# Cordon Length Can Influence Fruit Composition

*By R. Keith Striegler, Greg T. Berg, Ondine M. Chattan, and David R. Wineman*
*Viticulture and Enology Research Center, California State University, Fresno*

Considerable new planting and replanting of wine grapes is occurring in the San Joaquin Valley. An important consideration during the vineyard planning and development process is trellis system selection. Use of improved trellis systems has been shown to increase yield, improve fruit composition, reduce losses from fungal pathogens, and improve wine quality. The improved trellis systems being employed often have extended cordons. Cordon length in some systems can reach up to 16 feet depending on vine spacing and whether vines are trained to a unilateral or bilateral cordon. Grower observation and anecdotal evidence suggest that fruit borne at spur positions distant from the vine trunk does not mature to the same degree as fruit borne at spur positions closer to the vine trunk. Furthermore, use of extended cordons may increase the difficulty of mechanically harvesting vines with a trunk shaker picking head.

A study was conducted with the objective to evaluate the influence of cluster position from vines with extended cordons on fruit composition. At the same time, some practical aspects of unilateral vs. bilateral training for certain systems could be assessed.

The study was conducted in two vineyard locations on the California State University, Fresno Campus Farm Laboratory during the 1994 and 1995 seasons. French Colombard and Sauvignon Blanc vines were used in the study. French Colombard vines were grafted on Harmony rootstock and Sauvignon Blanc vines were own-rooted. Vineyard spacing was 7' x 12' (vine x row) and row orientation was east-west. French Colombard vines were trained to a double parallel unilateral cordon system and Sauvignon Blanc vines were trained to a unilateral cordon system. Both varieties were spur pruned.

Vines were identified which had cordons extending approximately 12-13 feet in length. Prior to commercial harvest, berry samples were collected from each 1-foot increment along the cordon for both varieties (0-1 is nearest the trunk and 12-13 is farthest from the trunk). In addition, French Colombard vines were also sampled according to canopy position (north vs. south cordon of double parallel unilateral cordon system) and vine capacity (small vs. large with small vines having <7 lbs. of dormant pruning weight and large vines having >7 lbs of dormant pruning weight).

Berry weight, % soluble solids, pH, and titratable acidity of samples were determined in the laboratory using standard procedures. Yield data were collected at harvest and pruning weight data were collected in December of each season. A completely randomized experimental design was used. Berry sample data were subjected to analysis of variance and means were separated using Duncan's Multiple Range Test. French Colombard data were analyzed as a factorial. Yield and pruning weight data were not analyzed statistically.

Canopy position, cordon position, and

*(continued on page 14)*

**Table 1. Effect of canopy position, cordon position and vine size on fruit composition of French Colombard grapevines. 1994.**

| Treatment | Berry Wt. (g) | Soluble Solids (%) | pH | Titratable Acidity (g/100ml) |
|---|---|---|---|---|
| **Canopy Position** | | | | |
| North | 1.6a[z] | 17.8 | 3.27 | 0.95a |
| South | 1.5b | 17.6 | 3.25 | 0.91b |
| **Cordon Position** | | | | |
| 0-1 | 1.7a | 18.2a | 3.29 | 0.95 |
| 1-2 | 1.7a | 18.2a | 3.30 | 0.93 |
| 2-3 | 1.7a | 18.1a | 3.28 | 0.94 |
| 3-4 | 1.7a | 18.2a | 3.28 | 0.93 |
| 4-5 | 1.6ab | 17.9ab | 3.26 | 0.93 |
| 5-6 | 1.6abc | 17.8abc | 3.25 | 0.95 |
| 6-7 | 1.6abc | 17.8abc | 3.27 | 0.90 |
| 7-8 | 1.5bcd | 17.8abc | 3.25 | 0.94 |
| 8-9 | 1.5bcd | 17.6abc | 3.25 | 0.94 |
| 9-10 | 1.4cd | 17.5abc | 3.24 | 0.94 |
| 10-11 | 1.4cd | 17.1bc | 3.25 | 0.94 |
| 11-12 | 1.5bcd | 17.4abc | 3.28 | 0.92 |
| 12-13 | 1.3d | 16.7c | 3.18 | 0.92 |
| | | | n.s. | n.s. |
| Vine Size | | | | |
| [illegible] | 1.5b | 17.9 | 3.24 | 0.91b |
| [illegible] | 1.6a | 17.6 | 3.28 | 0.95a |

[illegible] significantly at the 0.05 level;

## CORDON LENGTH

*(continued from page 6)*

vine size (as indicated by dormant pruning weight) had a significant impact on fruit composition of French Colombard during both seasons of the study (Tables 1 and 2). Canopy position and cordon position appeared to have a more consistent effect on fruit composition than vine size. Fruit from the north cordon had larger berries and higher titratable acidity than fruit from the south cordon. Berry weight and % soluble solids decreased as distance from the trunk increased. Cordon position did not have a significant effect on pH or titratable acidity. Vine size effects were statistically significant and consistent between seasons only for titratable acidity. Small vines had fruit with lower titratable acidity than fruit from larger vines.

Results for Sauvignon Blanc differed somewhat from those obtained for French Colombard (Tables 3 and 4). In 1994, pH was the only parameter significantly affected by cordon position (Table 3). A slight increase in pH was recorded as distance from the trunk increased. Percent soluble solids and pH were influenced by cordon position in 1995 (Table 4). As distance from the trunk increased, % soluble solids decreased and pH increased. There were no significant effects of cordon position on berry weight or titratable acidity.

Yield and pruning weight data are presented in Table 5. High yields were obtained for French Colombard in the 1994 and 1995 seasons and for Sauvignon Blanc in the 1995 season. It is interesting that in seasons during which vines produced high yield, reductions in % soluble solids were measured as distance from the trunk increased. Conversely, in the one instance when low yield was recorded (Sauvignon Blanc in 1994) this relationship was not observed. These data suggest that source: sink relationships in shoots at spur positions distant from the trunk may

**Table 2. Effect of canopy position, cordon position and vine size on fruit composition of French Colombard grapevines. 1995.**

| Treatment | Berry Wt. (g) | Soluble Solids (%) | pH | Titratable Acidity (g/100ml) |
|---|---|---|---|---|
| Canopy Position | | | | |
| North | 1.2a[z] | 15.9 | 3.35 | 0.88a |
| South | 1.1b | 16.2 | 3.40 | 0.82b |
| Cordon Position | | | | |
| 0-1 | 1.4a | 17.7a | 3.32 | 0.81 |
| 1-2 | 1.2bc | 17.1ab | 3.36 | 0.83 |
| 2-3 | 1.3ab | 17.0b | 3.35 | 0.83 |
| 3-4 | 1.2bc | 16.8bc | 3.43 | 0.84 |
| 4-5 | 1.3ab | 16.2cd | 3.34 | 0.86 |
| 5-6 | 1.2bc | 15.9de | 3.36 | 0.89 |
| 6-7 | 1.2bc | 15.9de | 3.36 | 0.86 |
| 7-8 | 1.2bc | 15.3ef | 3.38 | 0.86 |
| 8-9 | 1.2bc | 15.4ef | 3.36 | 0.85 |
| 9-10 | 1.0cd | 15.1f | 3.39 | 0.88 |
| 10-11 | 1.1bc | 15.5def | 3.39 | 0.82 |
| 11-12 | 1.0cd | 15.3ef | 3.42 | 0.88 |
| 12-13 | 0.9d | 15.3ef | 3.44 | 0.88 |
| | | | n.s. | n.s. |
| Vine Size | | | | |
| Small | 1.2b | 16.2a | 3.38 | 0.80b |
| Large | 1.1a | 15.8b | 3.37 | 0.90a |
| | | | n.s. | |

[z] Means followed by the same letter do not differ significantly at the 0.05 level; n.s.=not significant.

**Table 3. Effect of cordon position on fruit composition of Sauvignon Blanc grapevines. 1994.**

| Cordon Position | Berry Wt. (g) | Soluble Solids (%) | pH | Titratable Acidity (g/100ml) |
|---|---|---|---|---|
| 0-1 | 1.5 | 23.6 | 3.35c | 0.60 |
| 1-2 | 1.5 | 22.9 | 3.37bc | 0.59 |
| 2-3 | 1.5 | 23.2 | 3.38bc | 0.60 |
| 3-4 | 1.5 | 22.9 | 3.37bc | 0.60 |
| 4-5 | 1.4 | 23.5 | 3.36c | 0.59 |
| 5-6 | 1.5 | 22.9 | 3.38bc | 0.60 |
| 6-7 | 1.5 | 23.1 | 3.39bc | 0.59 |
| 7-8 | 1.5 | 23.3 | 3.40bc | 0.60 |
| 8-9 | 1.5 | 23.2 | 3.39bc | 0.58 |
| 9-10 | 1.4 | 22.5 | 3.39bc | 0.61 |
| 10-11 | 1.4 | 22.6 | 3.44ab | 0.56 |
| 11-12 | 1.4 | 22.5 | 3.38bc | 0.61 |
| 12-13 | 1.4 | 23.2 | 3.47a | 0.59 |
| | n.s.[z] | n.s. | | n.s. |

[z] Means followed by the same letter do not differ significantly at the 0.05 level; n.s.=not significant.

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**Table 4. Effect of cordon position on fruit composition of Sauvignon Blanc grapevines. 1995.**

| Cordon Position | Berry Wt. (g) | Soluble Solids (%) | pH | Titratable Acidity (g/100ml) |
|---|---|---|---|---|
| 0-1 | 1.4 | 22.5a | 3.58bcd | 0.47 |
| 1-2 | 1.3 | 22.1ab | 3.59bcd | 0.50 |
| 2-3 | 1.4 | 21.3bc | 3.59bcd | 0.48 |
| 3-4 | 1.4 | 21.5abc | 3.53d | 0.50 |
| 4-5 | 1.4 | 21.3bc | 3.59bcd | 0.47 |
| 5-6 | 1.4 | 21.2bc | 3.54d | 0.48 |
| 6-7 | 1.4 | 21.0bc | 3.57cd | 0.47 |
| 7-8 | 1.4 | 21.6abc | 3.58bcd | 0.51 |
| 8-9 | 1.3 | 20.8c | 3.59bcd | 0.50 |
| 9-10 | 1.4 | 21.0bc | 3.67abc | 0.47 |
| 10-11 | 1.3 | 20.9c | 3.62abcd | 0.48 |
| 11-12 | 1.4 | 20.8c | 3.69ab | 0.46 |
| 12-13 | 1.3 | 20.8c | 3.71a | 0.47 |
| | n.s.[z] | | | n.s. |

[z] Means followed by the same letter do not differ significantly at the 0.05 level; n.s.=not significant.

**Table 5. Yield & pruning weight data. Cordon length experiment. 1994-95.**

| Variety | Year | Yield (lbs/vine) | Pruning Wt. (lbs./vine) |
|---|---|---|---|
| French Colombard | 1994 | 87.2 | 7.2 |
| | 1995 | 101.6 | 10.2 |
| Sauvignon Blanc | 1994 | 24.1 | 5.9 |
| | 1995 | 68.3 | 6.7 |

be altered during high yield seasons. The precise physiological mechanism involved in this response is not evident.

The study concluded that cordon length can be an important consideration when selecting a trellis system, especially in the San Joaquin Valley where high yields are normally required for grower profitability. Extension of cordons beyond four feet from the trunk appears to have significant negative impact on fruit composition. In addition, we observed incomplete removal of fruit from the "end" spur of vines with extended cordons following machine harvest (trunk shaker). Improved uniformity of fruit maturation should result if vines are trained to minimize cordon length, e.g., quadrilateral or bilateral rather than double parallel unilateral training for horizontally divided systems. This may have important implications for wine quality in the San Joaquin Valley.


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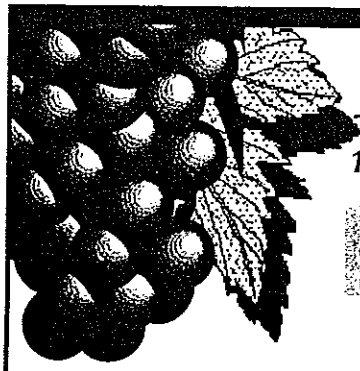

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