Viticulture, enology and marketing for cold-hardy grapes

The Northern Grapes Project: Integrating Viticulture, Enology, and Marketing of New Cold-hardy Wine Grape Cultivars in the Midwest and Northeast United States.

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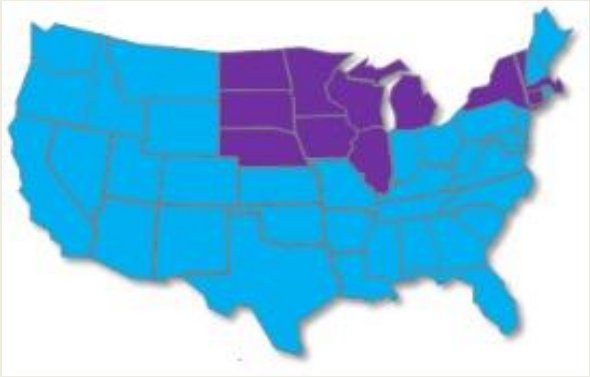
The Northern Grapes Project is funded by the USDA's Specialty Crops Research Initiative Program of the National Institute for Food and Agriculture, Project #2011-51181-30850

Viticulture, enology and marketing for cold-hardy grapes

Northern Grapes : Integrating viticulture, winemaking, and marketing of new cold hardy cultivars supporting new and growing rural wineries



- 5 Year Coordinated Ag Project
- 12 Institutions, 12 states
- 34 Research/Extension Scientists
- 23 Industry Associations
- $2.5M Funded (2 yr) USDA; $3M Renewal (2 yr)
- Matched > 25 Organizations and Individuals

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University of Minnesota Cultivars

Katie Cook, Jim Luby & Peter Hemstad

Cultivar	Frontenac	La Crescent	Marquette	Frontenac gris
Original cross	1979	1988	1989	-
Year released	1996	2002	2006	2003
Mid-winter cold tolerance	-36° C/-33°F	-38° C/-36 °F	-34° C/-29°F	-36° C/-33°F
Pedigree *(V. riparia, V. vinifera, V. labrusca)*	*V. riparia* 89 x Landot 4511	St. Pepin x E. S. 6-8-25	MN 1094 x Ravat 262	Single cane bud mutation of Frontenac
Ave. Soluble Solids (°Brix)	26.0°	25.5°	26.1°	26.0°
Ave. Titratable Acid. (g/L)	15.4	13.0	12.1	14.0

‘Elmer Swenson’ Cultivars

Elmer Swenson

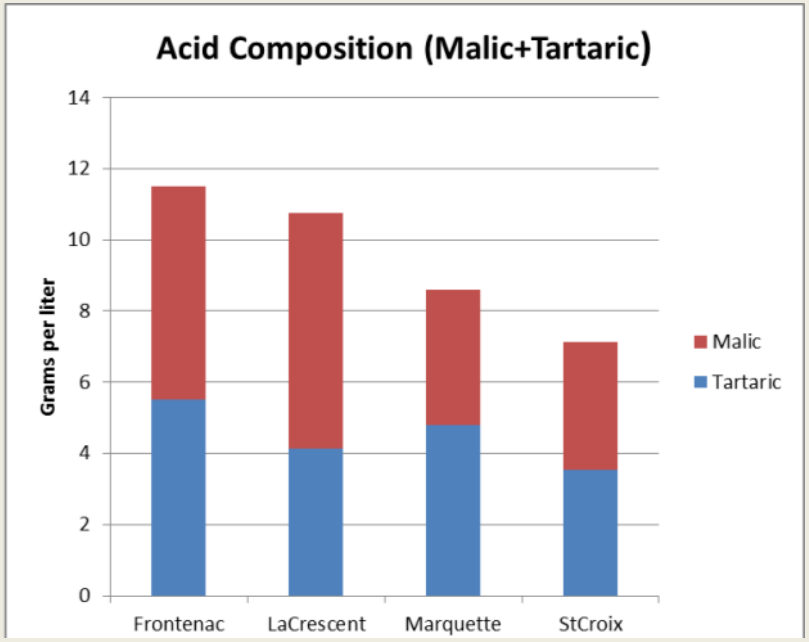
Cultivar	Brianna	Eidelweiss	St Croix	St Pepin
Original cross	1983	1955	?	?
Year released	2001	1978	1981	1986
Mid-winter cold tolerance	?	-34° C/-29°F	-35° C/-32°F	-32° C/-25°F
Pedigree *(V. labrusca, V. riparia, V. vinifera)*	*‘Kay Gray’ x E.S. 2-12-13*	St. Pepin x E. S. 6-8-25	E.S. 283 x E.S. 193	(MN #78 x Seibel 1000) x ‘Seyval blanc’ *Pistillate vine
Ave. Soluble Solids (°Brix)	18-20	14-16	16-20	20
Ave. Titratable Acidity (g/L)	7.3-9.0	10.0-12.0	9.0-11.0	10.0-12.0

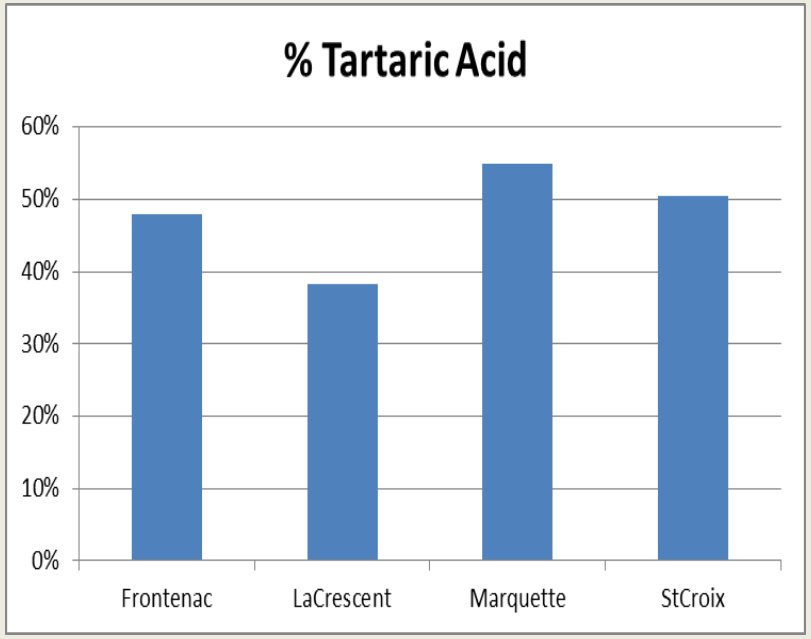
Unique Acid Composition

Malic vs Tartaric

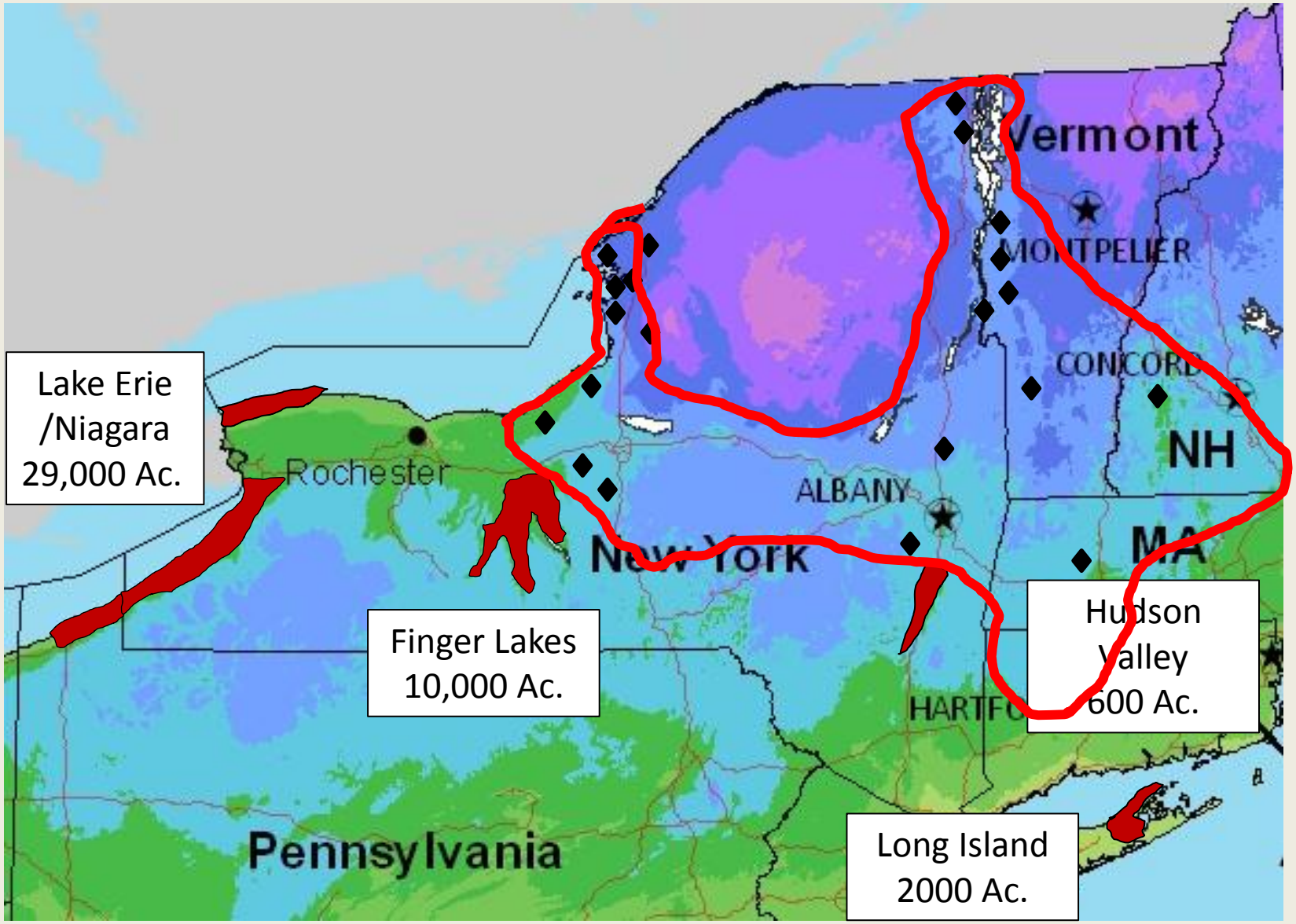
Murli Dharmadhikari
Iowa State University

Chardonnay
>=70%





New York Grape Production

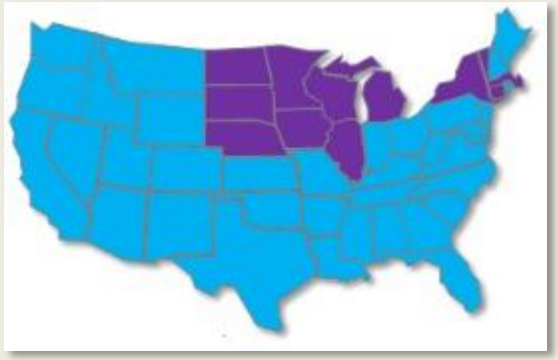


Novice Growers and Winemakers

Project clientele

Vineyards
5,900 acres (2,460 Ha)
40% Non-bearing (2011)
80% planted since 2002.
70% < 2 HA

Wineries
300
1000-3000 cases
80% established since 2002.

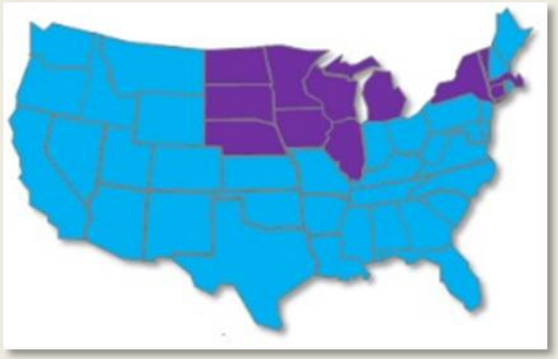


Tuck, B. and Gartner, W. 2013. Vineyards and grapes of the north: a status report. Univ. Minnesota Extension Center for Community Vitality. http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2013-Vineyards-Grapes-North.pdf

Tuck, B. and Gartner, W. 2013. Wineries of the north: a status report. Univ. Minnesota Extension Center for Community Vitality. http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2013-winery-north.pdf

Economic Impact of Cold Climate Cultivars

Brigid Tuck and Bill Gartner, University of Minnesota



Source	Economic Impact (Millions)	Jobs Generated
Winery	$215	5,000
Vineyard	$46	5,900
Winery-Associated Tourism	$140	1,700
Overall	$401	12,600

Tuck, B. and Gartner, W. 2014. Economic Contribution: Vineyards and Wineries of the North. . Univ. Minnesota Ext. Ctr. for Comm. Vitality. http://www.extension.umn.edu/community/economic-impact-analysis/reports/docs/2014-Economic-Contribution-Vineyards-Wineries-North.pdf

Novice Growers and Winemakers

Project clientele

- Enthusiastic
- Part-timers
- Still developing skills
- Startups, informal businesses
- Receptive to technical information
- Receptive to folklore/hearsay
- Growers inordinately fond of VSP, low yields, manual canopy manipulations

Basis for Northern Grapes Project

New cultivars, Unique fruit chemistry, Novice growers /winemakers/ retailers

Multi-Disciplinary Studies

Address

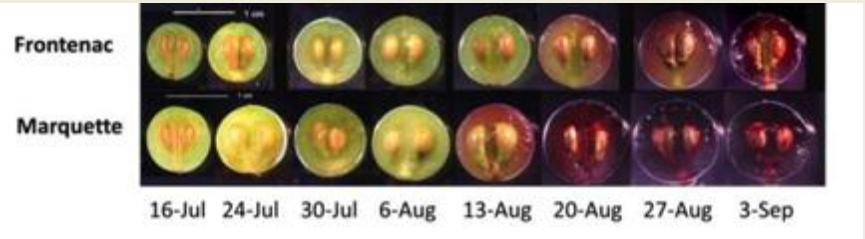
- Varietal performance and resulting fruit and wine flavor attributes in different climates — The Vine
- Applying appropriate viticultural practices to achieve consistent fruit characteristics for ripening — The Vineyard
- Applying winemaking practices to their unique fruit composition to produce distinctive wines that consumers will like and purchase — The Wines
- Understanding consumer preferences, individual/regional marketing strategies to increase sales and sustained profitability of wineries and vineyards. — The Tasting Room

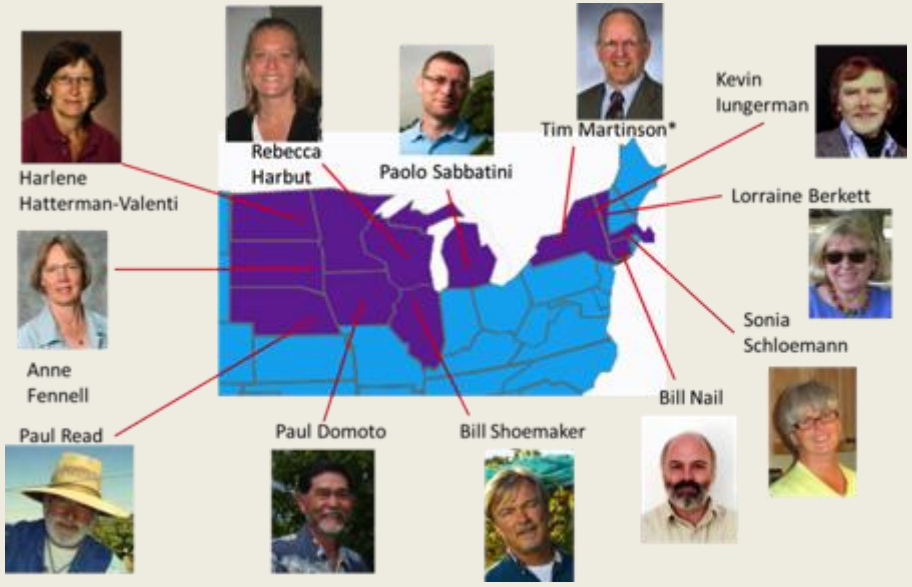
Project Outcomes:

- *5 YR: Production and sales double*
- *Improved quality from better growing and winemaking practices will improve customer retention and drive repeat sales*
- *Cold-climate cultivars will establish unique regional marketing identities*
- *Wineries will apply business and tasting room management practices that drive sales*

Northern Grapes Project

- Cultivar performance
  - Coordinated variety trials (NE1020)
  - Genomics and flavor attributes





Monoterpenoid biosynthesis gene expression

	Front Skin	Marq Skin
VIT_12s0134g00030	0.0	8.5
VIT_06s0004g06480	0.1	2.0
VIT_17s0000g05580	0.2	1.4
VIT_01s0010g02320	0.5	2.5
VIT_13s0067g00380	0.6	0.1
VIT_15s0046g03600	0.8	3.1
VIT_13s0067g00370	0.8	0.2
VIT_19s0135g00200	1.9	4.9
VIT_00s0253g00140	1.9	0.4
VIT_19s0135g00190	2.4	5.7
VIT_05s0049g00400	3.1	1.4
VIT_15s0046g03570	3.1	1.7
VIT_08s0032g00240	5.0	2.4
VIT_15s0021g01060	6.7	3.7
VIT_11s0016g01290	7.4	1.7
VIT_19s0015g02500	9.1	1.9
VIT_17s0000g09610	13.3	1.7
VIT_15s0048g01490	22.3	4.7
VIT_02s0025g04880	119.5	35.3

www.northerngrapesproject.org

Northern Grapes Project

- Viticulture
  - Training, cropping, canopy management
  - Nutrition
  - Disease management

Copper injury on Brianna

www.northerngrapesproject.org

Northern Grapes Project

- Enology
  - Acid reduction/Partial malolactic
  - Yeast selection
  - Wine styles that fit the cultivar

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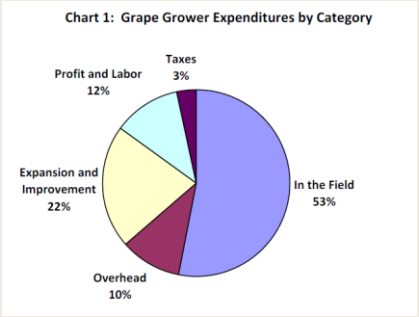
Northern Grapes Project

- Consumers
  - Baseline survey/Economic impact
  - Tasting room attributes
  - Branding
  - Collaboration



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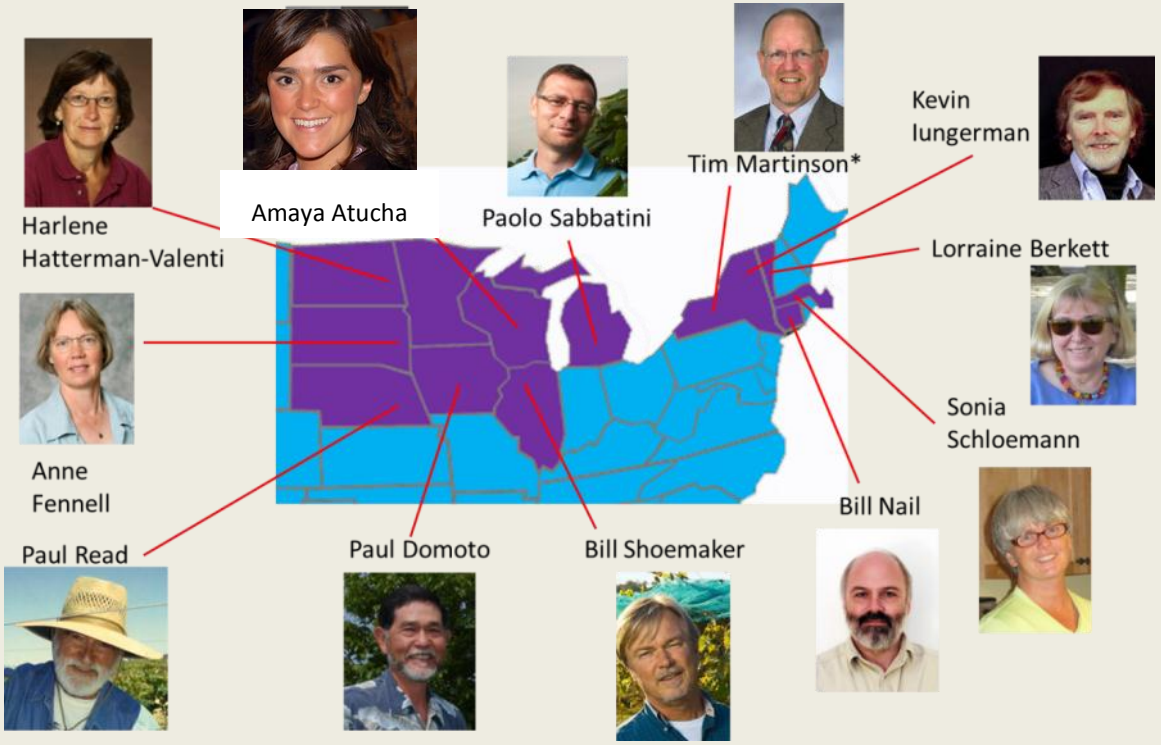
Coordinated Variety Trials

NE-1020 Project

Climate and standard maturity indices



Vine performance and climate

- Evaluate: Yield and quality vs. climate indices
- Data from 3-9 sites/variety

NE-1020 Blocks

With Northern Cultivars

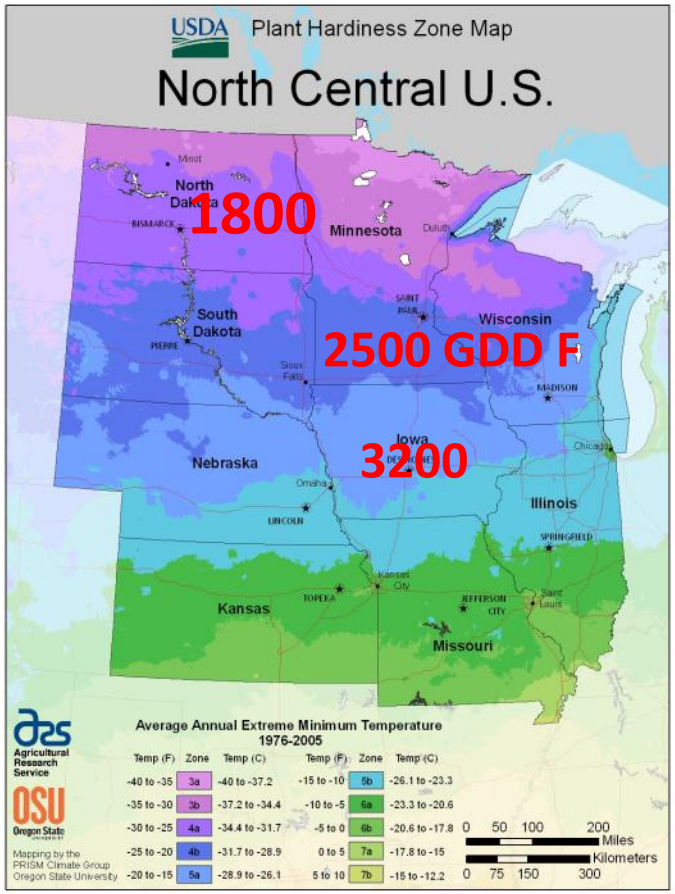
Table 1. List of cold-climate cultivars planted in NE-1020 project *Multi-state Evaluation of Winegrape Cultivars and Clones* **and two additional project blocks in Illinois and New York.**

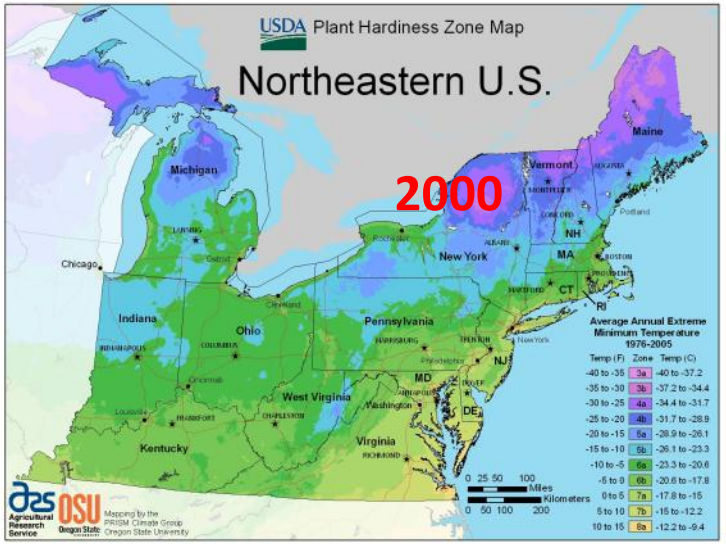
State	Cultivars under Evaluation (No. vines)												
	Edel-weiss	Front-enac	Frontenac gris	La Crescent	La-crosse	Mar-quette	MN 1258	MN 1189	MN 1200	MN 1220	MN 1235	Petit Amie	Prairie Star	St. Croix
NE 1020 Coordinated Variety Trials														
Connecticut		50	25			50		25	50		25			50
Iowa		50		50		50	50	50	50	50	50	50	50	50
Michigan		25		25										25
Nebraska	18	36	36	36	36	36	36	36	36	36	36		36	36
NY-Geneva				25		25								25
Pennsylvania				25		25		25			25			
South Dakota		36	36	36		36	25	25	25	36	25	25	25	36
North Dakota		24	24	24		24			24	24	24	24	24	24
Vermont		24		24		24							24	24
Massachusetts		24		24		24								24
Additional Cultivar Trials														
NY-Champlain	12	12	12	12	12	12			12			12	12	12
Illinois		24	24	24		24						24	24	24

NE 1020 blocks were planted in 2008; NY Champlain in 2005; and Illinois in 2008

Challenge #1: Climate

winter lows, heat units, early budburst



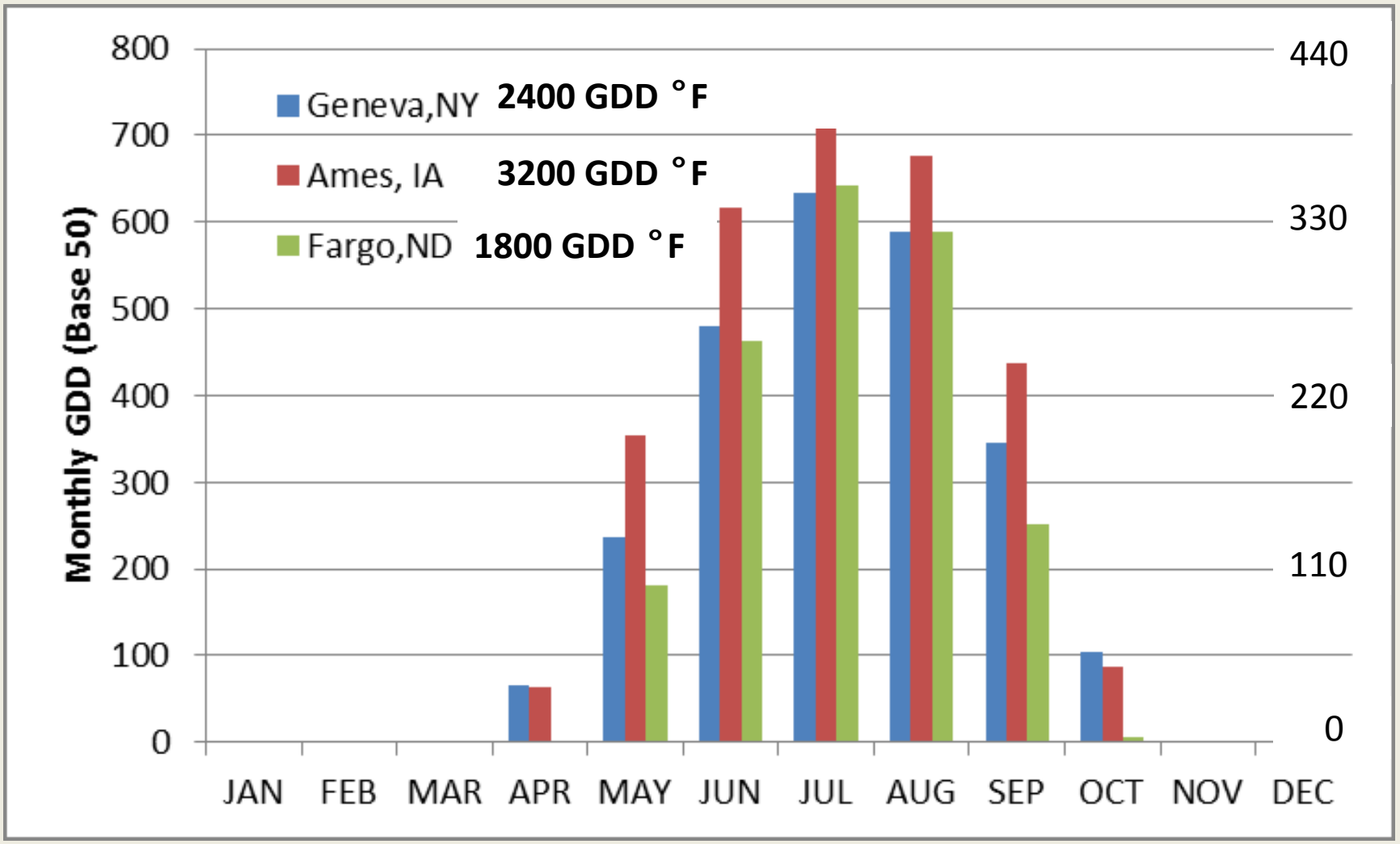


Average Annual Extreme Minimum Temperature 1976-2005

Temp (F)	Zone	Temp (C)	Temp (F)	Zone	Temp (C)
-40 to -35	3a	-40 to -37.2	-15 to -10	5b	-26.1 to -23.3
-35 to -30	3b	-37.2 to -34.4	-10 to -5	6a	-23.3 to -20.6
-30 to -25	4a	-34.4 to -31.7	-5 to 0	6b	-20.6 to -17.8
-25 to -20	4b	-31.7 to -28.9	0 to 5	7a	-17.8 to -15
-20 to -15	5a	-28.9 to -26.1	5 to 10	7b	-15 to -12.2

Weather and Growing Degree Days

30 year average 1980-2010



Challenge #1: Climate

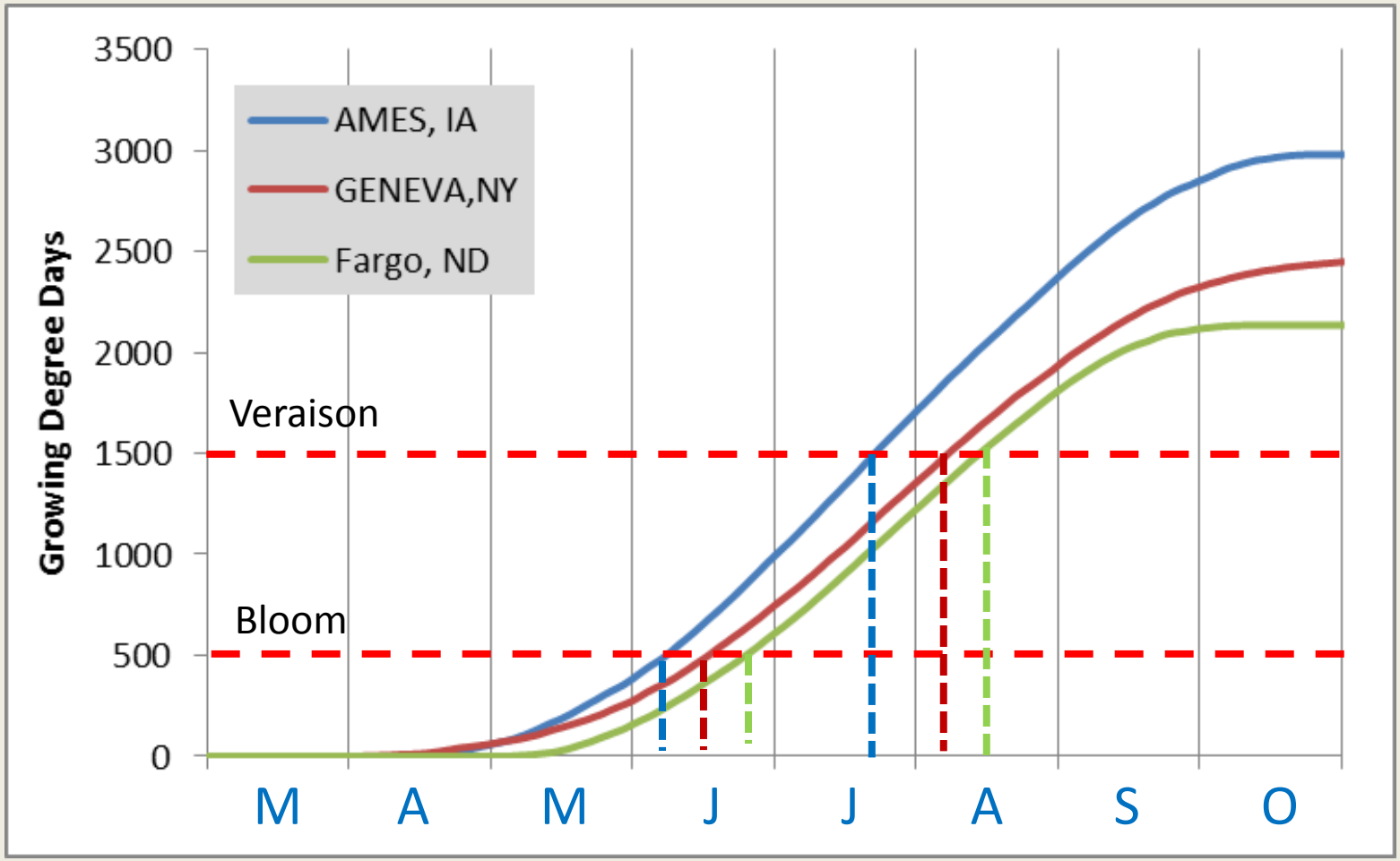
winter lows, heat units, early budburst

Heat Units and Fruit composition 2012

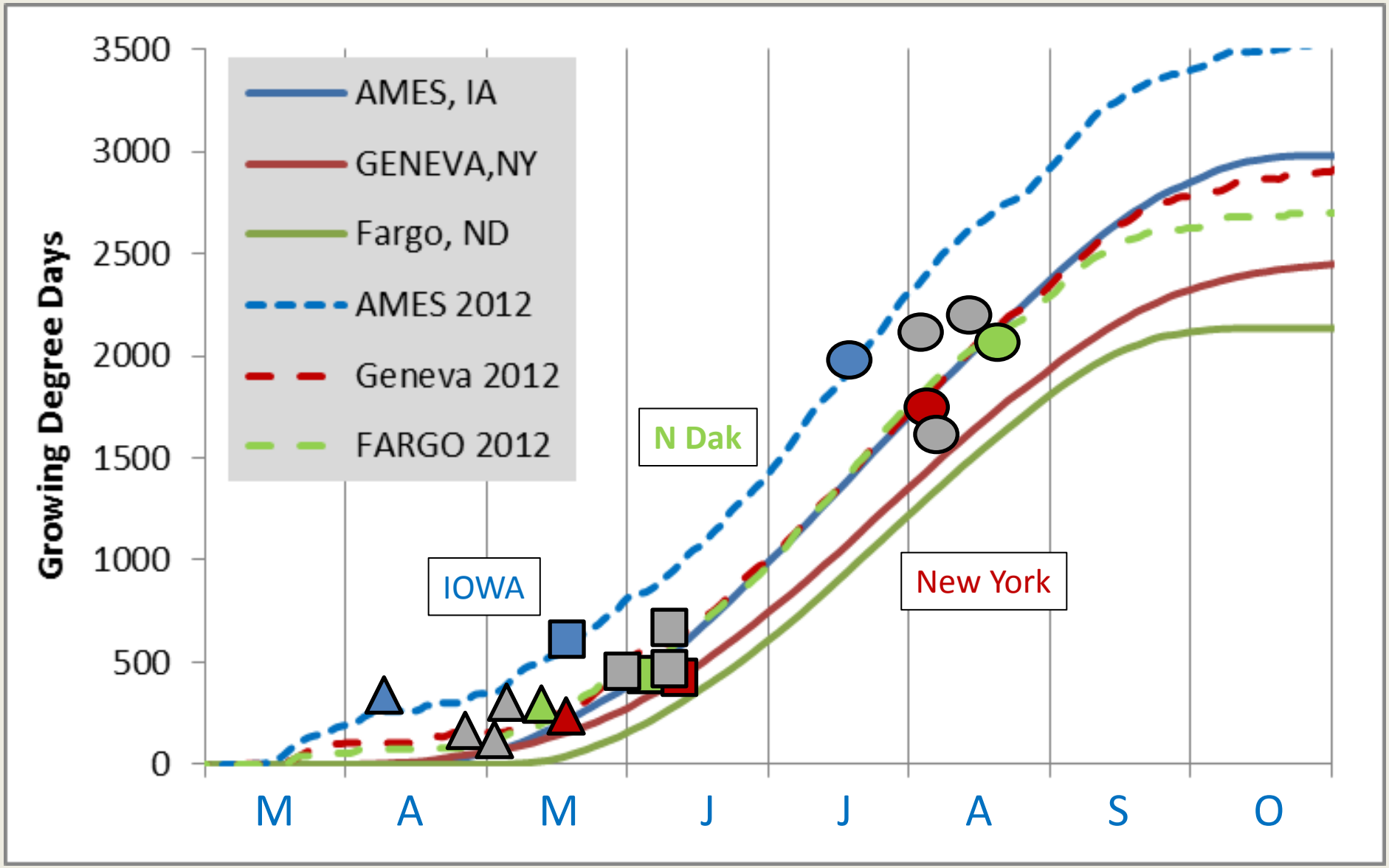
	Cooler			Warmer		
	Vermont			SW Michigan		
	Brix	TA	pH	Brix	TA	pH
Frontenac	20.6	17.0	2.98	19.1	14.2	3.03
La Crescent	19.9	14.7	2.97	22.2	11.6	3.16
Marquette	20.8	14.1	2.98	25.8	6.8	3.67
St. Croix	17.0	8.3	3.28	20.7	6.5	3.64

Heat Unit Accumulations

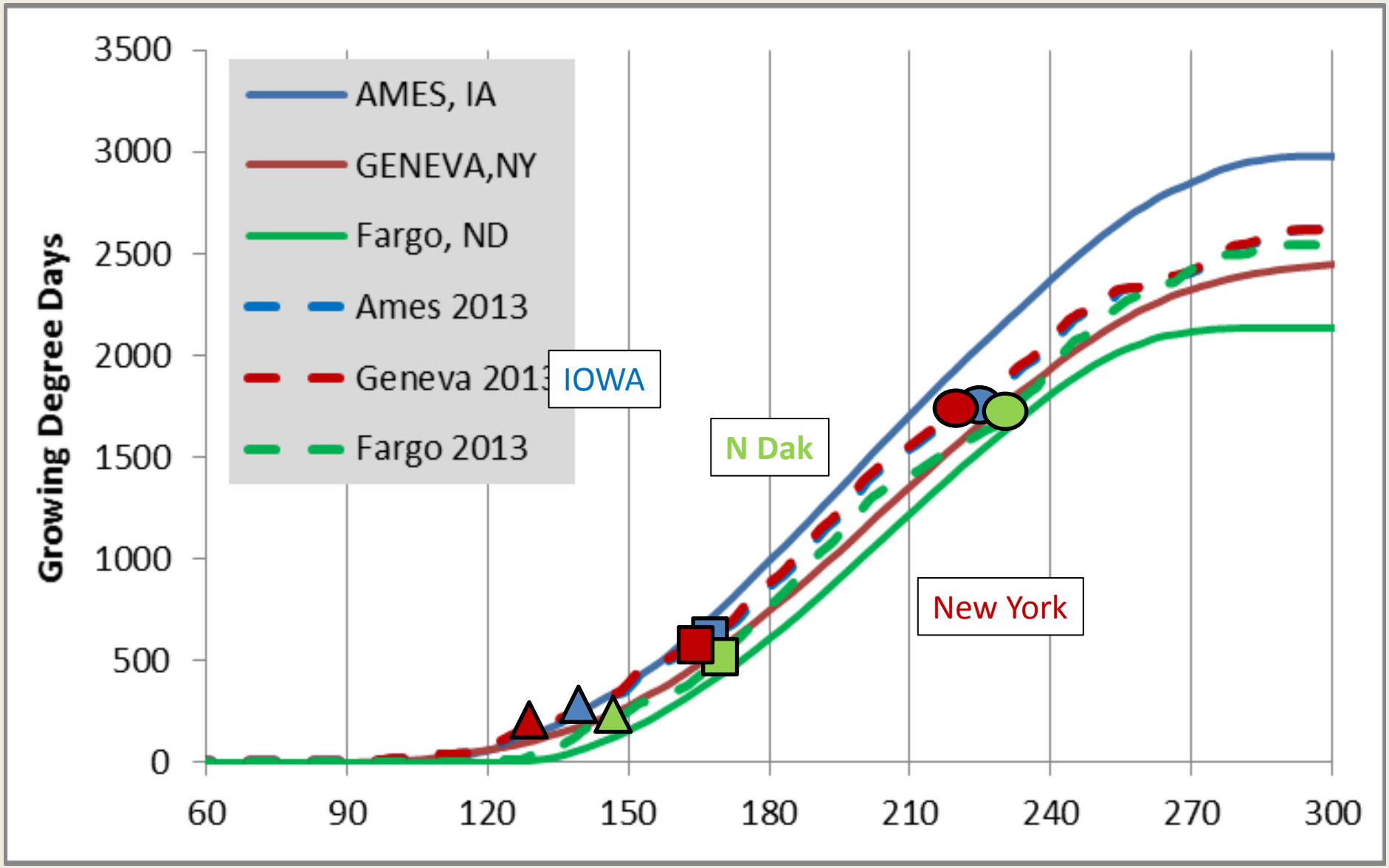
30 Yr Average Growing Degree Days



Frontenac Phenology Dates 2012

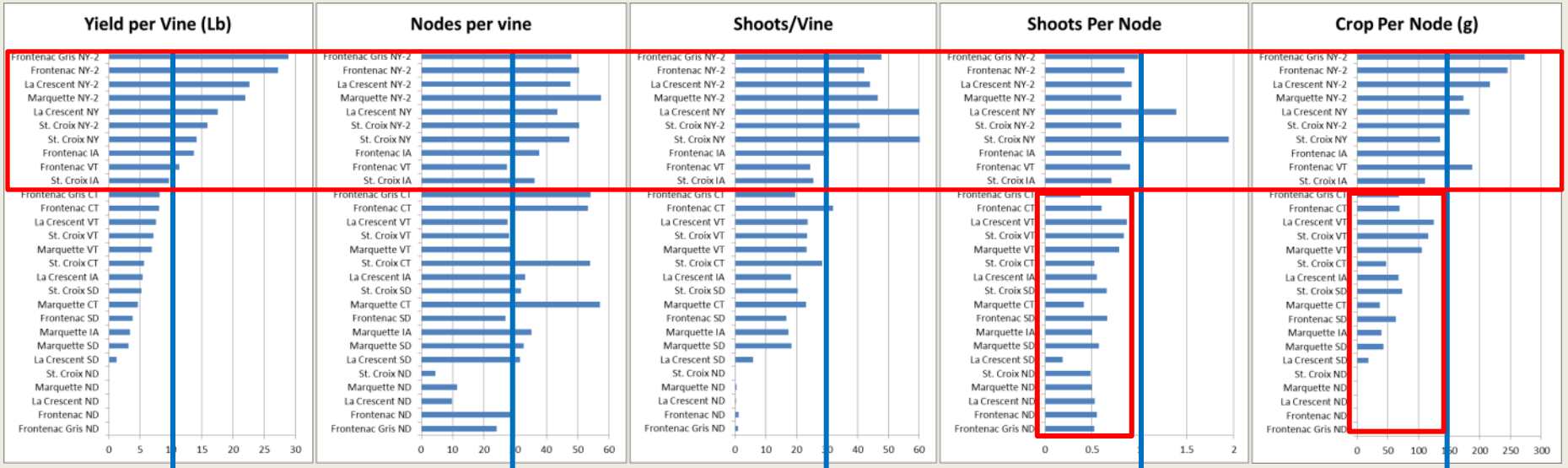


Frontenac Phenology Dates 2013



NE-1020 Performance 2012

Early spring, frost injury



10 Lb/vine

30 nodes/vine

30 shoots/vine

1 shoot/node

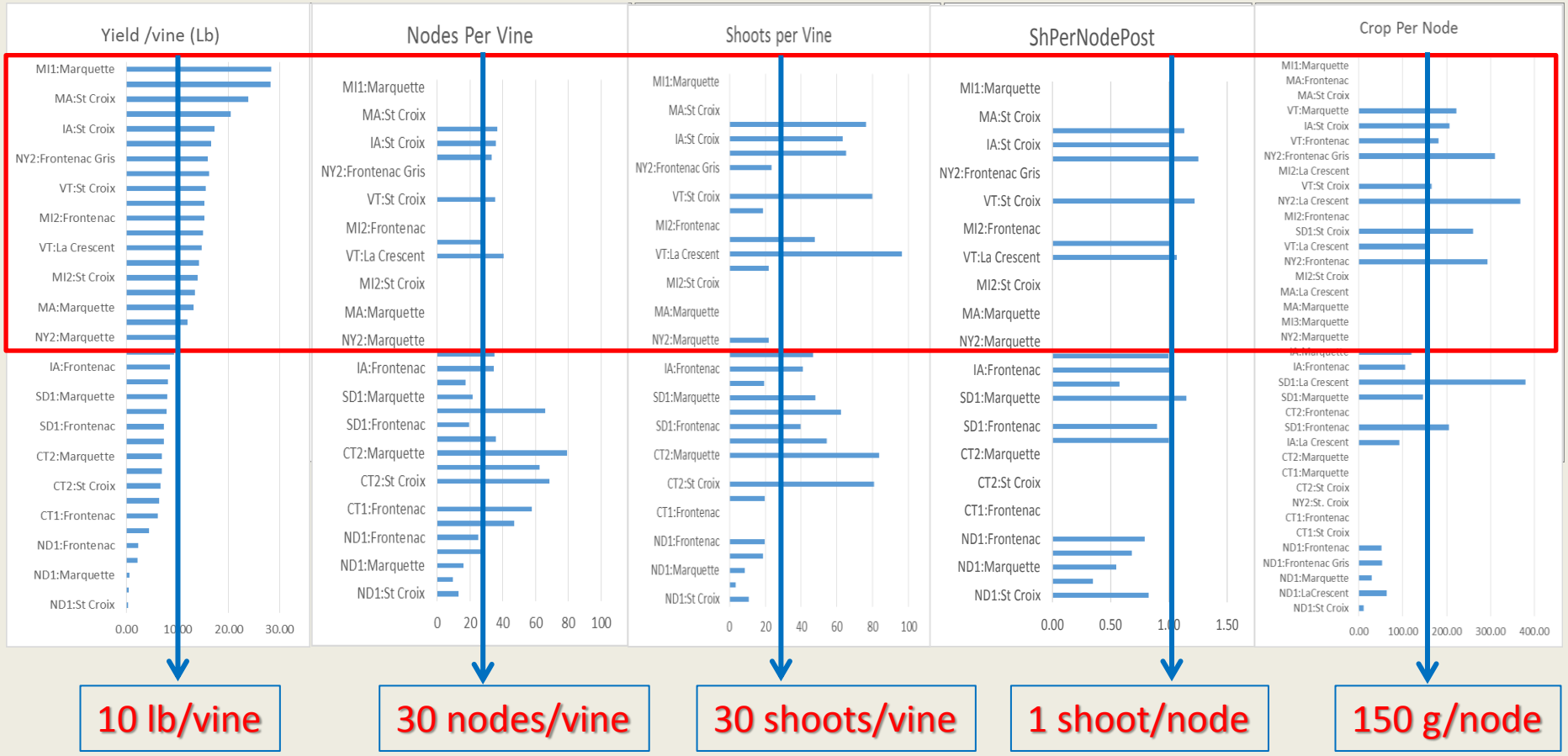
150 g/node

= ca 4 Tons/acre 6 x 9 Ft spacing

= 5 per foot at 6 Ft In-row spacing

= 10 lb/vine 30 shoots/vine

Yield and Retained Nodes 2013



10 lb/vine

30 nodes/vine

30 shoots/vine

1 shoot/node

150 g/node

Challenge #2: Training Systems and Canopy Management

Costs vs Returns

Merlot
2-3 T/acre @ $1800/T

Cayuga White
7-8 T/acre @ $500/T

Training Systems Trials in NY

Marquette and Frontenac

Vertical Shoot Positioning (VSP):

- Midwire cordon with catch wires
- Shoot position, shoot tip, leaf removal
- *Intensive canopy management.*

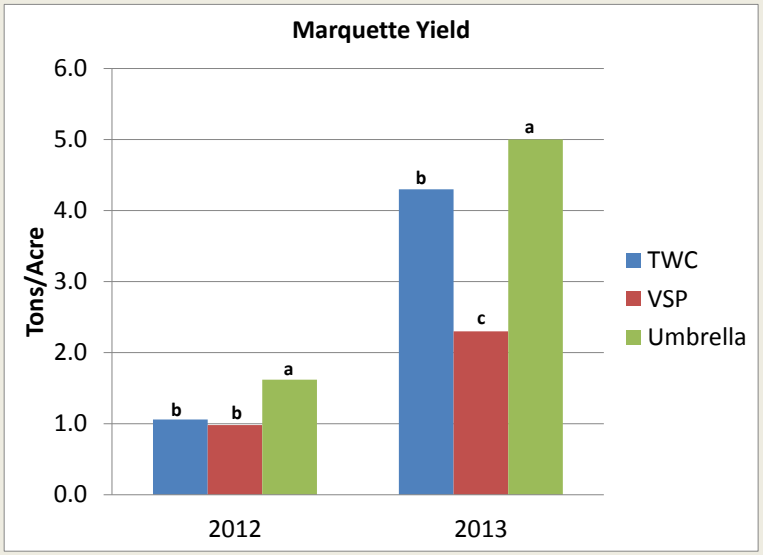
Top Wire Cordon (TWC):

- High cordon
- 'shoot combing'
- *Moderate canopy management.*

Umbrella Kniffen (UK):

- 3-4 long canes arched and tied to middle wire.
- No additional canopy management
- *Minimal canopy management.*

Marquette
2012 & 2013
Yield



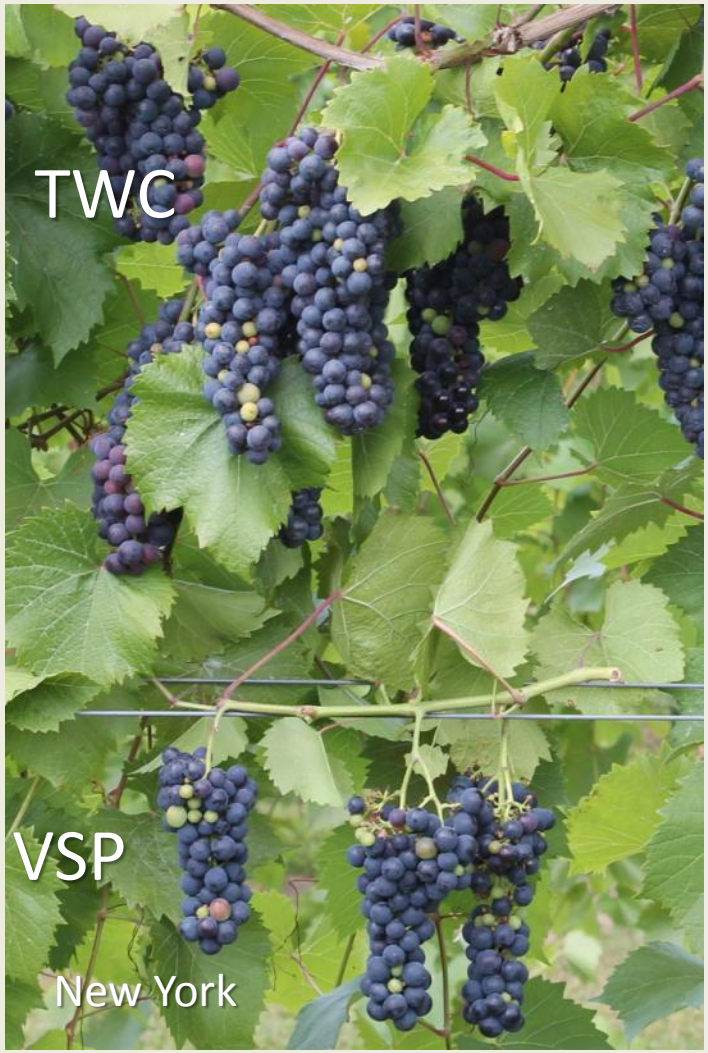
2012 Treatment	Yield t/acre	Yield (lb/vine)	Clusters per vine	Cluster wt. (g)	Berries/ cluster	Berry wt. (g)
TWC	1.1 ab	3.4	23.6 b	63.5 a	48.8 a	1.3
VSP	1.0 b	3.2	26.7 ab	49.2 b	37.8 b	1.3
Umbrella	1.6 a	5.2	36.0 a	64.8 a	54.0 a	1.2

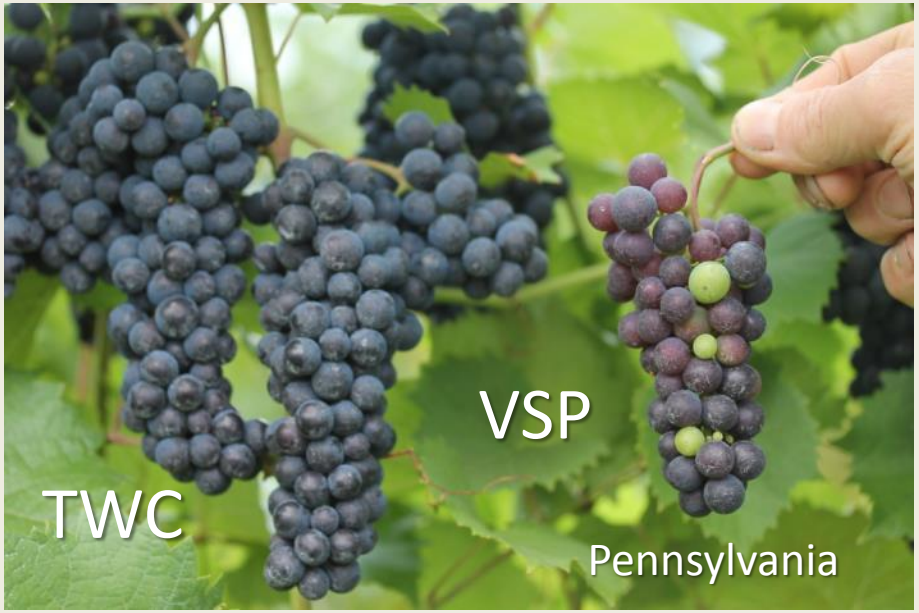
2013 Treatment	Yield (T/A)	Yield (lb/vine)	Clusters Per Vine	Cluster wt. (g)	Berries per cluster	Berry wt. (g)	Adj. # of shoots	Yield (g) per shoot (adj)	Clusters Per shoot (adj)
TWC	4.3 b	13.8	83.5 b	76.6 a	63.2 a	1.21 ab	36.9 b	178.1 a	2.3 a
VSP	2.3 c	7.4	69.4 c	49.2 b	43.4 b	1.13 b	36.3 b	94.2 b	1.9 b
Umbrella	5.0 a	16.1	101.3 a	72.5 a	59.2 a	1.23 a	41.0 a	178.8 a	2.5 a

@ $1500/ton = $3000 higher revenue/acre

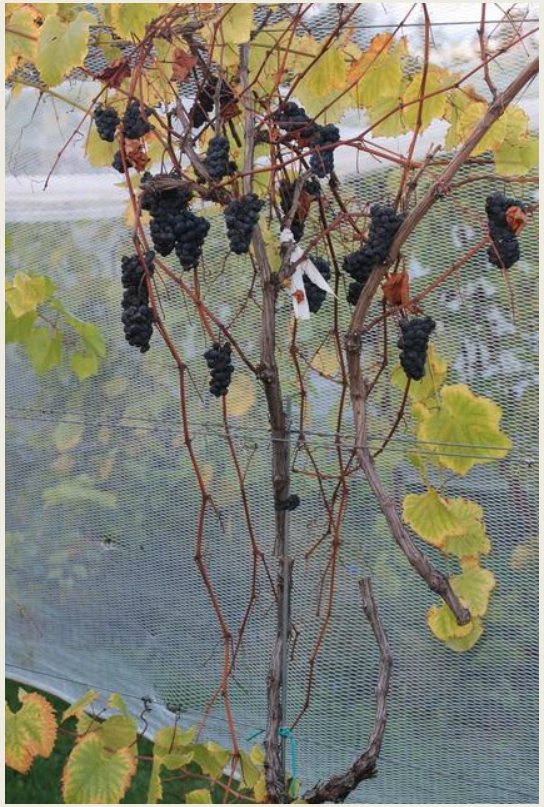
TWC vs VSP

Marquette 2013





Marquette
2014
Impact of Winter Injury

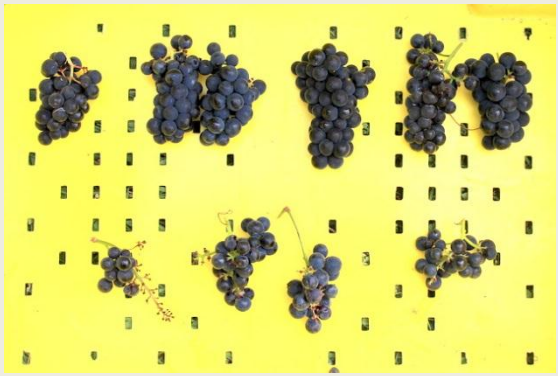


Shoot Counts

Trtmt	Nodes per vine	Shoots per vine	Shoots per node	Clusters per shoot
TWC	81.2	56.2	0.71	0.87
VSP	76.8	33.7	0.44	0.37
UK	81.2	46.1	0.57	0.93

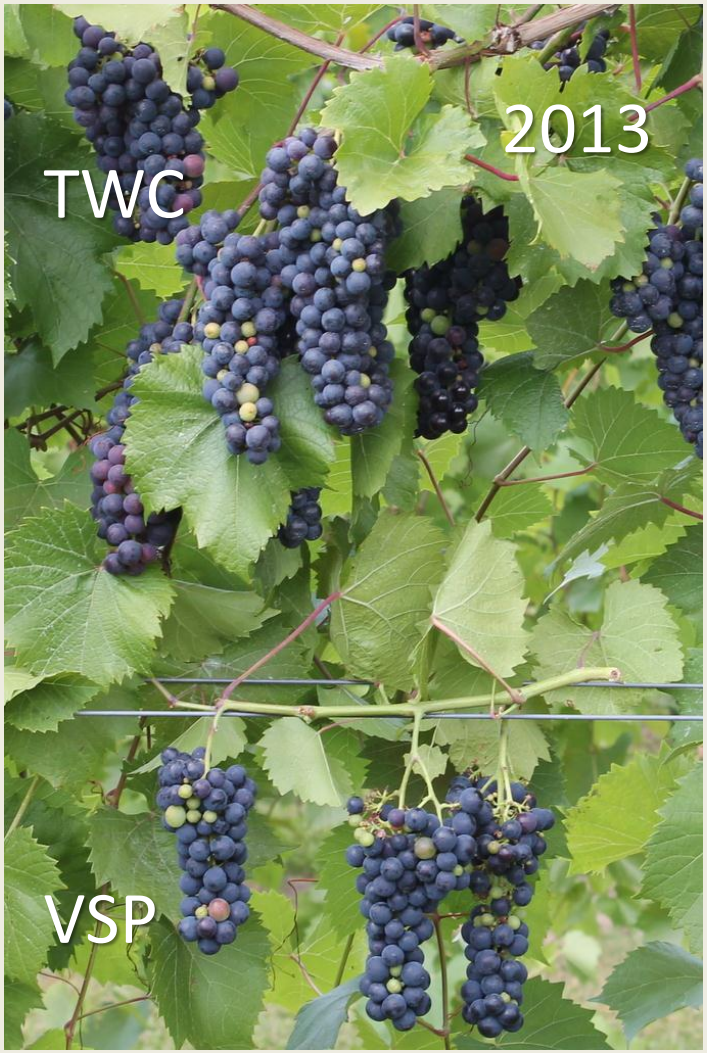
Vine Collapse – Adjusted Yield

Year	Treatment	Collapsed vines	No. Intact Vines	Yield lb/vine	Equivalent Yield t/acre	Adjusted Yield t/acre
2014	TWC	13	15	9.93	3.4	1.8
	VSP	3	24	*	*	
	UK	11	17	7.76	2.7	1.6

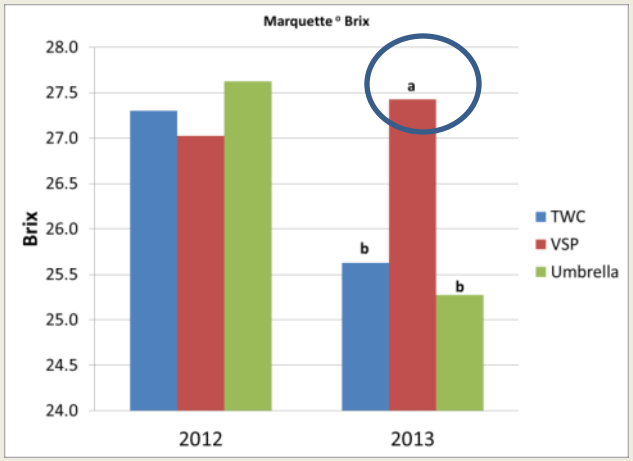


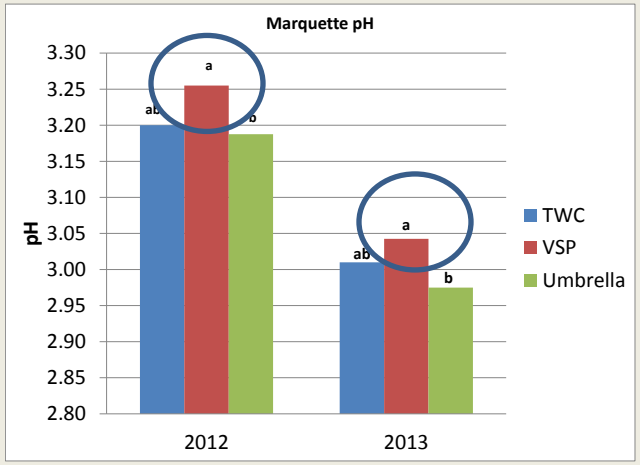
TWC vs VSP

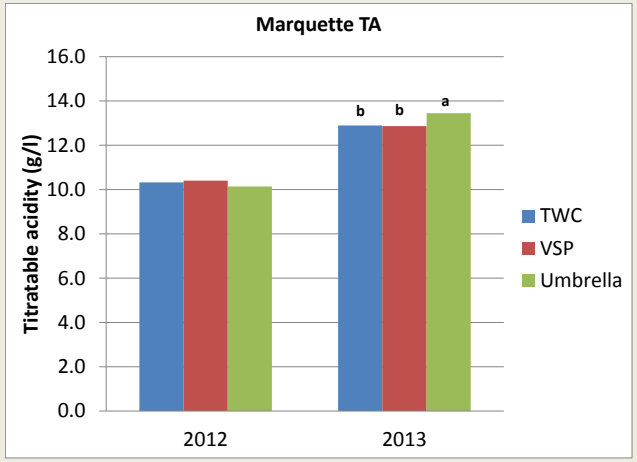
Marquette 2014

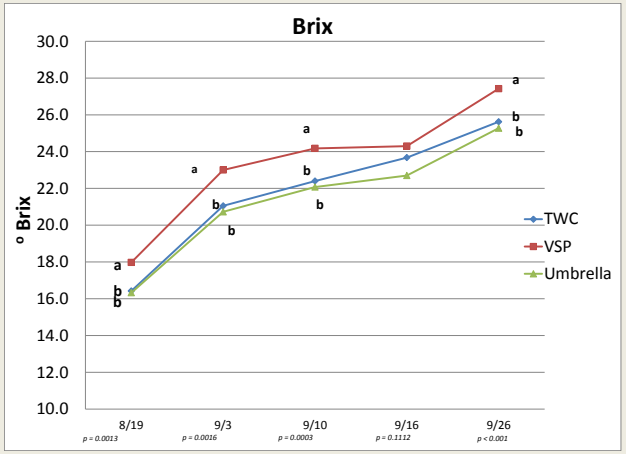


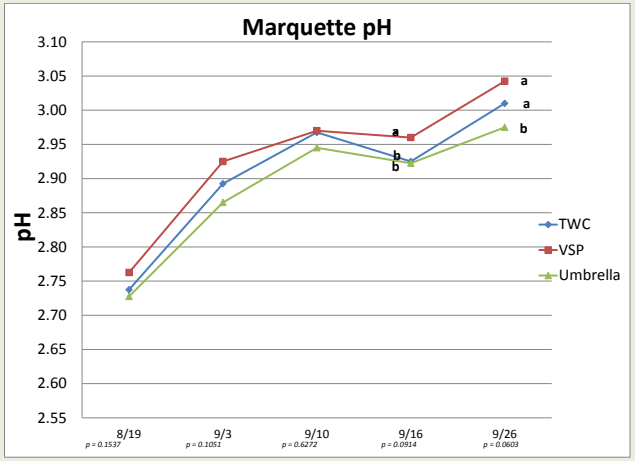
Marquette Fruit Composition 2013

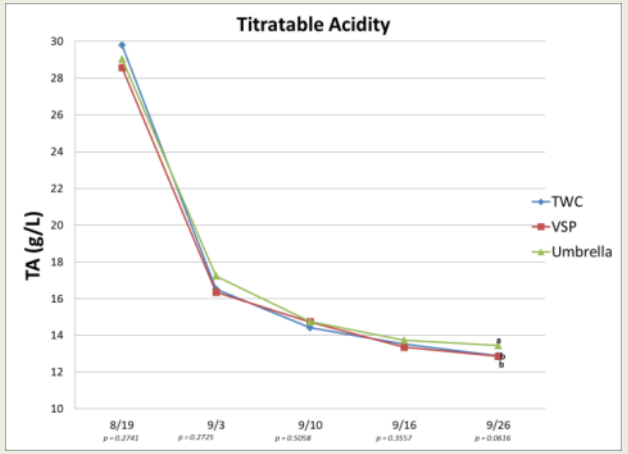








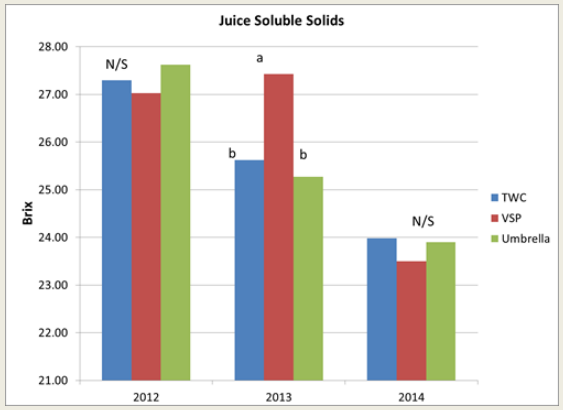


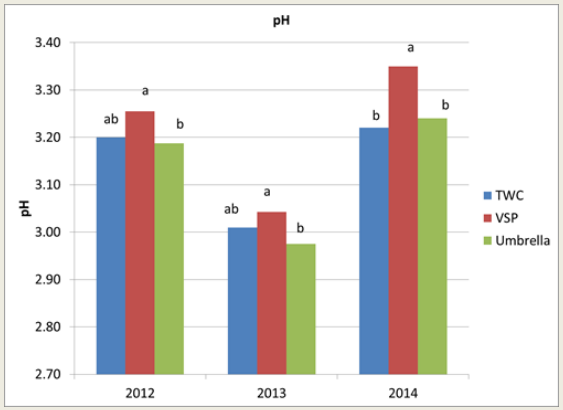


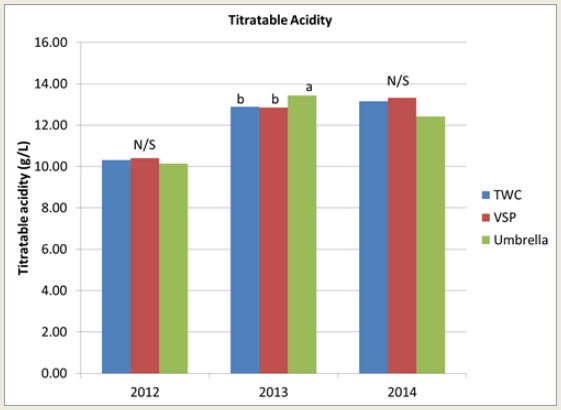
Marquette Fruit Composition

2014

2014







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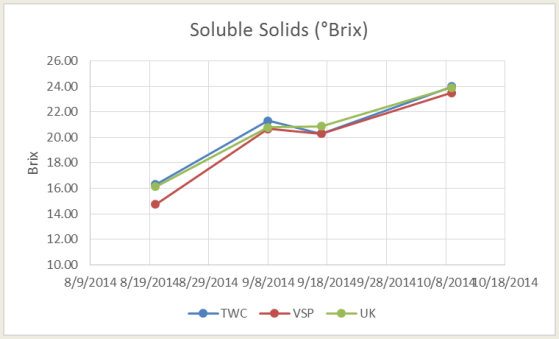
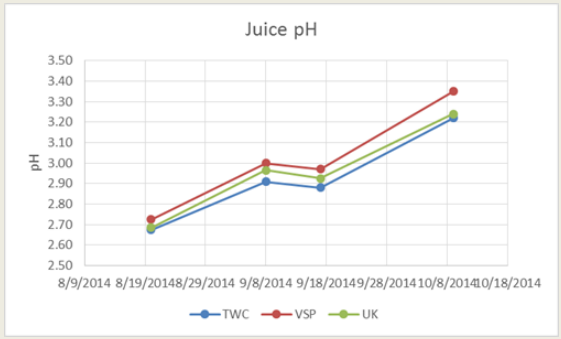
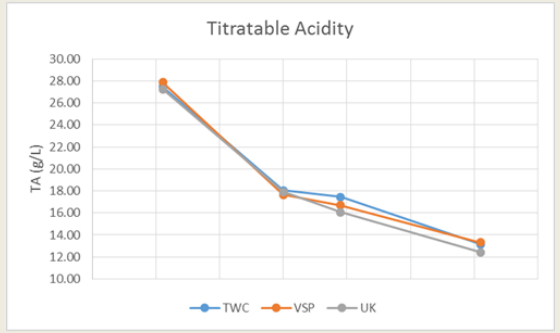






Marquette Crop Load – Michigan

Paolo Sabbatini – SW Michigan 2013

How does cropping level affect fruit composition?

Table 1. Yield components in Crop load Field Experiment from SWMREC in 2013.

Treatment	Yield Tons/acre	Yield Kg/vine	Cluster/ vine	Cluster weight (g)	Berries / cluster	Avg. berry weight (g)
High	13.81 a	18.17 a	264.0 a	114.85	93.00	1.19
Medium	9.84 b	12.95 b	184.8 b	115.61	94.34	1.18
Low	6.92 c	9.10 c	114.3 c	109.24	91.40	1.17

Table 2. Fruit chemical composition at harvest for Crop load Field Experiment from SWMREC in 2013.

Treatment	TSS (°Brix)	pH	TA (g/L)	Phenolics (a.u./g)	Anthocyanin (mol/g)
High	22.4 b	3.57 b	6.70	0.856	1.197
Medium	22.9 b	3.62 ab	6.93	0.818	1.129
Low	25.8 a	3.67 a	6.78	0.793	1.135

Exposed vs Shaded Clusters

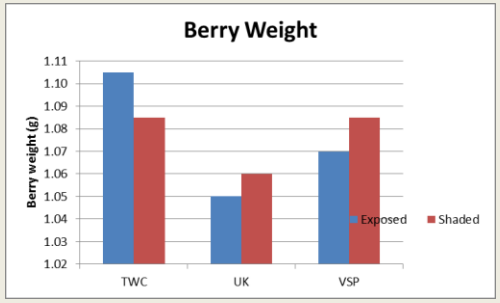
Impact on Brix, pH, TA

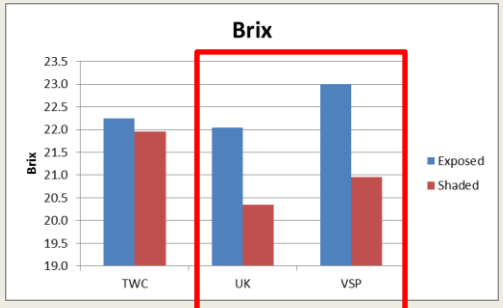
- Measured fruit composition from individual sunlight-exposed and shaded clusters from the same vines
- Frontenac 2013
- Marquette 2014
- Frontenac 2015

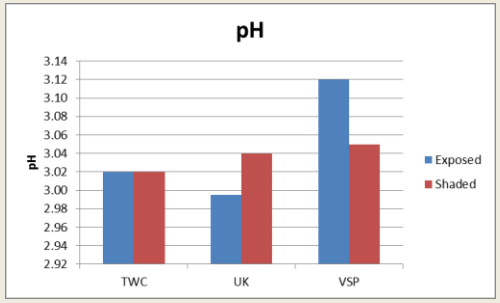
Shaded vs Exposed Clusters

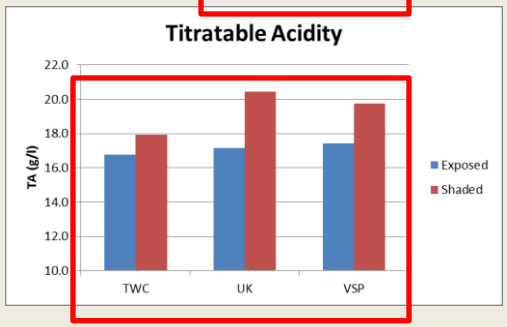
Frontenac 2013

	Berry Weight		pH		Brix		TA	
Train	Exposed	Shaded	Exposed	Shaded	Exposed	Shaded	Exposed	Shaded
TWC	1.11	1.09	3.02	3.02	22.3	22.0	16.7	17.9
UK	1.05	1.06	3.00	3.04	22.1	20.4	17.1	20.4
VSP	1.07	1.09	3.12	3.05	23.0	21.0	17.4	19.7





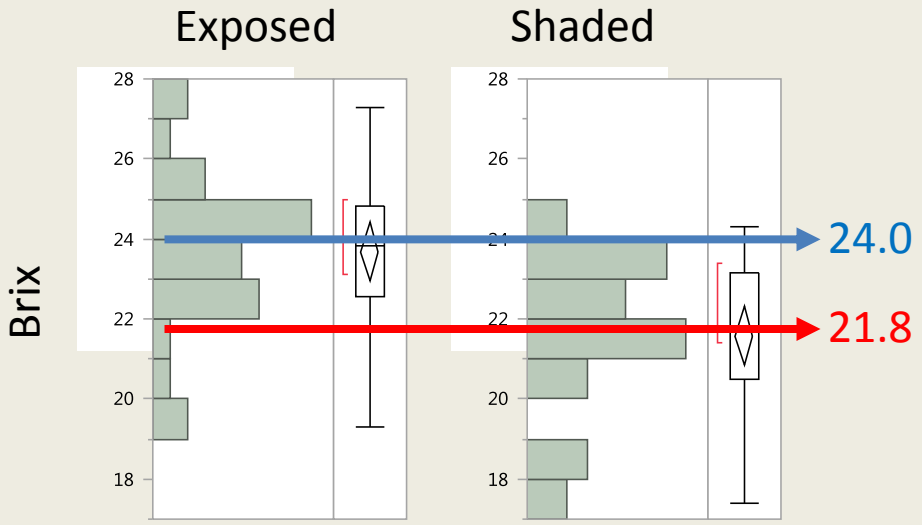


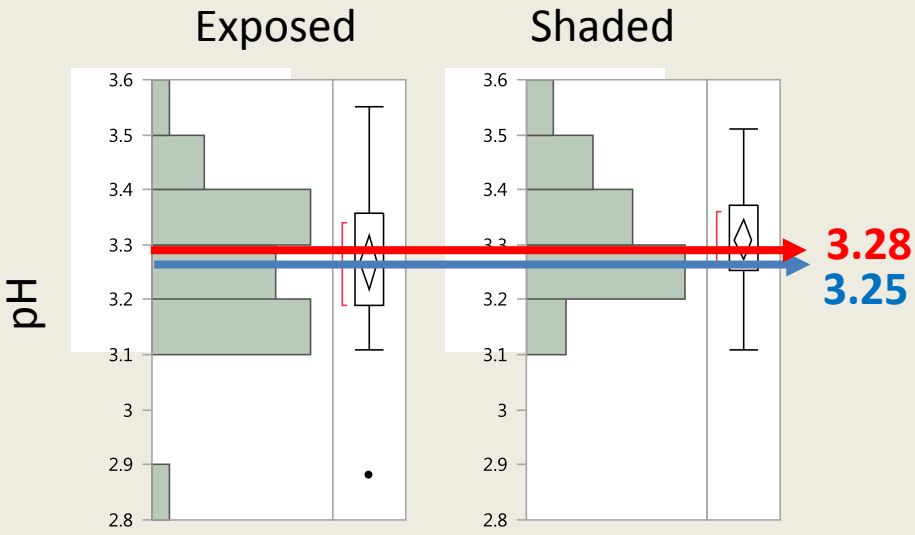


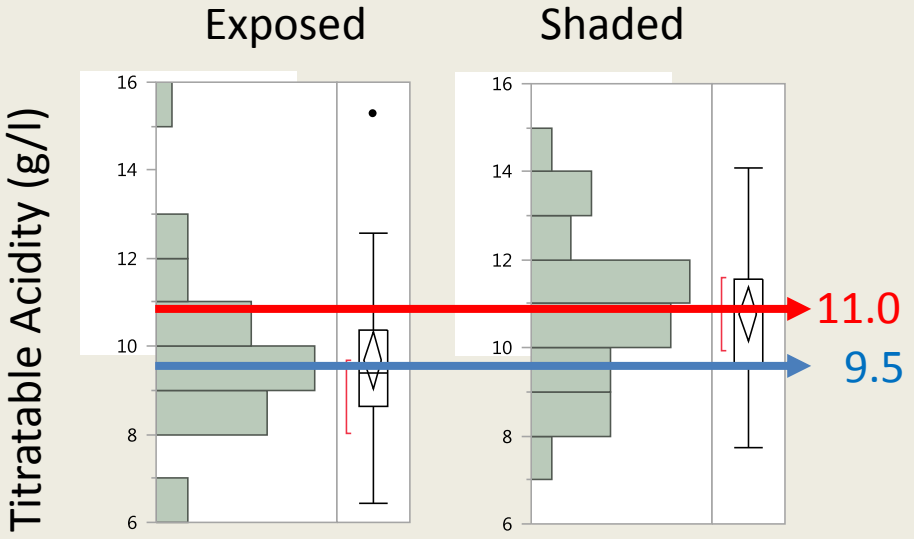
Shaded vs Exposed Clusters

Marquette 2014

- 6 vines
- 5 exposed and 5 shaded
- Individual Brix, pH, TA

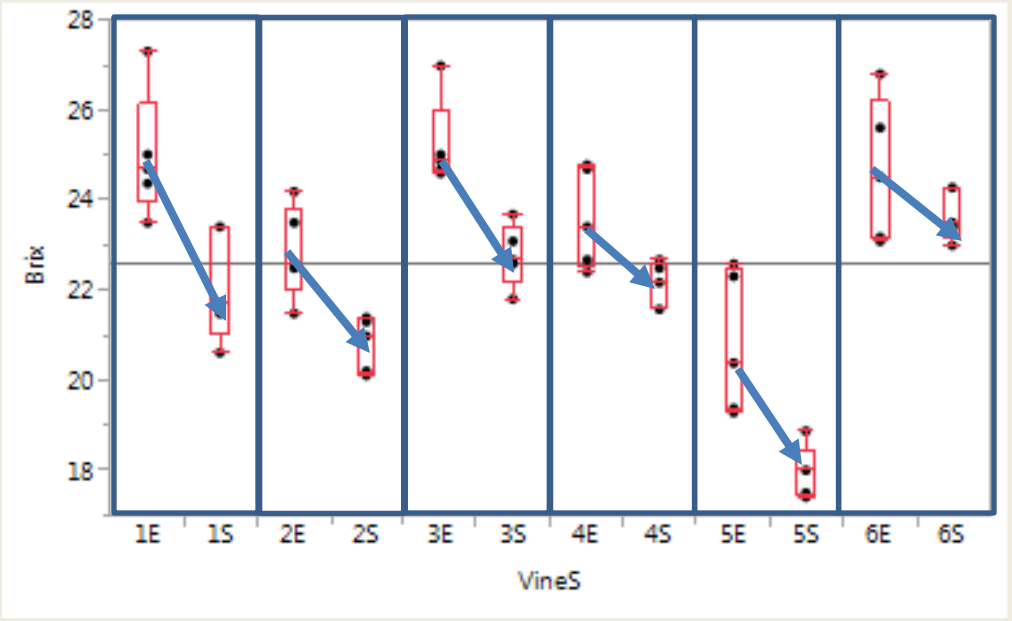


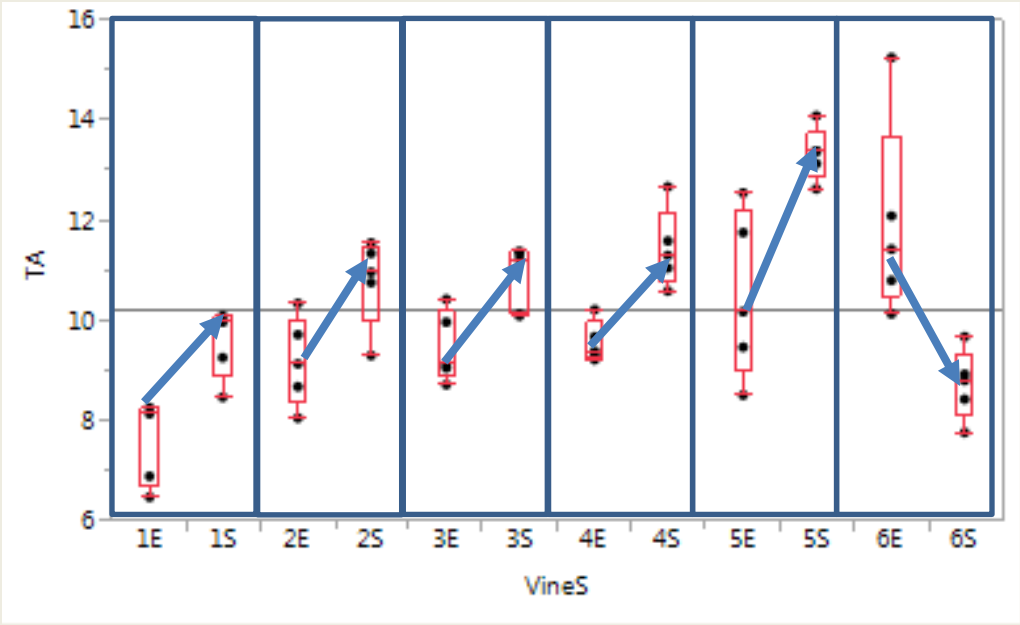




Exposed vs Shaded Clusters

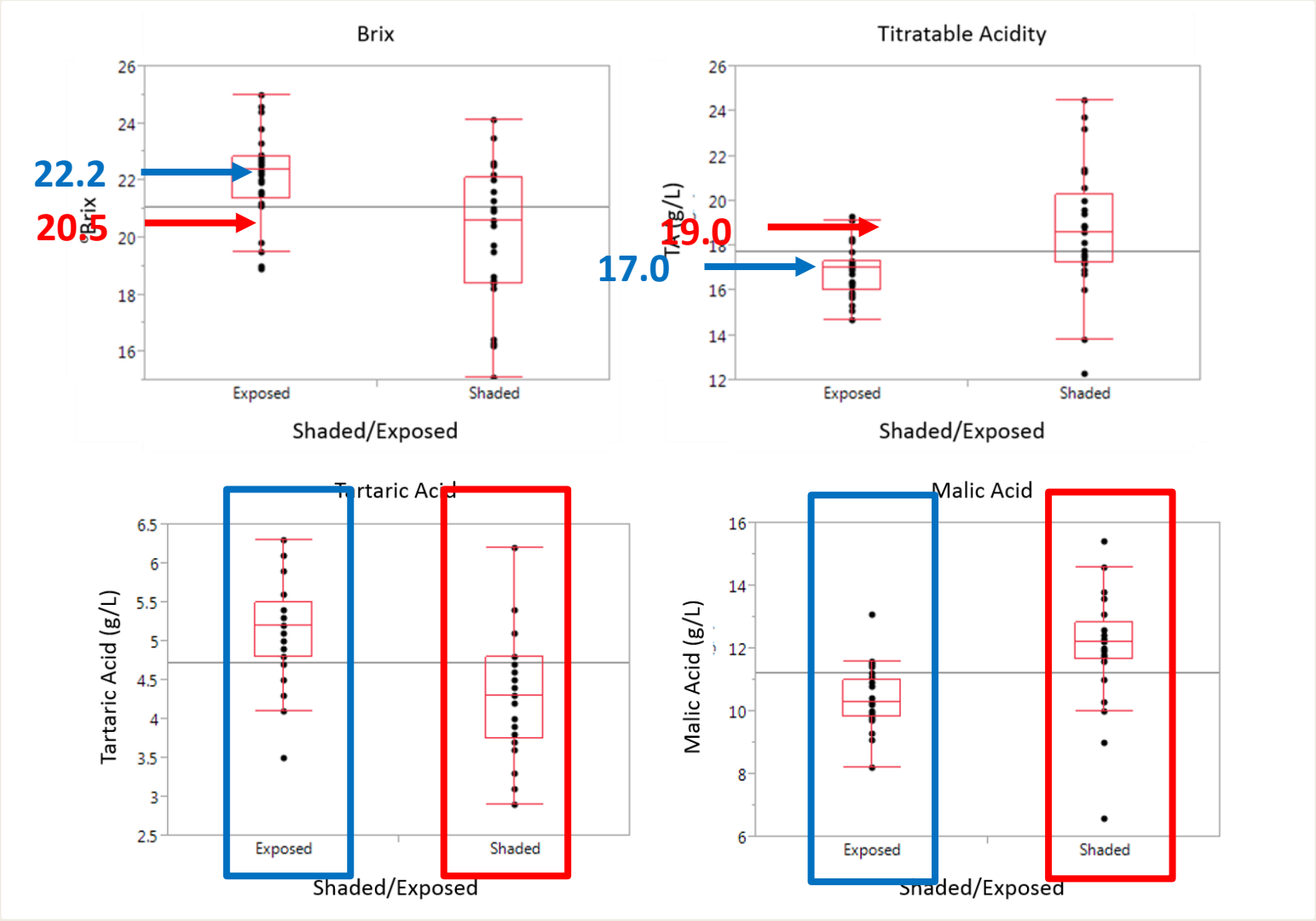
Marquette 2014





Shaded vs. Exposed Clusters

Frontenac 2015

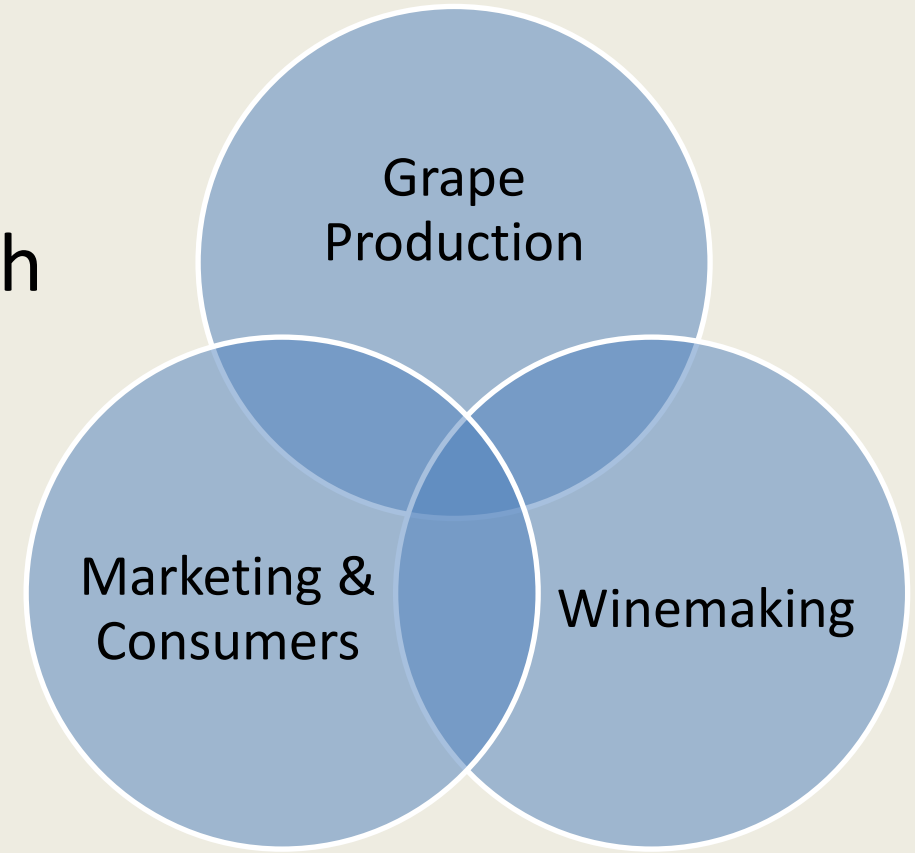


Preliminary Conclusions

- (NY) High training systems =
  - Higher yield
  - Lower cost
  - Minimal impact on fruit composition (Brix, pH, TA)
- (MI) Heavy cropping affected brix, not pH or TA
  - Caveat: Warm region, Heat units not limiting.
- Within vines:
  - Individual exposed clusters had higher soluble solids and lower titratable acidity than shaded clusters

Outreach to Industry

- Integration of Research and Extension
- Systems-based approach
- Develop growers/ winemakers' skills



Northern Grapes Symposium

- Held annually, in conjunction with another meeting
- Presentations by team members which update the audience about project findings

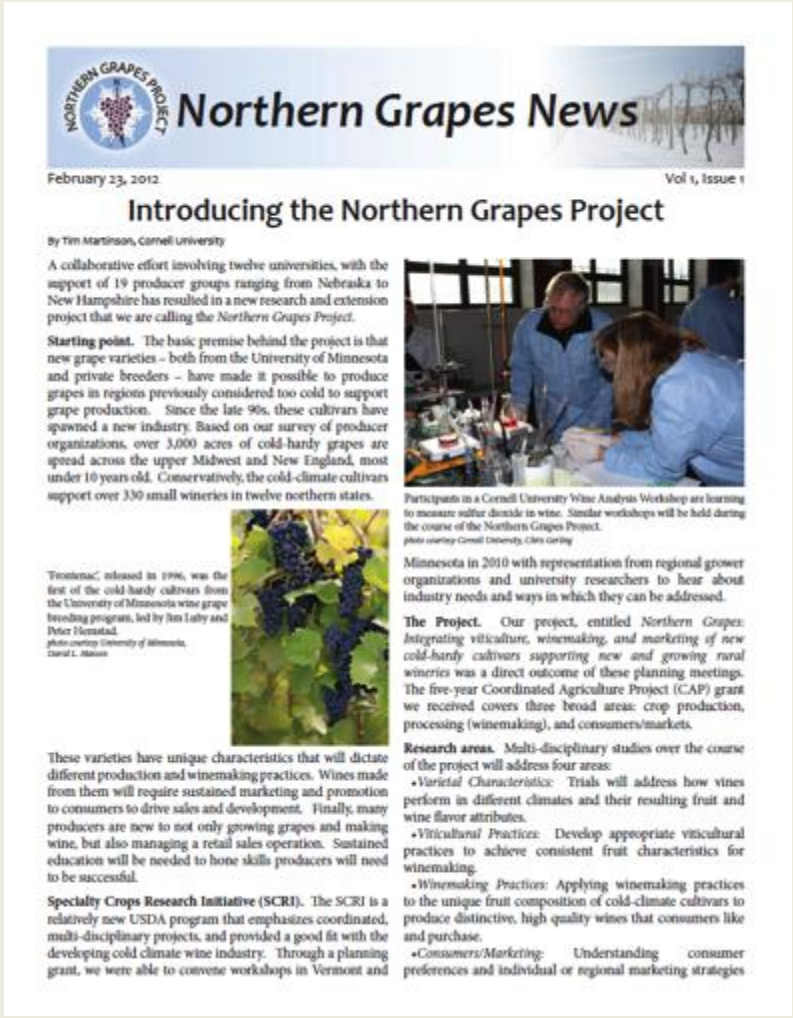
www.northerngrapesproject.org

2016 Michigan Grape & Wine Conference
February 24-26, 2016
Radisson Plaza Hotel, Kalamazoo

Northern Grapes News

- 4 issues each year
- Project news
- Team member profiles
- Relevant information
- Activities

www.northerngrapesproject.org



Northern Grapes News

February 23, 2012 Vol 1, Issue 1

Introducing the Northern Grapes Project

By Tim Martinson, Cornell University

A collaborative effort involving twelve universities, with the support of 19 producer groups ranging from Nebraska to New Hampshire has resulted in a new research and extension project that we are calling the *Northern Grapes Project*.

Starting point. The basic premise behind the project is that new grape varieties – both from the University of Minnesota and private breeders – have made it possible to produce grapes in regions previously considered too cold to support grape production. Since the late 90s, these cultivars have spawned a new industry. Based on our survey of producer organizations, over 3,000 acres of cold-hardy grapes are spread across the upper Midwest and New England, most under 10 years old. Conservatively, the cold-climate cultivars support over 330 small wineries in twelve northern states.

Participants in a Cornell University Wine Analysis Workshop are learning to measure sulfur dioxide in wine. Similar workshops will be held during the course of the Northern Grapes Project.
photo courtesy Cornell University, Chris Gerling

'Frontenac', released in 1996, was the first of the cold hardy cultivars from the University of Minnesota wine grape breeding program, led by Jim Luby and Peter Hemstad.
photo courtesy University of Minnesota, David L. Hanson

These varieties have unique characteristics that will dictate different production and winemaking practices. Wines made from them will require sustained marketing and promotion to consumers to drive sales and development. Finally, many producers are new to not only growing grapes and making wine, but also managing a retail sales operation. Sustained education will be needed to hone skills producers will need to be successful.

Specialty Crops Research Initiative (SCRI). The SCRI is a relatively new USDA program that emphasizes coordinated, multi-disciplinary projects, and provided a good fit with the developing cold climate wine industry. Through a planning grant, we were able to convene workshops in Vermont and Minnesota in 2010 with representation from regional grower organizations and university researchers to hear about industry needs and ways in which they can be addressed.

The Project. Our project, entitled *Northern Grapes: Integrating viticulture, winemaking, and marketing of new cold-hardy cultivars supporting new and growing rural wineries* was a direct outcome of these planning meetings. The five-year Coordinated Agriculture Project (CAP) grant we received covers three broad areas: crop production, processing (winemaking), and consumers/markets.

Research areas. Multi-disciplinary studies over the course of the project will address four areas:

- *Varietal Characteristics:* Trials will address how vines perform in different climates and their resulting fruit and wine flavor attributes.
- *Viticultural Practices:* Develop appropriate viticultural practices to achieve consistent fruit characteristics for winemaking.
- *Winemaking Practices:* Applying winemaking practices to the unique fruit composition of cold-climate cultivars to produce distinctive, high quality wines that consumers like and purchase.
- *Consumers/Marketing:* Understanding consumer preferences and individual or regional marketing strategies

Northern Grapes Enterprise Workshops

- Held across the states involved in the project
- Include topics like barrel workshop, NE 1020 wine tasting, field days, etc.

www.northerngrapesproject.org

Northern Grapes Webinars

- 24 webinars thru Spring 2015
- 50-150 each broadcast
- Interactive
- Archived on NG website

www.northerngrapesproject.org

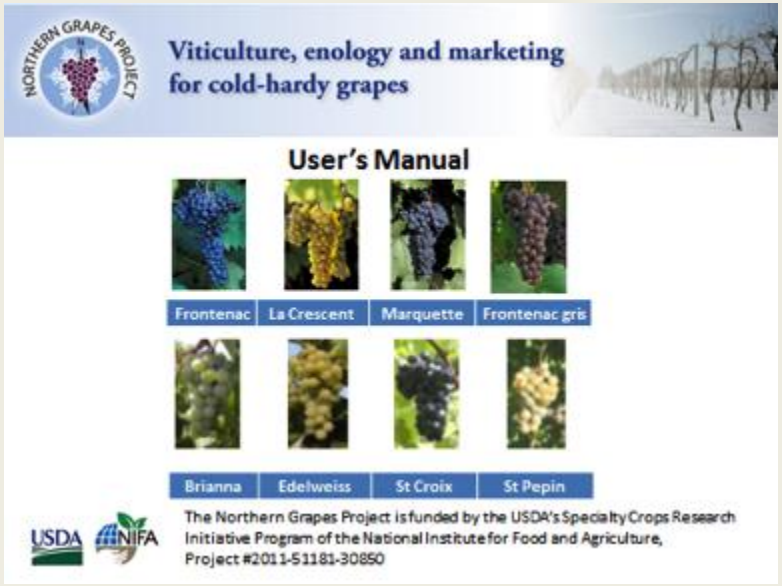
Upcoming Northern Grapes Webinars

- **March 8, 2016**
  "Cold-Hardy Grape Breeding at the University of Minnesota and North Dakota State University"
  Matt Clark, University of Minnesota and Harlene Hatterman-Valenti, North Dakota State University
- **April 12, 2016**
  "Northern Grapes Project Research Results: Fungicide Sensitivity and Vine Nutrition of Cold-Hardy Cultivars"
  Patricia McManus, University of Wisconsin-Madison and Carl Rosen, University of Minnesota
- **May 10, 2016**
  "From Vine to Glass: Understanding the Flavors and Aromas of Cold-Hardy Grapes and Wine"
  Anne Fennell, South Dakota State University; Adrian Hegeman University of Minnesota; and Somchai Rice, Iowa State University

www.northerngrapesproject.org

User's Manual

- Construction in 2015-16
- Digital format
- Research-based
- Specific to Cold Climate grape and wine industry



Viticulture, enology and marketing for cold-hardy grapes

Brianna and La Crescent: Ten Viticulture Tips

John Thull and Jim Luby
University of Minnesota

Photo by Nicholas Howard

Photo by Dave Hansen
Univ. of Minnesota

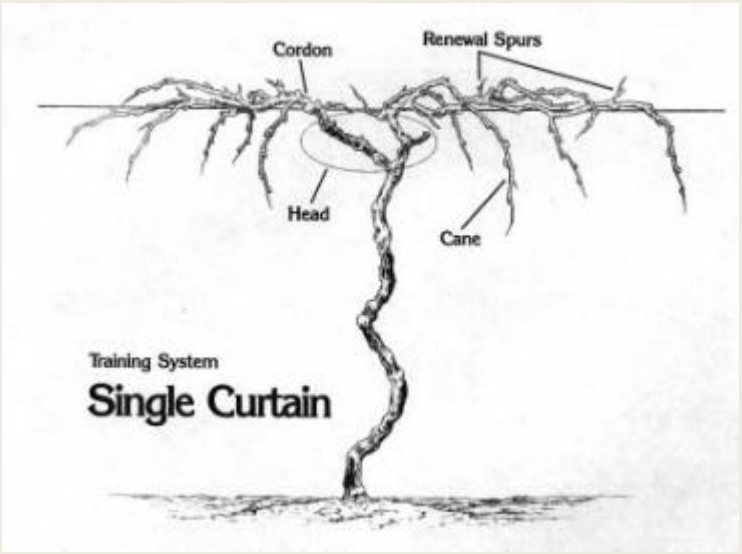
Brianna

- Bred by Elmer Swenson, 1983
- Named by Ed Swanson, Cuthills Vineyard, NE in 2002
- Kay Gray x ES 2-12-13

Brianna
Site Selection and Vineyard Establishment

- Vine spacing of 8' will fill the trellis, except in some low fertility, high pH soils.
- Vines fight upward growth. Do not use a VSP trellis system.

Cuthillswinery.com



Ohio State Univ Bulletin 815

Brianna
Training and Pruning

- Long, trailing shoots with stubborn tendrils.
- Long shoot internodes so leaf pulling not as critical as for La Crescent.

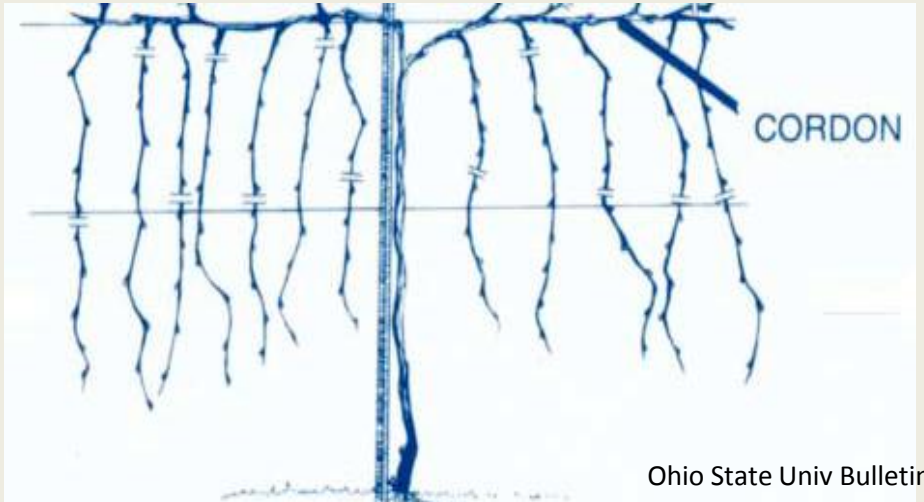
Brianna
Training and Pruning

- Cluster weights are typically under 1/4 pound.
  - Buds on node position 4 - 12 generally produce larger clusters
  - Very fruitful from secondary buds

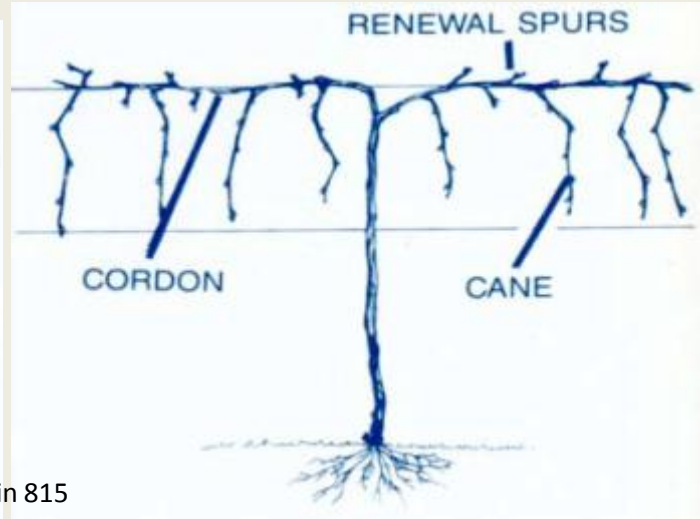
Brianna
Training and Pruning

- Long cane renewal pruning with renewal spurs may work well for many areas.
  - Can tie 2 canes together in both directions to improve yields during cordon renewal.
- 5 to 8 buds per foot of trellis retained at pruning works well on healthy, mature vines.

Before Pruning



After Pruning



Ohio State Univ Bulletin 815

Brianna
Disease and Pest Management

- Clusters are susceptible to Downy Mildew.
  - Vine is highly sensitive to copper and moderately sensitive to sulfur.

Downy Mildew on leaf and Cluster

Copper damage

Photos by David S. Jones and Patricia McManus, University of Wisconsin

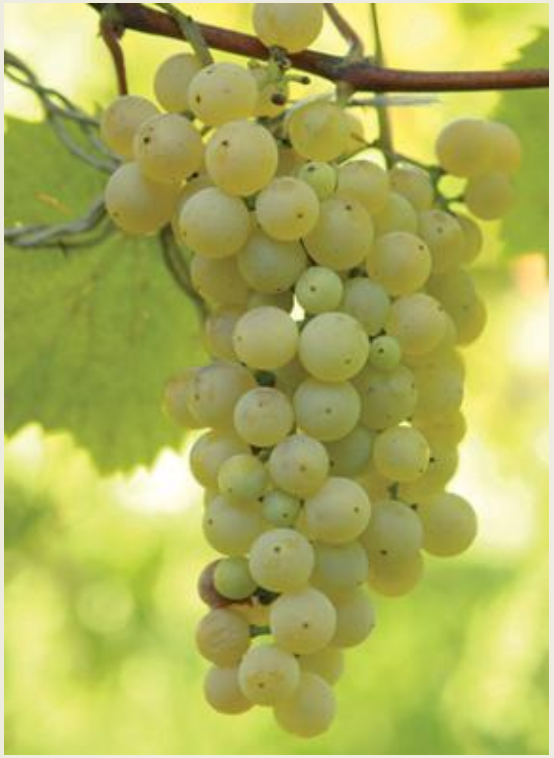
Brianna
Harvest Considerations

- Berries plump up after veraison. Compact clusters tend to split some berries inviting wasps and sour rots to take hold.
- Harvest at around 14-16 Brix to avoid over-development of unwanted foxy aromas.
  - usually late August to early September in Minnesota.

Wikipedia.org

Brianna

Viticulture, Enology, and Wine tasting



Jim Luby and Murli R Dharmadhikari

NGP meeting Kalamazoo MI

2/24/16

Styles of Brianna

1. Crisp light bodied white: crisp, lively, light in alcohol and not assertive in taste or aroma

Ex: Sauv. Blanc, Pinot Gris, Pinot Grigio, and Chenin Blanc

2. Smooth medium bodied white: *medium in body, flavor and acidity with a touch of sweetness in some cases*

3. Aromatic dry or off dry white: fruity, perfumed, aromatic, floral medium bodied dry or off-dry

Ex: Riesling, Muscat, Gewurztraminer , Sauv. Blanc

Styles of Brianna, cont.

4. Barrel-fermented or partially barrel-fermented style: increased aromatics, richness and mouth-feel

Ex: Chardonnay

5. Sparkling: 100% pure or in a blend, either bulk-carbonated or "Methode Champenoise": Sparkling wines are becoming more popular every day, low Brix at harvest lends itself to secondary in-the-bottle fermentation

Ex: Successful sparkling wines from L. Mawby (MI) and Illinois Sparkling Wine Co.

Brianna Aroma/Flavor Descriptors

- **Wine Quality and Characteristics:** 'Brianna' can be made into a semi-sweet white wine with pronounced pineapple nose and flavor when fully ripe.
- **For light table wines** with more grapefruit, tropical, and slight floral characteristics, 'Brianna' is best harvested between **3.2-3.4 pH**.
- **Ed Swanson noted** that the grapes are high in pectin, and need extra enzymes for good juice yield. Whole-cluster pressing can help.
- **Acquaviva winery:** Sweet, medium body wine. Flavors are predominantly peaches, apricots, lime-candies, grapefruit, and pineapple. Ideal as a dessert wine.
- **Miletta Vista :** Brianna wine is filled with flavors of tropical fruits like pineapple, mango and kiwi. A great sipping wine for the sweeter palate.

Brianna Vinification

- **Harvest early based on pH**. Whole-cluster press with rice hulls and pectinase enzyme to boost clarification and juice yield
- **Settle well**, may use Bentolact-S addition to pre-fine/settle the juice
- **Ferment cool** with chosen yeast strain, 52F to 58F
- **Minimize oxygen exposure**
- **Clean racking and proper sulfiting** during processing/maturing, aim to inhibit Malo-Lactic (secondary) fermentation
- **Clarify, stabilize, filter, and bottle**

Whole-Cluster Processing

(…and you won't need to clean your de-stemmer!)

The Wines

Frontenac Port

La Crescent

"does exhibit cherry and black currant flavors and aromas… but can be much more complex with integrated notes of blackberries, pepper, plum, tobacco, leather, and spice".

Project Evaluation Survey

- Help us evaluate the Northern Grapes Project
- Followup to 2012 Survey
- Survey open from now through March 15
- **https://umn.qualtrics.com/SE/?SID=SV_85JEKHqlD2Pk9zT**
- **Link Posted at http:northerngrapesproject.org**

Acknowledgements

Northern Grapes Project Team and Industry Advisory Council

Initiative Program of the National Institute for Food and Agriculture, Project #2011-51181-30850

Phil Randazzo