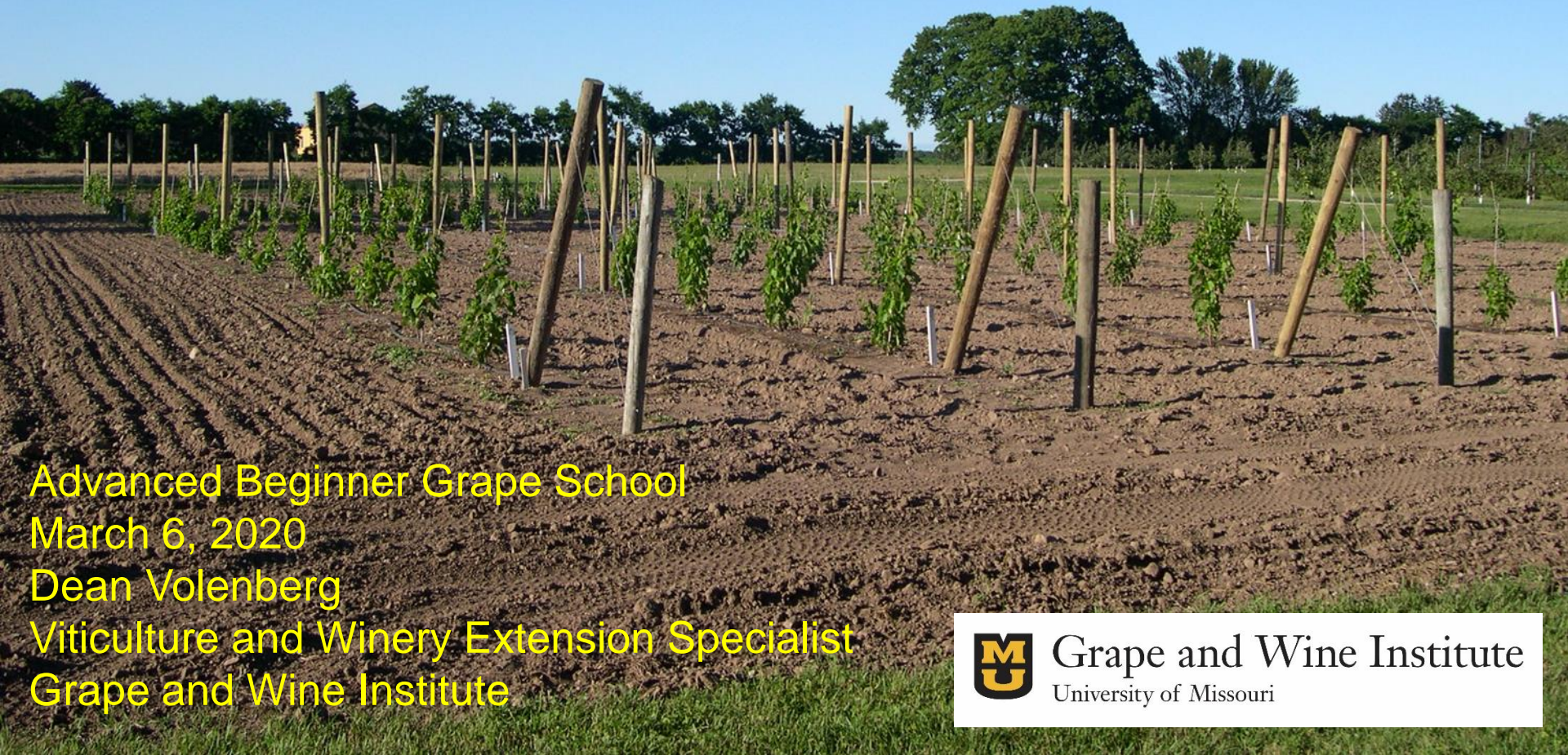


Successful Vine Establishment



Advanced Beginner Grape School
March 6, 2020
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Grape and Wine Institute



Grape and Wine Institute
University of Missouri

Establishing A New Vineyard

Soil and Nutrient Basics

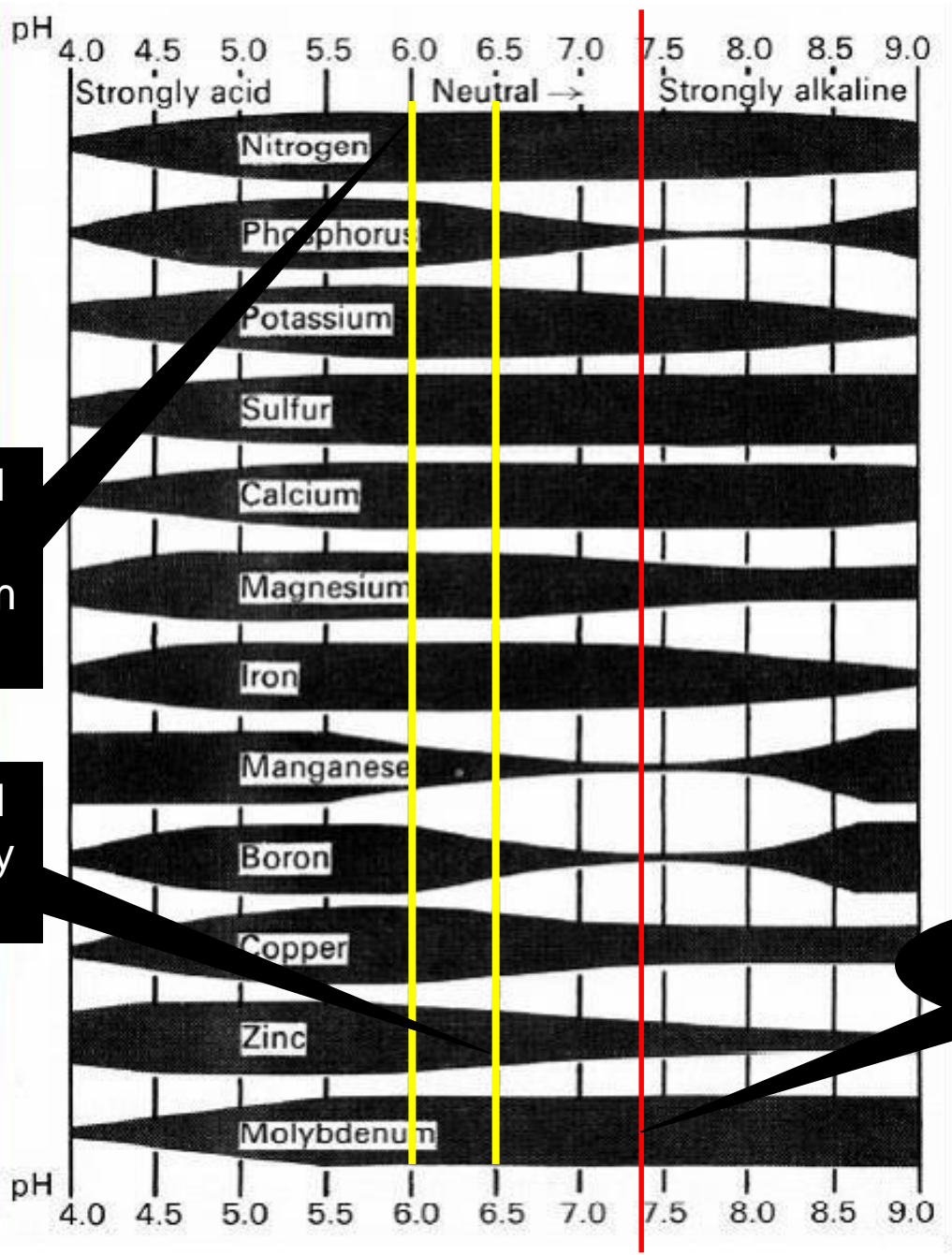
- Establishing new vineyard – soil sampling
 - P and K must be amended before planting
 - P and K non-mobile in soil-incorporate into soil
 - Acidic soils, amend with lime before planting
 - Alkaline soils, amend with sulfur before planting
- Established vineyard (year 3) – petiole analysis
 - Perform yearly to start tracking nutrients
 - Perform if nutrient deficiencies visually apparent

Establishing A New Vineyard

Soil and Nutrient Basics

- Soil Test Results
 - P_2O_5
 - K_2O
 - N
- Plants take up
 - $H_2PO_4^-$ or HPO_4^{2-}
 - K^+
 - NO_3^- or NH_4^+
- Soil mainly negatively charged
 - Clay particles
 - Organic matter
- $H_2PO_4^-$ or HPO_4^{2-} form complexes with
 - FE
 - AL
 - CA

These complexes are relatively insoluble



Ideal pH for clay/loam soils

Ideal pH for sandy soils

Results of soil test

Lowering Soil pH

		Soil organic matter content (%)						
		.5 - 2	2 - 4	4 - 6	6 - 8	8 - 10	> 10	
		lb S/acre						
in soil pH	Desired reduction	0.25	261	784	1220*	1742*	2309*	2700*
		0.50	522	1525*	2439*	3485*	4617*	5445*
		1.00	1045*	3049*	4879*	5227*	9235*	10890*

* Do not apply more than 870 lb/acre per year; retest soil between applications.

Raising Soil pH

- This will be available on soil test report
- Do not worry about raising soil pH if within 0.2 units of target pH
- Lime recommendations are for plow depth of 0 to 7 inches
 - If tilling deeper for planting use multiplier
- Lime needs to be incorporated into soil

Plow depth (inches)	Lime adjustment multiplier
0 to 7.0	1.00
7.1 to 8.0	1.15
8.1 to 9.0	1.31
>9.0	1.46

Adapted from: A2809 Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin

Established Vineyards

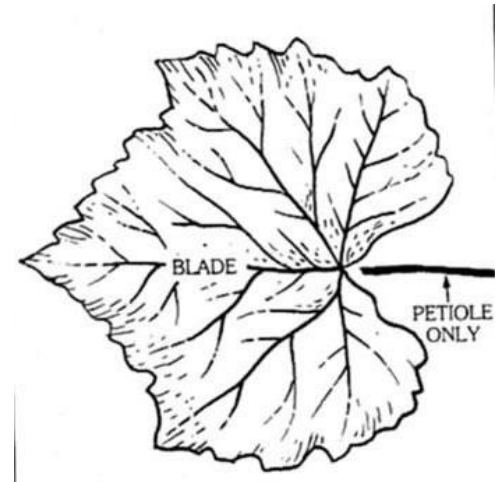
Petiole Analysis

- Why petiole sample
 - Gauge needs of vines
 - Response to fertilizers
 - Detect nutrient deficiencies before they manifest
- When to petiole sample
 - Full bloom = 2/3 of caps shed
 - Early veraison
 - Visual deficiency observed
 - Nutrient deficiencies in vineyards are often site specific
 - i.e. top of hill, rock outcrop, etc

Established Vineyards

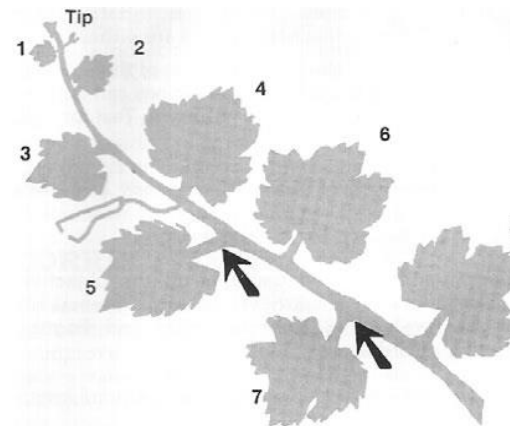
Petiole Analysis

- What to sample
 - Petioles opposite basal clusters
- When to sample
 - At full bloom
 - Early veraison



OR

- What to sample
 - Petioles from recently developed mature leaf



Established Vineyards

Petiole Analysis

- Don't use petiole analysis results as justification to apply nutrients until ...
 - Nutrient deficiency was visually apparent at petiole sampling
 - Establish nutrient levels over time
 - Track year to year trends and establish baseline
 - Always sample at same time each year
 - Results are only a snapshot at time of sampling
 - If trends develop i.e.
 - Certain nutrients declining over time and deficiencies manifest, then action is required
 - Be aware that nutrients may be available in soil at sufficient amounts, but unavailable to vine because of pH, organic matter, or chemical interactions

Subsoiler Ripper



Site Preparation

Weed Management



Weeds Controlled by Post-emergence Herbicides

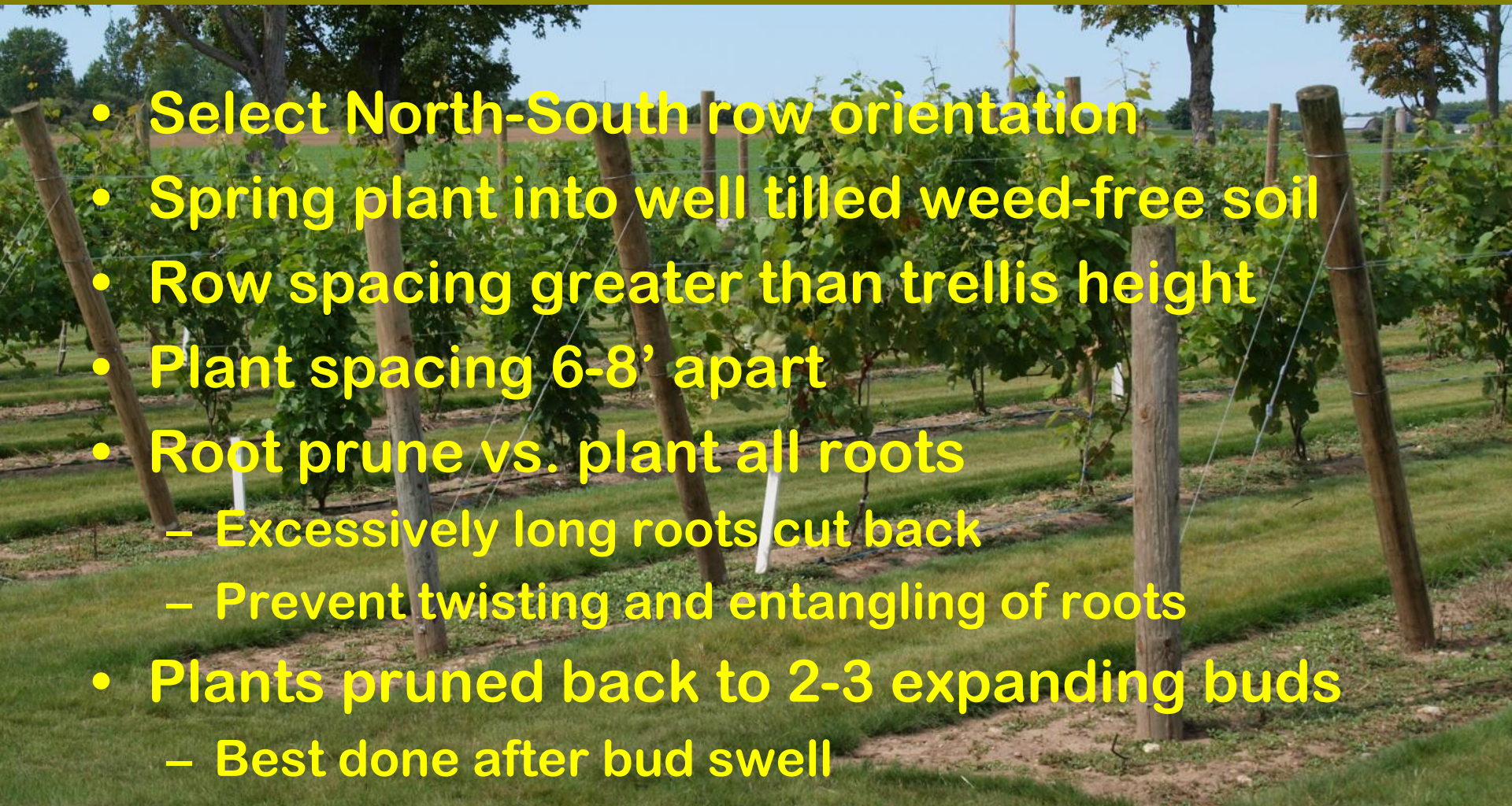
Product	Broadleaf		Grasses	
	Annual	Perennial	Annual	Perennial
Aim	Most			
Venue	Most			
Fusilade			Most	Most
Goal ¹	Most			
Gramoxone Inteon	Most	Suppress	Most	Suppress
Poast			Most	Most

¹Vines must be trellised and ≥ 3 feet in height.

Weeds Controlled by Post-emergence Herbicides

Product	Broadleaf		Grasses	
	Annual	Perennial	Annual	Perennial
Reglone	Most		Most	
Rely	Most	Most	Most	Most
Roundup Weathermax	Most	Most	Most	Most
Scythe	Most	Most	Most	Most
Select			Most	Most

Planting

- Select North-South row orientation
 - Spring plant into well tilled weed-free soil
 - Row spacing greater than trellis height
 - Plant spacing 6-8' apart
 - Root prune vs. plant all roots
 - Excessively long roots cut back
 - Prevent twisting and entangling of roots
 - Plants pruned back to 2-3 expanding buds
 - Best done after bud swell
- 

Planting

Proper planting depth

Own-rooted

Grafted

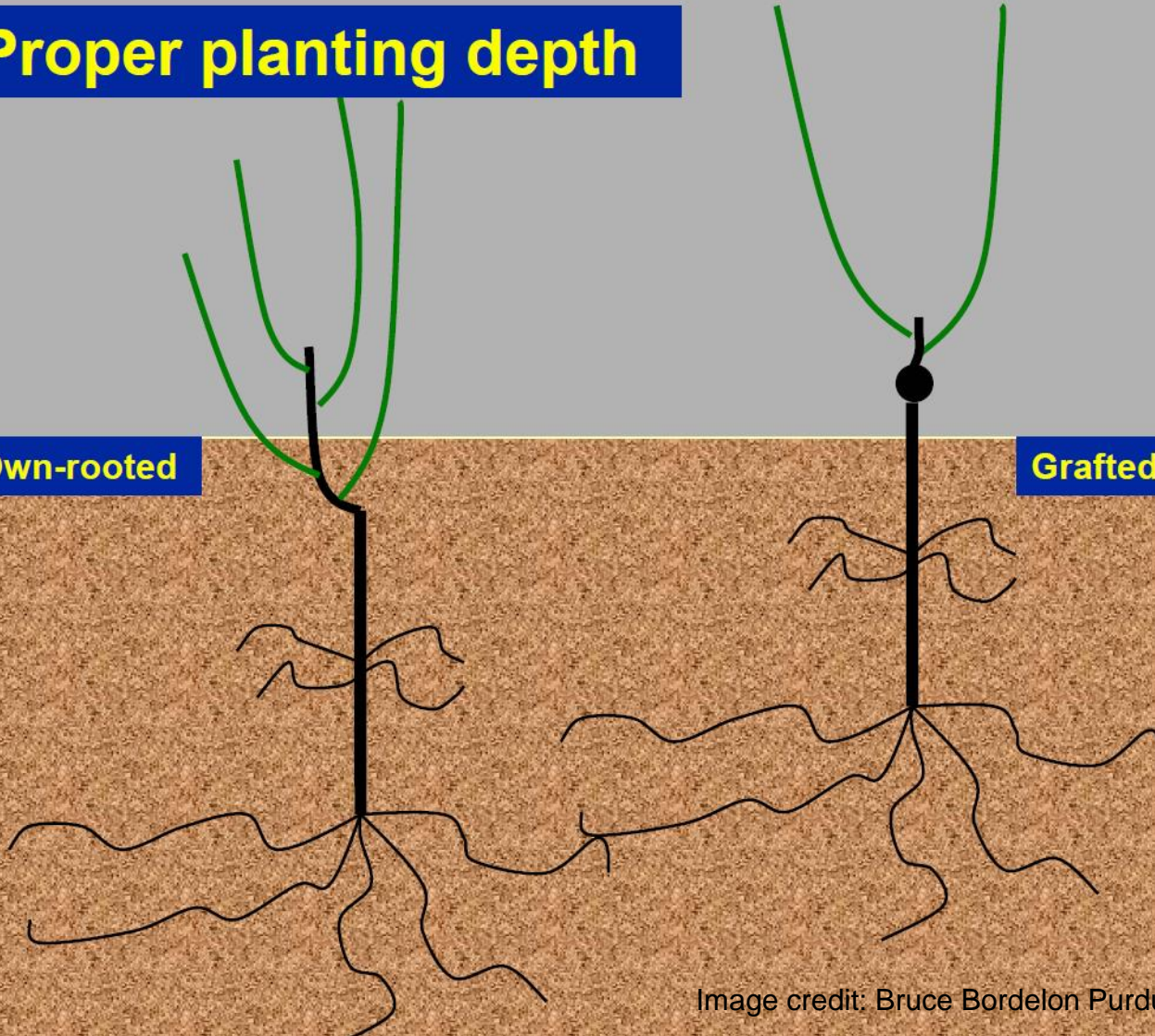


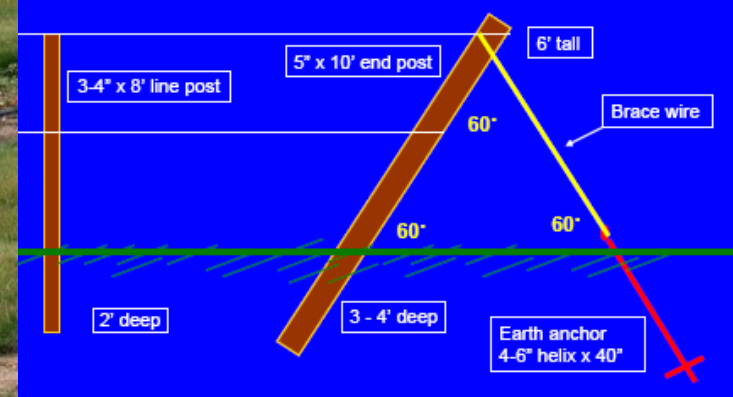
Image credit: Bruce Bordelon Purdue University

Trellis Construction


- Trellis responsible for vine + crop weight
 - Provides platform for pruning and training
 - Needs to function for 20-30 yrs.
 - Construct once and only once
- In place year one preferred
 - Wire available for initial shoot
 - Keep shoots off of ground
- Training systems for trellis
 - Cane pruning
 - Spur(2-3 bud cane) pruning

Anchored End Post System with an Earth Anchor

Suitable for rows up to 600 ft, but this is affected by soil texture and anchor's helix diameter.



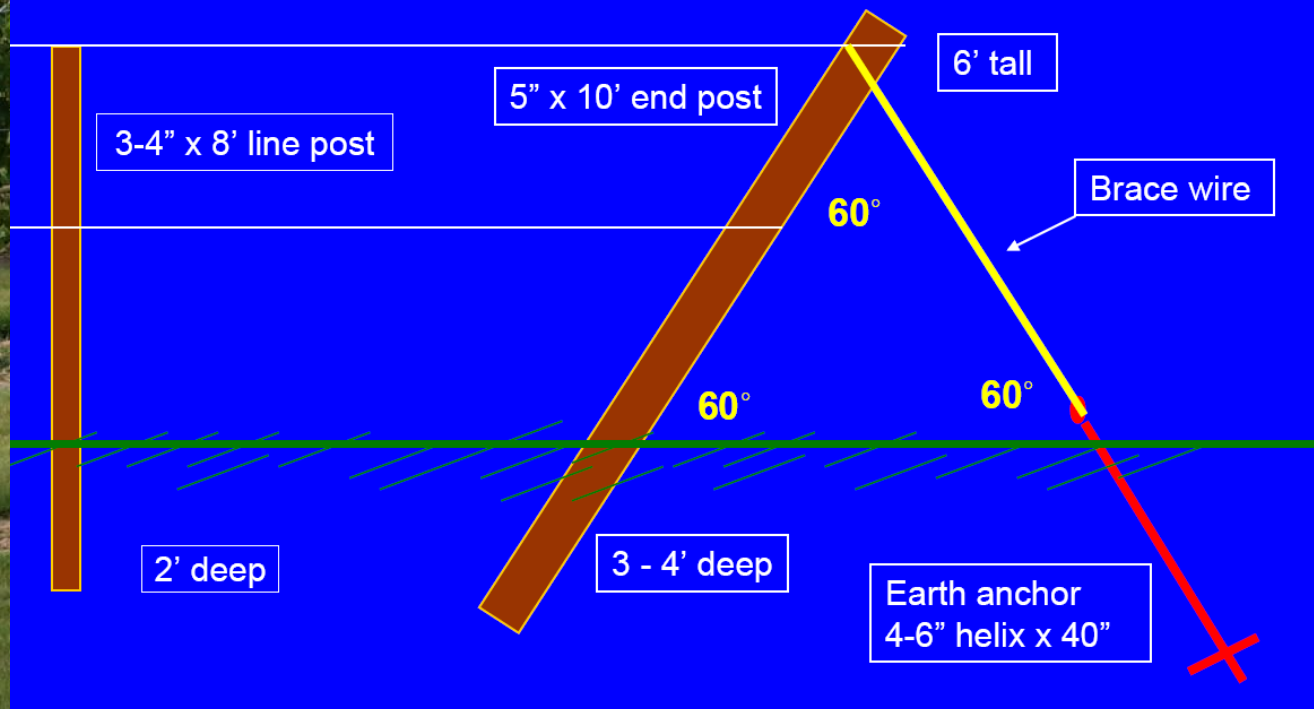
Major Trellis Components

- **Posts: Wood (preferred)**
 - **Line Posts**
 - Spaced 21, 24 or 28 ft apart - Dependent on vine spacing
 - **End Posts**
 - Anchored: earth anchor or tie-back post for rows less than 600 ft.
 - Braced: H-brace or slant brace for rows over 600 ft.
 - **Wire Support**
 - **High-tensile galvanized steel wire-12 gauge**
 - High cordon, or Kniffen: 1 to 3 wires
 - Vertical shoot positioning: 5 to 7 wires
 - Geneva Double Curtain: 3 or 4 wires
- 

End Post

Anchored End Post System with an Earth Anchor

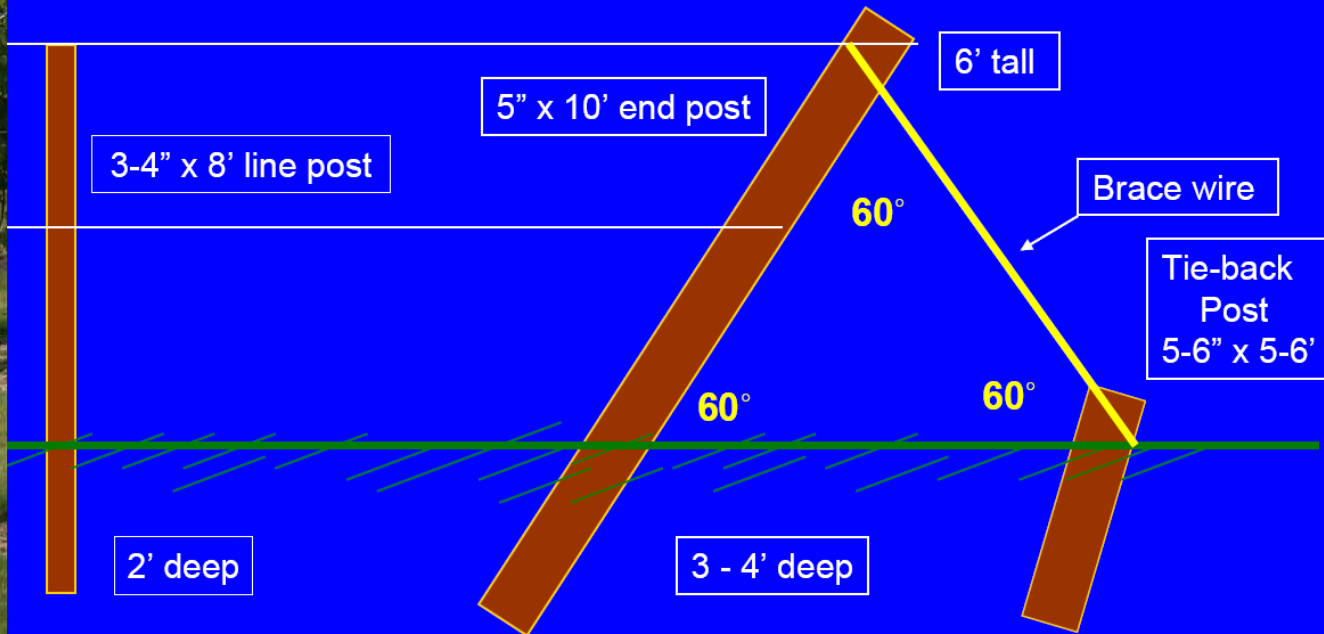
Suitable for rows up to 600 ft, but this is affected by soil texture and anchor's helix diameter.



End Post

Anchored End Post System with a Tie-back Post

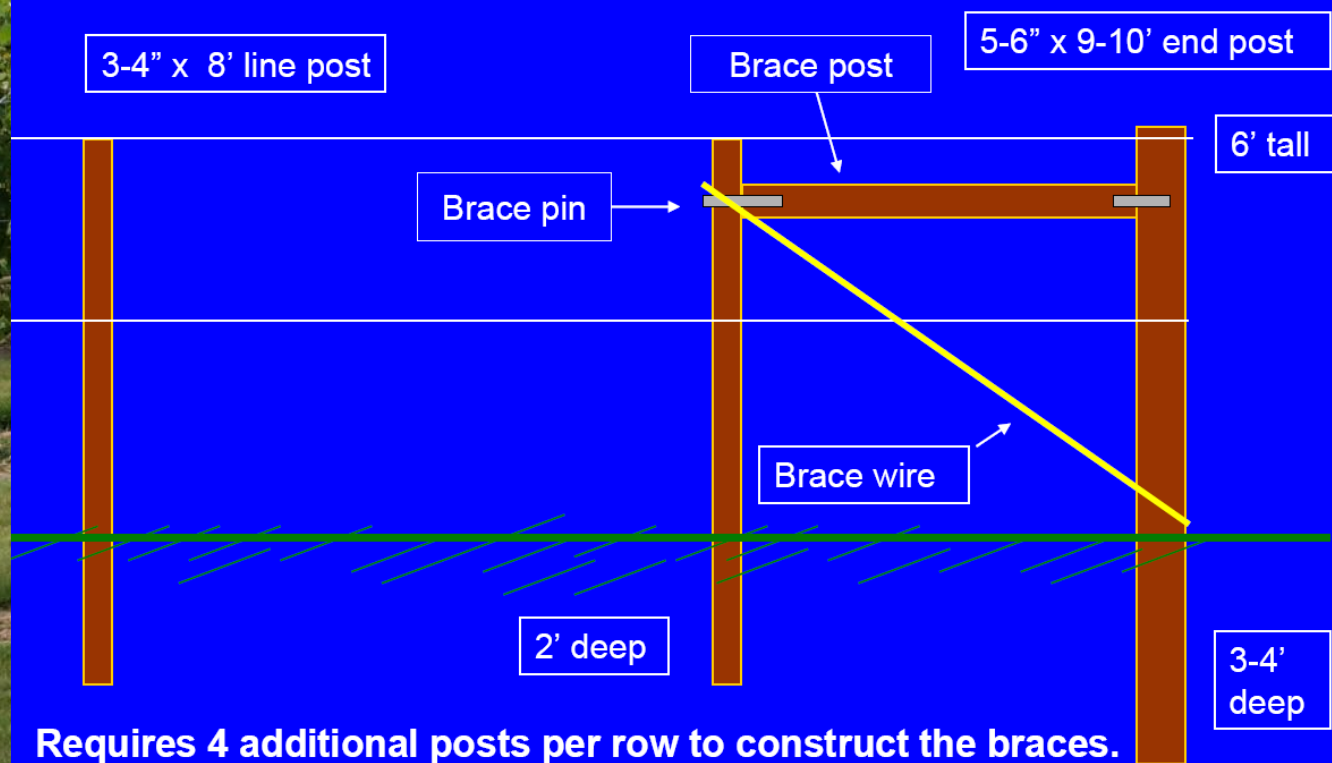
Suitable for rows up to 600 ft. Cost of materials will often determine whether an earth anchor or tie-back post is used.



End Post

H-Brace End Post System

Required for rows over 600 ft

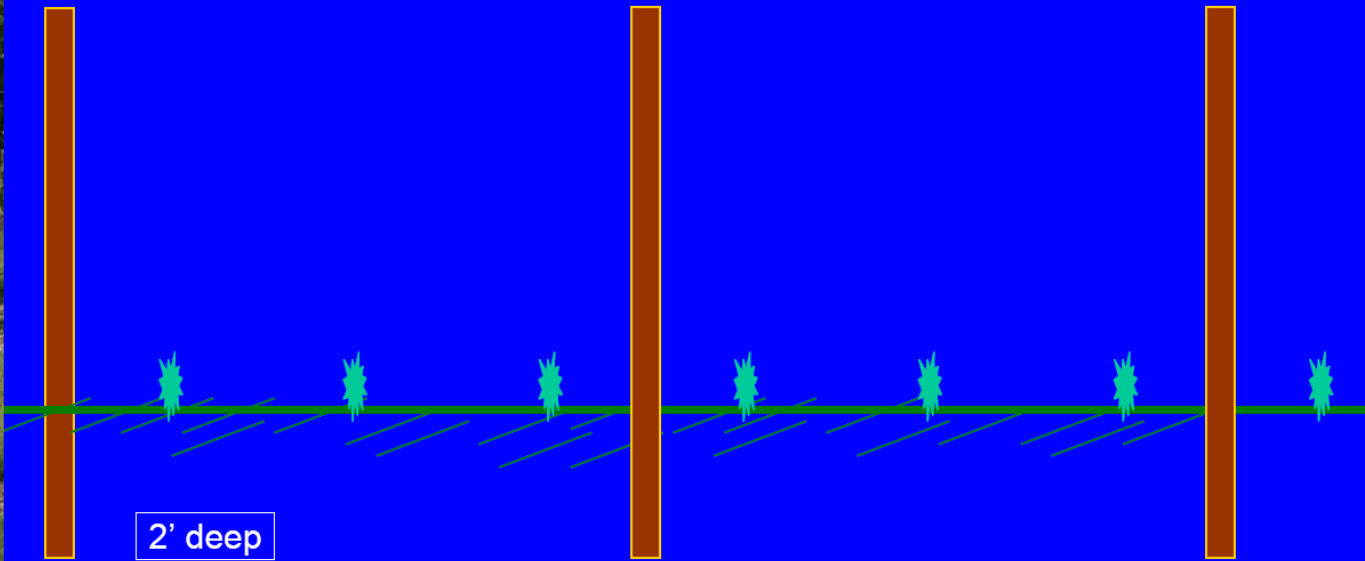


Line Post

Line Post
Should be positioned between vines

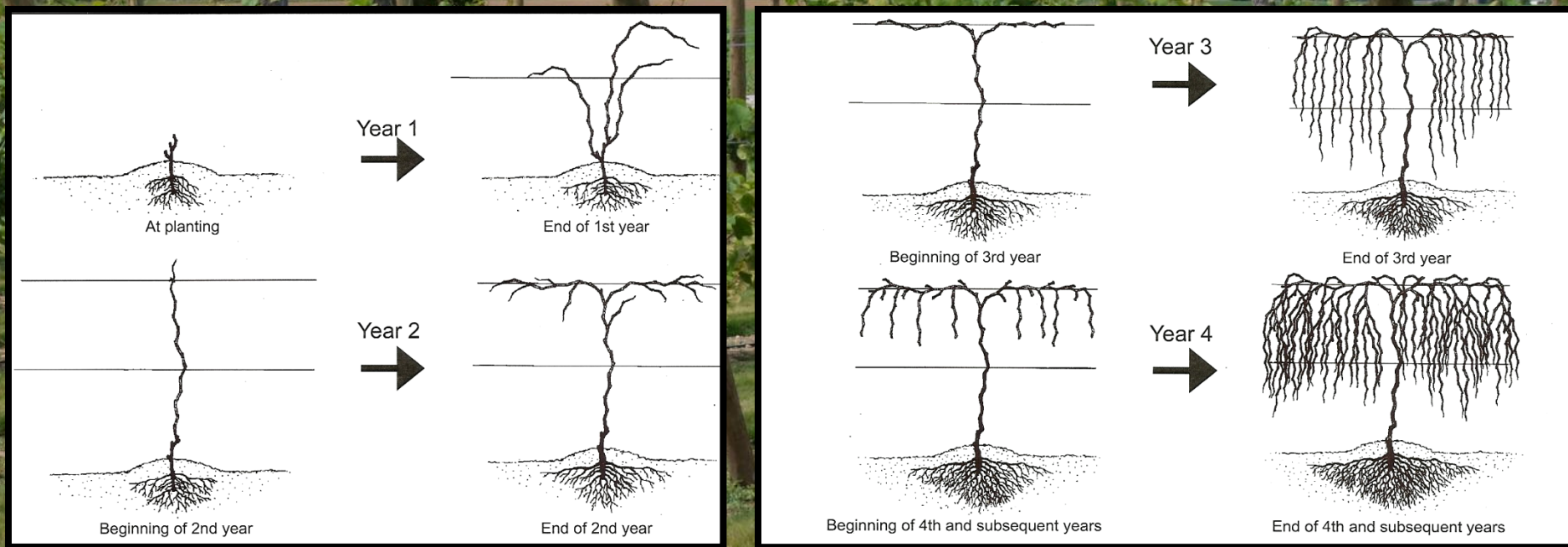
3-4" x 8' line post

2' deep



Pruning and Training

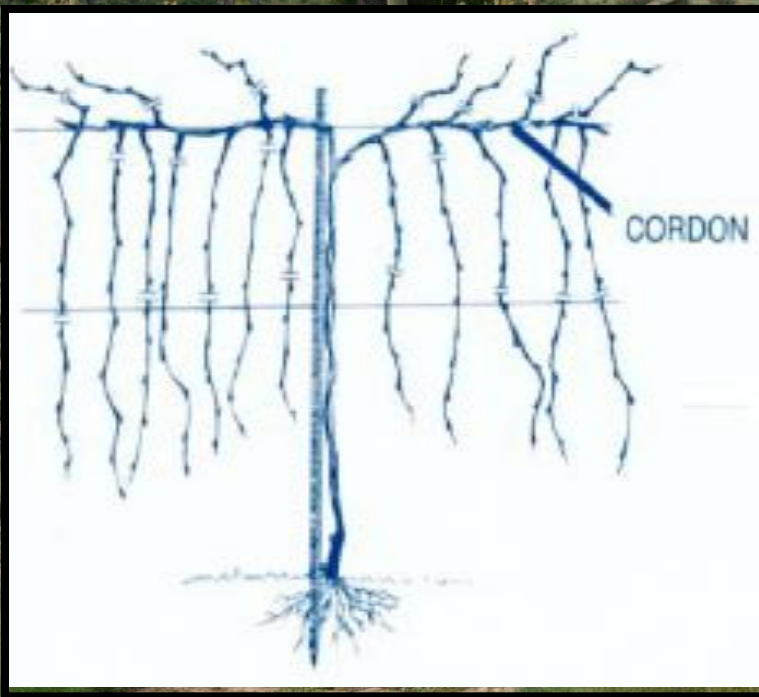
Initial Pruning from planting to fruiting



High Bi-Lateral Cordon
Relies on downward combing of new growth

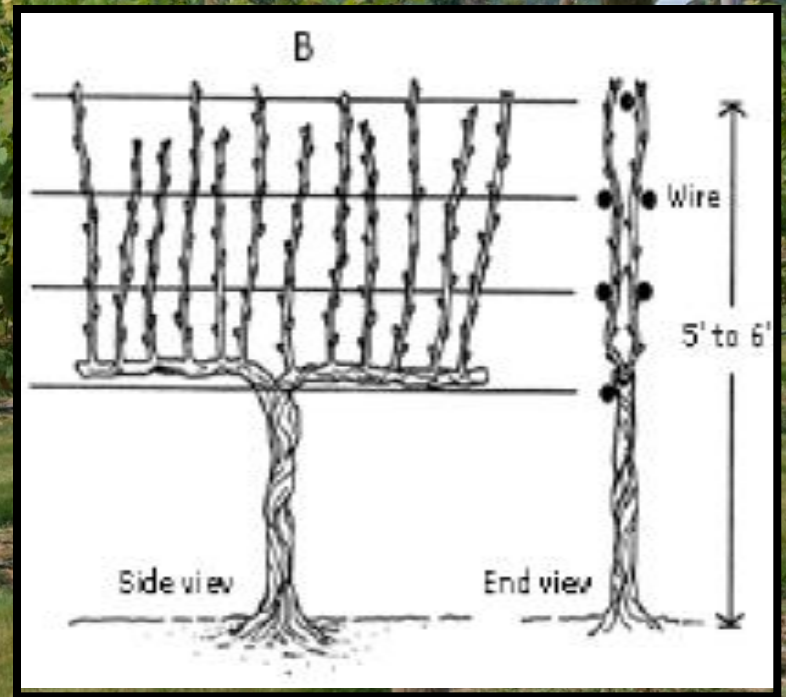
Training Methods

High Cordon



Use for trailing
grape cultivars

Low Cordon



Use for upright
grape cultivars

Training Methods

Low-Cordon Vertical Shoot Positioning



Site Preparation Basics

1. Start site preparation at least 1 year before planting vines
 1. Weed control
 2. Herbicide carryover
2. Soil Sampling
3. Layout vineyard
4. Consider irrigation
5. Trellis system materials
 1. Vine supports
 2. Grow tubes

Resources

- Sampling Soils For Testing

<https://extension2.missouri.edu/programs/soil-and-plant-testing-laboratory>

- USDA Plant Hardiness Zones

<http://planthardiness.ars.usda.gov/PHZMWeb/#>

- Climate information in Missouri

<http://climate.missouri.edu/climate.php>

Resources

- Midwest Regional Climate Center –County climate data

<https://mrcc.illinois.edu/>

- Web Soil Survey

<http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

- SoilWeb-Real Time Soil Descriptions

<http://casoilresource.lawr.ucdavis.edu/drupal/node/902>

Resources

- For More Information on Vineyard Site Selection and Layout.

Wolf, T. K. (editor). 2008. **Wine Grape Production Guide**. Natural Resource, Agriculture, and Engineering Service. Cooperative Extension. NRAES-145. Ithaca, N.Y. 336 p.

- ViNEWS IPM Scouting Reports – weekly reports sent weekly during growing season

<https://gwi.missouri.edu/>