

2002 Grape Cultivar Trial Performance

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Introduction

To identify grape cultivars adapted to Iowa, a cultivar by management system trial was established in 2002 at the Iowa State University (ISU) Horticulture Research Station (HRS) and the ISU Armstrong Research Farm (ARF) with a grant from the Leopold Center of Sustainable Agriculture. Fifteen cultivars, including ten wine and five seedless table cultivars, were being evaluated under three management systems that were discontinued in 2008. This report summarizes the cultivar performance for the 2010 growing season.

Materials and Methods

The vines were spaced 8 ft × 10 ft apart (545 vines/acre) with three vines/replication. Treatments were replicated 15 times at HRS and nine times at ARF (previous 5 and 3 replications × 3 management systems, respectively). Vines were trained to a bilateral cordon system on a two-wire trellis with wires at 3.5 ft and 6.0 ft above the ground. Vines with a procumbent growth habit were being trained to the top wire, while those with a semi-upright to upright growth habit were trained to the mid-level wire with vertical shoot positioning (VSP) being practiced.

In mid-March, five proximal (basal) buds on two canes/vine (30 buds/replication) were dissected and evaluated for primary bud injury. Bud retention was based on pruning

weight, and adjusted for primary bud mortality when injury exceeded 15 percent for American cultivars and 20 percent for French-American hybrid cultivars. Date of bud break was recorded at both sites. Following *veraison*, berry samples were collected from the mid-cluster position to test for maturity based on percentage soluble solids (% SS), initial pH, and titratable acids (TA). Time of harvest was based on these measurements and fruit condition. At harvest, the number of clusters/vine were counted and weighed.

Results and Discussion

During the 2009–10 winter, vines were exposed to significant freezes in early October, December, and January with HRS recording the lowest temperatures (Table 1). When cane buds were examined for injury prior to pruning, greater injury was found at HRS, than at ARF (Table 2). At both sites, the injury was generally greatest on cultivars classified as being “slightly hardy” to “moderately hardy,” while those classified as being “very hardy” exhibited the least bud injury. Bud injury following the 2009-10 winter was generally greater than the previous winter when lower temperatures were recorded. The early October freeze was probably the contributing factor because the 2009 growing season was cooler than normal, and many cultivars matured much later than normal.

Based on pruning weights and feet of established cordon, less hardy cultivars generally grew better at ARF than at HRS, however, hardy cultivars had similar pruning weights and feet of established cordon at each site (Table 2). At HRS, considerable cane die-back was noted, and probably contributed to the lower pruning weights.

The 2010 growing season was characterized by warmer than normal growing conditions with the departure from normal for growing degree days and days above 86°F greater at ARF than at HRS (Table 1). As a result, harvest was early at ARF (Table 3). At HRS, the vines were exposed to a May 9 freeze that killed most of the primary shoots. As a result, fruit production was on secondary and tertiary shoots, and much later than at ARF. Yield per vine and average cluster weights were lower than in previous years, particularly on the less hardy cultivars which suffered the greatest bud injury and had a greater percentage of trunks killed to the ground. Generally, yields per vine were higher on cold hardy cultivars than on moderately hardy cultivars. At HRS, Vignole, Traminette, Chambourcin, Vanessa, Reliance, Jupiter, and Marquis failed to produce a crop.

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Table 1. Significant minimum temperatures (°F) recorded during the 2009-10 winter and accumulated growing degree days from May 1 to October 1, 2010.

Date	ARF	HRS
Minimum temperatures (°F):		
Oct 10	25	24
Dec 10	-11	-10
Jan 2	-18	-21
May 9	35	29
Growing degree days (base 50°F, cap. 86°F):		
May 1 to Oct 1 ^z	3,018	2,943
Departure from avg.	163	112
Days above 86°F	25	11

^zFrom the ISU Ag Climate Network.

Table 2. Primary bud injury following exposure to freezes during the 2009-10 winter, pruning weight, feet of established cordon, date of bud break (Julian), and frost injury rating following a May 9 freeze for 15 grape cultivars in the ISU 2002 grape cultivar by management system trial planted at the Armstrong Research Farm (ARF) and Horticulture Research Station (HRS).

Cultivar	Relative hardiness ^z	% Primary bud injury		Pruning wt (lb)		Feet of cordon per Vine		Date of bud break ^y		Frost injury rating
		ARF	HRS	ARF	HRS	ARF	HRS	ARF	HRS	HRS ^x
Chambourcin ^w	3	64	100	4.5	1.2	4.3	0.1	119	.	.
Traminette ^w	4	59	100	4.3	1.2	7.2	0.7	122	119	5.0
Seyval blanc ^w	4	67	99	3.9	3.0	7.5	4.2	114	117	5.0
Vignole ^w	4	52	98	5.5	3.8	8.0	6.0	120	120	5.0
Cynthiana	4	52	93	4.4	3.1	7.9	6.1	120	116	4.5
Maréchal Foch	5	38	52	1.7	1.2	7.9	6.7	108	106	3.6
Edelweiss	5	49	58	3.0	1.8	7.9	7.4	111	108	4.5
La Crosse ^w	5	47	68	6.4	4.5	8.0	7.8	113	109	4.8
St. Croix	6	38	46	3.8	2.7	8.0	7.8	111	108	4.7
Frontenac	6	37	53	3.1	1.5	8.0	7.8	111	107	4.5
Marquis	4	67	99	2.3	1.1	5.7	1.7	120	119	4.9
Vanessa	4	59	99	2.7	1.5	3.6	2.0	120	123	4.5
Jupiter ^v	4	69	100	3.9	1.0	7.7	1.2	114	117	4.6
Reliance	4	58	99	1.7	2.4	6.1	6.0	118	115	4.6
Mars	4	55	75	3.9	4.0	7.8	7.8	112	110	4.6
LSD, P < .05		16	12	0.7	0.6	0.9	1.1	3	2	0.6

^zRelative cold hardiness (temperature range at which injury begins to occur): 3 = cold tender/slightly hardy (-5°F); 4 = moderately hardy (-10°F); 5 = hardy (-15°F); 6 = very hardy (-20°F).

^yJulian date; 121 = May 1, 2010.

^xFrost injury rating: 1 = no injury evident; 2 = slight, most clusters survived; 3 = moderate, most clusters killed, most shoots alive; 4 = severe, all clusters killed, some shoots alive at the base; 5 = very severe, all shoots killed to the base.

^wTrained to a mid-wire cordon with catch wires.

^vPlanted in 2003.

Table 3. Fruit yield and harvest characteristics in 2010 for 15 grape cultivars in the ISU 2002 grape cultivar by management system trial planted at the Armstrong Research Farm and Horticulture Research Station.

Cultivar	ISU Armstrong Research Farm						ISU Horticulture Research Station						
	Harvest date	% SS	pH	TA ^z	Yield (lb)	Cluster wt (lb)	Harvest date	% SS	pH	TA ^z	Yield (lb)	Cluster wt (lb)	
Vanessa	8/13	18.3	3.18	6.0	1.1	.23	.	.	.	.	0.0	.
Reliance	8/13	19.1	3.37	7.4	3.2	.37	.	.	.	.	0.0	.
Jupiter ^y	8/15	19.1	3.78	3.7	7.7	.37	.	.	.	.	0.0	.
Edelweiss	8/18	13.4	3.41	8.9	10.2	.30	9/3	15.0	3.48	6.0	6.8	.22	
Seyval blanc	8/18	17.8	3.46	7.0	10.1	.51	10/8	21.5	3.51	7.6	4.5	.25	
Maréchal Foch	8/23	19.1	3.65	8.3	12.2	.19	9/8	19.3	3.47	7.1	8.2	.10	
St. Croix	8/28	16.1	3.72	6.8	13.1	.17	9/17	18.3	3.64	6.0	3.8	.09	
Marquis	8/29	17.8	3.87	3.0	1.7	.34	.	.	.	.	0.0	.
La Crosse	8/31	15.1	3.48	7.5	23.3	.24	9/17	19.2	3.22	7.4	13.8	.16	
Mars	9/1	16.9	3.77	4.7	4.1	.33	9/3	19.0	3.41	5.3	7.0	.23	
Vignole	9/1	20.8	3.29	11.1	6.5	.20	.	.	.	.	0.0	.
Traminette	9/1	17.4	3.49	7.4	6.2	.28	.	.	.	.	0.0	.
Frontenac	9/7	20.4	3.44	9.9	24.9	.29	9/22	17.8	3.28	10.2	18.3	.16	
Chambourcin	9/20	19.7	3.46	8.2	7.0	.42	.	.	.	.	0.0	.
Cynthiana	10/11	20.4	3.35	14.2	6.4	.13	10/8	19.2	3.09	14.8	0.6	.09	
LSD, P < .05					4.5	.09						1.8	.03

^zTitrateable acids reported in grams/liter.^yPlanted in 2003.