The Connecticut Agricultural Experiment Station, New Haven

Wine Grape Trials 1990-1993

BY RICHARD K. KIYOMOTO

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SUMMARY

Since the passage of the Farm Winery Bill in 1978, Connecticut has seen the acreage devoted to grapes increase from fewer than 20 acres to 325 by 1989. However, Connecticut wineries must still rely on neighboring viticultural districts to meet their demand for wine grapes. A 4-year study was undertaken to follow the yield of 18 grape varieties in an unreplicated experimental planting in Hamden, CT in order to provide information on performance of wine grapes in Connecticut. Data from 1990-1993 show excellent performance by two promising French hybrid cultivars which are not currently grown in Connecticut on a commercial scale. The red wine cultivar Chambourcin and the white wine cultivar Villard Blanc showed yield, sugar, and acid characteristics which compared favorably with the white wine cultivar Seyval which has a proven record of hardiness and productivity in Connecticut.

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Since the passage of the Farm Winery Bill in 1978, the acreage of grapes in Connecticut increased from fewer than 20 acres to 325 by 1989, and the number of farm wineries increased from one to eight during the same period (Baxevanis, 1989). Despite the increase in acreage devoted to wine grapes, the supply of Connecticut-grown grapes is inadequate.

In response to the increased interest in grapes, the Experiment Station began experiments in 1978 to investigate the winter hardiness and disease susceptibility of both table and wine grapes (Walton, 1987). The original plantings were made in 1978 and 1979. Additional cultivars were added during 1982-1987 after others were discarded for poor performance. Pesticides were applied sparingly in order to assess disease susceptibility. Although these early trials included both table and wine grape cultivars, I have focused on the performance of the wine grapes and report vine vigor, sugar content, and acidity of the grapes.

MATERIALS AND METHODS

Table 1 lists the wine grape cultivars in the trial and the date of planting at Lockwood Farm in Hamden, CT. Vines were trained with single trunks to an umbrella Kniffin system with three to four canes approximately 36 inches in length each. Trellis wires were spaced 3 and 6 ft above the ground. Five vines of each cultivar were planted within a row at 6 ft spacing. Each row consisted of 10 vines of two cultivars. There were two plantings of Seyval and Chambourcin. Rows were spaced 9 ft apart with a mixed grass groundcover. A weed-free strip (2 ft wide) was maintained down the planted row around the vines. Fertilizer, 10-10-10, was applied as a split application in May and early July to supply a total of 40 lbs each of N, P_2O_5, and K_2O. To encourage air movement beneath the canopy, I removed leaves from around developing bunches in June and pruned canes in June and July so the canopy never draped to within 3 ft of the soil. Depending on the berry set, soil moisture, and vine vigor, bunches were thinned to two per shoot in 1990, one to two per shoot in 1991 and 1992, and one per shoot in 1993. In early July, 1993 only one bunch was left per shoot to reduce the extreme drought stress on the vines.

Table 1. Wine grapes in trial.

Cultivar	Year Planted	Juice Color
HYBRID AND NON-VINIFERA GRAPES:		
Cayuga White	1983	White
Horizon	1985	White
Seibel 10868	1985	White
Seyval	1980	White
Verdelet	1985	White
Vidal 256	1986	White
Vignoles (Ravat 51)	1983	White
Villard Blanc	1985	White
Chambourcin	1984	Red
Chancellor	1984	Red
Chelois	1986	Red
DeChaunac	1983	Red
S26-627	1986	Pink
Villard Noir	1985	Red
VINIFERA GRAPES:		
Chardonnay	1984	White
Gewurztraminer	1984	White
Riesling	1984	White
Gamay Beaujolais	1986	Red

At the start of these studies in the winter 1989-1990, cultivars showed great differences in the amount of the canes produced, which was taken to be an indicator of vigor. Vigorous vines produced large quantities of canes which required pruning. Visual ratings were made on the amount of cane material collected from each cultivar during winter pruning in 1989-1990 and 1990-1991 (0-3 scale with 0 representing no prunings and 3 representing the largest

amount of pruned wood). Fruit set was evaluated in the springs of 1990 and 1991 (0-5 scale with 0 representing no fruit set and 5 representing the largest amount of fruit set). All fruit were removed from cultivars with poor cane vigor in spring 1990 to allow the vines to recover. Vine renovation was attempted by pruning most of the old wood and training new vines from strong basal shoots.

No insecticides were applied from 1990-1993, and fungicide applications were adjusted to rainfall and drying conditions. Figure 1 plots the cumulative rainfall from Julian Date 126-250 (10 June-7 September) for the 4 years of study. Julian Dates number the days of the year sequentially beginning with January 1 as Julian Day 1. Three fungicide applications were made in 1990 and 1991. Fungicides were applied four times in 1992, a season with many cool, moist days. In 1993, a dry spring and summer, fungicides were applied twice. Fungicides were applied as dilute mixtures of Captan 50WP (0.3 oz/gal) and Nova 40W (0.02 oz/gal) starting when shoot growth was approximately 5-10 in. and usually stopped during the last week in July.

Fermentable sugar, the starting point for ethyl alcohol production, was estimated by two methods. One used a refractometer to measure percent soluble solids (equivalent to degrees Brix) of fresh juice obtained by pressing a representative sample of bunches through cheesecloth, and the second measured bouyant density of the juice with a Brix hydrometer. Brix readings reported are an average of readings obtained by the two methods. Total acidity was determined by measuring the quantity of NaOH required to neuturalize 0.17 oz (5 ml) samples of juice prior to the start of fermentation. A minimum of two titrations for acidity were made on each juice sample.

Harvest date was determined by field measurement of sugar content with a refractometer reading of approximately 17%. In some harvest years grape cultivars may have been harvested earlier than optimum in order to avoid excessive loss to birds and racoons. Although I initially collected yield and quality data on most cultivars, it became apparent that some cultivars yielded so poorly due to low vigor, poor fruit set, or bunch rots that further data were not collected. Yields were taken and calculated on a per vine basis.

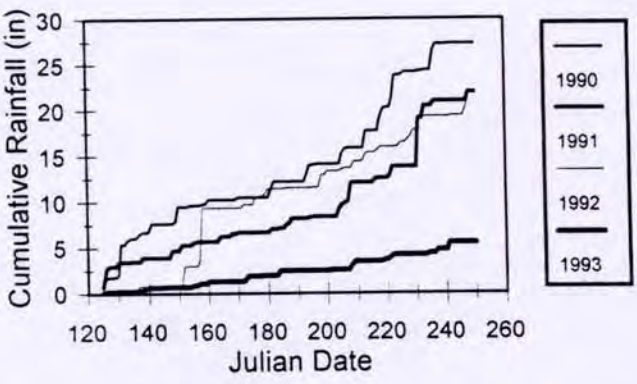

Figure 1. Cumulative rainfall at Lockwood Farm, Hamden, CT, from Julian Date 126 (10 June) to 250 (7 September), 1990-1993.

RESULTS AND DISCUSSION

Table 1 lists cultivar, type, year planted, and juice color. By 1993 only two vines each of Chardonnay and Riesling of the vinifera cultivars remained alive. Table 2 summarizes the evaluation of vine vigor during the first 2 years of this study. Of the 18 cultivars, Seyval, Chambourcin, Villard Blanc, Seibel 10868, and JS26-627 were the most vigorous in 1990 and 1991. Riesling was the only vinifera cultivar that exhibited high vigor in 1991. Complete removal of fruit clusters in 1990 allowed Vignoles, Cayuga White, Chancellor, and DeChaunac to return to high vigor in 1991. Seyval, Chambourcin, and Villard Blanc had high fruit set in 1990 and 1991. Seibel 10868, Horizon, and Chancellor had high fruit set in 1991. Although the four vinifera cultivars survive and grow elsewhere in Connecticut, they apparently need a more protected site than our vineyard in Hamden. Because fungicides were applied sparingly during 1982-1989 in order to evaluate cultivars for disease resistance, it is not clear whether disease pressure, cold weather, or a combination of both caused the low vine vigor observed in 1990 and 1991. It is possible that Cayuga White and Vidal, which are commercially grown in Connecticut, were harmed by problems caused by disease pressures as they showed excellent yield potential in some years but not in others (Table 3).

The highest yields were observed in 1990 (Table 3), which was probably influenced by the abundant, well-timed rainfall (Fig. 1), and the thinning of bunches to two per shoot; whereas, in other years bunches were thinned to less than two per shoot. Lowest yields were observed in 1993 which can be attributed to the very low rainfall (Fig. 1) during the period berries were expanding, the great length of time between rainfall, and the fact that bunches were thinned to one per shoot. Although thinning bunches to a certain number per shoot can bias the comparative yields of cultivars, it is likely that the highest yielding cultivars in the trial suffered the greatest yield loss by this procedure. For some cultivars three or fewer years of data were collected because there was too little or no sound fruit (Table 3).

Yields cannot be compared between years because different degrees of bunch thinning were practiced. Within years cultivars were thinned and vines were trained similarly, so yields can be compared. However, this may obscure the ability of certain cultivars to support a greater fruit load. Cultivars with promising yield and outstanding vine vigor over the period, 1990-1993, were Seyval, Chambourcin,

Table 2. Vine vigor and fruit set of wine grapes in 1990 and 1991.

Cultivar	Juice Color	Vine Vigor 1989-90	Vine Vigor 1990-91	Fruit Set 1990	Fruit Set 1991
HYBRID AND NON-VINIFERA GRAPES:					
Seyval	white	3	3	5	5
Chambourcin	red	3	3	5	5
Villard Blanc	white	3	3	5	5
Seibel 10868	white	3	3	3	5
JS26-627	pink	3	3	1	3
Horizon	white	2	3	4	5
Villard Noir	red	2	3	3	4
Vignoles	white	2	3	R	4
Chelois	red	2	3	3	4
Cayuga White	white	2	3	R	3
Chancellor	red	2	3	R	5
Vidal 256	white	2	1	R	1
DeChaunac	red	1	3	R	4
Verdelet	white	1	1	R	R
VINIFERA GRAPES:					
Riesling	white	1	3	R	2
Gamay Beaujolais	red	0	0	0	0
Chardonnay	white	0	0	0	0
Gewurztraminer	white	0	0	0	0

Vine vigor: 0 = no pruning; 3 = extensive canewood pruned.
Fruit Set: 0 = no berries set; 5 = complete berry set; R = Grape clusters removed.

Table 3. Yield of selected wine grape cultivars at Lockwood Farm, Hamden, CT, 1990-1993.

Cultivar	Yield (lbs/vine) 1990	1991	1992	1993	Mean
Seyval	16.7	9.7	8.4	2.2	9.3a
Chambourcin	16.5	9.6	11.5	3.3	10.2a
Villard Blanc	16.2	7.0	8.6	2.3	8.5a
Horizon	6.6	5.9	10.2	2.9	6.4a
Villard Noir	3.7	5.0		0.7	
Chelois	3.4	4.3			
Seibel 10868	4.0	4.6			
JS 26-627	2.0	0.6			
DeChaunac		5.4			
Vignoles		3.9			
Cayuga White		5.0		2.4	
Vidal			8.3	4.6	

a Values followed by the same letter are not significantly different by Duncans Multiple Range Test (P = 0.05).

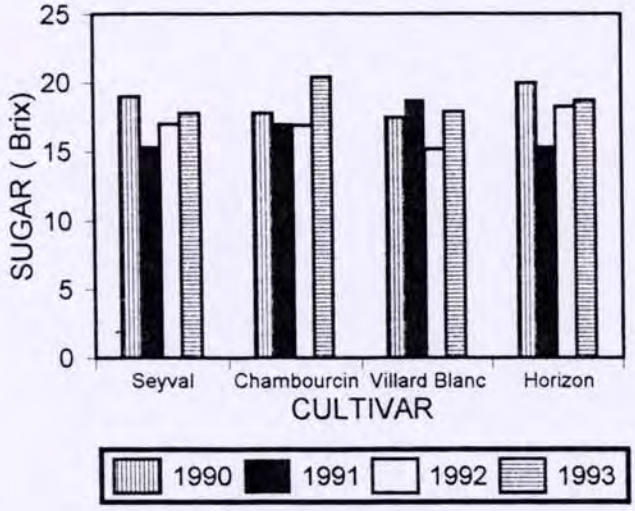

Figure 2. Estimated sugar content for fresh juice of Seyval, Chambourcin, Villard Blanc, and Horizon wine grapes harvested from 1990 to 1993.

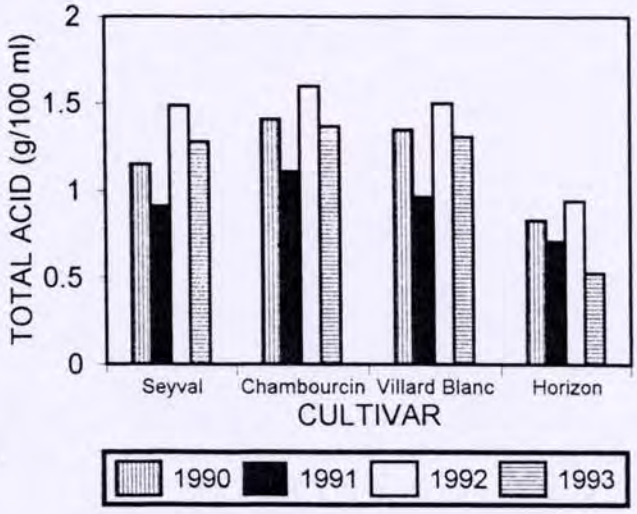

Figure 3. Total acid of fresh juice of Seyval, Chambourcin, Villard Blanc, and Horizon wine grapes harvested from 1990 to 1993.

Villard Blanc, and Horizon (Fig. 2). These four cultivars yielded significantly more fruit than the others in the trial and did not differ significantly from one another in average yield when subjected to two-way analysis of variance (Table 3). Seyval, Vidal, and Cayuga White are examples of white wine grape cultivars which show excellent yield in commercial vineyards in Connecticut; however, there is a need for high quality, high yielding red cultivars. The red wine grape cultivar Chambourcin showed high yield potential in Hamden. Villard Noir may hold promise as a red wine grape cultivar, but its yield potential was significantly lower than that of Seyval, Chambourcin, and Villard Blanc (Table 3). JS26-627 and Seibel 10868 also showed promise as red wine grapes because of their excellent berry set, but the small, tight bunches resulted in low yield or excessive bunch rot. Chancellor also showed excellent berry set, but invariably the fruit rotted before harvest. This may have been avoided with a more intensive fungicide program. However, the four most promising cultivars followed throughout the study produced excellent fruit with low input of disease controls.

Figures 2 and 3 summarize the sugar content and total acid of the juice of Seyval, Chambourcin, Villard Blanc, and Horizon before the start of fermentation. No statistics have been performed on these values because they are influenced by harvest date. In no year were our harvests timed to the optimum quality level of a cultivar. The data show that Seyval, Chambourcin, and Villard Blanc are similar in sugar content, but Chambourcin is consistently higher than Seyval and Villard Blanc in acid even when its sugar content is higher than the others (Figs. 2 and 3). It is possible that Chambourcin was harvested too early. Generally, levels of acid decline and sugar rises as the berries mature. In Hamden Seyval appears to ripen at a time near that of Villard Blanc and Chambourcin (Table 4). In contrast, Horizon appears to mature well before Seyval, Chambourcin, and Villard Blanc. This differs from observations in Geneva, NY. Thus, by the time I harvested Horizon, it may have been overripe and may account for its high sugar and low acid. The 1991 sugar data deviate the most. Excessive summer pruning and periods of drought may have resulted in insufficient canopy to produce photosynthate for the plant and fruit. Although this is speculation, I mention it to emphasize the necessity to strike a balance between opening of the canopy by pruning for cultural control of pests and leaving sufficient amounts of canopy to supply the plant with carbohydrates.

CONCLUSION

The unreplicated wine grape trial at Hamden, CT showed consistent high yield by Seyval, Chambourcin, Villard Blanc, and Horizon over 4 years of study, 1990-1993. The French Hybrid cultivars Chambourcin and Villard Blanc also showed sugar and acid characteristics which compared favorably with the white wine cultivar Seyval which has a proven record of hardiness and productivity in Connecticut. Further studies should focus on determining the optimum cultural conditions and harvest time for Chambourcin and Villard Blanc in Connecticut.

Table 4. Harvest dates in experimental plots in Hamden, CT and expected dates in Geneva, NY (Fruit Testing Association Nursery, Inc., 1994).

Cultivar	1990	1991	1992	1993	Geneva, NY
Seyval	2 Oct	24 Sept	23 Sept	22 Sept	22 Sept
Chambourcin	21 Sept	20 Sept	21 Sept	22 Sept	12 Oct
Villard Blanc	21 Sept	24 Sept	23 Sept	22 Sept	13 Oct
Horizon	7 Sept	16 Sept	23 Sept	20 Sept	29 Sept

REFERENCES

Baxevanis, J.J. 1989. The wines of New England. Vinifera Wine Growers Journal 16:110-115.

Fruit Testing Association Nursery, Inc. 1994. A catalog of new and noteworthy fruits. Fruit Testing Association Nursery, Inc., P.O. Box 462, Geneva, NY 14456.

Walton, G.S. 1987. Testing table and wine grape varieties for hardiness and disease susceptibility. Connecticut Agric. Expt. Sta, New Haven, Frontiers of Plant Science 40(1):6-7.

The Connecticut Agricultural Experiment Station, founded in 1875, is the first experiment station in America. It is chartered by the General Assembly to make scientific inquiries and experiments regarding plants and their pests, insects, soil and water, and to perform analyses for State agencies. The laboratories of the Station are in New Haven and Windsor; its Lockwood Farm is in Hamden. Single copies of bulletins are available free upon request to Publications; Box 1106; New Haven, Connecticut 06504.

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