Willsboro Grape Variety Trial

Willsboro Research Farm
Willsboro, NY

Anna Wallis & Tim Martinson
Cornell Cooperative Extension

Background and Rationale: Evaluating performance of cold-hardy grape varieties in field plantings is critical to identifying varieties suitable to specific climates and locations. 25 cold-hardy varieties were planted in 2005 at the Willsboro Research Farm to evaluate the feasibility of growing these varieties in northeastern New York for wine production.

Treatments: 25 cold-hardy varieties, planted in 3 vine panels, 4 replications. Planting was a randomized complete block design.

- Aromella
- Baco
- Cayuga
- Edelweiss
- ES 6-16-30
- Foch
- Frontenac
- Frontenac Gris
- GR-7
- La Crescent
- La Crosse
- Landot
- Leon Millot
- Louise Swenson
- Marquette
- MN 1200
- Niagara
- Noiret
- Petite Amie
- Praire Star
- Not Ravat
- Sabrevois
- St. Croix
- St. Pepin
- Vignoles

Methods: Vines were planted at the Willsboro site in spring 2005 inside a ~½ acre plot surrounded by deer fencing. Vines were spaced 8' within rows and 10' between rows, and supported a two-wire trellis on 8' posts and 10' end posts. The site is an ideal location for a cold-hardy vineyard. Soil is a well-draining fine textured sandy loam. The farm is in climate zone 4b, but slightly more mild than surrounding sites due to proximity to Lake Champlain, slight elevation and slope providing good air drainage, and excellent sun exposure.

Training

- In 2008-9 vines were trained to Umbrella Kniffen
- In 2010 vines were trained to Top Wire Cordon

Maintenance

- Pruning
- Standard weed and pest control program (pesticide application, bird netting, raccoon fest)
- Canopy management
- Harvest

Data Collection (2008-2015)

- Phenology
- Pruning Weights
- Yield
- Maturity Metrics (TA, Soluble Solids (°Brix), pH)
- Winter Injury

New Variety Trial: As of 2014, this trial included 8 years of data on the varieties above. In November 2014, an industry advisory group prioritized investigation of new candidates for cold climate grape production. Following collection of pruning weight data on all 25 varieties in early spring (dormant), 21 of the 25 varieties were removed from the planting. Marquette, Frontenac, Frontenac gris, and La Crescent were retained to provide fruit for enology research. New varieties are being investigated for planting in spring 2017 to be funded by the Northern NY Agriculture Development Program (NNYADP).

Fruit harvested from La Crescent, Frontenac, Marquette, and Frontenac gris in 2015 was sent to Cornell, Geneva for winemaking experimentation.

Berry samples were taken at verasion and harvest from the varieties Frontenac, Marquette, La Crescent and Frontenac gris and sent to Iowa State University for analysis.

Results:

Phenology was recorded for all 25 varieties from 2008-2014. Averages for 2010-2014 are displayed in Table 2. Pruning weights were measured in 2008 and 2009 only. Weights per meter averaged 0.5 and 0.4 kg per linear meter of row in 2008 and 2009 respectively (0.07 and 0.06 lbs/ft). These weights fall within acceptable standards for vine vigor.

Yields for all varieties, from 2008-2014 averaged 20 lbs/vine. At 630 vines/acre this corresponds to approximately 6.3 T/acre. Average yield per variety ranged from Landot at the least with 12 lbs/vine (3.2 T/acre) to Niagra at the most with 35 lbs/vine (9.5 T/acre). However, there was a great deal of variation in yield between years for most varieties.

Clusters per vine and weight per cluster varied greatly between varieties. Clusters per vine averaged 60 clusters/vine and weight per cluster averaged 100g/cluster for all varieties and seasons. Yields and maturity metrics are displayed in Table 3.

Winter bud injury evaluated in March 2015 for all 25 varieties revealed differences in hardiness (Table 1). During the winter of 2014-15, the Willsboro Research Farm experienced low temperatures of -20.5 in late February. Edelweiss experienced >50% bud mortality. Louise Swenson, Vignoles, Sabrevois, and St. Pepin sustained >10% injury. All other varieties experienced 10% or less injury.

What the results mean:

- Pruning weights are in range
- Phenology
- Yields are economical
- Quality metrics are highly variable between varieties and growing seasons
- Winter injury has not been an issue for most cultivars at this site.

Table 1. Bud Injury Willsboro 2015

Grape Variety	Bud Injury (%)
Edelweiss	51
Louise Swenson	27
Vignoles	24
Sabrevois	18
St. Pepin	13
Frontenac	10
Aromella	10
Cayuga White	9
Landot	8
Noiret	6
Not-Ravat 34	5
GR 7	5
Niagara	4
MN 1200	4
Leon Millot	4
Foch	3
LaCrescent	2
Baco	2
St. Croix	1
Petite Amie	1
Marquette	1
Frontenac Gris	1
Prairie Star	0
LaCrosse	0
Adalmina (ES 6-16-30)	0

Table 2. Average phenology (Julian Date) over five years at Willsboro, NY. 2010-2014.

Variety	Budburst	Shoots	Flowering	Capfall	Berry Set	Veraison	Harv Date
Modified E-L No.	**(4)**	**(12)**	**(19)**	**(23)**	**(27)**	**(35)**	**(38)**
Aromella	128	149	165	173	178	229	257
Baco	125	145	159	169	178	229	259
Cayuga White	129	152	167	174	180	229	261
Edelweiss	127	146	160	169	177	227	261
ES 6-16-30	127	149	160	169	178	229	261
Foch	125	148	160	169	177	223	261
Frontenac	126	148	159	168	174	219	262
Frontenac Gris	127	146	159	168	177	221	262
GR 7	125	146	160	169	178	223	263
La Crescent	126	144	160	168	177	223	263
La Crosse	128	147	162	170	178	225	264
Landot	130	153	165	177	181	233	264
Leon Millot	126	148	159	169	177	219	264
Louise Swenson	126	148	160	169	178	223	265
Marquette	126	144	159	169	177	219	265
MN 1200	126	148	159	168	177	219	265
Niagara	126	148	160	169	178	232	265
Noiret	129	149	167	174	180	229	265
Not Ravat 34	127	153	165	172	178	225	265
Petite Amie	127	148	160	169	177	223	265
Prarie Star	126	149	160	169	177	223	266
Sabrevois	127	149	160	169	177	223	268
St. Croix	126	145	160	169	177	227	268
St. Pepin	127	149	165	172	179	223	268
Vignoles	129	153	167	174	180	232	270

Table 3. Pruning Weight, Yield, Soluble Solids, pH, and titratable acidity over seven years at Willsboro, NY. 2008-2014. [a]

Variety	Yield (Kg/Vine)[b]			Soluble Solids (°Brix)			Juice pH			Titratable Acidity (g/l)		
	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max
Niagara	16.0	8.3	24.0	13.3	8.6	15.0	3.24	3.00	3.49	7.1	4.3	12.4
Geneva Red (GR 7)	11.3	5.8	16.4	17.0	10.3	20.2	3.41	3.23	3.53	11.4	5.5	21.1
Frontenac	11.2	6.4	17.4	21.6	20.5	23.0	3.21	2.85	3.53	14.6	13.3	16.4
Frontenac Gris	11.2	7.2	13.8	21.7	19.8	23.6	3.21	2.89	3.40	14.4	12.4	15.8
La Crosse	10.8	4.2	14.3	16.7	10.6	19.0	3.08	2.81	3.23	11.8	7.2	18.5
Aromella (NY76.844.24)	10.6	5.8	14.6	16.5	10.3	22.0	3.18	2.95	3.34	10.9	7.5	16.7
Louise Swenson	10.5	4.9	15.0	16.9	9.1	20.0	3.28	3.14	3.43	8.0	5.2	15.4
Cayuga White	10.4	6.0	14.4	15.6	10.0	18.0	3.12	2.82	3.31	10.4	6.7	16.5
Not Ravat	10.0	4.6	17.5	14.2	12.7	15.9	3.17	3.09	3.29	11.3	5.9	16.7
Leon Millot	9.7	4.9	13.5	18.7	8.8	22.0	3.49	3.28	3.72	10.4	6.3	20.9
Marechal Foch	9.4	4.9	13.1	19.5	11.3	22.0	3.31	3.14	3.49	11.4	8.0	20.5
Baco Noir	9.3	4.3	12.3	18.9	13.8	21.0	3.26	3.07	3.40	12.3	9.1	15.1
Edelweiss	9.3	4.2	16.4	15.5	8.0	18.0	3.45	3.29	3.66	8.2	4.9	17.1
La Crescent	9.3	6.9	11.5	22.5	19.6	24.0	3.24	2.96	3.50	12.8	11.4	15.7
Vignoles	9.3	4.1	12.0	17.7	12.6	20.4	3.09	2.85	3.22	14.9	10.1	20.1
Sabrevois	8.8	2.9	14.1	17.2	9.9	20.0	3.42	3.24	3.51	11.5	9.0	18.5
Marquette	8.6	4.7	13.6	23.2	21.8	25.8	3.11	2.87	3.30	10.9	10.2	12.3
St. Pepin	8.6	4.7	12.0	18.2	10.8	21.0	3.22	3.01	3.31	11.9	8.6	21.4
Noiret	8.3	4.6	10.4	14.6	10.8	17.1	3.15	3.11	3.20	11.4	6.3	18.3
Petiete Amie	8.3	3.1	11.5	16.0	9.0	18.2	3.35	3.20	3.46	9.6	5.8	18.8
Prairie Star	8.1	5.3	15.0	17.3	10.1	19.3	3.45	3.25	3.58	11.3	9.5	18.3
St. Croix	7.8	2.9	9.9	18.9	17.8	20.0	4.26	3.17	3.10	9.9	7.1	18.0
ES 6-16-30	6.9	2.5	11.6	16.8	7.1	20.3	3.40	3.27	3.50	9.2	5.7	19.6
MN 1200	6.6	1.9	10.6	18.9	10.3	21.8	3.26	3.08	3.37	11.3	7.9	22.6
Landot Noir	5.4	1.7	8.5	16.7	9.0	19.7	3.25	3.06	3.40	10.9	7.7	19.8
Average	**11.2**	**5.8**	**16.1**	**17.2**	**12.1**	**19.9**	**3.24**	**3.01**	**3.43**	**11.0**	**7.4**	**17.0**

[a] The average of individual vine measurements (3 vines in 4 replicates= 12 vines) in each year was used to calculate the average (over all seven years), minimum and maximum (extreme years) values for yield, soluble solids, pH, and titratable acidity.

[b] Yield is in Kg/vine. Multiply by 2.24 to get pounds per vine. Vine spacing is 8 x 9 ft, which is the equivalent of 605 vines per acre. As a reference point, 10 kg/vine is equivalent to 22.4 lb/vine = 6.7 Tons per acre.