

Yield and Quality of 'Concord' Grapes as Affected by Irrigation, Pruning Severity, and Nitrogen

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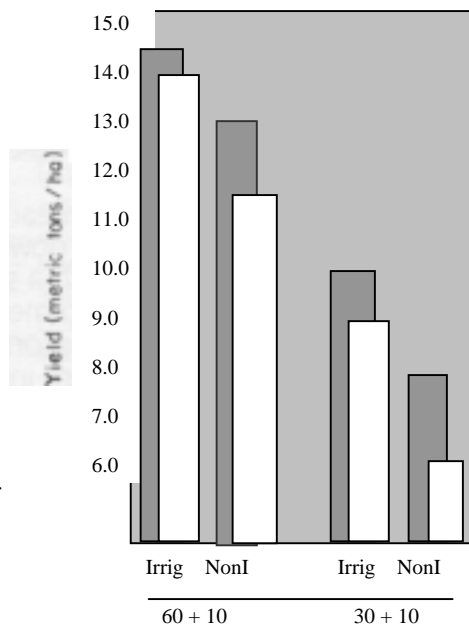
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In Arkansas the main training and pruning system used for 'Concord' grapes is the Umbrella Kniffin system, with the vines balance-pruned on a 30 + 10 schedule (30 nodes retained for the first 4548 of dormant prunings and 10 more nodes left for each additional 454g).

New training and pruning practices such as the Geneva Double Curtain system have been shown to increase yield (see Arkansas Farm Research, Vol. 26, No. 6). Although high yields are desirable, heavy fruit loads may have a detrimental effect on vine growth and fruit quality (see accompanying article in Vol. 26, No. 6, of Arkansas Farm Research).

Cultural practices such as irrigation and fertilization with nitrogen may contribute to maintenance of large vines even while they are producing yields of high quality fruit. This study was conducted to determine the interaction effects of two irrigation levels, two pruning severities, and two nitrogen levels on yield and quality of 'Concord' grapes trained to the Geneva Double Curtain system.

Effect of Irrigation, Pruning Severity, and Nitrogen on Grape Yields



The study was conducted for two years (1975 and 1976) in a 'Concord' vineyard established in 1966. Vines averaged 1.1 kg in size. They were either not irrigated or irrigated as needed to maintain field capacity at a depth of 60 cm. Vines received 2.97 x 10³ and 3.45 x 10³ cu m of supplemental water/ ha in 1975 and 1976, respectively.

Pruning schedules used in the study were the conventional 30 + 10 level and a 60 + 10 level, and 6 node canes were retained. Two nitrogen levels were established using either 0 kg/ha for the two year period or 152 kg/ha (1975) and 228 kg/ha (1976) of actual nitrogen (NH₄NO₃). A factorial design with 4-vine plots replicated 6 times was used. All treatments were imposed on the same vines each year.

Samples of fruit were obtained at 2-week intervals and frozen for later analysis, at which time they were thawed and blended. Percent soluble solids was determined on the raw juice. Samples were cooked and strained. Five ml of juice diluted to 100 ml with distilled water was used to determine absorbance at 520 nm. Titratable acidity, expressed as percent tartaric acid, was determined by titration.

For the two-year average, irrigation increased yield and maintained vine size (indicated by pruning weight in table). The high fruit load that resulted

Main Effects of Irrigation, Pruning Severity, Nitrogen, and Year on Yield, Pruning Weight, and Juice Quality at Harvest of 'Concord' Grapes'

Main effect ²	Yield (MT/ha)	Pruning wt (kg/vine)	Soluble solids %	Tartaric acid,	Absorbance at 520 nm
Irrigation					
Irrigated	11.9a	1.2a	18.1b	0.68a	0.32b
Not irrigated	9.6b	0.8b	18.9a	0.67a	0.37a
Pruning severity					
30+10	8.2 b	1.1a	18.8a	0.68a	0.37a
60+10	13.2a	1.0a	18.1b	0.66a	0.32b
Nitrogen					
Low	10.2a	1.0a	18.4a	0.69a	0.35a
High	11.3a	1.1a	18.6a	0.66b	0.34a

Mean separation between treatments within a row by Duncan's Multiple Range Test, 5% level. ²Means within main effect blocks are pooled over 6 replications and all other variables in the table.

from irrigation reduced the percent soluble solids and color (indicated by a lower absorbance value) of the juice. Juice acidity was not affected by irrigation.

By decreasing pruning severity, yield was increased by 5 metric tons per ha with no reduction in vine size. Juice quality was reduced at the 60 + 10 schedule as indicated by lower percent soluble solids and poorer color, but tartaric acid did not differ. Nitrogen had no effect on yield, pruning weight, soluble solids, and absorbance, but acidity was reduced at the high nitrogen level.

The two-year average yield of each of the treatments is shown in the figure. The highest yielding treatment (60 + 10 irrigated, high nitrogen) and the lowest yielding treatment (30 + 10 not irrigated, low nitrogen) differed in yield by about 8 metric tons/ha. All treatments produced juice of acceptable quality (15 percent soluble solids or more) by harvest (data not shown).

Most of the 'Concord' grapes in Arkansas are pruned to 30 + 10. Irrigation is not commonly practiced. The yield increases in this study resulting from irrigation and less severe pruning indicate that the yield potential of 'Concord' vineyards in Arkansas may not have been fully exploited. However, these factors (irrigation and less severe pruning) tended to affect juice quality adversely. These results reflect only two years of research, and the failure of vine size to stabilize may indicate the need for caution in making recommendations at this time.

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