Horticulture and Disease Management of Cold Climate Grapes in Vermont

Terence Bradshaw, Tree Fruit and Viticulture Specialist, University of Vermont
63 Carrigan Dr, Burlington, VT 05405. tbradsha@uvm.edu. http://www.uvm.edu/~fruit

Winegrape production is relatively new to New England, especially in colder regions away from the coast, due to the breeding of cold-hardy cultivars that has enabled this industry to be successful. In the great wine regions of the world, cultivar adaptation to sites evolved over decades if not centuries. The comparatively young New England winegrape industry must likewise adapt cultivar choice and management to ensure profitable production of high-quality wines that consumers want and purchase.

Evaluation of winegrape cultivar performance has been conducted at the UVM Horticulture Research and Education Center in South Burlington, VT (USDA hardiness zone 5a) since 2007. The farm is located on Windsor-Adams loamy sand soil with low organic matter and good soil drainage. Eight winegrape cultivars were planted in a randomized complete block design of six blocks with four-vine plots of each cultivar per block: ‘Corot Noir’, ‘Frontenac’, ‘La Crescent’, ‘Marquette’, ‘Prairie Star’, ‘St. Croix’, ‘Traminette’, and ‘Vignoles’. Vines were trained from two trunks per vine to a five-foot high-wire bilateral cordon system at a density of 726 vines/acre.

Assessed horticultural parameters included: vine vigor (pruning weight); indirect cold hardiness measurements (primary winter bud survival, cordon length); yield, and juice quality parameters. In addition, incidence of disease on fruit and foliage was evaluated. ‘Frontenac’, ‘La Crescent’, ‘Marquette’, ‘Prairie Star, and ‘St Croix’ rated well for measurements of cold hardiness and vine vigor. Those cultivars also had among the highest crop yield in most years, except ‘Prairie Star’ which rated among the lowest in all years. ‘Corot Noir’ had among the best crop yield through 2013, but suffered from substantial winter damage in the cold 2013-2014 and 2014-2015 winters. ‘Frontenac’, ‘La Crescent’, ‘Marquette’, and 'Vignoles' generally produced juice with higher titratable acidity (TA) and soluble solids than other cultivars, and ‘Corot Noir’ and ‘St Croix’ juices ranked lower for those variables. ‘Traminette’ and ‘Vignoles’ performed poorly in most measures of cold hardiness, vine vigor and crop yield compared to other cultivars in this trial, and were removed from the planting after 2011.

Diseases that were assessed included: powdery mildew; downy mildew; black rot; Phomopsis leaf spot and fruit rot; angular leaf scorch; and anthracnose (data not shown). Complete assessment was conducted in 2010-2012. Later assessments have been conducted as the vines have matured but data were not analyzed by the time of this publication. Powdery mildew was the most prevalent disease and was observed on the foliage of all cultivars in each year. 'Frontenac' or 'Prairie Star' ranked the highest numerically in percent leaves infected but were not significantly different from some of the other cultivars. No powdery mildew was observed on any fruit in any year. Downy mildew was also observed only on foliage and not on any fruit over the three years of the study. In 2010 and 2011, the highest foliar incidence was observed on 'Vignoles'; in 2012, the highest foliar incidence was observed on 'La Crescent' vines after 'Vignoles' vines (and 'Traminette' vines) were removed from the planting after 2011. Phomopsis foliar symptoms were not observed in any year but fruit rot symptoms were observed in 2010 and 2012. In 2012, 'Frontenac' had the highest

incidence and severity, followed by 'Marquette'. Black rot, angular leaf scorch and anthracnose were either not observed or at very low incidence during the three growing seasons. In summary, differences in disease incidence and severity among the cultivars were observed for some diseases. Future research which allows for comparison of multiple fungicide programs during a growing season is needed to determine the innate disease resistance/susceptibility of these cultivars and how best to incorporate this knowledge into effective disease management programs that address economic, health, and environmental concerns.

Acknowledgements

The research was supported by the Vermont Agricultural Experiment Station, USDA Hatch funds, the USDA NE-1020 Project; and the USDA NIFA SCRI Project #2011-51181-30850 (Northern Grapes Project). This project was supported by the work of Dr. Lorraine Berkett and Sarah Kingsley-Richards.

UVM NE-1020 Winegrape Evaluation Vineyard: Harvested crop yield tons/acre.

Cultivar	Cumulative	2009	2010	2011	2012	2013	2014	2015
Corot Noir	28.80a[z]	1.87ab	3.75abc	9.20a	5.16a	5.61	1.72c	1.49c
Frontenac	29.97a	2.29a	3.84ab	6.33a	4.10ab	6.00	4.06a	3.34ab
La Crescent	24.81a	1.80ab	4.69ab	6.46a	2.75bc	5.31	2.57bc	1.21c
Marquette	26.67a	1.17abc	4.79ab	6.24a	2.51c	6.91	2.89abc	2.34abc
Prairie Star	21.06a	1.45abc	2.68bc	2.66b	1.77c	5.28	3.74ab	3.47a
St Croix	29.30a	1.93a	5.79a	7.91a	2.59c	5.65	3.39ab	2.04bc
Traminette[y]	5.01*	0.26c	2.14bc	2.62b	.	.	.	.
Vignoles[y]	1.59*	0.66bc	0.92c	.	.	.	.	.

Mean performance parameters 2009-2015

Cultivar	Cordon length (m)	Pruning weight (kg)[w]	% Live nodes in spring	Cluster weight (g)	°Brix[x]	pH[x]	TA[x]
Corot Noir	1.61ab	0.45bc	65.5b	133.3a	16.5d	3.14b	0.89d
Frontenac	1.72a	0.68ab	86.0ab	107.2b	23.5ab	3.16b	1.64a
La Crescent	1.72a	0.69ab	87.2ab	92.1bc	21.8bc	3.05bc	1.52ab
Marquette	1.61ab	0.72ab	83.9ab	87.9bc	24.4bc	3.08b	1.39ab
Prairie Star	1.65ab	0.56b	73.9b	77.2c	20.8b	3.32a	1.10c
St Croix	1.71ab	0.80a	88.9a	97.5c	18.7c	3.13b	0.88d
Traminette	1.63ab	0.39bc	64.7b	73.2c	21.5bc	2.86c	1.15c
Vignoles	1.50b	0.23c	63.4b	53.8c	22.0bc	2.95c	1.53a

[z] Values represent the mean from 6 replicate four-vine plots per cultivar of 20 leaves or 10 clusters per plot. Means followed by the same letters within columns are not significantly different according to Tukey's Studentized Range (HSD) Test ($p \leq 0.05$).

[y] Traminette and Vignoles were removed after the 2011 season due to poor cold hardiness, yield, and disease sensitivity.

[x] Parameters measured on extracted juice samples.

[w] Pruning weight represents mean weight of canewood removed per vine each year.

Relative Disease Ratings for Wine Grape Varieties Grown in Vermont

Lorraine P. Berkett, Professor Emeritus, University of Vermont

http://www.uvm.edu/~fruit/grapes/gr_ipm/RelativeRatingsOfDiseaseMay2011.pdf

Ratings: *+ slightly susceptible; ++ moderately susceptible; +++ highly susceptible*

	Black Rot	Powdery Mildew	Downy Mildew	Botrytis	Angular Leaf Scorch	Phomopsis	Anthracnose
Baco Noir	+++	++	+	+++	++	+	**?**
Cayuga White	+	+	++	+	++	+	**?**
Frontenac	+++	+++	+	++	++	+	+
Frontenac Gris	++	+++	+	++	**?**	+	+
La Crescent	+++	+++	+++	+	++	+	+++
La Crosse	+++	++	+++	+++	**?**	++	+
Leon Millot	+	+++	+++	+	+	+	+
Louise Swenson	+	+	+	+	++	**?**	++
Marechal Foch	++	++	+	+	+	+	++
Marquette	+++	+++	+	+	+	**?**	+++
Prairie Star	++	+	+++	+++	++	**?**	++
Riesling	+++	+++	+++	+++	+	++	**?**
Sabrevois	+	+	+	+	**?**	**?**	**?**
St. Croix	+++	++	++	++	++	**?**	+
St. Pepin	+	+++	++	++	+	**?**	**?**
Seyval	++	+++	++	+++	++	++	**?**
Swenson Red	+	++	+++	++	++	**?**	**?**
Swenson White	+	++	++	+	+++	+	+++
Traminette	++	+	+++	+	+	**?**	+
Vidal	++	+++	+++	+	+	+	+++
Vignoles	+	+++	+++	+++	++	++	+++

*Resources: Midwest Grape Production Guide, Bulletin 919, OSU, 2005; New York and Pennsylvania Pest Management Guidelines for Grapes: 2006; "Characteristics of Cold Hardy Grape Cultivars", Dr. Paul Domoto, Iowa State University, 2007; and observations from Vermont vineyards. Note: Where there were differing ratings, the more susceptible rating was used.