



# 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

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**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)

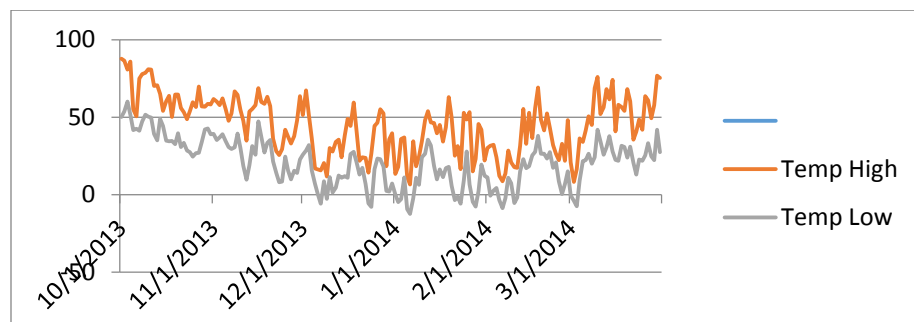
**Methods:**

- 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:** Season 2014 as with the 2012-13 once again experienced damage from herbicide drift but was also affected by two extreme cold weather events in late fall early winter in October and November of 2013. Temperatures reached well below the freezing point in the later part of October and then the single digits in mid November. The temperatures in themselves may not be so radical but the warm temperatures that both preceded and followed these cold spells made them more detrimental to the vines. The cold temperatures in the fall and winter (four months with the lows reaching -7F or lower) along with the residual effects from the herbicide drift and new drift problems in the spring of 2014 caused death of most of the primary buds. Additional mortality was observed to cordons or in some cases the whole plant. The stresses the plants have been under are reflected in their pruning weights (Table 1). The 2014 season was spent mostly trying to retrain the vines resulting in very little crop that was ultimately dropped for the health and recovery of the plants.

**Figure 1. Temperature extremes in degrees Fahrenheit at Dove Landing Vineyard during the period October 1, 2013 through March 31, 2014.**



**Table 1. Dove Landing Vineyard 2013-14 Pruning Weights**

Dove Landing Pruning Weights for 2013-14		Ave Pruning Weight kg 2013	Ave Pruning Weight lbs 2013	Ave Pruning Weight kg 2014	Ave Pruning Weight lbs 2014
Block 1	Chambourcin	NA	NA	0.18	0.4
	MN 1235	0.13	0.3	0.13	0.3
	St. Croix	0.34	0.7	0.28	0.6
	Frontenac	0.18	0.4	0.29	0.6
	Vidal Blanc	0.13	0.3	0.20	0.5
	MN 1220	0.26	0.5	0.16	0.4
Block 2	MN 1220	0.12	0.3	0.14	0.3
	Sabrevois	0.42	0.9	0.31	0.7
	Seyval/101-14	0.11	0.2	0.13	0.3
	MN 1258	0.16	0.4	0.08	0.2
	Valiant/101-14	0.18	0.4	0.17	0.4
	Marquette	0.14	0.3	0.11	0.3
	MN 1235	0.13	0.3	0.09	0.2
	MN 1189	0.07	0.2	0.06	0.2

Figure 2. mortality of primary buds at Dove Landing April 22, 2014.

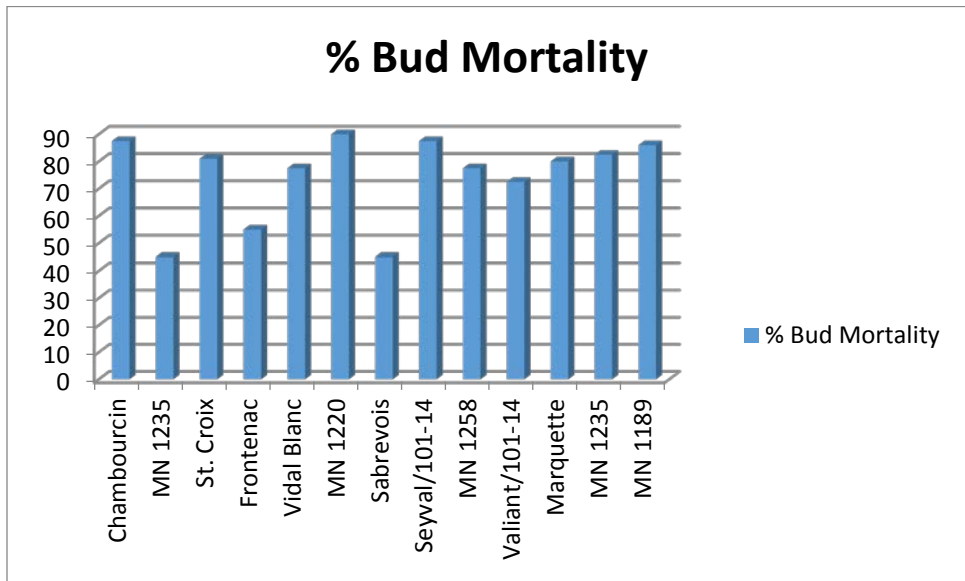


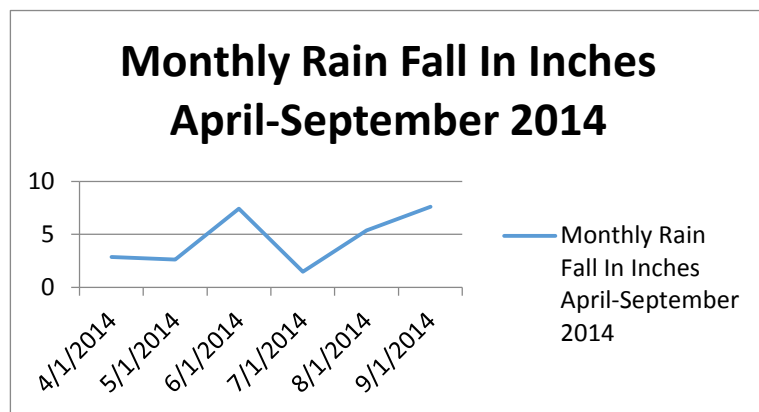
Table 2. Dove Landing Vineyard Plant Evaluation: Disease and Other Problems (observations July, 2014)

Dove Landing Plant Evaluation Disease and Other Problems for 2013-14		Insect		Herbicide Damage		Leaf Spot		Black Rot		Phylloxera	
		2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Block 1	Chambourcin	2	2	3	2	2	1	3	NA	3	1
	MN 1235	1	1	2	2	2	1	3	NA	3	1
	St. Croix	2	1	3	2	2	1	2	NA	3	2
	Frontenac	2	2	3	2	2	1	3	NA	3	2
	Vidal Blanc	2	2	3	2	2	1	3	NA	3	1
	MN 1220	2	2	2	1	2	1	2	NA	3	2
Block 2	MN 1220	2	2	2	1	2	1	2	NA	3	2
	Sabrevois	2	2	3	3	3	1	3	NA	3	1
	Seyval/101-14	2	2	3	2	3	1	3	NA	3	1
	MN 1258	2	2	3	2	2	1	2	NA	3	1
	Valiant/101-14	NA	1	NA	2	NA	1	NA	NA	NA	1
	Marquette	2	1	3	2	3	1	3	NA	3	2
	MN 1235	1	1	2	1	2	1	3	NA	3	2
	MN 1189	2	2	2	1	3	1	3	NA	3	2

Ratings 1 thru 3 with 1 showing no signs of problems and 3 being the worst

**2014:** Rainfall for the months of April and May totaled under 6 inches, less than 3 inches for each month. June rainfall total was nearly 7.5 inches then July under 1.5 inches. August's total was over 5.25 inches. The rainfall totals for April and May were inadequate for bud break, flowering and fruit set. Then the heavy rainfall in June didn't help with the disease control. The low July rain total slowed the overall growth of the plant. All the cultivars with the exception St. Croix had shoot growth of less than a meter and in 9 of the 12 other cultivars less than a half meter of shoot growth. In plants that were being retrained from the roots growth averaged between 1 to 1.5 meters in length. Not very good for plants that in most years will grow from 3 to 6 meters in a single season.

**Figure 3. Monthly Rain Fall in Inches April thru September, 2014**



**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 grape cane borer (apple twig 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 three years prunings.

**Table 3. Percentage of Plants by Cultivar Infested by Borers Observed at Pruning.**

<b>Borer Infestation</b>			
Site	Block	Cultivar	Borer Infestation Percentage
DL1	1	Chambourcin	100%
DL1	1	MN 1235	100%
DL1	1	St. Croix	69%
DL1	1	Frontenac	67%
DL1	1	Vidal Blanc	72%
DL1	1	MN 1220	44%
DL1	2	MN 1220	100%
DL1	2	Sabrevois	82%
DL1	2	Seyval/101-14	100%
DL1	2	MN 1258	83%
DL1	2	Valiant/101-14	44%
DL1	2	Marquette	88%
DL1	2	MN 1235	100%
DL1	2	MN 1189	100%

**Future Observations of Interest:**

- The earlier bud break cultivars are not only more susceptible to late spring freezes but also are more susceptible to herbicide drift.
- State wine vineyards suffered from the extreme 2013 Fall temperatures unless the location has good air drainage. Many vineyards throughout the state suffered anywhere from a complete die back to the ground or crop losses up to 70 or 80%.
- October 25, 2013, experienced a low of 24 °F. The two days before and after October 25 the temperature was 28 °F or lower.
- November recorded 4 days of single digit temperature lows and December 4 days of negative temperature lows.