

Effect of Mechanical Pruning on Yield and Quality of 'Concord' Grapes

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AFTER MECHANICAL harvesting of 'Concord' grapes was totally implemented, the most time-consuming vineyard operation in Arkansas became pruning. Grape producers complain of decreasing availability of qualified labor for pruning and tying, and feel that pruning should be the next operation mechanized.

Single and double curtain vines were established in a 14-year-old vineyard at the Main Station, Fayetteville, and in 1971 research was begun to evaluate the effects of mechanical pruning on yield and quality of 'Concord' grapes. The cutter bar on the mechanical pruner was adjusted to prune to 4- or 5node spurs.

The experiment was designed as a randomized block consisting of 2 training methods (single and double curtain) and 4 levels of nodes per vine (hand at 30+10, 60, 90, and no touchup). On the no-touch-up treatment, any canes that were running along the wires were cut halfway between the vines when the cordons were retied. All treatments were replicated 6 times.

Time required to prune each treatment was recorded. Fruit was harvested, yield was recorded, and representative samples were collected and frozen until quality could be analyzed.

The rows where the 1971 test was conducted were removed from the vineyard and a 5-year study on mechanical pruning was reestablished in another section of the vineyard in 1974. There was no shoot positioning in 1971; shoots were positioned in 1974.

The figure shows the time required in 1971 to prune vines to 90 and 60 buds on single and double curtain trellis systems after machine pruning, as compared to total hand pruning. Without shoot positioning, there was no saving in labor on the mechanically pruned double curtain system. However, labor was reduced considerably on the mechanically pruned, single curtain vines, with a reduction of about half of the labor needed for the 90 node-per-vine treatment.

In the 1971 test, with no shoot positioning, there was no significant difference in yield between the two training systems (see table). Soluble solids were significantly higher under the single curtain training. There was no difference in titratable acidity, but color was superior on grapes produced on the nonpositioned, single curtain system.

In 1971 the no-touch-up treatment (which averaged 120 nodes per vine) produced significantly more grapes than the hand-pruned (30+10) treatment, with no statistically significant reductions in quality.

In 1974, with shoot positioning, the double curtain system produced a significantly higher yield, with no statistically significant effect on solids and acidity. However, juice color as determined by %T at 520 nm was slightly poorer.

The 90 node-per-vine treatment and the no-touch-up treatment (which averaged 100 nodes per vine in 1974) resulted in significantly higher yields than the 60-node-per vine treatment or the hand-pruned treatment, with little effect on quality attributes.

Preliminary results with mechanical pruning indicate that this practice will reduce pruning labor if the proper training system is used. It is possible to totally mechanize pruning for 1 year without dramatic effects on quality; however, the trends in the data indicate that if an excessive number of nodes are left per vine, quality problems could occur. It will be necessary to study the accumulative effects of these treatments over a period of years before recommendations can be made.

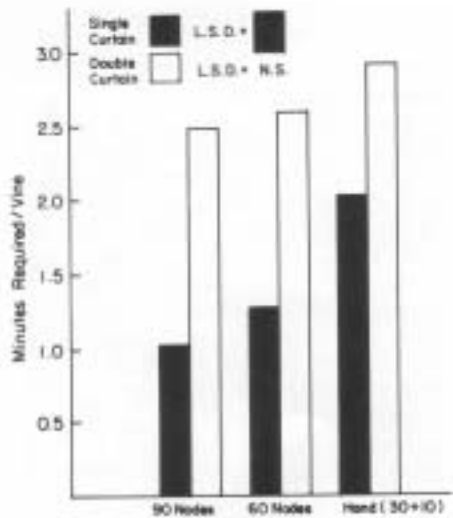
Viticultural concerns with mechanical pruning, even if followed by hand pruning, at present are:

1. The impossibility of treating each vine individually (balance pruned) which could result in the overcropping or undercropping of individual vines; therefore a vineyard of uniform vigor would be a major consideration for mechanical pruning;
2. The inability to select only superior canes; it is entirely possible that these canes would be removed by mechanical pruning.

Main Effects of Training System and Pruning Level on Yield and Quality of Mechanically Pruned 'Concord' Grapes, 1971 and 1974¹

Treatment	Yield (tons/A)	% soluble solids	Tit. acidity	% T at 520 nm
1971 results				
Training system				
Double curtain	6.3 a	14.5 b	7.1 a	55.8 a
Single curtain	6.4 a	15.1 a	7.1 a	50.1 b
Pruning level				
Hand (30 + 10)	5.8 b	15.0 a	7.1 a	52.2 a
60 nodes	6.3 ab	15.0 a	7.1 a	52.1 a
90 nodes	6.0 ab	14.7 a	7.2 a	52.7 a
No touch up	7.3 a	14.5 a	7.1 a	54.8 a
1974 results				
Training system				
Double curtain	5.0 a	12.5 a	7.0 a	79.1 a
Single curtain	3.9 b	13.0 a	7.3 a	74.2 b
Pruning level				
Hand (30 + 10)	2.8 b	13.3 a	7.4 a	73.8 b
60 nodes	3.8 b	12.8 a	7.1 a	75.8 ab
90 nodes	5.3 a	12.7 a	7.3 a	78.9 a
No touch up	5.9 a	12.4 a	7.2 a	78.1 ab

¹ Means within training system and pruning level for each year that are not followed by the same letter are significantly different by Duncan's multiple range test at the 5% level.



Time required to prune to 90 and 60 nodes on single and double-curtain systems after machine pruning, 1971