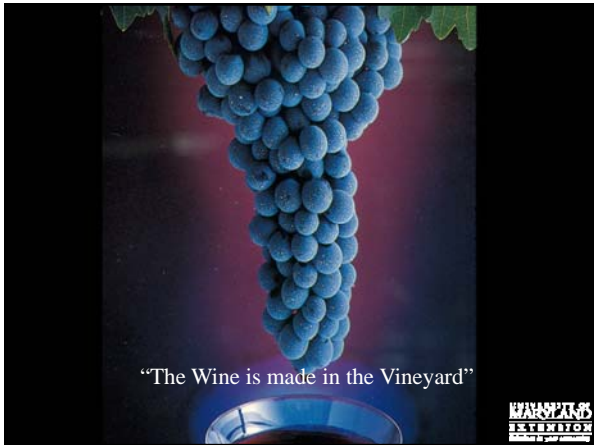


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**Early Vine
Nutrition, Training,
and Canopy Management**

Joseph A. Fiola, Ph.D.
Professor and Specialist in Viticulture and Small Fruit
University of Maryland Extension



"The Wine is made in the Vineyard"

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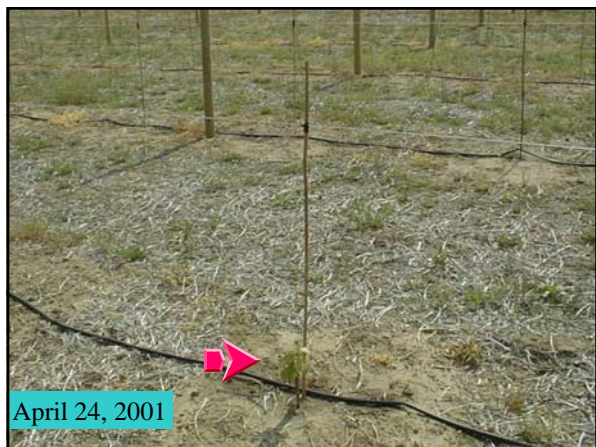
Canopy Management Basics

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



Canopy Management Basics



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

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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.



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


| Nutrient | Soil | | Bloom petiole | | Late-summer petiole | |
|----------------|-----------------|------|---------------|------|---------------------|------|
| | Range | Unit | Range | Unit | Range | Unit |
| Nitrogen | -- ^z | -- | 1.2 - 2.2 | % | 0.8 - 1.2 | % |
| Phosphorus | 20 - 50 | ppm* | 0.17 - 0.30 | % | 0.14 - 0.30 | % |
| Potassium | 75-100 | ppm | 1.5 - 2.5 | % | 1.2 - 2.0 | % |
| Calcium | 500 - 2000 | ppm | 1.0 - 3.0 | % | 1.0 - 2.0 | % |
| Magnesium | 100 - 250 | ppm | 0.3 - 0.5 | % | 0.35 - 0.75 | % |
| Boron | 0.3 - 2.0 | ppm | 25 - 50 | ppm | 25 - 50 | ppm |
| Iron | 20 | ppm | 30 - 100 | ppm | 30 - 100 | ppm |
| Manganese | 20 | ppm | 25 - 1000 | ppm | 100 - 1500 | ppm |
| Copper | 0.5 | ppm | 5-15 | ppm | 5 - 15 | ppm |
| Zinc | 2 | ppm | 30-60 | ppm | 30 - 60 | ppm |
| Aluminum | < 100 | ppm | | | | |
| Organic matter | 3 - 5 | % | | | | |

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



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 (?) |



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



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Canopy Management Basics



“Sunlight into Wine”
Good Fruit Exposure

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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



Canopy Management Basics

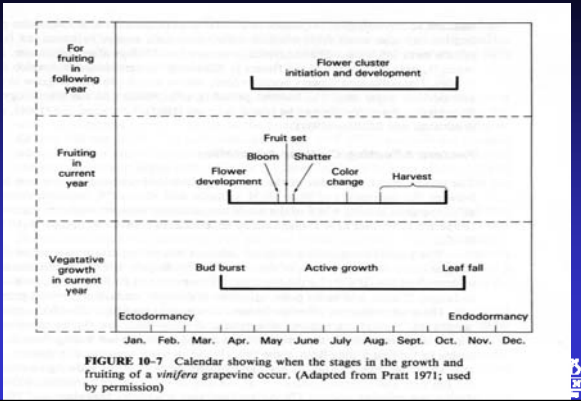
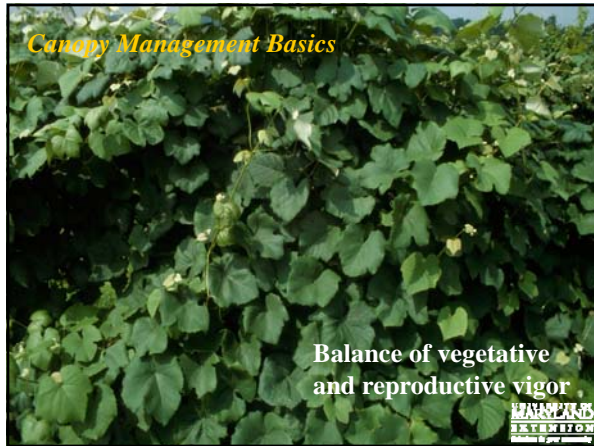
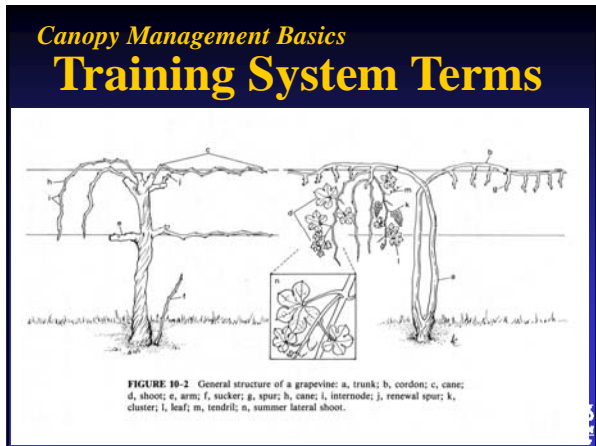


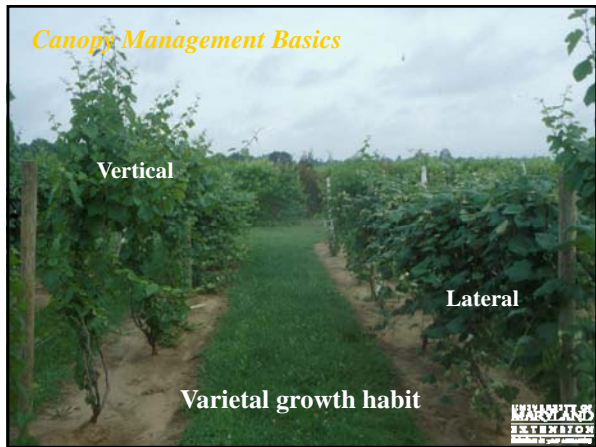
FIGURE 10-7 Calendar showing when the stages in the growth and fruiting of a *vinifera* grapevine occur. (Adapted from Pratt 1971; used by permission)

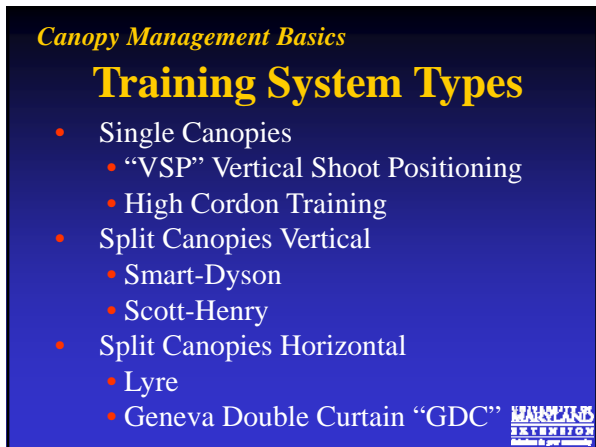


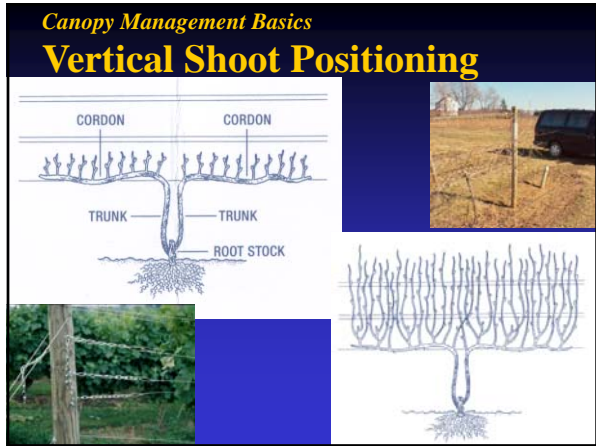
Balance of vegetative and reproductive vigor

















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



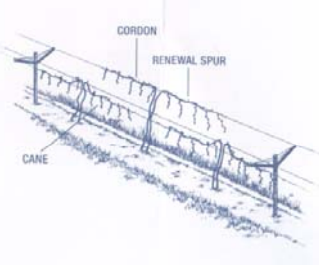
Canopy Management Basics



Lyre – Under and Inside

Canopy Management Basics

Geneva Double Curtain (GDC)









Canopy Management Basics

Benefits of Proper Canopy Management

- Fruit Exposure
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- Decreased Disease
- Increased Color
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- 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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