Successful Vine Establishment

Beginner Grape School March 11, 2022 Dean Volenberg Viticulture Extension Leader Grape and Wine Institute



Grape and Wine Institute

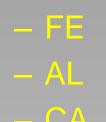
Establishing A New Vineyard Soil and Nutrient Basics

- 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
 - $-P_2O_5$
 - $-K_{2}O$
 - -N
- Plants take up $- H_2 PO_4^- \text{ or } HPO_4^{2-}$
 - K+
 - $\mathrm{NO_3^+}\mathrm{or}$ $\mathrm{NH_4^+}$

- Soil mainly negatively charged
 - Clay particles
 - Organic matter
- H₂PO₄⁻ or HPO₄²⁻ form complexes with



These complexes are relatively insoluble

UW Soi 8452 Mi Verona, (608) 26	Analyzed By: I & Plant Analysis ineral Point Road WI 53593 52-4364 5839	ab SOIL TEST REPORT Results also available on-line at http://uwlab.soils.wisc.edu/reports lab number: 5839 access code: q8h55 This Beport is for:									Universi Univer	OPERATIVE ity of Wiscons sity of Wiscor Department of	in-Extension sin-Madison
County Door Date Received 4/16/2009		DOOR CO UW CO GOVERNM STURGEON B	IENT CTR, 421 N	EBRASH	(A ST								
				NUTRI	ENT RE	COMME	ENDATIO	ONS					
Slope Acre 0% 5	es Plow Depth Irrigated 7"N0	Cropping Sequence	Yield Goal	Grop N	P2O5	K20	legume N	Fertilzer Manure N	Credit P2O5	К20	N	utrients to Ap P2O5	^{ply} к2О
Soil Name unknown	(group D)	Grape, establishment	all	see below	— Ibs/a — 0	250	- ibs/a 0	0	- Ibs/a 0	0	see below	— Ibs/a — 0	250
Field Name WI		(no crop) (no crop)	n/a n/a										
Previous Crop (no crop) n/a no crop There is no lime recommendation.													

ADDITIONAL INFORMATION

Lime recommendations for apples and cherries apply only to pre-plant tests. Adjustment of pH is impractical once an orchard is established. Other perennial fruit crops must also be limed or amended with an acidifying material and incorporated prior to establishment.

Recommended rates are the total amount of nutrients to apply (N-P-K), including starter fertilizer.

This soil should be monitored more closely because of it has a relatively low potassium buffering capacity.

P₂O₅ and K₂O nutrient application rates are provided for establishment of fruit crops. Nutrient application rates after the establishment year should be based on tissue testing with the goal of achieving and maintaining tissue nutrient concentration sufficiency.

Because of very high P levels, P₂O₂ applications from fertilizer or manure should be reduced and crops with a high P removal should be grown.

Year 1: Apply 1 ounce of N per plant two times during the establishment year. This rate applies for the establishment year only. After establishment use tissue testing to guide fertilizer application.

N.R.=Not required for calculation of time requirement when soil pH is 6.6 or higher.

TEST INTERPRETATION										
Cropping Sequence	Very Low	Low	Optimum	Hìgh	Very High	Excessive				
Grape, establishment	РРРРРРРРРРР ККККККК	РРРРРРРРРРРРРРРР	РРРРРРРРРРРРРРРРР РРРРРРРРРРРРРРР	РРРРРРРРРРРР	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP				
(no crop)										
(no crop)										
(no crop)										
Rotation pH	xxxxxxxxxxxxxxxx			0000000000						

	LABORATORY ANALYSIS															
Sample Identification	Soil P ^H	0.M %	Phosphorus ppm	Potassium ppm	60-69 Lime Req (17a)	Calcium ppm	Magnesium ppm	Estimated CEC	Baron ppm	Manganese ppm	Z'inc ppm	Sulfate-Sulfur ppm	Sulfur Av ail. Index	Texture Code	Sample Density	Buffer pH
1	7.4	2.7	51	45	0									2	1.10	N.R.
Adjusted Averages	7.4	2.7	51	45												

4

,	ples Analyzed By: SOIL TEST REPORT W Soil & Plant Analysis Lab 452 Mineral Point Road											COOPERATIVE EXTENSION University of Wisconsin-Extension University of Wisconsin-Madison Department of Soil Science		
Verona, WI 53593 (608) 262-4364		Results a		able on-lin Imber: 58		/uwlab.soi ess code:		iu/reports			Ľ	epareneric or	our ocience	
LAB #: 5839]							This	Report is	for:				
County Account No. Door 555015 Date Received Date Processed	0	oor co u o govern Turgeon	MENT C	TR, 421 N	EBRASK	A ST					1			
4/16/2009 5/1/2009					NUTRI	ENT RECO		ATIONS						
Slope Acres Plow Depth Irrigated 0% 5 7"No	Cropping Se	equence	Yie	ld Goal		Nutrient Nee			tilzer Credit re N P2O5	К20	N	utrients to Ap P2O5	^{ply} к20	
Soil Name unknown (group D)	Grape, establishi	ment	all	er agre —	see below	- Ibs/a		0 0) 0	0	see below	— 169'a — 0	250	
Field Name WI	(no crop) (no crop)		n/a n/a											
Previous Crop	(no crop)		n/a											
no crop	There is no lime	recomment	dation.											
			-	ADDITI	1 07	z. N/r	olant	x 60)0 pla	ants/	acre	x 2 =		
Lime recommendations for a crops must also be limed or													it	
Recommended rates are the	e total amount of n	utrients to a	upply (N-P	P-K), inc				• ••	/h 1					
This soil should be monitore	d more closely be	cause of it I	nas a relat	tively lo			6	8 Ibs	s/N a	cre				
P ₂ O ₅ and K ₂ O nutrient applic on tissue testing with the go														
Because of very high P level	ls. P.O. application	ns from fert	lizer or m	anure sho	ould be rea		crops wit	h a hìgh l	P removal	should be	arown.			
Year 1: Apply 1 ounce of N p testing to guide fertilizer app	per plant two times lication.	during the	establish	ment yea	r. This rate	e applies f	or the est	ablishmei	nt year onl	y. After e	stablishm	ent use tis	sue	
N.R.=Not required for calcula	ation of time requi	ementwhe	n son pH	IS 6.6 UIT	iigner.									
				TEST I	TERPRE	TATION								
Cropping Sequence Ver	v Low	Low			Optimun	1		High		Very Hig	h	Ex	cessive	
Grape, establishment PPPI	, PPPPPPPPPPPP KKKK	PPPPPPP	PPPPPP	PPPPP	PPPPPP	PPPPPP			РРРРРР			PPPPPP	PPPPPP	
(no crop)														
(no crop)														
(no crop)														
Rotation pH XXXX	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	xxxxxxx	xxxxxx	xxxxxx	xxxxxx	~~~~~	xxxxxxx	xx						
				LABOR/	ATORY A	NALYSIS								
Sample Soil O.M Identification pH %	Phosphorus Potassium ppm ppm	n 60-69 Lime Req (17a)	Calcium ppm	Magnesium ppm	Estimated CEC	Baron ppm	Manganese ppm	Zino ppm	Sulfate-Sulfur ppm	Sulfur Avail. Index	Texture Code	Sample Density	Buffer pH	
1 7.4 2.7	51 45	0									2	1.10	N.R.	

Adjusted Averages 7.4 2.7 45

51

Samples Analyzed By: UW Soil & Plant Analysis 8452 Mineral Point Road	Lab	SOIL TEST	REPORT				Universit Universit	PERATIVE I y of Wiscons ity of Wiscon	in-Extension sin-Madison
Verona, WI 53593 (608) 262-4364	Results als	o available on-line at htt lab number: 5839 a	p://uwlab.soils.wisc. ccess code: g8h55	.edu/reports				,	
LAB #: 5839]			This B	eport is fo	or:			
County Account No. Door 555015 Date Received Date Processed 4/16/2009 5/1/2009	DOOR CO UW CO GOVERNM STURGEON B	ENT CTR, 421 NEBRA	SKA ST				2		
Slope Acres Plow Depth Irrigated			RIENT RECOMMEN		0				
0% 5 7" No	Cropping Sequence	Yield Goal N	op Nutrient Need P2O5 K2O e Ibs/a	Fertilz egume N Manure bs/a — — —	er Credit N P205	К20	N	P2O5 P2O5	к20
Soil Name unknown (group D)	Grape, establishment	all see below	0 250	0 0	0	0	see below	0	250
Field Name	(no crop)	n/a							
WI	(no crop) (no crop)	n/a n/a							
Previous Crop NO C/Op	There is no lime recommendat								
						nto/	oro	v 0	
	pples and cherries apply only to amended with an acidifying ma	pio pian toot	oz. N/plan	II X 044	+ pia	1115/8	acre	X Z =	it
Recommended rates are the	total amount of nutrients to ap	oly (N-P-K), inc							
This soil should be monitored	d more closely because of it ha	s a relatively lo <mark>r</mark>		68 lbs/	N ac	re			
	ation rates are provided for esta al of achieving and maintaining								
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N.H.=Not required for calcula	ation of time requirement when	son pH is 6.6 or nigher.							
		TEST INTERP	RETATION						
	/ Low Low	Optim		Hìgh		'ery High			cessive
	РРРРРРРРРРРРРРРРРРРР КККК	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP	PPPPPPPP	PPPPPPI	PPPPF	PPPPPP	PPPPPI	PPPPPP
(no crop)									
(no crop)	102								
(no crop)	lbs P/acre								
Rotation pH XXXX		××× 90	2000	XXXX					
	$\Delta \cap$	Ibs K/a	acre						
Sample Soil O.M Identification pH %	Phosphorus Potassium 60-69 Lime ppm ppm Req (T/a)		ACT C Mangane ppm	se Zino S ppm	ulfate-Sulfur S ppm	Sulfur Av all. Index	Texture Code	Sample Density	Buffer pH
1 7.4 2.7 Adjusted 7.4 2.7	51 45 51 45				1		2	1.10	N.R.
Avérages 7.4 2.7									

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Verona, WI 53593	Results als	o available on-line					ports				-	
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			NUTRIE	NT RE	COMME	ENDATIO	ONS					
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		ADDITION	AL INFO	RMATIC	ON							

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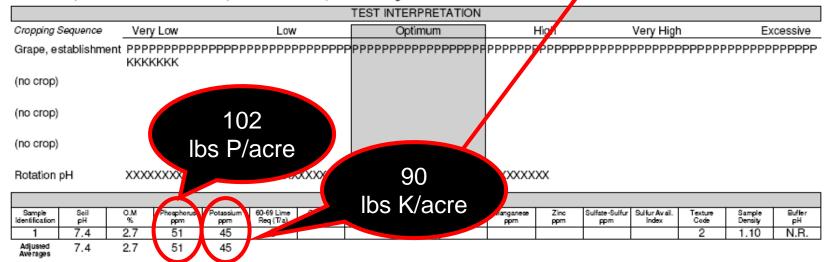
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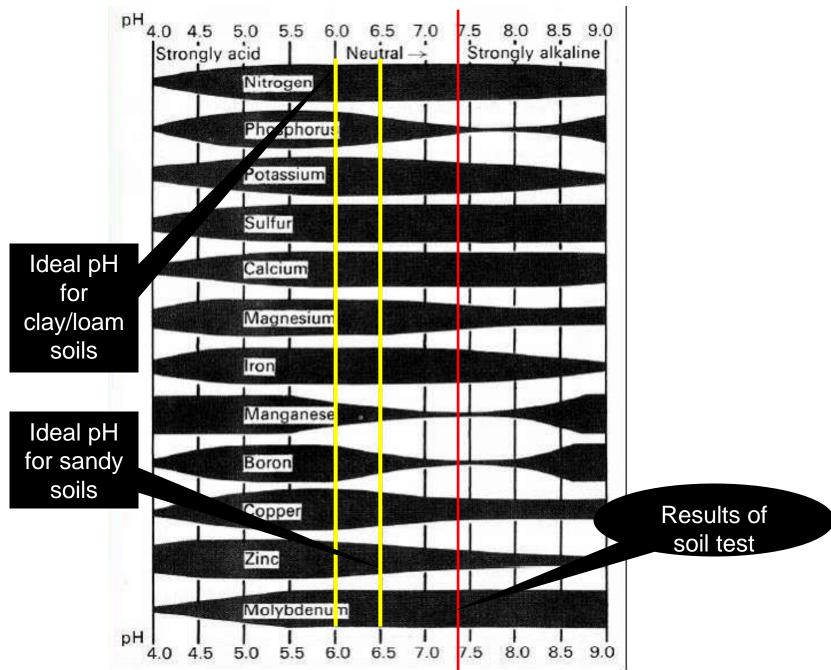
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Complete Antelored De

Avérages

	TEST INTERPRETATION															
Cropping	Sequence	Very	Low		Low			Optimum	1		Hìgh		Very High	า	Ex	cessive
Grape, e	stablishme		РРРРРР КККК	PPPPPP	PPPPPP	PPPPPP	PPPPPI	PPPPPP	PPPPPP	PPPPPF	PPPPP	PPPPPP	PPPPPF	PPPPPP	PPPPPP	PPPPPP
(no crop)																
(no crop)																
(no crop)																
Rotation	pН	XXXX	xxxxxx	~~~~~	xxxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx		XX					
							LABORA	ATORY AN	VALYSIS							
Sample Identification	Soil P ^H	о.м %	Phosphorus ppm	Potassium ppm	60-69 Lime Req (17a)	Calcium ppm	Magnesium ppm	Estimated CEC	Baron ppm	Manganese ppm	Zino ppm	Sulfate-Sulfur ppm	Sulfur Av ail. Index	Texture Code	Sample Density	Buffer pH
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Adjusted	7.4	2.7	51	45												

COORERATIVE EXTENSION



Lowering Soil pH

			S	soil orga	anic ma	atter co	ntent (%)
			.5 - 2	2 - 4	4 - 6	6 - 8	8 - 10	> 10
					lb S	/acre		
	Desired	0.25	261	784	1220*	1742*	2309*	2700*
in soil pH		0.50	522	1525*	2439*	3485*	4617*	5445*
Í	reduction	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

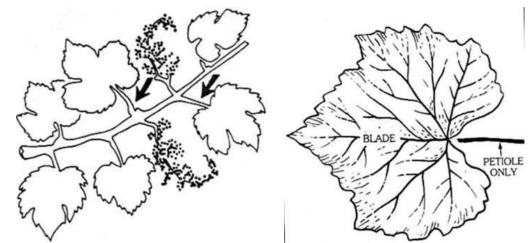
Adapted from: A2809 Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin

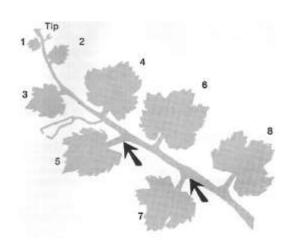
Established Vineyards Petiole Analysis

- 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 verasion
 - 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

Site Preparation Weed Management



Subsoiler Ripper



Weeds Controlled by Postemergence Herbicides

	Broa	adleaf	Gra	ISSES		
Product	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 \geq 3 feet in height.

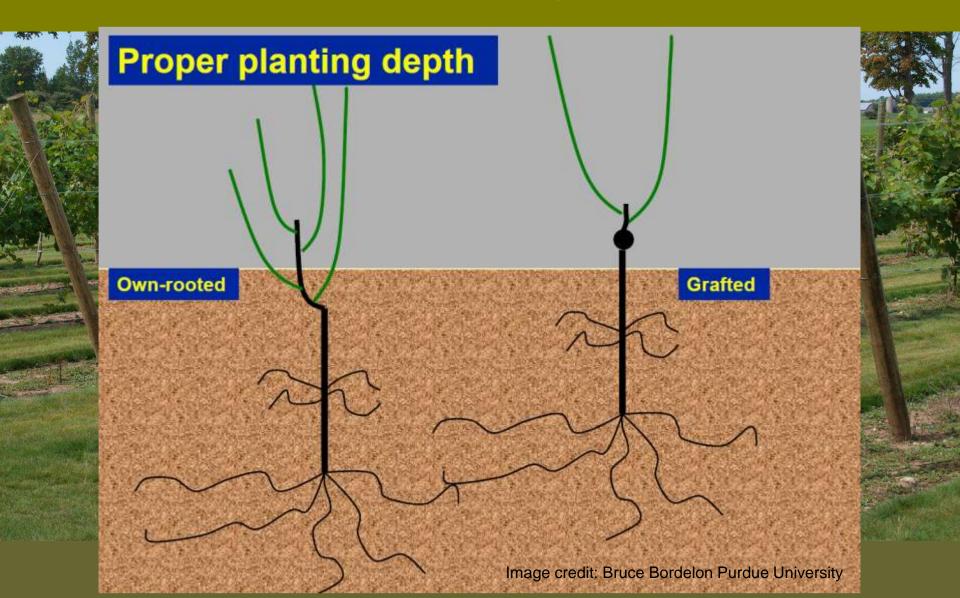
Weeds Controlled by Postemergence Herbicides

	Broa	adleaf	Gra	ISSES
Product	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

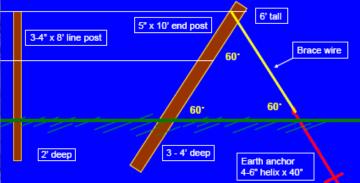


Trellis Construction

Trellis responsible for vine + crop weigh 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 5" x 10' end post 3-4" x 8' line post Keep shoots off of ground **Training systems for trellis Cane pruning** 3 - 4' deep 2' deep - 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.

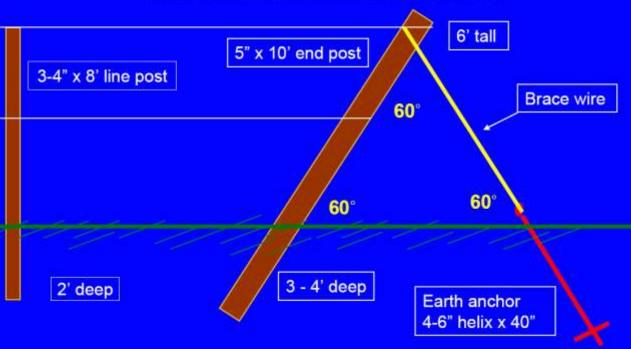
Wire Support

- 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

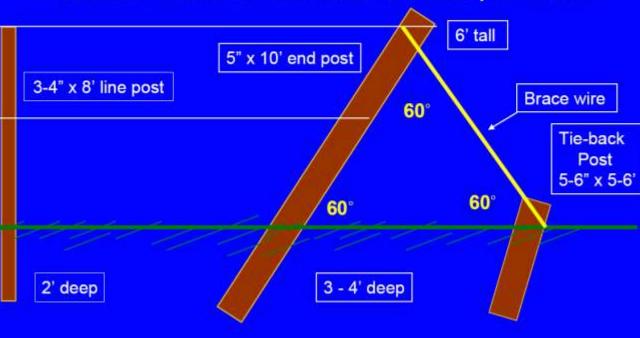
Suitable for rows up to 600 ft, but this is affected by soil texture and anchor's helix diameter.



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

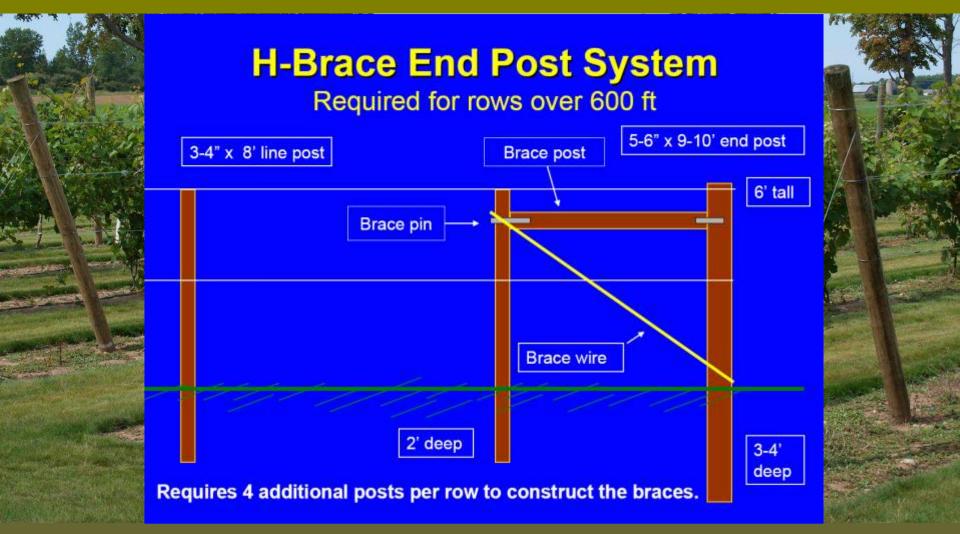
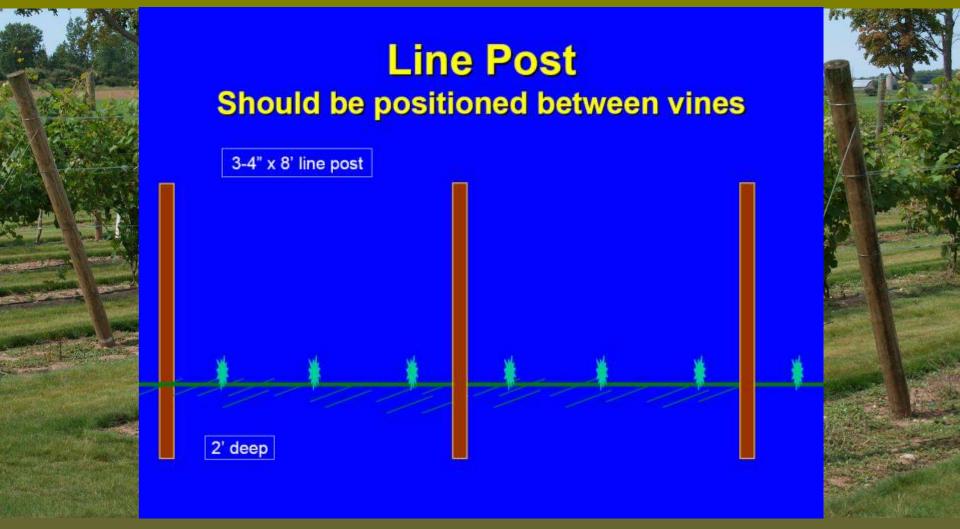
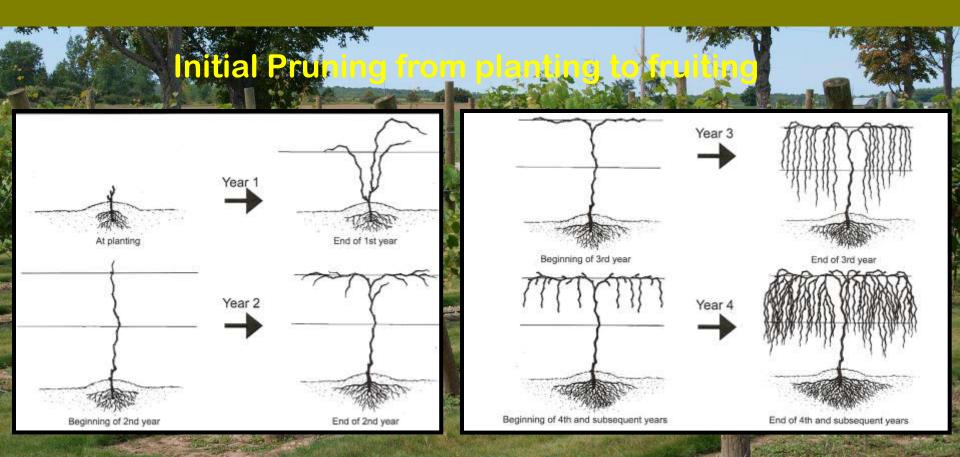


Figure credit: Paul Domoto, Department of Horticulture, Iowa State University <u>http://viticulture.hort.iastate.edu/info/pdf/domototrellis.pdf</u>

Line Post

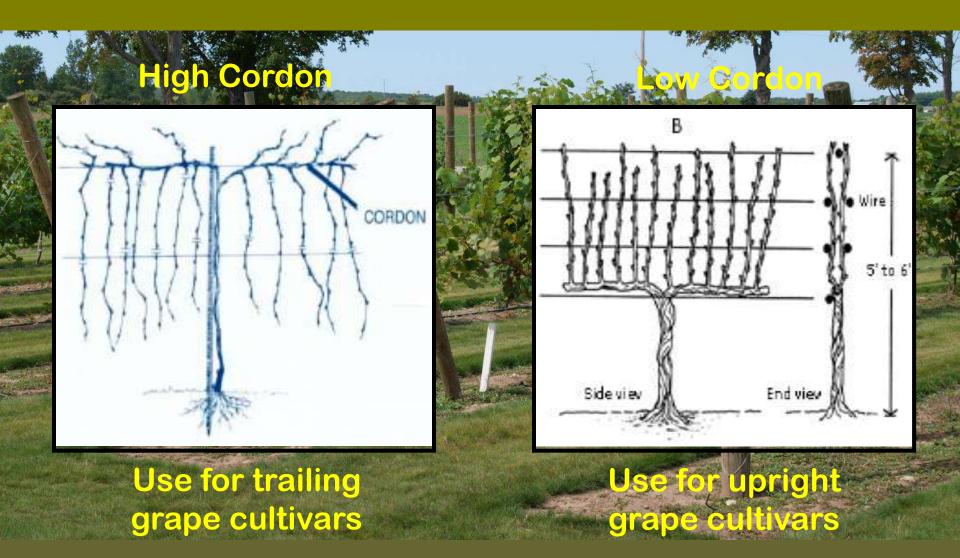


Pruning and Training



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

Training Methods



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-testinglaboratory

USDA Plant Hardiness Zones

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

Climate information in Missouri

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



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