

# Effects of Training and Pruning Systems on Yield of French-American Hybrid Wine Grapes

By J.R. Morris, C.A. Sims, J.E. Bourque and J.L. Oakes

French-American hybrid cultivars have allowed for wine grape production in areas where *Vitis vinifera* cultivars could not withstand either the climate or disease pressure, and a major portion of the wine produced in Arkansas is made from these cultivars. Research was needed on the French-American hybrids to determine the optimum fruit load and best training system.

This four-year (1977-80) study was conducted in a vineyard of French-American hybrid grapes established in 1974 at the Arkansas Agricultural Experiment Station, Fayetteville. The vineyard contained six cultivars: three red cultivars, 'Chelois' (Seibel 10-878), 'Chancellor' (Seibel 7053), and 'Villard Noir' (Seyve Villard 18-315); and three white cultivars-'Verdelet' (Seibel 9110), 'Seyval' (Seyve Villard 5-276), and 'Aurore' (Seibel 5279). Vines were spaced 2.44 m within the rows and 3.05 m between the rows.

Treatments were cultivar, pruning severity, level of nodes/spur, and training systems. Pruning severities consisted of 10 + 10 and 20 + 10 schedules: 10 or 20 nodes retained for the first 454 g of one year-old dormant prunings and 10 additional nodes retained for each additional 454 g of prunings removed. Vines were pruned to either two or four nodes/spur.

The training systems used were a Geneva Double Curtain (GDC) and a single wire, bilateral cordon system (BC) on a 1.8 meter high trellis.

Over four years, Chelois and Chancellor had the highest mean yields followed by Villard Noir and Seyval (see table). Aurore and Verdelet were the lowest yielding cultivars, with the early maturing Aurore having slightly higher yields than Verdelet. In each of the four years, Aurore was the earliest maturing cultivar and Villard Noir was the latest maturing cultivar (data not shown). Yearly yields *were* similar to the four-year mean with the exception of 1977, when Verdelet had comparable production with Villard Noir and Aurore. After the high yields on Verdelet in 1977 (the first fruiting year), this cultivar suffered severe winter injury during the winter of 1977-78. The winter injury was so severe that there were losses of many cordons and some entire vines. Verdelet is the most cold sensitive of the six cultivars and, because of this injury, had low yields for the remainder of the study. Accurate yield determinations for Aurore in 1979 could not be made due to extensive damage to the fruit by birds.

Yields from both count and noncount positions were measured for three years. During that period, Villard Noir had the greatest percentage of total yield from count positions, but this was due to the extremely high yields on count positions in 1979 (data not shown).

The main effects of training system indicated that, across the four seasons, the GDC training system produced higher yields than the BC system (see table). However, a significant cultivar x training systems interaction showed that Aurore did not benefit from the GDC training system (data not shown). In the high yielding year of 1977, Verdelet produced higher yields on the GDC system, but not during the remainder of the study when yields were low (data not shown). The GDC training system was a superior training system under conditions of high fruit loads.

There were no differences in yield between the 10 + 10 and 20 + 10 pruning severities nor between the two-node spur length and four-node spur length (see table). However, for the four-year mean, the 20 + 10 pruning severity resulted in greater yield from the count positions (54.4% of total yield) as compared with the 10+ 10 pruning severity (47.5% of total yield).

In summary, all six of the cultivars produced commercially acceptable yields with an average yield above 12 MT/ha. However, Verdelet had low yields for the last two years of the study due to winter injury.

All cultivars except Aurore were more productive on the GDC system than on the BC system. The GDC system probably resulted in superior bud development and light distribution in the canopy.

There were no differences in yield between the 10 + 10 and 20 + 10 pruning severities and only a small difference in percent of total yield from count positions between the two pruning severities. The basal buds that are in noncount positions were highly productive and, thus, prevent the use of the traditional balance pruning method currently used on *Vitis labrusca* cultivars. The two-node and four-node spur length also produced no difference in yield, indicating equal bud development along the spur.

Dr. Morris is a professor, Mr. Sims is a research assistant, and Ms. Bourque and Mr. Oakes were graduate assistants in the Department of Food Science.

**Mean Yield (MT/ha) by Cultivar, Training System, Pruning Severity  
and Spur Length; 1977-1980.**

Treatment	Year				1977-80
	1977	1978	1979	1980	
<b>Cultivar</b>					
<b>Red</b>					
Chelois	27.5 a <sup>1</sup>	28.9 a	19.4 b	26.9 a	25.6 a
Chancellor	24.7 ab	24.1 b	25.2 a	22.4 b	24.1 a
Villard Noir	22.2 bc	21.4 b	25.7 a	17.0 c	21.6 b
<b>White</b>					
Seyval	23.3 b	22.6 b	18.4 b	15.8 c	20.1 b
Aurore	16.9 d	14.3 c	-- <sup>2</sup>	13.9 cd	15.0 c
Verdelet	18.8 cd	14.3 c	7.3 c	10.7 d	12.7 d
<b>Training System</b>					
Bilateral Cordon	20.3 b	18.9 b	18.1 a	16.6 b	18.5 b
Geneva Double Curtain	24.2 a	23.0 a	20.3 a	19.0 a	21.7 a
<b>Pruning Severity</b>					
10+10	22.5 a	20.6 a	20.0 a	17.5 a	20.1 a
20+10	22.0 a	21.3 a	18.4 a	18.1 a	20.0 a
<b>Spur Length</b>					
2 nodes	22.9 a	21.0 a	18.9 a	17.8 a	20.2 a
4 nodes	21.6 a	20.9 a	19.5 a	17.8 a	20.0 a

<sup>1</sup> Means within treatments and years separated by Duncan's multiple range test, 5% level.

<sup>2</sup> Bird damage prevented accurate yield determination.