot length</td>
<td>12 to 20 fully unfolded leaves</td>
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<tr>
<td>Active shoot tips</td>
<td>5% or less by veraison</td>
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<tr>
<td>Cluster exposure</td>
<td>50% or more exposed on East side of canopy; less exposure on West side.</td>
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Light Exposure
Air Circulation
Pesticide Deposition
Benefits of Excellent Canopy Management

- Reduction of disease pressure
- Uniform ripening
- Decreased disease incidence
- Bud fruitfulness
- Uniform bud break
- Healthy vines
- Facilitates harvest
Crop Management

- Young vines
- Mature vines
  - Eliminate over crop situations
  - Maintaining consistent yields
  - Ripening the crop
- Crop Load (Ravaz Index)
  - Crop/pruning weight
  - Value should fall between 5 and 10
Vt.edu, Viticulture Extension Resources

eViticulture.org