

Response of Concord Grapes to Training System

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Most 'Concord' vineyards in Arkansas have been trained to the Umbrella Kniffin (UK) system and pruned to a 30+10 schedule. In the Geneva Double Curtain (GDC) training system (a 1.2 m divided double curtain "T" type trellis) shoots are positioned vertically toward the vineyard floor. Under northern conditions, this system allows better distribution of fruiting spurs, reduced shading of interior shoots, and produces higher yields on vigorous vines than UK or Single Curtain (SC) training. Because of this, and the prospects of pruning mechanization (see Arkansas Farm Research Vol. 24, No. 3), which requires cordon-trained vines, Arkansas vineyards may need to be shifted to GDC or SC systems.

The objective of this study was to evaluate the response of 'Concord' yield and juice quality to GDC, SC, and UK training systems under two pruning severities. The study was conducted from 1974 through 1978 in an own-rooted vineyard established in 1957 at the Main Station, Fayetteville, on a Lintonia silt loam.

All vines were balanced pruned to either a 30+10 or 70+10 schedule (30 or 70 nodes retained for the first 454 g (1 lb) of 1-year-old dormant prunings and 10 additional nodes retained for each additional 454g of prunings removed). Fruiting nodes on GDC and SC trained vines were retained on 6-node canes, and canes on UK-trained vines were 12 to 15 nodes long. Vines on GDC and SC systems were shoot positioned (current season's growth positioned vertically toward the vineyard floor), while shoots on UK-trained vines were allowed to grow at random.

When yields were averaged across the 5 years of the study, GDC was the most productive training system while the SC and UK systems did not differ significantly (see table). GDC-trained vines were more consistent in high yields than the SC- or UK-trained vines during all 5 years (data not shown), and in 1978 GDC vines yielded significantly more than UK-trained vines.

Light pruning (70+10) produced higher yields than 30+10 pruning for the first 4 years (data now shown). However, by the 5th year, vines pruned to the 70+10 schedule showed definite overcropping stress, resulting in reduced yields (see table). This overcropping of the 70+10 vines occurred regardless of training system.

UK-trained vines maintained a large size throughout the study. Lower pruning weights on GDC and SC vines are indicative of the effects of shoot positioning and are not directly related to yield. When means are pooled across training systems, effects of pruning severity on vine size were found related to yield and stress. The low vine growth for 1978 can be attributed to poor cane maturation due to heavy cropland and to the fact that only 12.4 cm of rain fell in the 85 days before harvest.

Even with higher yields on GDC-trained vines, no sacrifice of percent soluble solids occurred for the 5-year average or for 1978. The effect of training systems on acidity, though significant, was not large enough to be of commercial importance. The overriding factor controlling juice acidity in southern production areas is the excessive day and night temperatures during fruit maturation.

Color of fruit from GDC- and SC-trained vines was superior to fruit color from UK-trained vines for the 5-year average and 1978. This probably resulted from shoot positioning of GDC and SC vines, which reduces foliage shading of interior canopy fruit and foliage. Uneven ripening was not affected by training systems, as indicated by percent green fruit. In 1977, the year with highest yields, vines trained to the GDC system did not have the uneven-ripening problem present on the other training systems (data not shown).

Fruit quality was poor in lightly pruned vines as indicated by lower soluble solids, poorer color, and a higher percentage of green fruit. The uneven ripening problem on lightly pruned vines could be critical since green fruit is considered a serious damage defect in USDA Grades and Standards.

No significant interactions occurred in any year between training systems and pruning severities, indicating that vines on all training systems responded similarly to the two pruning schedules in all factors studied.

In summary, grapevines trained to the shoot-positioned GDC system yielded consistently more than vines with SC; or UK training. Even though yields were higher on GDC, fruit quality was not sacrificed. The 70+10 pruning schedule showed trends of overcropping stress, resulting in quality reduction and eventually yield loss.

Vineyard training can be changed from the conventional UK system to a shoot-positioned SC system with minimal effort, without a reduction in productivity or fruit quality, and would allow implementation of mechanized pruning. However, on the basis of productivity and adaptability to mechanical pruning, GDC proved superior to SC or the conventional UK system in this Arkansas study.

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Effects of Training System and Pruning Severity on 'Concord'

Main effect'	Yield (MT/ha)	Vine Size (kg/vine)	% Sol. solids	% tartaric acid	Color Abs. 520nm	% Green fruit
5-year mean						
Training system						
GDC	15.4 a	0.95b	15.4 a	0.87 b	.228a	3.4 a
SC	11.9 b	0.89b	15.6 a	0.89 a	.238a	4.7 a
UK	12.7 b	1.35a	15.2 a	0.86 b	.197b	5.6 a
Pruning severity						
30+10	12.2 b	1.13a	15.7 a	0.87	.242a	1.8a
70+10	14.5 a	1.00b	15.0 b	0.88 a	.200b	7.3 b
1978 results						
Training system						
GDC						
SC	17.1 a	0.65b	15.5 a	0.84 a	.213a	3.5 a
UK	14.9 ab	0.63b	16.0 a	0.85 a	.208a	3.1 a
Pruning severity						
30+10	13.5 b	0.85a	15.7 a	0.80 b	.171b	3.3 a
70+10	16.1 a	0.79a	16.1 a	0.82 a	.213a	1.7 a
	14.2 b	0.63b	15.4 a	0.84 a	.182a	4.9 b

'Means within main effect blocks are pooled over the other variables in table. Means separation within columns and main effects for 5-yr mean and 1978 by Duncan's Multiple Range Test (5 percent).