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## Early Vine Nutrition, Training, and Canopy Management

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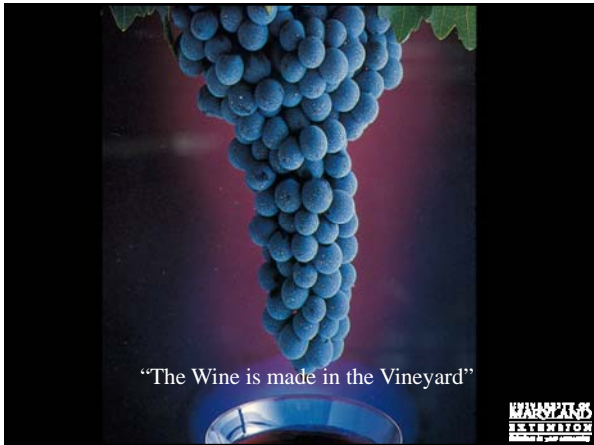
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"The Wine is made in the Vineyard"

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*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

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**Canopy Management Basics**



Remove young clusters



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*Canopy Management Basics*



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*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



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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



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*Canopy Management Basics*



Train multiple trunks



Train 2 trunks

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*Canopy Management Basics*  
**Young Vine Training**

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**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

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**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.

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### 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.



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

Nutrient	Soil		Bloom petiole		Late-summer petiole	
	ppm	%	ppm	%	ppm	%
Nitrogen	20 - 50	-- <sup>z</sup>	0.17 - 0.30	1.2 - 2.2	0.14 - 0.30	0.8 - 1.2
Phosphorus	75-100	ppm*	1.5 - 2.5			
Potassium	500 - 2000	ppm	1.0 - 3.0			
Calcium	100 - 250	ppm	0.3 - 0.5			
Magnesium	0.3 - 2.0	ppm	25 - 50	ppm	25 - 50	ppm
Boron	20	ppm	30 - 100	ppm	30 - 100	ppm
Iron	20	ppm	25 - 1000	ppm	100 - 1500	ppm
Manganese	0.5	ppm	5-15	ppm	5 - 15	ppm
Copper	2	ppm	30-60	ppm	30 - 60	ppm
Zinc	* < 100	ppm				
Aluminum	3 - 5	%				
Organic matter						

<sup>z</sup> Soil nitrogen is not normally evaluated for vineyards.  
\* Multiply ppm by 2 for the lb/acre equivalent (mg/kg = ug/g = ppm).



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### NUTRIENTS ESSENTIAL FOR NORMAL GRAPEVINE GROWTH AND DEVELOPMENT

Obtained from air and water	Macro-nutrients	Micro-nutrients
Carbon (C)	Nitrogen (N)	Iron (Fe)
Hydrogen (H)	Phosphorus (P)	Manganese (Mn)
Oxygen (O)	Potassium (K)	Copper (Cu)
	Calcium (Ca)	Zinc (Zn)
	Magnesium (Mg)	Boron (B)
	Sulfur (S)	Molybdenum (Mo)
		Others (?)



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## 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



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## 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



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## Canopy Management Basics



The Goal = “Ripe grapes”



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## Key Viticultural Goals

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



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## Canopy Management Basics



“Sunlight into Wine”  
Good Fruit Exposure

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## Canopy Management Basics



Light Exposure  
“Air” Exposure  
Pesticide Exposure

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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



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Canopy Management Basics

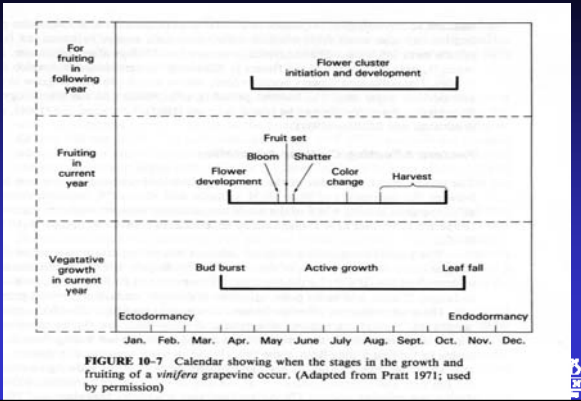


FIGURE 10-7 Calendar showing when the stages in the growth and fruiting of a *vinifera* grapevine occur. (Adapted from Pratt 1971; used by permission)

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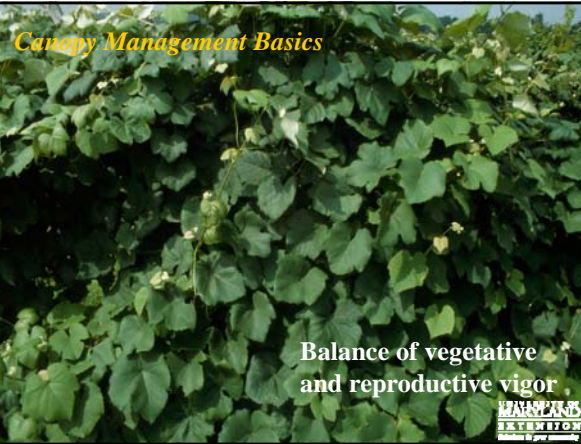
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Balance of vegetative and reproductive vigor



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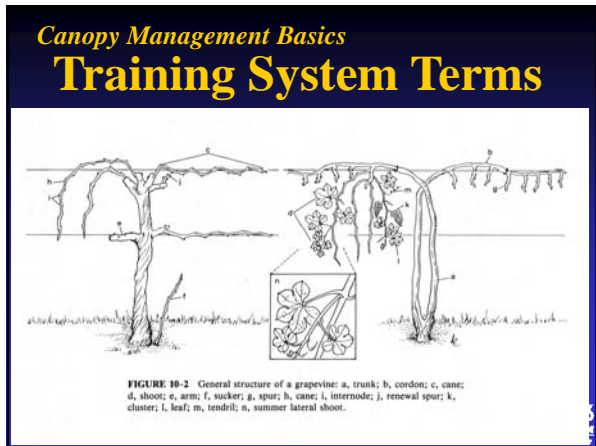
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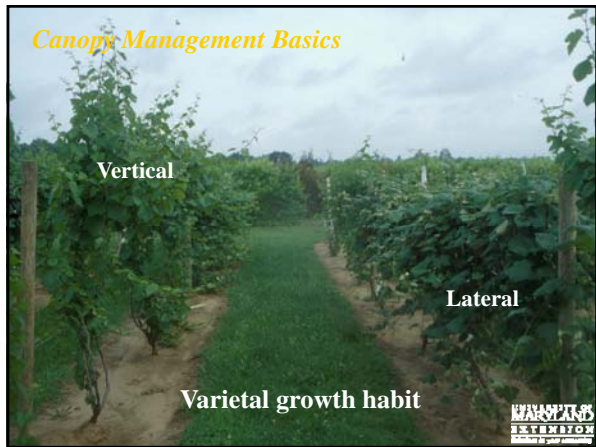
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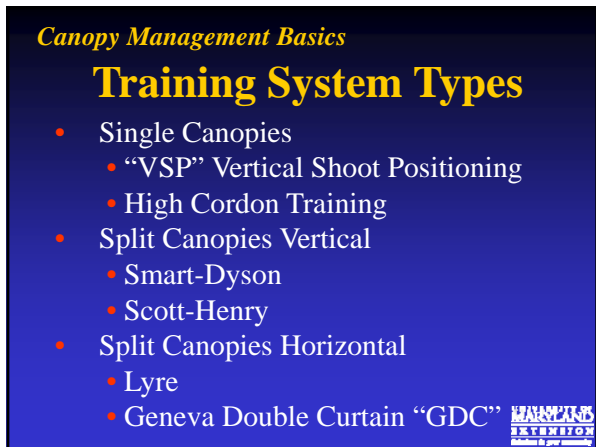
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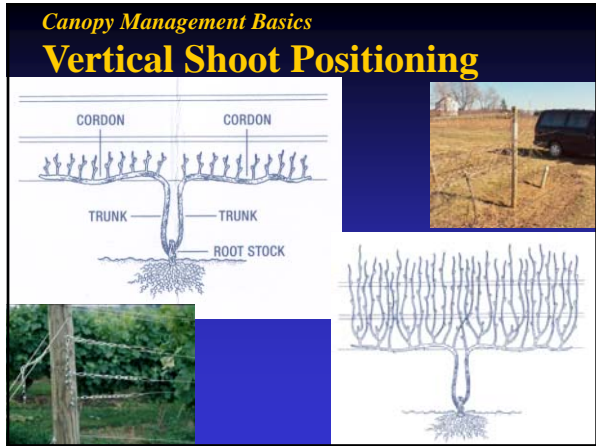
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*Canopy Management Basics*  
**Smart-Dyson; Scott Henry**

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

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**Smart-Dyson**

**Scott Henry**

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*Canopy Management Basics*

# Open Lyre; Geneva Double Curtain

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



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*Canopy Management Basics*



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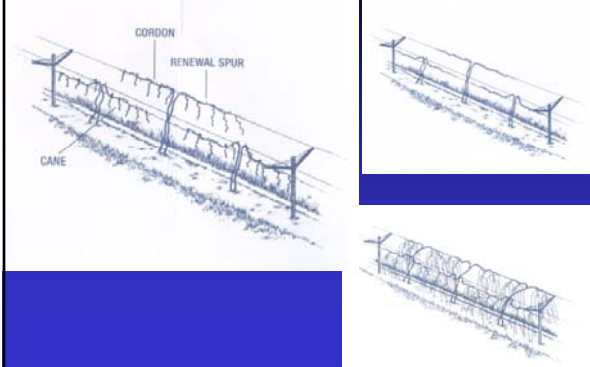
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*Canopy Management Basics*

# Geneva Double Curtain (GDC)



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*Canopy Management Basics*

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- Uniform Bud Break
- Uniform Shoot Vigor
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**“Wine makes daily living easier,  
less hurried, with fewer tensions,  
and more tolerance.”**

**Benjamin Franklin**



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