



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**



Upright

Trailing

Varietal growth habit



VirginiaTech

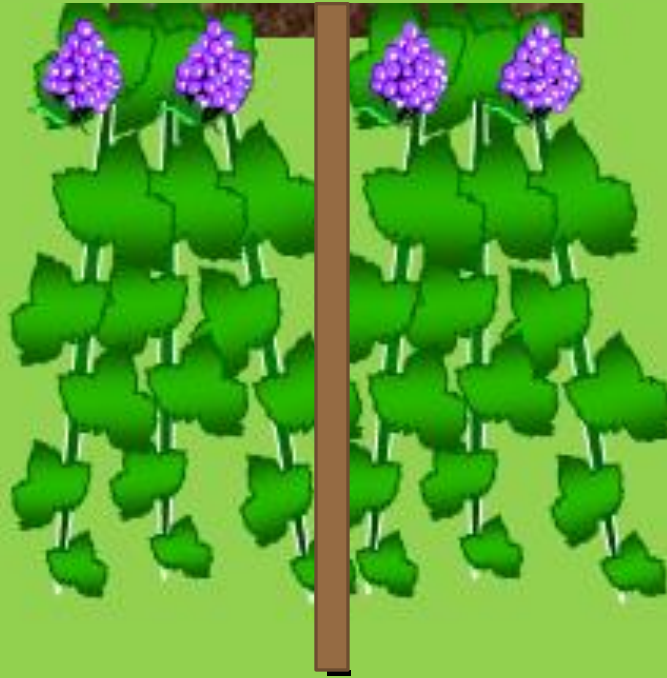
Virginia Agricultural
Experiment Station

- # Canopy
- Growing upward



Canopy

Growing downward



A Review of Some Common Vine Training Systems



Single Canopy

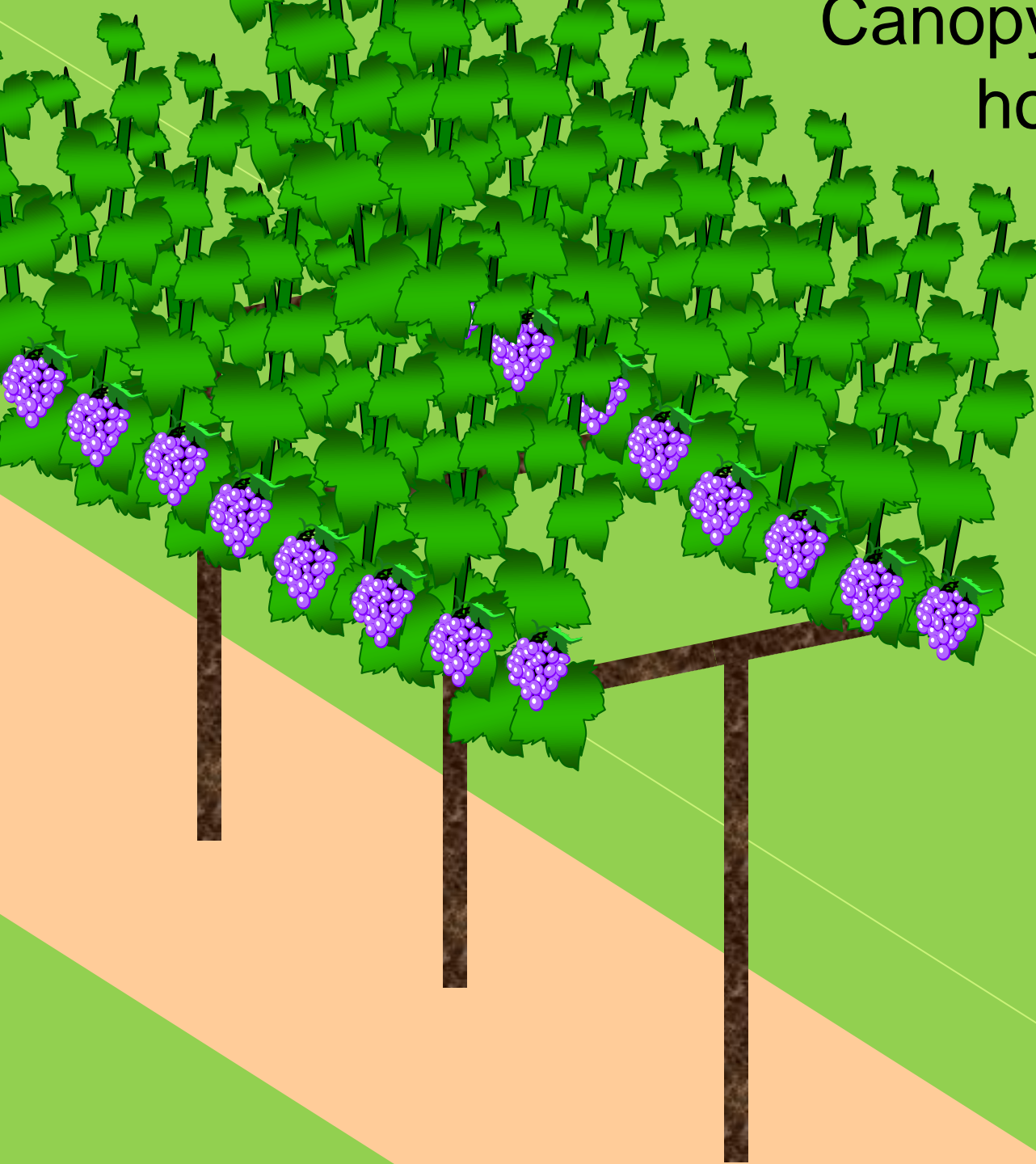


Vertical Shoot Positioning VSP

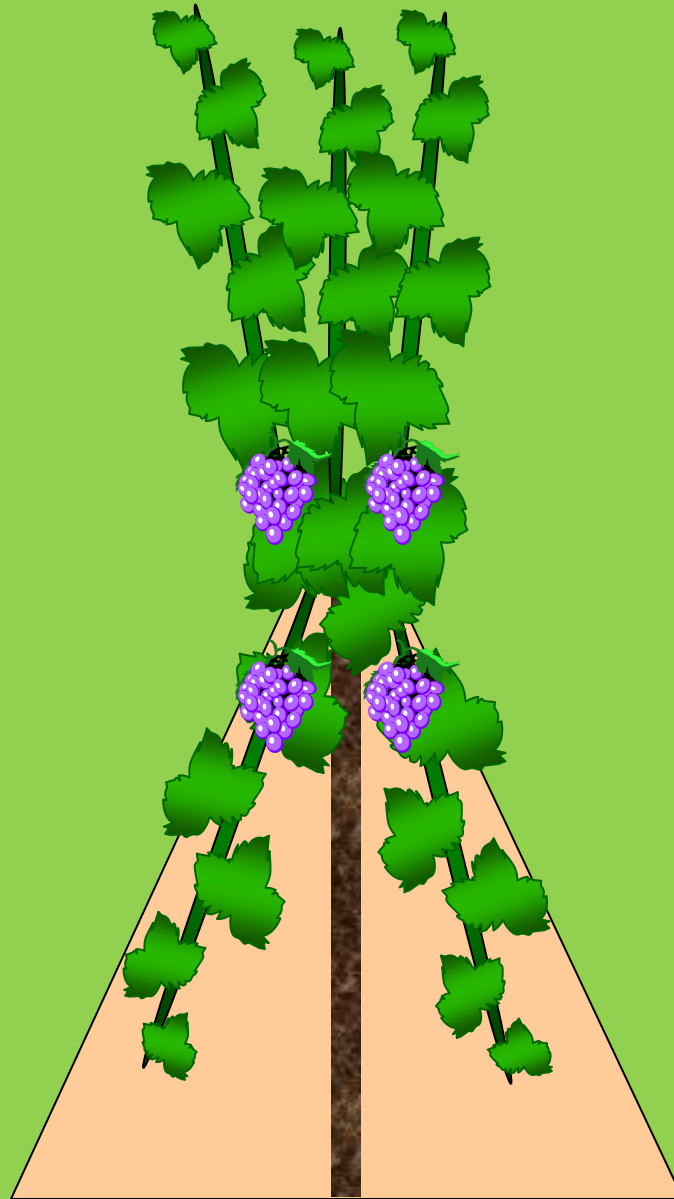
- A “standard” system
- One fruiting zone
- Can lead to congested canopies



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

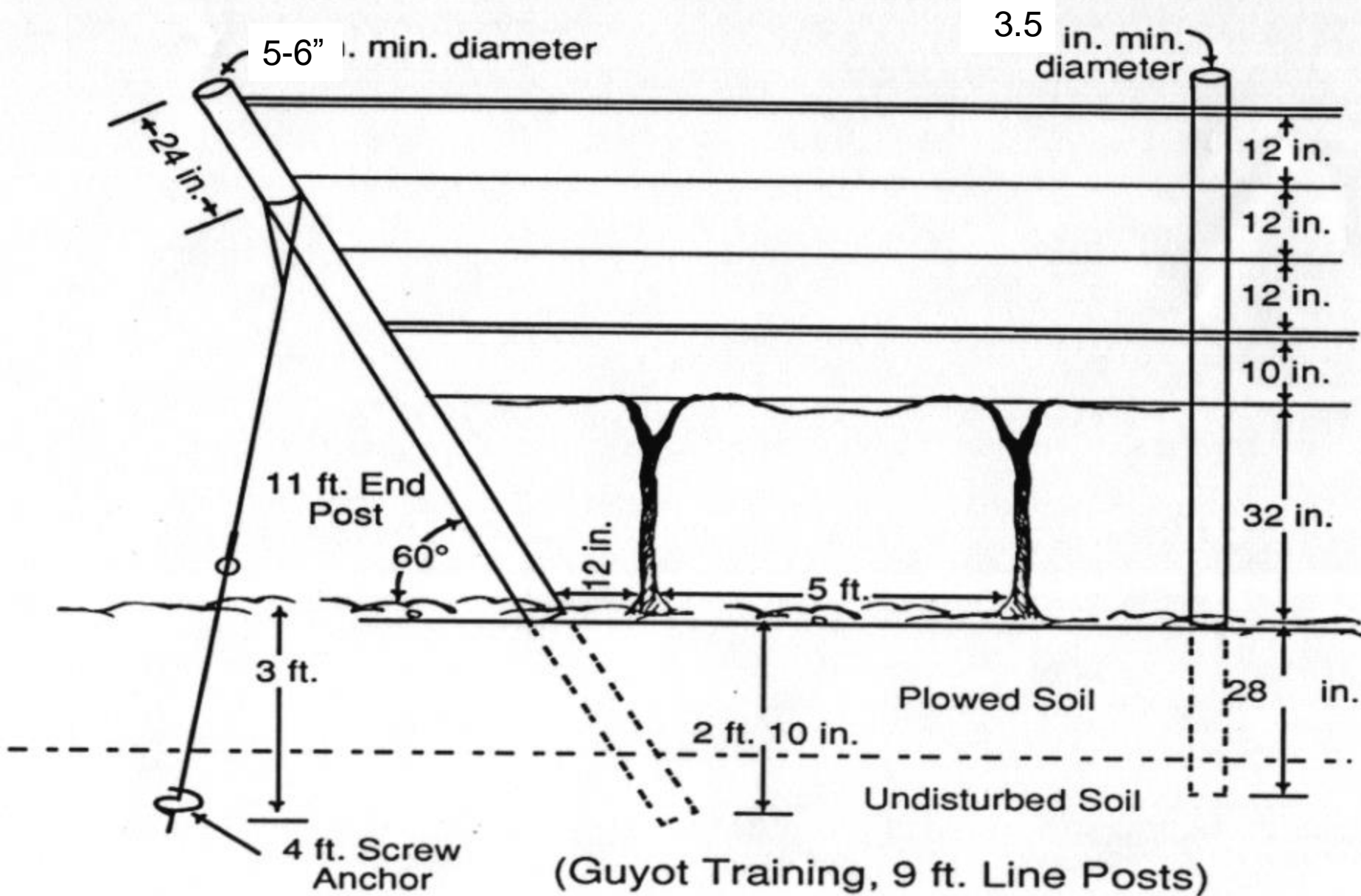
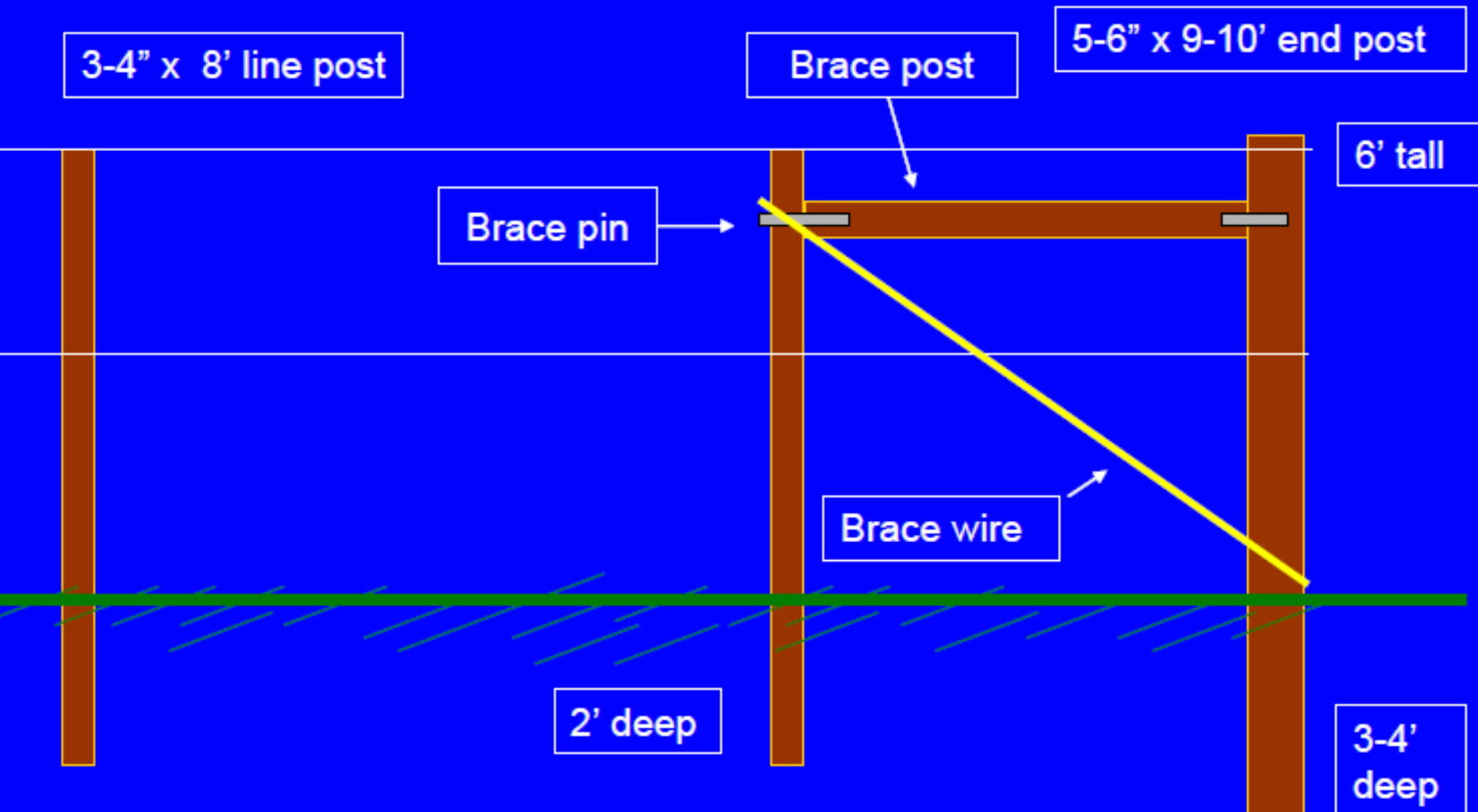


Figure 11-22 Screw Anchor Deadman Assembly

H-Brace End Post System

Required for rows over 600 ft



Requires 4 additional posts per row to construct the braces.

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



The Way to Straight Rows



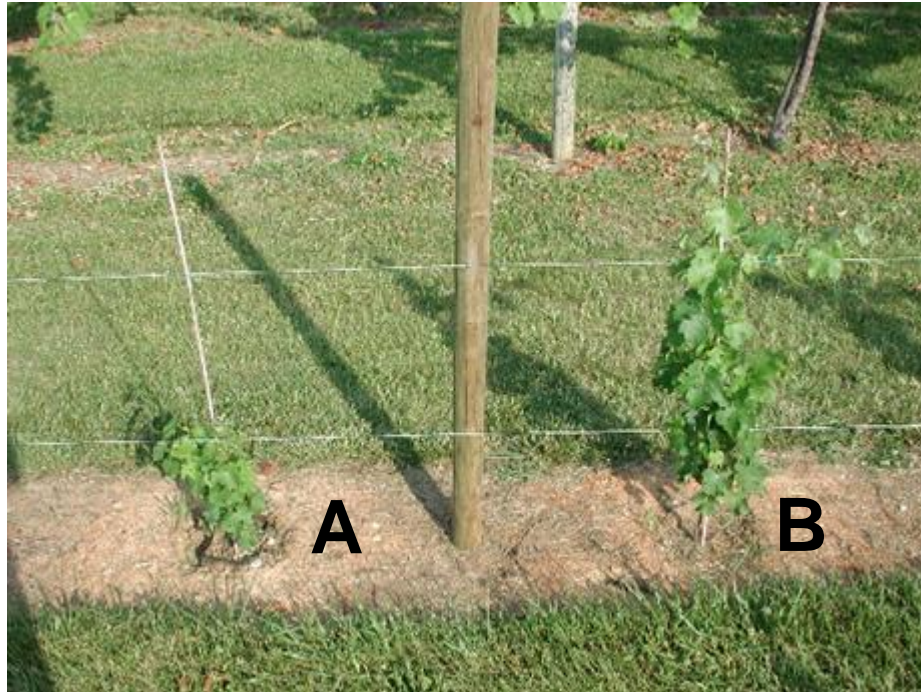
Training new vines

- 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

Obtained from

air and water

Carbon (C)

Hydrogen (H)

Oxygen (O)

Macro-nutrients

Nitrogen (N)

Phosphorus (P)

Potassium (K)

Calcium (Ca)

Magnesium (Mg)

Sulfur (S)

Micro-nutrients

Iron (Fe)

Manganese (Mn)

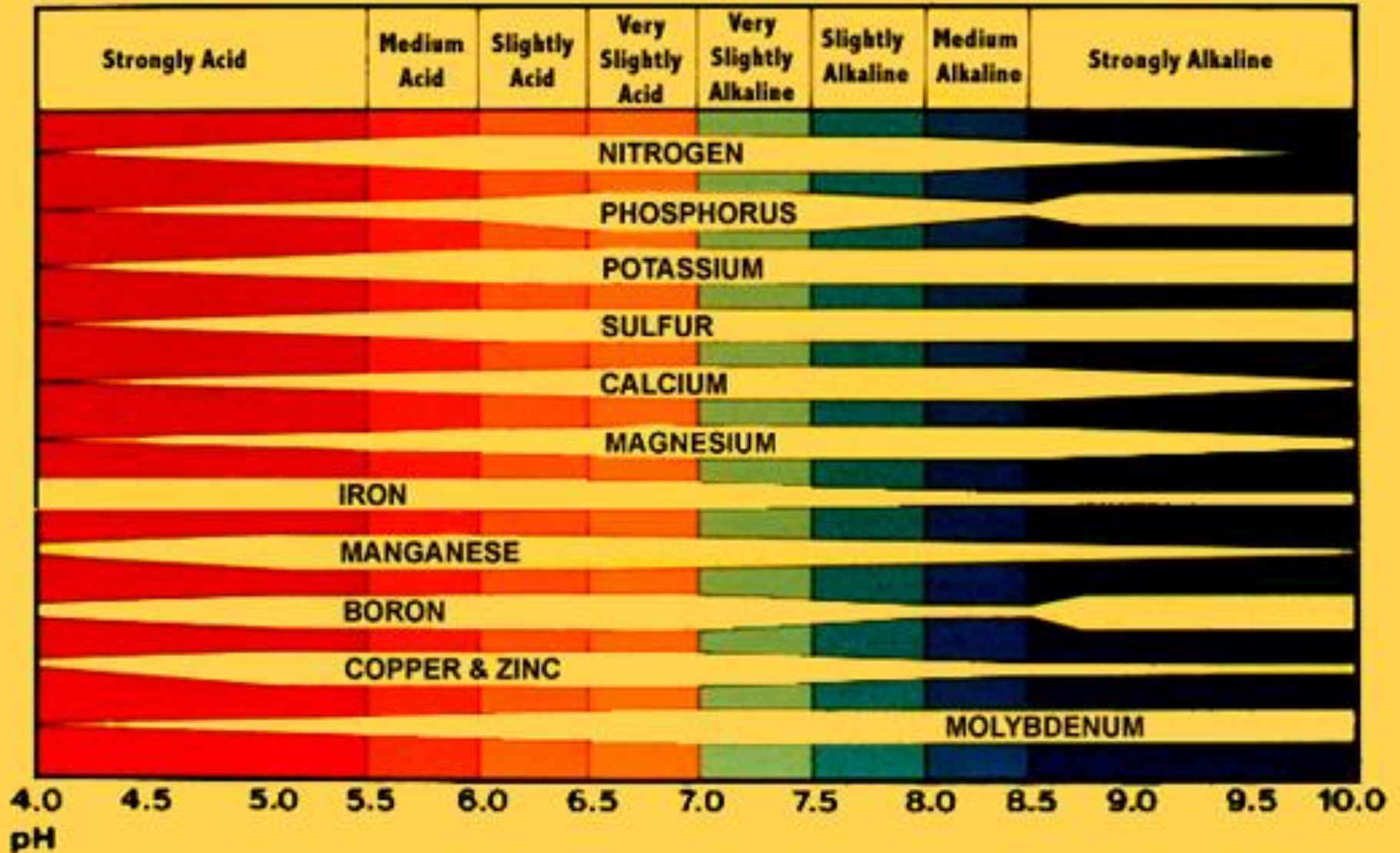
Copper (Cu)

Zinc (Zn)

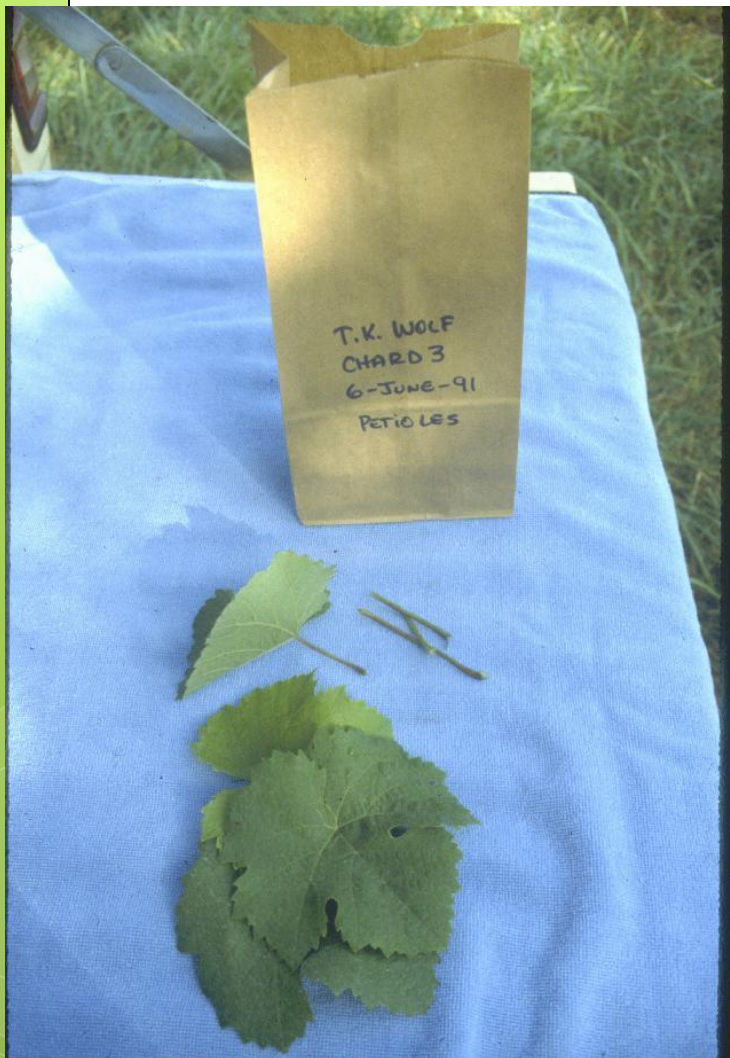
Boron (B)

Molybdenum (Mo)

1. **Identify the main components of the system.** The system consists of a **client** and a **server**. The client is responsible for sending requests to the server, and the server is responsible for processing these requests and returning responses.



Plant Tissue Analysis



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, A and L Lab, Richmond
<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

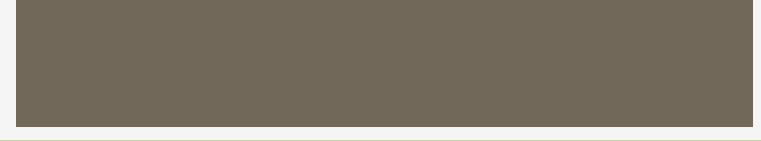
- Balanced vine
 - Healthy, active, exposed canopy
- Uniform, fully mature, pest free grapes
- Ripen wood to maximum maturity for cold hardiness



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



Canopy feature	Optimal value or range
Leaf layers	1.0 to 1.5, on average; somewhat more on West; but requires either PQA or experience to assess
Shoot density	3 – 4 shoots per foot of canopy
Shoot length	12 to 20 fully unfolded leaves
Active shoot tips	5% or less by veraison
Cluster exposure	50% or more exposed on East side of canopy; less exposure on West side.



Light Exposure
Air Circulation
Pesticide Deposition

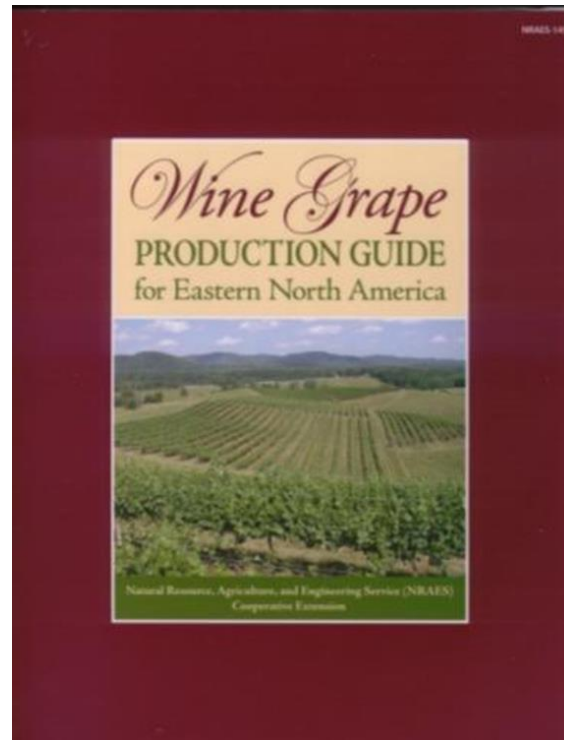
Benefits of Excellent Canopy Management

- 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