



Viticulture, enology and marketing for cold-hardy grapes



Marquette, Frontenac, St. Croix, La Crescent Training Trial

Dove Landing Vineyard
Lincoln, NE &
Kimmel Research Site
Nebraska City, NE

*Dr. Paul E Read & Stephen Gamet
Department of Agronomy and Horticulture
University of Nebraska - Lincoln*

Background and Rationale: With the introduction of new cultivars bred for the colder climate conditions in the central and northern states of North America the choice of a training system is not as clear-cut as systems employed for the classic vinifera cultivars. The trials were set up to help determine how a trellis system can and will influence yield, quality and the amount of labor input that is required for each system. Ultimately research results will be available to help growers determine what system will produce the highest quality of grapes with the lowest input of labor to maximize the best return on investment input.

Treatments: Two systems were chosen that best represent what is most commonly used in the region, but also the two distinctly different treatments of either the upward or downward growth habits of the plants.

- Vertical Shoot Positioning (VSP)
 - Low or Mid cordon wire with catch wires above cordon wire
 - Upward shoot positioning, canopy hedging, leaf removal
- High Wire System
 - High (5 foot plus) cordon wire
 - Downward shoot positioning (shoot combing)

Methods:

- Row orientation is North to South
- Vines planted in 3-vine panels in a randomized complete block design; grow tubes were used and removed mid-summer.
- Spacing between rows is 10ft, spacing between vines is 8ft.
- Trellis is constructed using steel Mannwerks® Vertical Line Post, 8in pressure treated Lodge Pole Pine end post and high tensile 12.5 gauge wire; mid wire at 40 inches for VSP and 60 inches for High Wire System.
- Trellis end posts are set at a 90° angle and secured with a “dead man” and anchor wires
- Soil type – Aksarben Silty Clay Loam Dove Landing Vineyard
- Soil type – Morrill Clay Loam Kimmel Orchard Research Site
- Turf type fescue grass has been retained for the row middles.
- Vines pruned in dormant season
- Standard weed, insect, disease management program used.
- Row middles mowed as needed.

Vines were pruned to shoots every 4 to 5 inches with 4 to 5 buds per shoot resulting in 20 to 25 buds per half cordon or 40 to 50 buds per plant. Shoot thinning was not necessary because of herbicide drift issues. Management of the vines was done throughout the growing season. Fruit was collected at véraison and at time of harvest. At harvest, cluster numbers and yield data were collected for each representative block of each cultivar.

Results: Seasons 2012 and 2013 the vineyard experienced severe damage from herbicide drift resulting in limited data in many of the cultivars. As a result of these two events the maintenance of the surrounding commercial vineyard was altered to both counteract the negative impact of the herbicide damage and to minimize the possible source of the drift. Because of these choices our data were limited to the cultivars grown on the low wire system (VSP) that wasn't as greatly affected. The high wire system (TWC) plants did not yield reliable data that wouldn't taint the results. We were also forced to drop much of the fruit because of the resulting leaf and shoot damage that occurred.

Table 1. Dove Landing Vineyard 2013 Pruning Weight

Dove Landing Pruning Weight for 2013											Ave PW	Ave PW	
Pruning Weights	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	Lbs	
St. Croix	0.38	0.30										0.34	0.7
Marquette	0.06	0.10	0.28	0.10	0.18	0.14						0.14	0.3
La Crescent	NA											NA	NA
Frontenac	0.16	0.20										0.18	0.4
Chambourcin	NA											NA	NA
Vidal Blanc	0.08	0.18										0.13	0.3
Sabrevois	0.48	0.44	0.34	0.34	0.36	0.54						0.42	0.9
Seyval/101-14	0.14	0.16	0.06	0.08	0.02	0.14	0.15					0.11	0.2
Valiant/101-14	0.10	0.22	0.26	0.18	0.10	0.21						0.18	0.4
MN 1189	0.08	0.06										0.07	0.2
MN 1220	0.28	0.52	0.20	0.44	0.08	0.02	0.02	0.14	0.16	0.16		0.20	0.4
MN 1235	0.20	0.14	0.08	0.10								0.13	0.3
MN 1258	0.16	0.16	0.26	0.04	0.12	0.24	0.14	0.12				0.16	0.4

Cultivars listed other than St. Croix, Marquette, La Crescent and Frontenac are for comparison.

Table 2. Dove Landing Vineyard Plant Evaluation: Disease and Other Problems

	Insect	Herbicide	Leaf Spot	Black Rot	Phylloxera
St. Croix	2.7	4.0	3.7	4.3	3.8
Marquette	2.3	3.5	4.0	4.0	5.0
La Crescent	NA	NA	NA	NA	NA
Frontenac	2.8	4.0	3.7	3.8	4.0
Chambourcin	3.0	4.7	3.7	4.0	5.0
Vidal Blanc	2.8	4.5	3.7	4.7	4.7
Sabrevois	2.8	3.8	4.7	5.0	5.0
Seyval/101-14	2.7	4.3	4.0	4.0	5.0
Valiant/101-14	NA	NA	NA	NA	NA
MN 1189	2.5	3.0	4.0	5.0	5.0
MN 1220	3.1	3.8	3.5	3.8	3.9
MN 1235	1.8	2.8	3.3	4.3	4.3
MN 1258	3.0	4.0	3.7	3.3	5.0
Field Ave	2.66	3.81	3.74	4.08	4.62

Ratings 1 thru 5 with 1 being the worst and 5 showing no signs of problems

2013: Rainfall amounts were above average for the first 5 and half months of the year and then we went for four weeks with no rain. This caused a number of problems. One being not able to get a timely fungicide spray on and with the reduced sun exposure and herbicide damage the plants didn't grow as much as they should have.

Diseases: Data were taken on Leaf Spot and Black Rot. Phomopsis and Anthracnose could also be seen.

Insects: Insects that caused the most damage were white fly and leaf hoppers. Leaf Phylloxera was present but not in damaging amounts.

Borer Damage: Of the 228 plants in the research planting 143 were observed to have some level of borer infestation. So 62.7% of the research plot is infested at some level with borer damage. The main reason for this infestation is the reluctance of the vineyard owner to burn the last two years prunings

Table 3. 2013 Harvest Weights and Cluster Counts – Dove Landing Vineyard

2013 Harvest Weights and Cluster Counts				
Cultivar	Ave Weight/Rep	Ave Weight/Plant	Ave Weight/Cluster	Ave Cluster Count/Plant
MN 1235	22.5 lbs	3.8 lbs	0.122 lbs	31.3
Frontenac	40.3 lbs	6.7 lbs	0.197 lbs	32.5
St Croix	40.6 lbs	6.8 lbs	0.152 lbs	49.3
MN 1220	34.6 lbs	5.8 lbs	0.116 lbs	25.1
Marquette	09.3 lbs	1.6 lbs	0.098 lbs	17.2
Sabrevois	24.2 lbs	4.0 lbs	0.099 lbs	37.3
Frontenac Gris	32.1 lbs	5.3 lbs	0.178 lbs	30.0
La Crescent	23.6 lbs	3.9 lbs	0.145 lbs	27.2

**Table 4. Juice Characteristics from Nebraska Northern Grapes Project Trials
Véraison and Harvest Berry Readings**

Summary Data**			g/L					(g/L)		(g)	(ml)	
Varietal	Sample Interval	Sample Date	Citric	Tartaric	Malic	Glucose	Fructose	pH	TA	Brix	Weight	volume
St. Croix	Véraison	8/12/2013	0.51	4.79	9.50	59.17	24.34	3.22	13.93	14.5	51.66	47
Marquette	Véraison	8/7/2013	0.35	5.69	6.83	298.80	76.93	3.13	11.14	16.7	n/a	n/a
La Crescent	Véraison	8/5/2013	0.74	5.67	11.92	72.89	72.60	3.04	17.52	16.7	36.79	35
Frontenac	Véraison	n/a	0.51	6.80	9.62	75.81	26.19	2.97	16.74	16.8	36.01	34
St. Croix	Harvest	8/31/2013	0.42	3.03	3.37	85.40	87.16	3.87	5.03	19.4	n/a	n/a
Marquette	Harvest	8/23/2013	0.42	4.35	4.91	94.69	102.62	3.29	8.83	22.3	35.17	32
La Crescent	Harvest	9/2/2013	0.91	2.88	9.33	99.45	104.35	3.66	10.57	24.1	n/a	n/a
Frontenac	Harvest	n/a	0.79	6.19	5.53	103.25	104.57	3.34	10.56	25.4	42.04	38

** values presented as mean of 3 reps of 50 berry samples, weight and volume are from a 50 berry sample when condition of sample allowed.

Fruit Composition: With the reduced amount of sunlight due to the above average spring rains and the effects of the herbicide drift issue blossom and berry set were delayed. Then with the heat of the summer months fruit maturity was accelerated and the time lost early was soon made up. (Note: The high temperatures exceeded 90°F for 40 days and 100°F for 8 days.) Véraison Brix levels were typical for Marquette but pH was higher and TA was lower. These readings are believed to be the results of the high Solar Lang readings. Because of this intense amount of light and heat the fruit had to be harvested before the Brix levels could reach 24° or higher.