

GROWING HIGH QUALITY COLD CLIMATE GRAPE VARIETIES

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OUTLINE FOR TODAY:

- Breeding grapes for cold hardiness
- Cold climate grape varieties
- Management tactics for high quality fruit & why we do them
 - How vines ripen fruit
 - My favorite canopy management tips
 - My favorite pruning tips
 - Does nutrition matter?





SECTION 1:

Cold climates call for cold hardy grapes

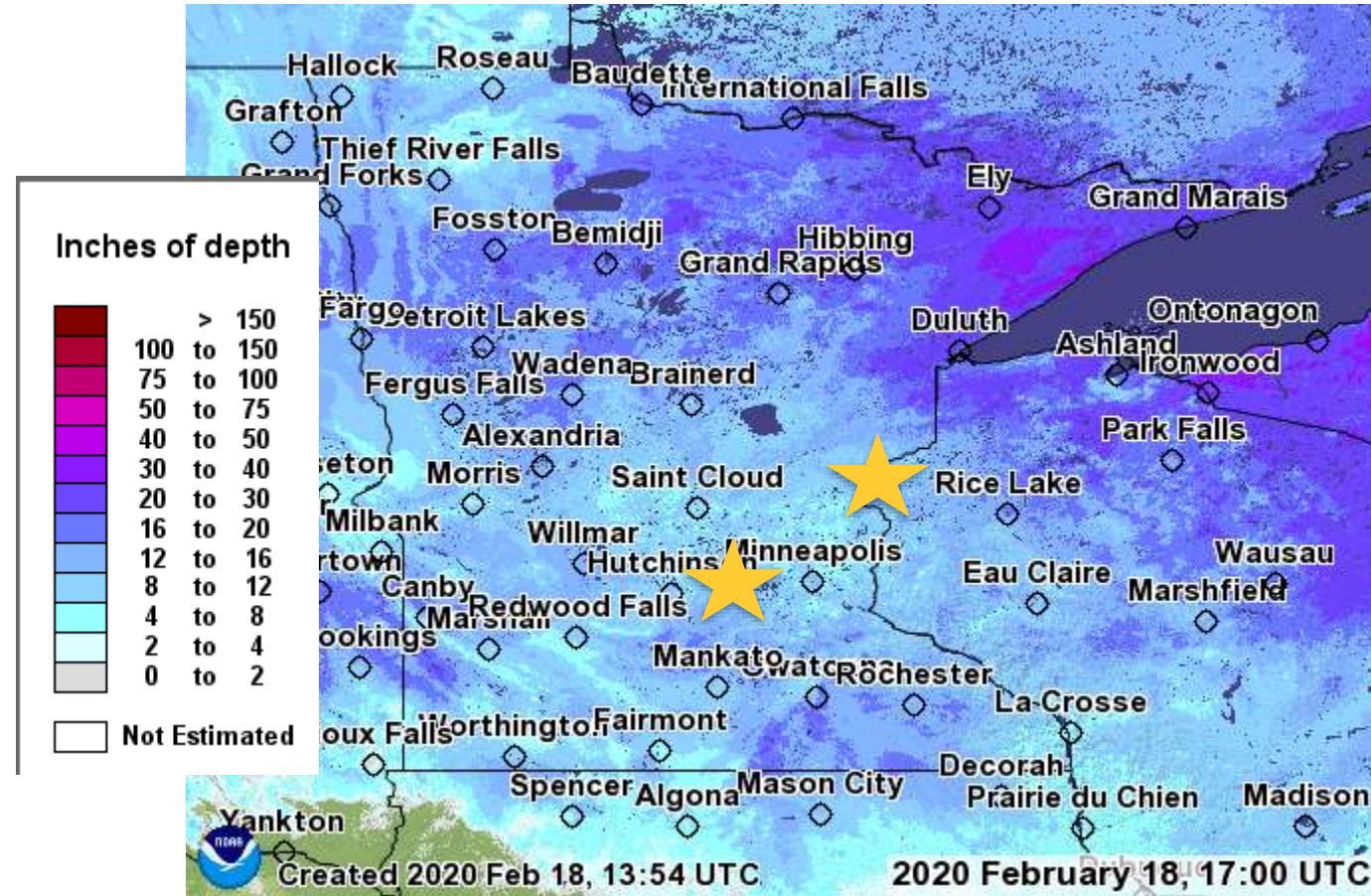
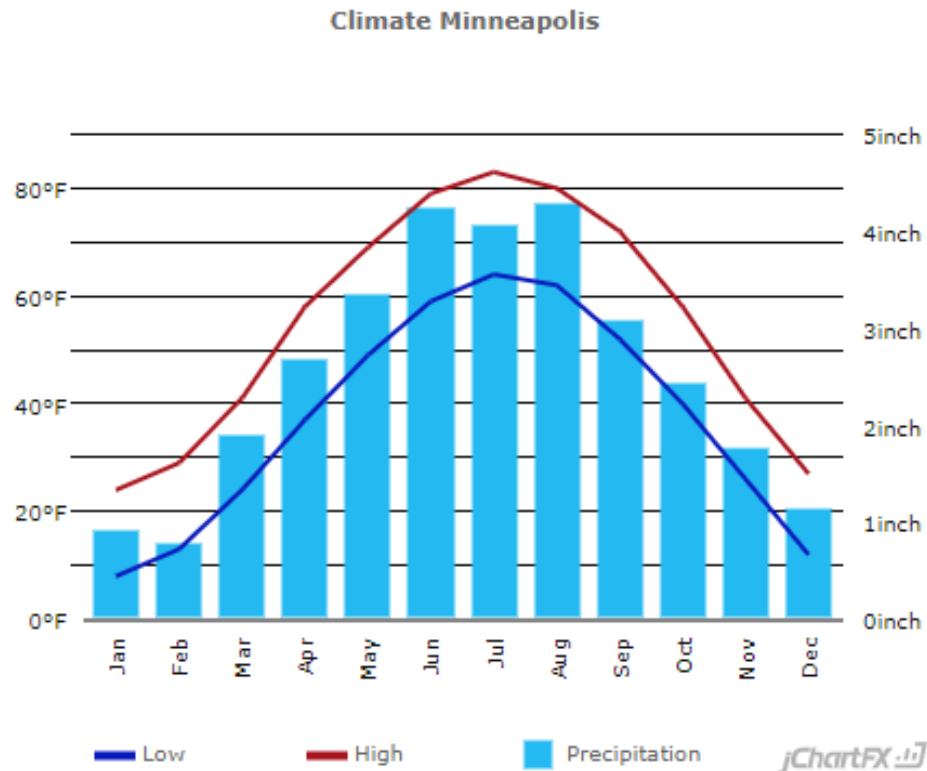
COLD HARDINESS:

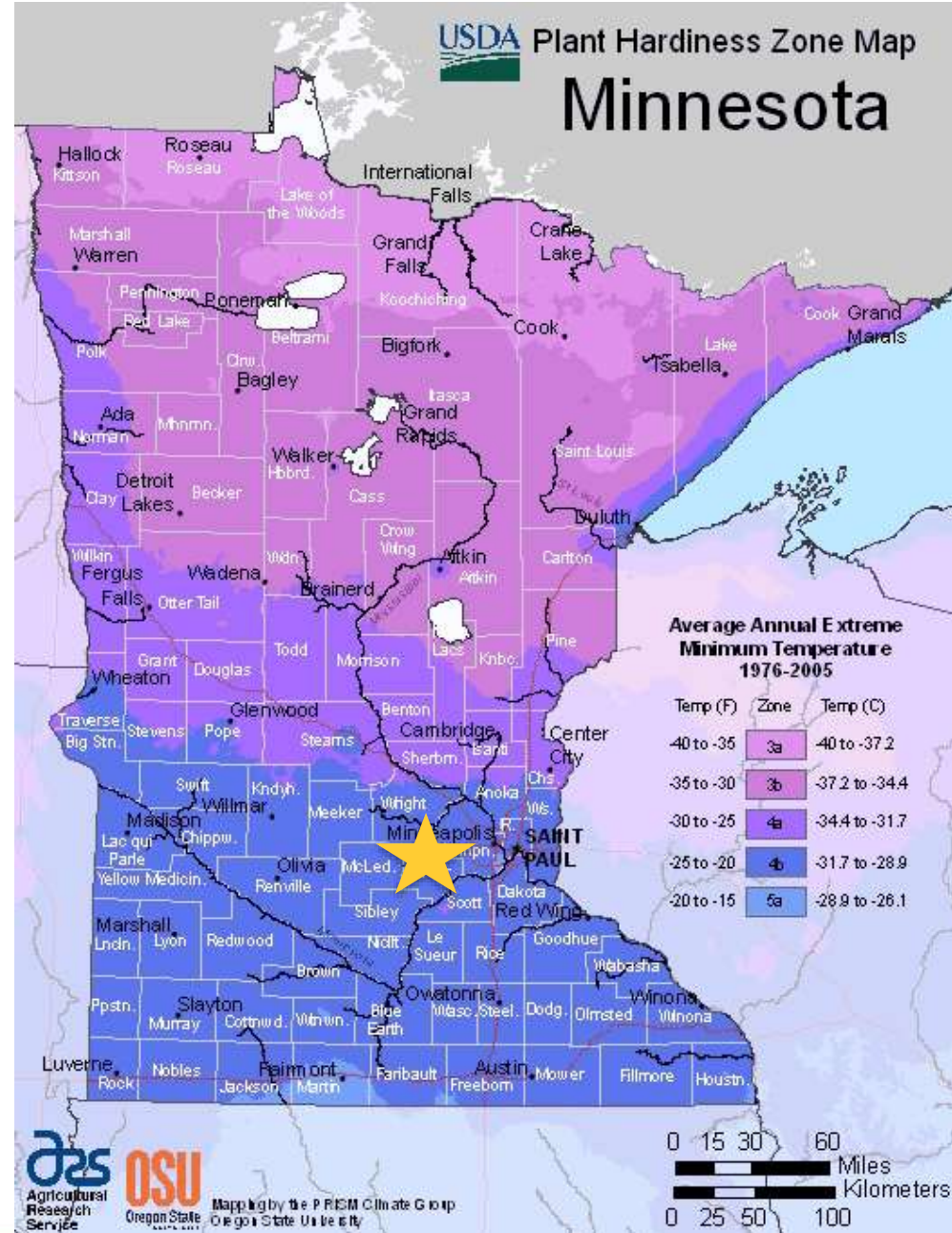
- Lowest temperature for survival
- Injury can still occur above min. temps.
 - Sudden hot-cold in fall
 - Season length
 - Duration of extreme temps
 - Early spring/late frost

Hardiness is relative: “Test winters” like 2014 and 2019 change our understanding of each variety’s hardiness

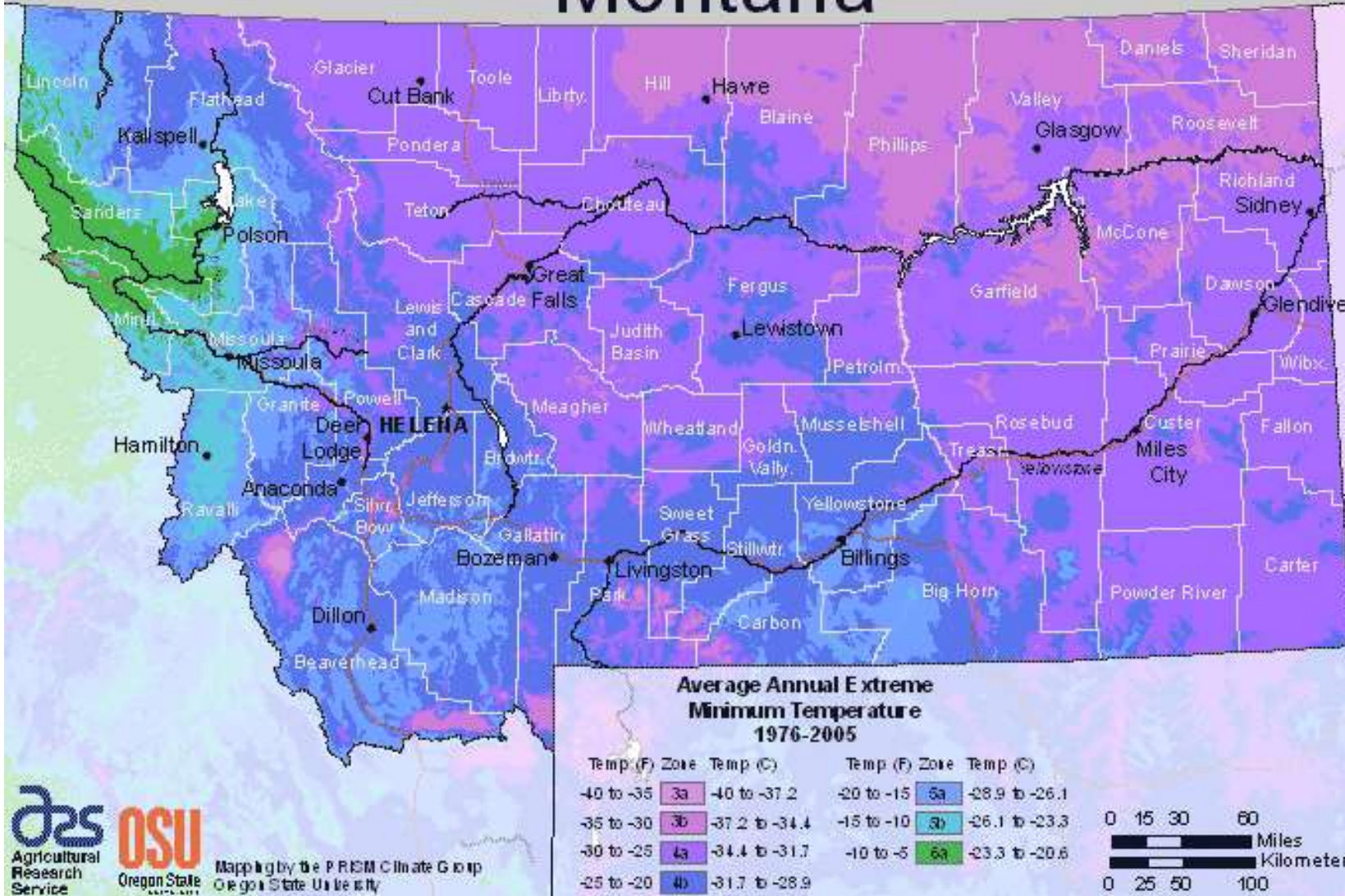


WHERE COLD CLIMATE VARIETIES ARE BRED





USDA Plant Hardiness Zone Map
Montana



- Zones 4a, 4b, 5a, some 5b



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Each variety differs in its cold hardiness, but all from UMN have been bred to grow reliably in USDA Zone 4 & up

Extreme weather can still lead to periodic failures



HOW MUCH COLD THEY CAN TAKE

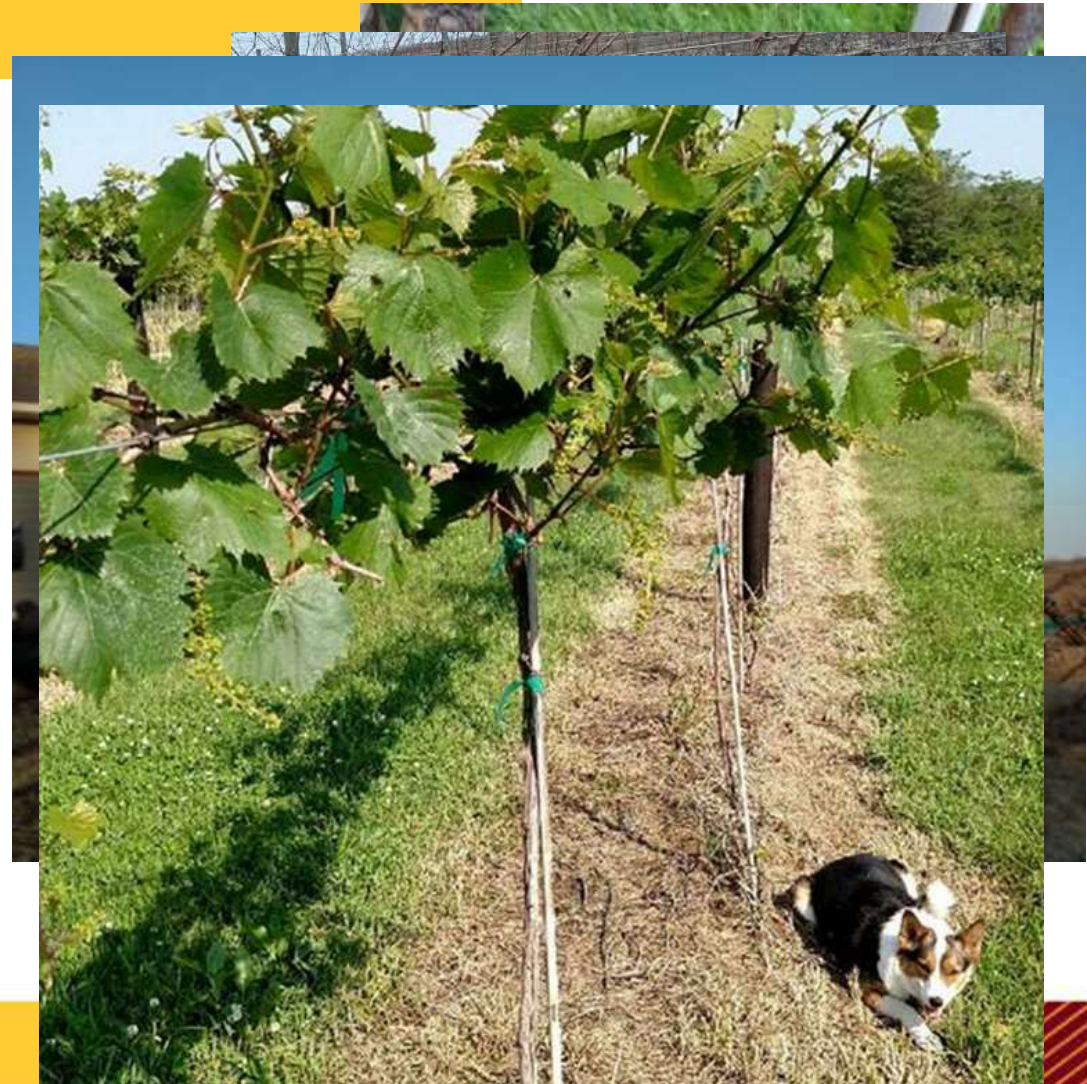
Relative minimum ranges:

- Marquette: -20 to -30 degrees F
- La Crescent: -20 to -35 degrees F
- Louise Swenson: -20 to -40 degrees F
- Frontenac: down to -40 degrees F
- Sunset Seedless: -15 degrees F



THINGS WE DO DIFFERENTLY IN COLD CLIMATE VINEYARDS

- Replace damaged trunks & cordons
- Train up 2 trunks, not just one
- Leave extra buds during pruning
- Single high cordon (SHC) or VSP
 - SHC prevents radiation frost damage
 - Supports vigor of many cold climate hybrids



COLD HARDY GRAPE BREEDERS

- Elmer Swenson (1913-2004), 27 varieties
- University of Minnesota – MN Hardy
- Tom Plocher – Petite Pearl Plus



WHAT TO THINK ABOUT WHEN CHOOSING VARIETIES:

- Who will buy the grapes? What varieties do wineries want?
- What kind of wine does it make?
 - Flavor and aroma qualities
 - Foxiness, herbaceousness
- How hardy is it?
- How easy is it to grow?
- Will it be good for my site?
- What trellis system does it prefer?





SECTION 2:

10 Popular Cold Climate Grapes



ITASCA



MARQUETTE



LA CRESCENT



THE FRONTENAC FAMILY



ELMER SWENSON VARIETIES

Brianna



Swenson Red



St. Pepin



TOM PLOCHER VARIETIES

Petite Pearl



Verona



Crimson Pearl



ITASCA

- 2017 – University of Minnesota
- Grape: Golden to rosy skin. Ripens mid-September.
- Wine: Lower acidity, high sugar levels.
- Vine: Upright, vigorous. High resistance to downy mildew and leaf phylloxera. Superior hardiness.



TRELLISING ITASCA



- 2006 - University of Minnesota
- Grape: Black skin, pink pulp, small/medium cluster size
- Wine: Medium-bodied. Cherry, black currant, and can take on complex flavors.
- Vine: Moderate vigor, somewhat upright. 2 clusters per shoot. Does well on SHC or VSP trellis. Less hardy than Frontenac.

MARQUETTE



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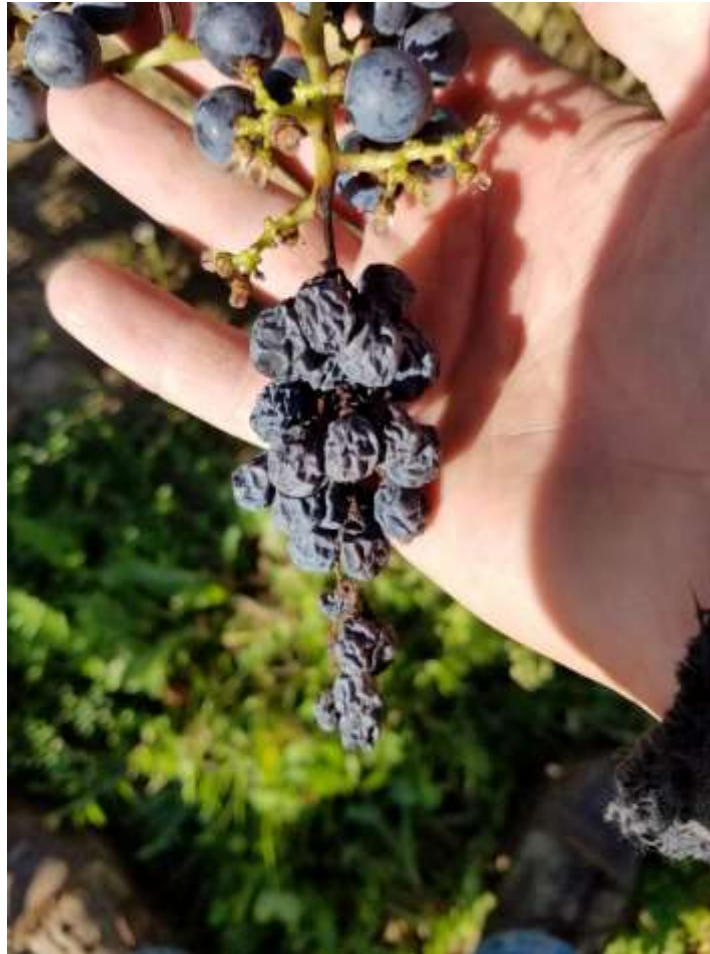
MARQUETTE ISSUES

Does not like:

Wet soils during fall

Extreme cold temperatures during winter (below -30)

Can thrive in cold temperatures as long as site is not wet. Significant dieback limited to wet low-lying sites.



- 2002 – University of Minnesota
- Grapes: Yellow. Fruity but not foxy flavor. Medium, loose clusters. Moderate acidity. Late Sept. harvest.
- Wine: Apricot, citrus, tropical fruit. Very popular as dry, semi-dry, or sweet.
- Vine: Moderate disease resistance. Berries sometimes fall off (shatter) 15-20% during harvest. Early bud break

LA CRESCENT



- 1996 – University of Minnesota
- Grapes: Blue/black skin, dark pulp. Late harvest. High acidity, must fully ripen.
- Wine: Bold cherry. Can have notes of grass, evergreen, chocolate.
- Vine: Superior hardiness. Moderately high vigor. Shoot and leaf thinning may be needed. Good disease resistance
- Trellis: High cordon preferred

FRONTENAC



Frontenac Blanc



- 2012
- Amber skin
- Earlier harvest than Front. or Front. Gris
- Highly productive

Frontenac Gris



- 2003
- Gray-amber fruit, clear to rosy, amber juice
- Fruit-forward: Peach, pineapple, honey

FRONTENAC BLANC AND GRIS



- 2000 – Tom Plocher
- Grapes: Small compact clusters, dark berries
- Wine: Relatively higher tannin. Can take on nice black pepper notes. Blends well with Crimson Pearl or a small % Marquette.
- Vine: Similar hardiness to Marquette (moderate). Lower vigor than other northern hybrids; plant @ 6 foot spacing

PETITE PEARL



Photo: petitepearlplus.com



- 2002 – Elmer Swenson
- Grapes: Greenish-gold, medium/large berries.
- Wine: Makes a semi-sweet white wine w/ pineapple notes. For lighter table wine (tropical, floral) harvest b/t 3.2-3.4 pH.
- Vine: Productive, high vigor, produces on secondary buds. Harvest mid-late August.
- Trellis: High cordon or GDC preferred

BRIANNA



Photo: Double A Vineyards



- 1978 - Elmer Swenson
- Grapes: Large berries. Pink to reddish. Good wine or table grape.
- Wine: White or blush. Often used for sweeter wine. Strawberry and floral notes.
- Vine: Early-mid Sept. harvest. Less hardy (-15). Not suited for northern MN.

SWENSON RED



Photo: Double A Vineyards



DISEASE RESISTANCE

*Growing Grapes
in Minnesota*
guide, page 47

Online pdf

Table 22. Relative disease susceptibility and chemical sensitivity of cold hardy grape cultivars.

Cultivar	Disease Susceptibility*							Chemical Sensitivity*			
	Black rot	Downy mildew	Powdery mildew	Botrytis	Phomopsis	Crown gall	Anthrax-nose	Sulfur	Copper	2,4-D	dicamba
Aromella	1	1	1	1	2	?	1	?	?	3	3
Beta	1	1	1	1	?	?	?	?	?	?	?
Bluebell	1	1	1	1	?	?	?	?	?	?	?
Brianna	2	1	1	1	?	?	?	2	1	2	2
Concord	3	1	2	1	3	1	1	Y	1	3	2
Edelweiss	?	1	2	2	?	1	2	N	N	2	2
Esprit	?	2	3	2	?	?	?	?	?	2	3
Frontenac	3	1	2	2	1	?	2	1	1	1	3
Frontenac gris	2	1	2	2	1	?	2	1	1	1	2
Geneva Red	1	2	2	2	1	1	1	N	?	1	3
Kay Gray	1	1	1	1	?	1	?	?	?	?	?
King of the North	1	3	1	?	3	?	1	?	?	?	?
La Crescent	2	3	2	1	3	1	2	1	1	1	3
La Crosse	2	3	2	1	3	1	2	N	N	1	3
Louise Swenson	1	1	2	1	?	?	2	?	?	?	?
Leon Millot	1	2	3	1	1	2	1	Y	1	2	3
Maréchal Foch	2	1	2	1	1	2	2	Y	1	3	3
Marquette	3	1	1	3	?	1	2	1	1	1	3



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MORE VARIETY INFORMATION:

A Review of Cold Climate Grape Cultivars (Iowa State Univ.)

www.petitepearlplus.com

mnhardy.umn.edu

WHAT TO THINK ABOUT WHEN CHOOSING VARIETIES:

- Who will buy the grapes? What varieties do wineries want?
- Does it make good wine, and is it popular?
- How hardy is it?
- Will it be good for my site? Where on my site should I plant it?
- How susceptible is it to diseases?
- What flavor and aroma qualities does it have?
- How easy is it to grow?



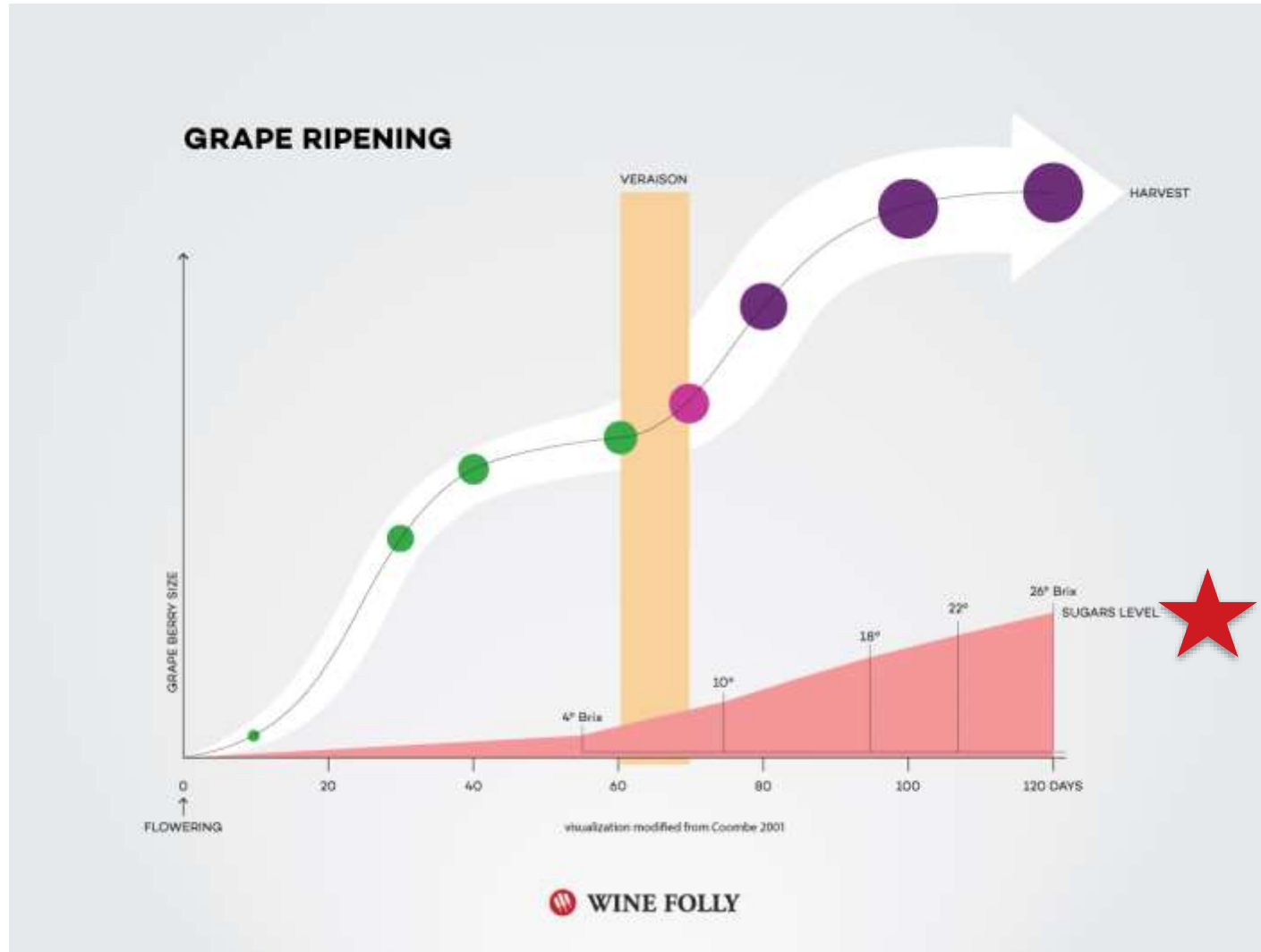
MANAGING COLD CLIMATE GRAPES

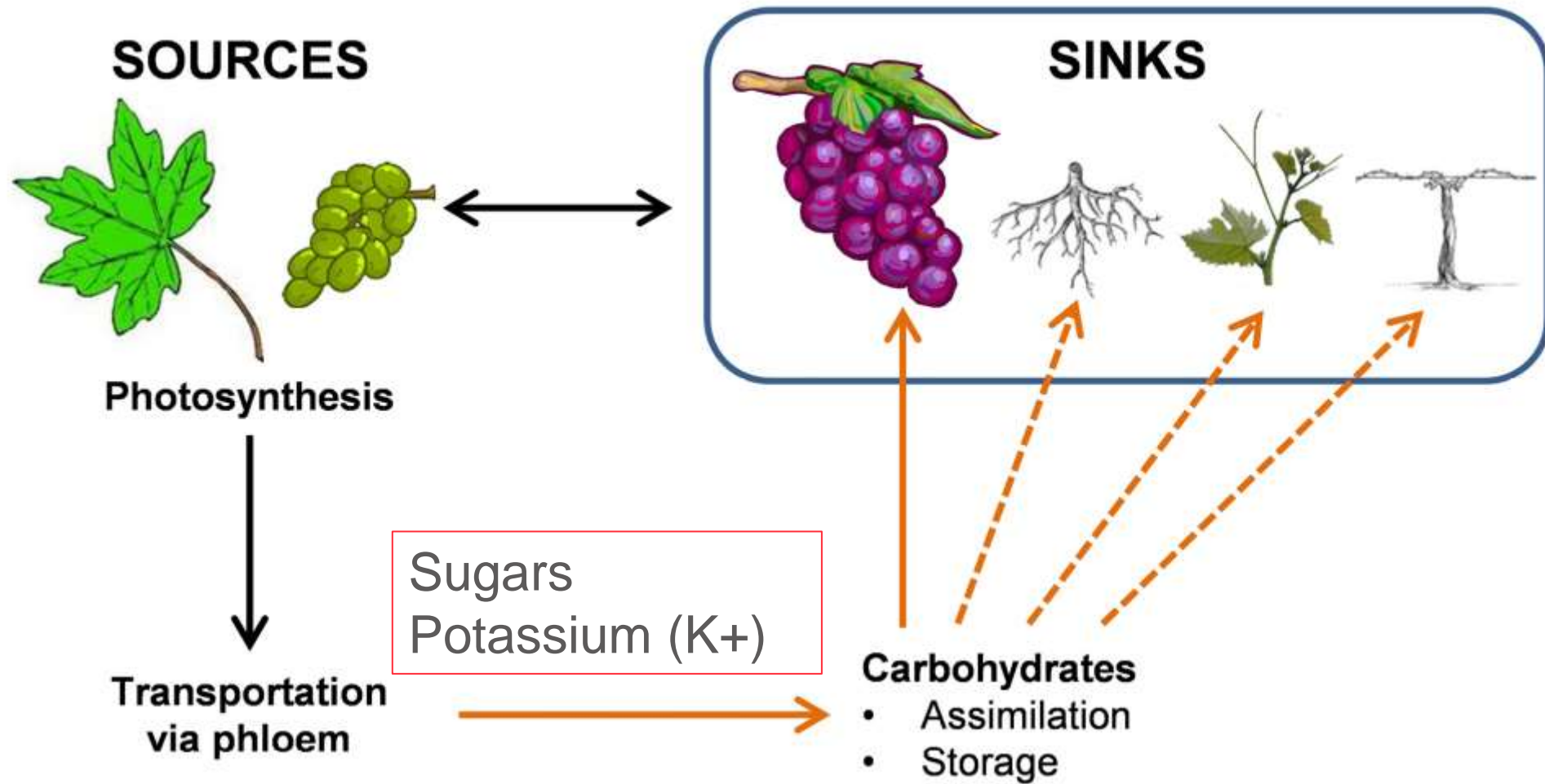
STOPPING WINE FLAWS IN THE VINEYARD

- In-season canopy management
- Harvest season practices
- Pruning
- Vine nutrition and fertilization



LET'S START WITH HARVEST – THE GOAL





HOW MANY LEAVES PER CLUSTER FOR GOOD RIPENING?

High cordon, GDC, or Scott-Henry:

- 0.8 m² leaf area per 2.2 lbs (1 kg) of fruit

Vertical-shoot positioning:

- 0.8-1.2 m² leaf area per 2.2 lbs of fruit

2.2 lbs = ~7-9 clusters. Need about a square meter of leaves for every 7-9 clusters



CANOPY MANAGEMENT IN-SEASON

Manage your canopy for:

- Balanced sun exposure to fruit
- Balanced shoot – fruit ratio
- Balanced canopy, fruit and shoots



Sugar & nutrient source for fruit



SHOOT THINNING



IMPORTANCE OF SHOOT THINNING

Question: why would you shoot thin?

- Too many buds left during winter pruning
- Air flow through canopy
- Sun exposure
- Balance energy between fruit and shoots



BEST PRACTICES FOR SHOOT THINNING

- Not every vine needs the same thinning
- When shoots are between 4-11 inches long
- Aim for 2 shoots per spur, spurs spaced 3-5 inches apart
- Keep these shoots:
 - Strongest
 - Best positions



LEAF PULLING



IMPORTANCE OF LEAF PULLING

- Less clear-cut than benefits of shoot thinning
- Increases sun exposure to fruit
- May create looser clusters to decrease disease
- May increase phenolics (tannins, flavor compounds)



LEAF PULLING

- Early: bloom
- Mid: Pea-sized fruit
- Late: Veraison



PRUNING



PRUNING – HOW MANY BUDS TO LEAVE?



PRUNING – ESTABLISHING NEW CORDONS



THERE'S NO SHAME IN A RE-TRAIN

1. Replacing unproductive cordons
2. Bringing up new trunks



Photo: Annie Klodd



DO NOT DO THIS!





DON'T DO THIS EITHER

**Too long!
Too weak!**



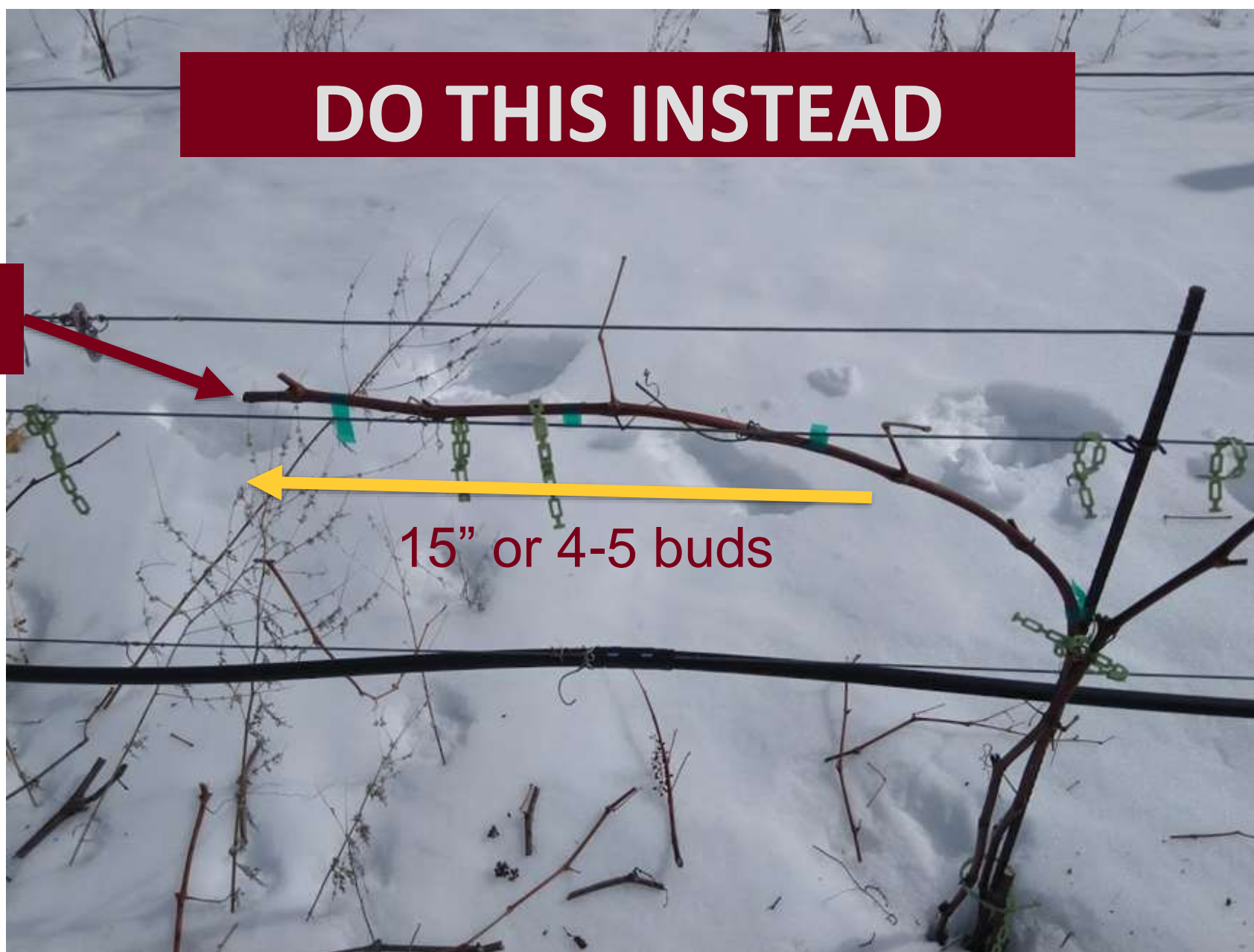
A YEAR LATER:

- Weak cordon
- Spindly shoots
- No good fruit
- Cordon may just die



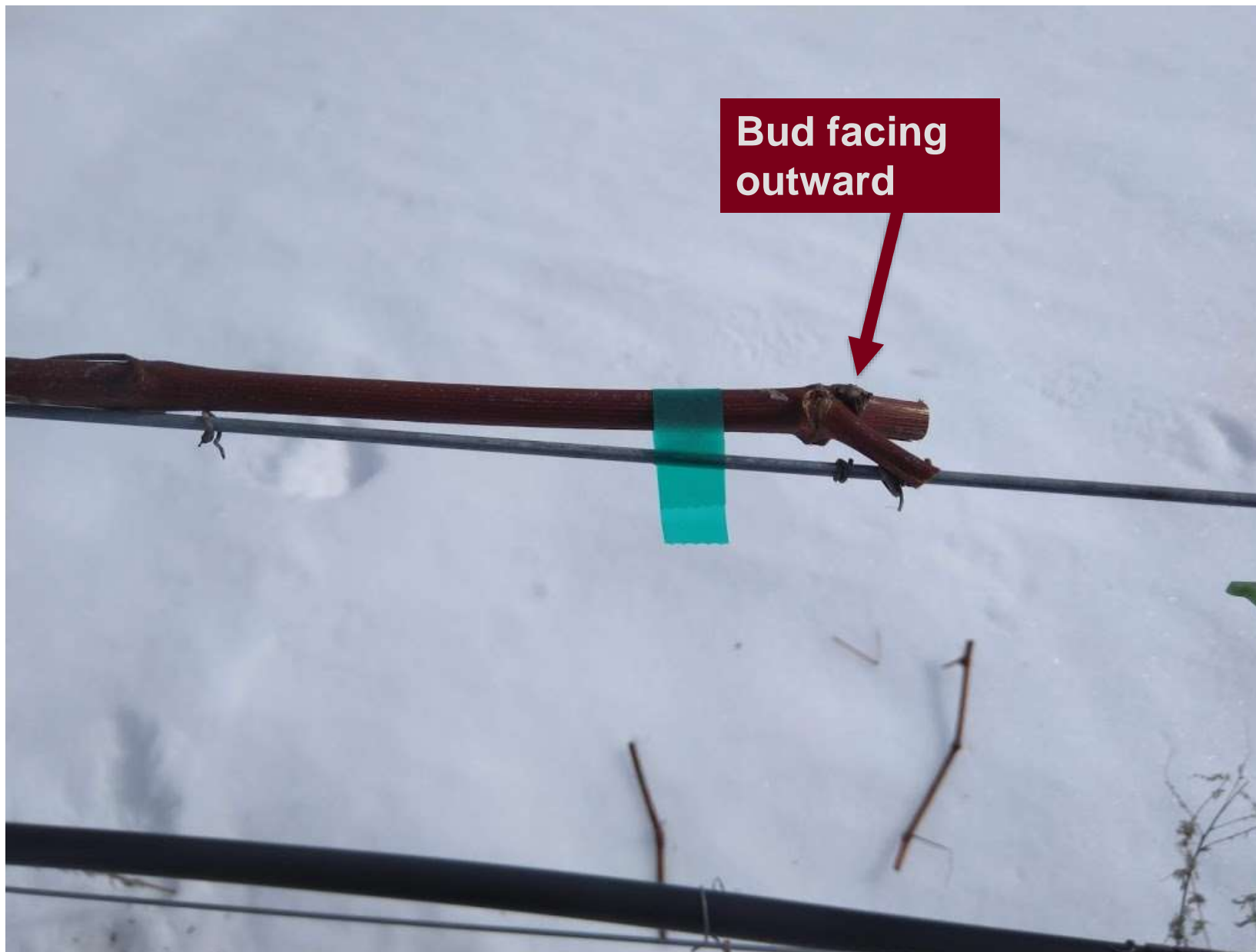
DO THIS INSTEAD

**Strong and
thick!**



DO THIS INSTEAD





PRUNING – ESTABLISHING NEW VINES

Prune back to
strong growth in
winter



NEW VINES



FERTILIZATION AND GRAPEVINES

Common grower question:

Should I fertilize my vines or not?

TRICK QUESTION! IT'S NOT THAT SIMPLE.

- All grapevines need nutrients for:
 - Yield
 - Berry size
 - Balanced acidity
 - Berry sugar accumulation
 - Vine vigor
 - Vine winter hardiness

Need to fertilize depends on:

Soil fertility

Soil type

Soil pH

Current vine health



BOTH VINEYARDS PLANTED 2010



Silty clay soil on south-facing
Fertilized every year according to foliar & soil tests
Big strong canes, consistent growth, minimal die-back



Silt loam soil on flat land
Never fertilized
Mix of weak and strong canes, inconsistent growth, frequent die-back

Pre-Planting nutrient sufficiency ranges

Test	Ohio	Iowa	U of MN	Eastern NA
Soil pH	5.5 - 6.5	6.0 - 6.5	6.0 to 7.0	**
Phosphorus (P)	20 - 50 ppm	> 30 ppm	> 25 ppm	20 - 50 ppm
Potassium (K)	125 - 150 ppm	> 150 ppm	> 160 ppm	75 - 100 ppm
Magnesium (Mg)	100 - 125 ppm	100 - 125 ppm	~ 100 ppm	100 - 250 ppm
Zinc (Zn)	4 - 5 ppm	3 - 4 ppm	> 1 ppm	2 ppm
Organic matter	2 - 3 %	2 - 3 (4) %	--	3 - 5 %
Calcium (Ca)	--	--	> 600 ppm	500 - 2000 ppm
Boron (B)	0.75 - 1.0 ppm	--	> 1 ppm	0.2 - 2.0 ppm
Manganese (Mn)	--	--	> 6 ppm	20 ppm
Copper (Cu)	--	--	> 0.2 ppm	0.5 ppm
Iron (Fe)	--	--	--	20 ppm
Sulfur (S)	--	> 7 ppm	> 7 ppm	--



Sufficiency nutrient ranges in petiole samples

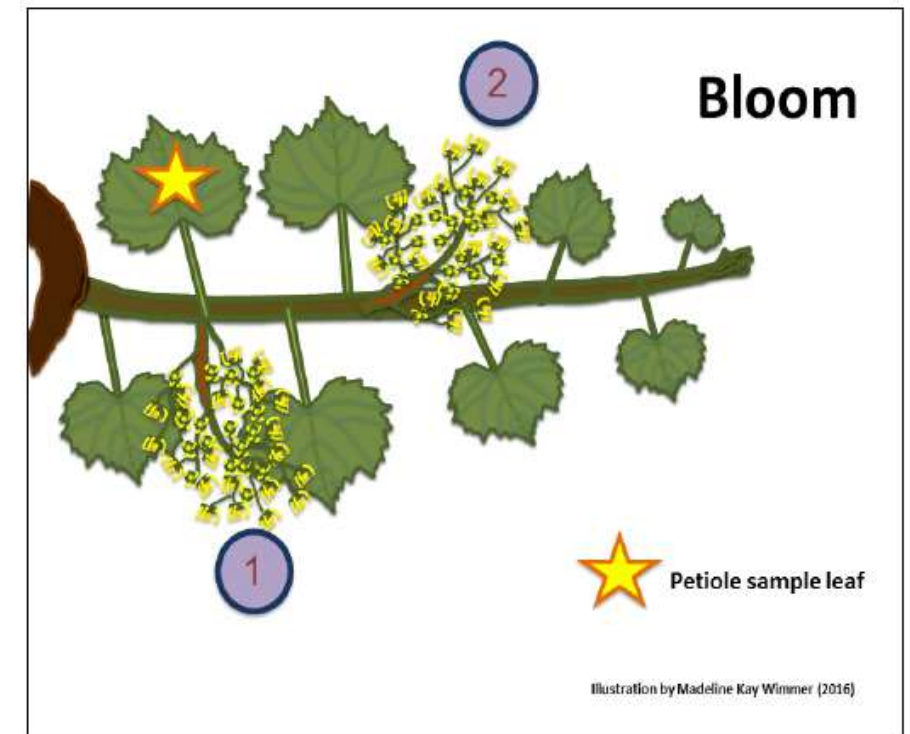


Nutrient	Full bloom	Veraison
	mid to late June	mid July to mid August
Nitrogen (%)	1.20 - 2.20	0.90 - 1.30
Phosphorus (%)	0.15 - 0.60	0.12 - 0.40
Potassium (%)	1.50 - 4.00	1.50 - 2.50
Calcium (%)	0.70 - 2.00	1.00 - 2.00
Magnesium (%)	0.20 - 0.50	0.25 - 0.45
Sulfur (%)	> 0.12	> 0.12
Manganese (ppm)	20 - 150	30 - 150
Boron (ppm)	25 - 50	25 - 50
Copper (ppm)	5 - 10	5 - 15
Zinc (ppm)	20 - 100	30 - 50
Iron (ppm)	40 - 180	30 - 100

Based on Domoto and Rosen

Common grower question:
How do I know how much fertilizer to apply?

Soil testing – every few years
Petiole testing (foliar) - annually
Vine vigor – cane girth, vine size, etc.
Visual symptoms – leaf discolor



SOIL AND FOLIAR TESTING

How do I know how much fertilizer to apply?

Instructions for calculating rates:

<https://blog-fruit-vegetable-ipm.extension.umn.edu/2019/05/calculating-fertilizer-rates-for.html>

REPORT NUMBER
19-315-1675

COMPLETED DATE
Nov 15, 2019

RECEIVED DATE
Nov 11, 2019

ACCOUNT
35040

CANNON RIVER VINEYARD
JARRED MCCARTHY
421 MILL STREET W
CANNON FALLS MN 55009



IDENTIFICATION
SOGN VALLEY

PAGE 1/1

TODAY'S DATE
Nov 15, 2019

SOIL ANALYSIS REPORT

LAB NUMBER	SAMPLE IDENTIFICATION	ORGANIC MATTER L.O.I. percent	PHOSPHORUS						POTASSIUM		MAGNESIUM		CALCIUM		SODIUM		pH	BUFFER INDEX	CATION EXCHANGE CAPACITY CEC meq/100g	PERCENT BASE SATURATION (COMPUTED)												
			P ₁ ppm		P ₂ ppm		OIL/ZN CARBONATE P ppm	K		Mg		Ca		Na		% K				% Mg	% Ca	% H	% Na									
			depth in	lb/A	depth in	lb/A		depth in	lb/A	depth in	lb/A	depth in	lb/A	depth in	lb/A									depth in	lb/A							
352																																
82929	V1WB	2.2 L	8 L	26 M					147 H	326 VH	1796 H		8	7.2					12.1	3.1	22.5	74.1	0.0	0.3								
82930	V1SB	2.3 L	17 M	43 H					161 H	311 VH	2236 H		8	7.5					14.2	2.9	18.3	78.6	0.0	0.2								
82931	V1NB	2.5 L	27 H	41 H					262 VH	301 VH	1794 M		9	6.0					14.4	4.7	17.4	62.3	15.3	0.3								
82932	V1PB	2.4 L	17 M	44 H					139 M	363 VH	2129 H		7	7.2					14.1	2.5	21.5	75.8	0.0	0.2								
82933	V2MO	1.9 L	10 L	38 M					82 L	328 VH	2420 H		13	7.5					15.1	1.4	18.1	80.1	0.0	0.4								
82934	V2 WEST	2.2 L	16 M	35 M					125 M	332 VH	2029 H		10	7.0					13.3	2.4	20.8	76.5	0.0	0.3								
82935	V3 LCT	3.1 M	15 M	23 M					92 L	268 VH	2162 H		9	6.5					14.4	1.6	15.5	75.1	7.5	0.3								
82936	V3MO	2.1 L	11 L	31 M					85 L	350 VH	2007 H		8	7.2					13.2	1.7	22.1	75.9	0.0	0.3								

LAB NUMBER	NITRATE-N (FIA)										SULFUR S ppm	ZINC Zn ppm	MANGANESE Mn ppm	IRON Fe ppm	COPPER Cu ppm	BORON B ppm	SOLUBLE SALTS ppm
	SURFACE		SUBSOIL 1		SUBSOIL 2		Total lb/A										
	ppm	lb/A	ppm	lb/A	ppm	lb/A		ppm	lb/A								
352																	
82929	4	7	0-6					7	3 VL	0.7 L	3 VL	18 H	0.4 L	0.2 VL	L	0.2 L	
82930	4	7	0-6					7	4 VL	0.8 L	2 VL	17 H	0.5 L	0.2 VL	L	0.2 L	
82931	5	9	0-6					9	4 VL	1.2 M	9 M	45 VH	0.6 L	0.2 VL	L	0.1 L	
82932	3	5	0-6					5	4 VL	0.8 L	3 VL	19 H	0.5 L	0.2 VL	L	0.2 L	
82933	3	5	0-6					5	4 VL	0.4 VL	2 VL	19 H	0.4 L	0.2 VL	L	0.3 L	
82934	3	5	0-6					5	3 VL	0.7 L	5 L	39 VH	0.4 L	0.2 VL	L	0.2 L	
82935	4	7	0-6					7	4 VL	0.6 L	5 L	34 VH	0.3 VL	0.2 VL	L	0.2 L	
82936	5	9	0-6					9	3 VL	0.6 L	2 VL	23 H	0.4 L	0.2 VL	L	0.1 L	

REV 10/17



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Common grower question:

Do I fertilize the whole field, or just the vine rows?

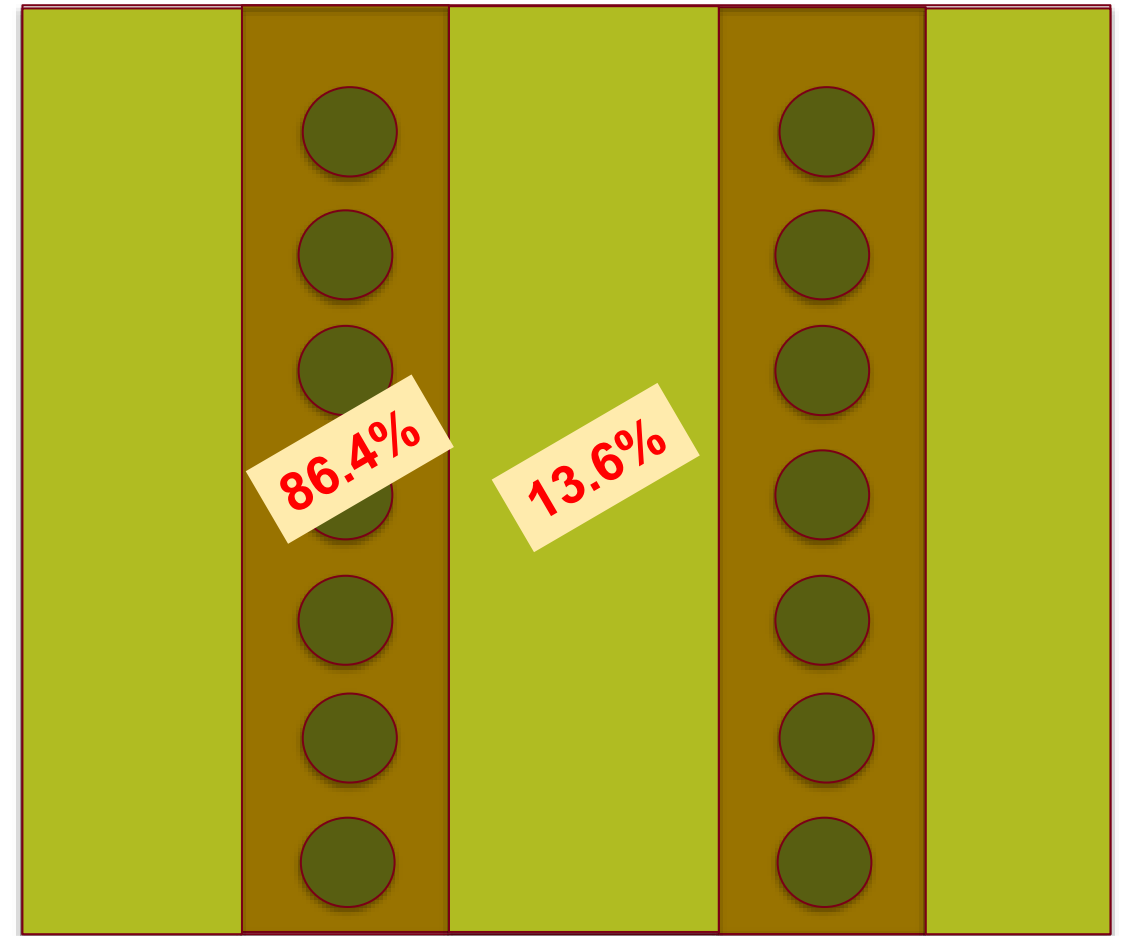


Vast majority of roots are in the vine rows

2003 study — Morlat and Jacquet

86.4% of roots within 0.8 m of trunks

13.6% of roots in aisles (inter-row space)





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For more information on cold climate grape varieties, refer to:

- *A Review of Cold Climate Grape Cultivars* (Iowa State Univ.)
- mnhardy.umn.edu
- www.petitepearlplus.com

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