Pruning time affects development of Chenin blanc vines

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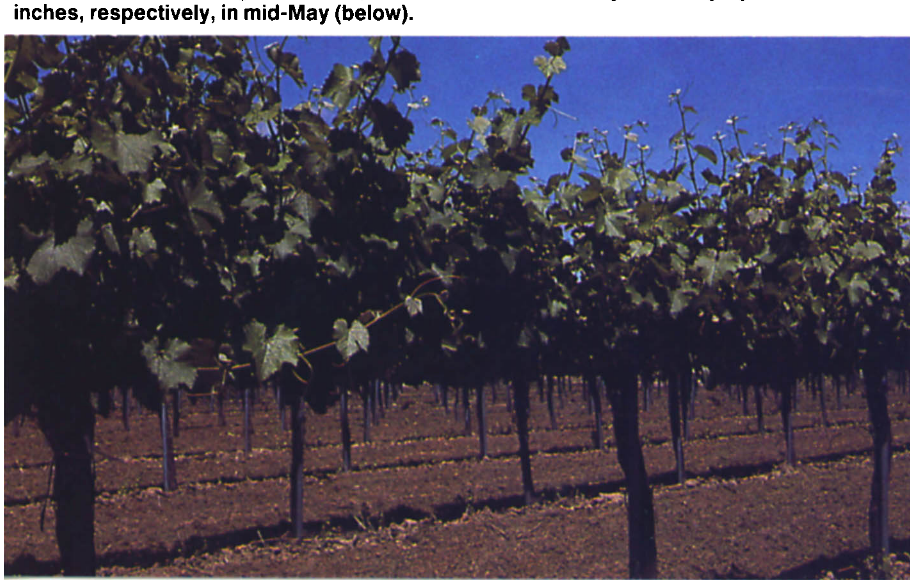
A delay in maturity may be a small price to pay for avoiding serious vine dieback disease

Pruning grapevines at the time of bud swell in the late spring has been recommended for many years as a means of delaying the onset of growth for about a week to avoid spring frost damage. A number of researchers have reported consistent observations of this effect. Growers employ the technique, especially in north coast vineyards, by double pruning — trimming vines to long spurs during the normal midwinter pruning and then shortening the spurs to two or three nodes when the distal buds begin to swell and develop shoots. This second pruning is done quickly, because the vines have been cleaned of excess growth, and spur numbers and locations determined.

To our knowledge, there are no reports in the literature comparing early with late pruning that indicate whether the initial difference in vine growth persists, and whether later shoot development influences the progression of bloom and fruit ripening.

On April 20, shoots of Chenin blanc grapevines pruned in December (left) averaged 16 inches compared to 11 inches on vines pruned in March (right). The early-pruned vines maintained an advantage over late-pruned vines in shoot length, averaging 36 and 33 inches, respectively, in mid-May (below).



Our interest in the effects of pruning time on vine development stems from repeated field observations and some research data indicating that late pruning, such as in March, reduces the incidence of Eutypa dieback. Those studies at Davis compared early and late pruning dates, after which the freshly cut surfaces were inoculated with suspensions of known numbers of *Eutypa armeniacae* spores. This technique eliminated the variability of natural inoculation by unknown numbers of air-borne spores that are released from perithecia following rains and dispersed by winds. Thus, the large differences in vine susceptibility to Eutypa dieback observed in the Davis trial were attributed to an unknown vine response and considered an effect of the time of pruning.

Vineyard study

To develop more information on the effectiveness of late pruning as a means of minimizing Eutypa infection, we began a relatively large trial in 1980 in a commercial Chenin blanc vineyard near Clarksburg, California. The vineyard was selected because Eutypa dieback is severe in the Sacramento delta area, the Chenin blanc variety is highly susceptible, and the vineyard, planted in 1978, was still free of Eutypa infection.

The four-year trial, encompassing nearly an acre overall, compared early and late pruning (main plots), with and without fungicide wound protectant (subplots) in a split-plot design with eight replicate blocks. Each plot consisted of 13 adjacent vines. The early-pruned treatments were made each year in mid-December 1980-83, and the late-pruning treatments in the second week of March 1981-84.

The following report does not deal with the main purpose of the trial, which is to test the effectiveness of the treatments in preventing Eutypa dieback, and which will require several additional years of observation. Here we cover only the responses of Chenin blanc vines to time of pruning.

Each year, the pruning date affected the rate of shoot development. For example, on May 10, 1982, shoots on early-pruned vines were mostly 18 to 20 inches long, whereas those on late-pruned vines were mostly 14 to 16 inches. Similarly, on April 13, 1983, shoots on December-pruned vines were 6 to 9 inches long, and those on March-pruned vines were 1 to 3 inches. In both years, the differences in shoot development were striking and quite uniform across all plots.

To find out whether these differences in development persisted, we observed vine and fruit development throughout most of the 1984 growing season. Early-pruned vines were trimmed on December 13, 1983, and late-pruned vines on March 8, 1984. By March 8, bud swell was beginning on the vines reserved for late pruning, whereas all buds were swollen on December-pruned vines and 1 percent had burst, showing green growth.

We began to measure shoot length on March 28, 1984. Each vine had been pruned to 12 two-bud spurs. Six areas were assigned to the cordon branches as ends, middles, and interiors, and one spur on each of six vines in a plot was selected from one area in succession for shoot measurements. The length of two primary shoots originating from two-bud spurs was measured and averaged for each vine. Average shoot length for each plot represented the mean of the measurements from six vines for a total of 12 shoots per plot. These measurements were repeated at 5- to 10-day intervals between April 2 and May 11. Bloom had already begun by the last shoot-measurement; at this time, the shoots were beginning to lose their upright orientation and lateral shoots were rapidly developing.

Grape flowers began blooming early in the week of May 7 on early-pruned vines, and on May 11 on late-pruned vines. We determined bloom development by estimating the percentage of calyptras (caps) that had fallen from individual flower buds, exposing ovaries and stamens.

Fruit ripening began in mid-July, when 5 percent of the berries on early-pruned vines were estimated to be soft, and less than 1 percent on late-pruned vines. Six days later, on July 19, the percentage of clusters with soft berries was estimated visually.

On July 26, 10 clusters at random were picked from each plot and crushed for must analysis. Nearly three weeks later, in anticipation of grower harvest, cluster samples were again collected for determination of fruit composition. Mean weights of clusters and berries were also calculated from the samples as well as the °Brix of 50-berry samples plucked from the 10 clusters taken from each plot.

Results

December-pruned vines, beginning with an earlier date of bud burst, maintained a significant shoot-length advantage over the March-pruned vines throughout late March, April, and early May, when bloom began (fig. 1)

The next physiological stage to be observed was the development of bloom. Estimates of the percentages of fallen caps were delayed until the late-pruned vines had begun to bloom. On May 11, an average of 1 percent of the caps had fallen from flowers on March-pruned vines compared with 53 percent on December-pruned. Six days later, on May 17, the comparison was 61 versus 99 percent.

We judged that the two pruning dates resulted in a five-day difference in attainment of the 50 percent caps-off stage (fig. 1). Differences in development thus began at bud burst and persisted during shoot elongation and development of bloom.

Berry softening, the first outward indication of the ripening stage, had already begun on early-pruned vines on July 13, whereas those on late-pruned vines were just barely beginning to turn. Six days later, 53 percent of the clusters were judged to have soft berries on early-pruned vines, and only 16 percent on late-pruned. Nearly two weeks later, when clusters were sampled at random, the juice of clusters from early-pruned treatments averaged 11.3° Brix as compared with 9.0° from late-pruned.

By August 15, when the final samples were collected, the disparity in maturity had lessened somewhat, but the difference was still statistically significant. Also significantly different was the level of titratable acidity, another indicator of maturity enhancement by the early-pruning treatment. However, neither pH nor average cluster weight was affected. When 50 berries were stripped from the 10-cluster samples, crushed separately, and the °Brix of the juice compared, the soluble solids enhancement was consistent with the cluster-sample data. Mean berry weight was not influenced.

It would have been desirable to compare maturity again by taking another series of samples in late August, but commercial harvest prevented further sampling. Harvest was unusually early in 1984 because of a warm, dry spring and hot summer. Perhaps the difference in maturity would have narrowed even further in a more normal season when picking might take place in early September.

Contrary to our expectation, differences in vine development persisted throughout most of the growing season in this trial. Our comparison of pruning dates was extreme, however — the earliest and latest dates commercially feasible. Pruning in January or February might produce smaller differences in shoot and fruit development than March pruning did.

We still believe that a delay in maturity may be a small price to pay for avoiding serious vine dieback resulting from *Eutypa armeniacae* infections. This vineyard trial will be continued for several more years to follow the effects of pruning date and fungicide protection on the incidence of Eutypa dieback.

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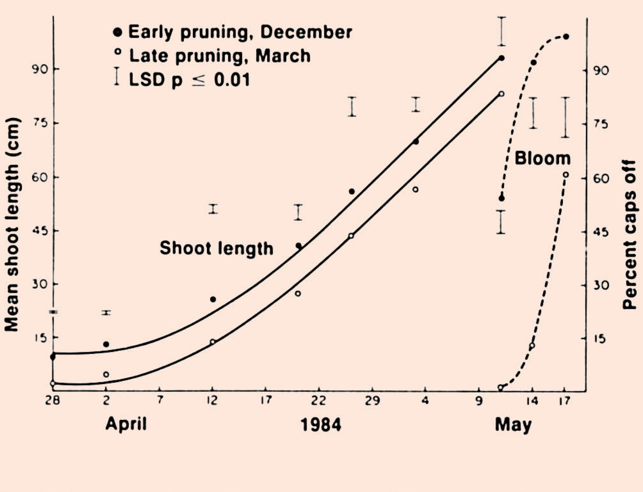

Fig. 1. Shoot lengths and progression of bloom on early- vs. late-pruned vines were significantly different through mid-May.

TABLE 1. Comparison of fruit ripening from Chenin blanc vines pruned in December 1983 (early) or March 1984 (late)

Date (1984) and parameter measured	Early pruned	Late pruned
July 13:		
% of soft berries	5% (range 1%-15%)	1% (range 0%-1%)
July 19:		
% clusters w/soft berries	53%	16%
°Brix (soft berries)	10.7	9.2
°Brix (hard berries)	5.4	5.1
July 26:		
Avg. °Brix of cluster samples	11.3**	9.0
August 15:		
Avg. °Brix of cluster samples	17.9**	16.4
Avg. °Brix of berry samples	18.9**	17.5
pH of cluster samples	3.19	3.15
Titratable acidity (g/100 ml juice) of cluster samples	1.22*	1.36
Cluster weight (g)	317	332
Berry weight (g)	1.73	1.73

*,** Significantly different at P = < 0.05 and 0.01, respectively.