

Oregon Wine Advisory Board Research Progress Report

1988

Canopy Management Research at OSU

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Presented at OSU Winegrape Research Day, December 1, 1987

Canopy management research at OSU began on a large scale in 1984 with the establishment of several pruning level trials. Since that time the program has expanded to include trials on trellising, leaf removal, shoot orientation, and alternative pruning methods. The program has grown as new ideas came out of the research program and in response to new ideas from the industry. This article will summarize the results from several trials with the main emphasis on growth and yield. Grape composition and wine quality will be covered in future articles.

PRUNING TRIALS

In 1984 two pruning trials were established in commercial blocks of Pinot noir: one in the Willamette Valley at Sokol-Blosser Vineyard and one in the Umpqua Valley at Henry Vineyard. Three pruning levels were established at each site: 27, 44, and 67 nodes per vine at Henry Vineyard and 20, 34, and 57 nodes per vine at Sokol-Blosser. The trial ran for three years. Yield and growth responses were generally similar at both sites.

Yield per vine responded to pruning level all three years (Fig. 1 a). The only exception was the 67 node treatment in 1986 where yield was equal to the 44 node treatment. The main factor affecting yield per vine was clusters per vine (Fig. 1b). Cluster and berry weights were not significantly different. These results were not too surprising; if you leave more buds you get more crop. Although yield per plant increased as buds per plant increased, yield per node decreased (Fig. 1c). This was caused both by a decrease in clusters per shoot and shoots/node (Fig. 2b).

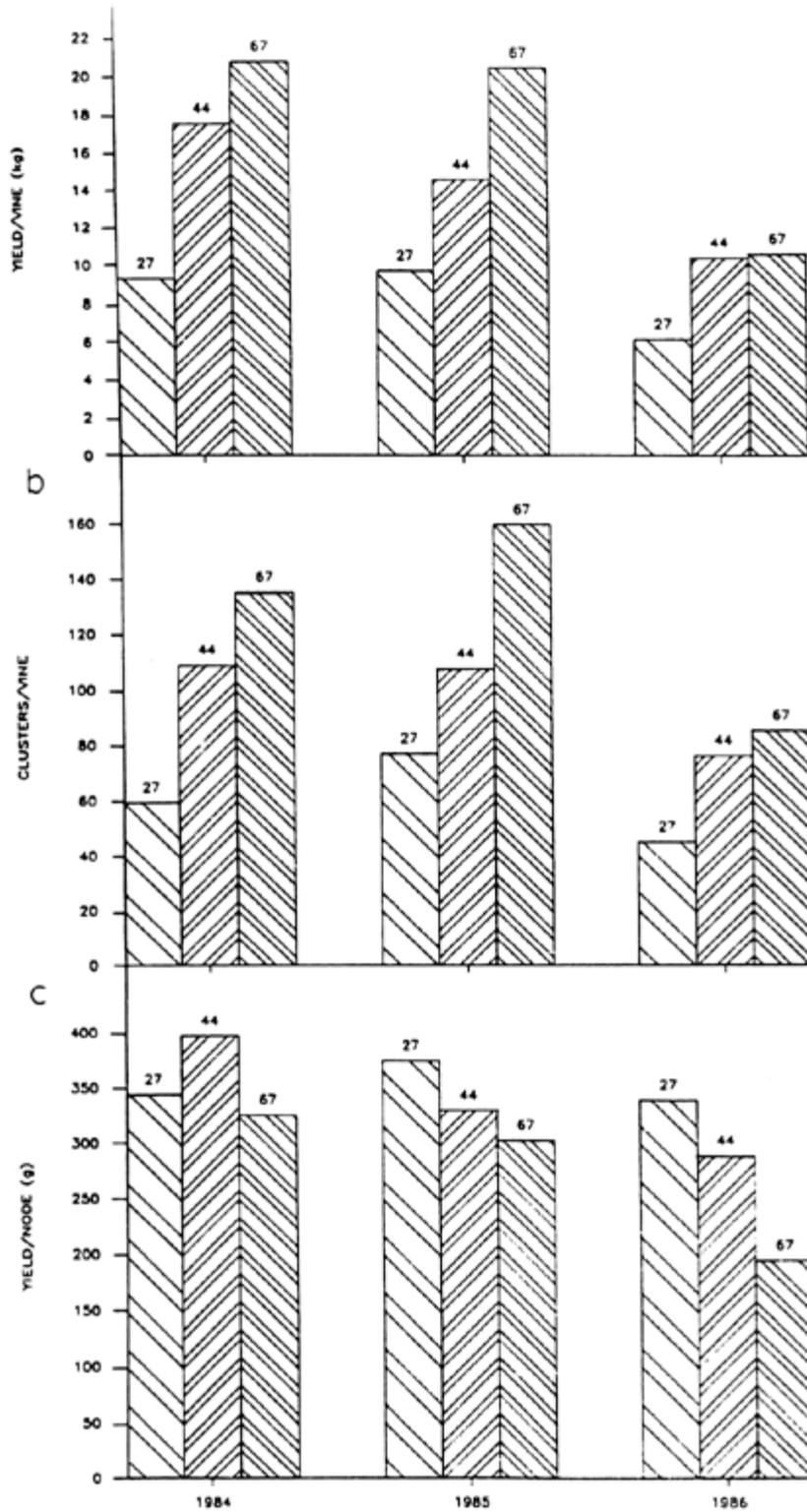


Figure 1. Yield data for pruning trials, 1984-1986., Henry Vineyard. Numbers above bars are nodes per vine.

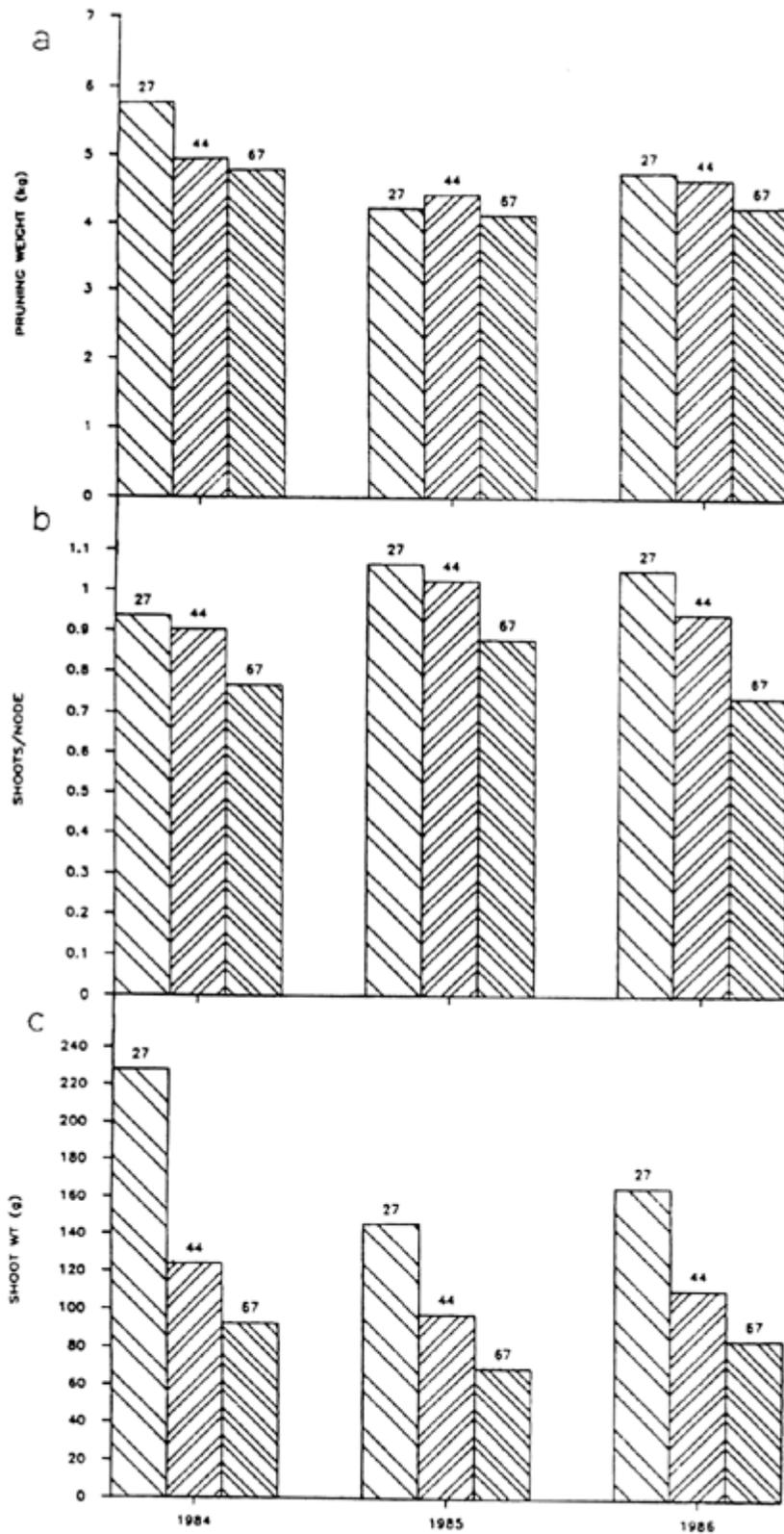


Figure 2. Growth data for pruning trials, 1984-1986, Henry Vineyard. Numbers above bars are nodes per vine.

One of the most interesting results of this trial was that pruning level had no effect on pruning weights (Fig 2a). At the end of the season all the treatments had grown the same amount, even though one treatment had two and half times as many buds as one of the others. The vines compensated! Shoots per vine did increase as more buds were left per plant, but shoots per node and shoot weight decreased as node number increased (Figs. 2c and 2d).

This presents two dilemmas to the grape grower. The first is that you cannot decrease canopy density by pruning severely. Even though you can reduce shoot numbers, the shoots that are left will be thicker, longer, and have more laterals and the pounds of pruning per foot of row will be unchanged. The second dilemma concerns cropping. Although you can increase the crop by leaving more buds, there is little change in the canopy available to support the crop. The net result is a decrease in quality as crop increases. In these trials there was a decrease in sugar, color, and phenolics and an increase in acid at higher cropping levels. To increase the yield and maintain a given level of quality, the canopy would have to be improved.

GROWTH DIVERSION

Lightly pruned vines in the pruning trials had canopy densities equal to severely pruned vines, but the distribution of the growth was different. The shoots on the plants with very high bud numbers were thinner and shorter and they had fewer laterals. In 1987 we developed a method of pruning to take advantage of the beneficial shoot characteristics of high bud numbers without the drawbacks of high shoot numbers and excessive crop. This method is called the growth diversion (GD) or disposable cane system.

At pruning, two canes per vine were tied to the wire as usual with the standard number of buds. These were the fruiting canes. Two more long canes on each vine were left hanging down to the ground. These became the "disposable" canes (Fig. 3). These vines were compared to controls that had only the two standard fruiting canes. The result of these extra canes were vines with more than twice as many nodes per vine as the control. After bud break, the shoots from the fruiting canes on the GD vines were trained up onto the trellis as usual, but the shoots from the disposable canes were kept down below the canopy. At shatter, in early July, the disposable canes were cut off, leaving only the two fruiting canes on both treatments. Both treatments ended the season with equal node numbers per vine.

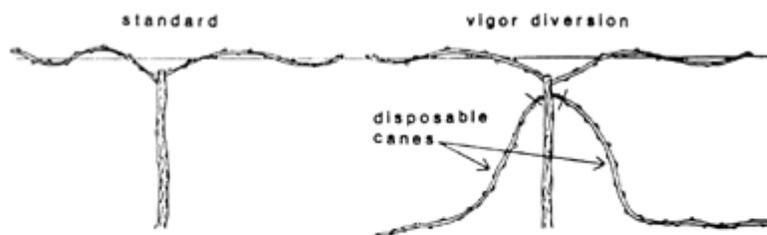


Figure 3. Standard cane pruning vs pruning with a growth diversion system. Disposable canes are cut off at the slash mark three weeks after full bloom.

The GD vines did not differ from the controls in yield, brix, titratable acidity, or pH. They did grow differently. Shoot growth rates on the fruiting shoots of the GD vines were 37% less than the control and there was a 66% decrease in laterals per shoot. Pruning weights were less than half of the control vines. This technique will be tried on a larger scale this summer to determine if this change in the canopy is large enough to have an impact on grape quality.

LEAF REMOVAL

There has been considerable interest in leaf removal recently. There have been reports out of California indicating considerable improvements in wine quality as well as a reduction in botrytis when leaves were pulled around the clusters early in the season. To see if comparable results could be obtained in Oregon with our different weather and trellises, a trial was established on Chardonnay in collaboration with Dr. Jim Marois of the University of California, Davis. Leaves were removed from around the clusters at shatter in early July and at veraison in mid-August. Sensors were installed in the canopy to measure differences in microclimate and samples were collected at harvest to evaluate grape composition.

Samples and weather data have yet to be analysed, but first indications are that with a typical Oregon vertical canopy (shoot positioned and hedged) there is less environmental modification with leaf removal than in the vigorous California canopies where some of the earlier work has been done. There was, however, a visible difference in the grapes from the leaf removal treatments. Leaf removal greatly increased the number of clusters directly exposed to the sun, and exposed clusters were more amber colored and less green at harvest. This was more pronounced in the late leaf removal date than the early one. There was no botrytis this year in any of the treatments. In 1988 this trial will be expanded to allow wines to be made from the various treatments and may include wine processing variables.

CANOPY ORIENTATION

Many of the recent plantings of wine grapes in the Willamette Valley have been trained to a single wire trellis for a downward growing canopy. This system offers substantial savings in vineyard establishment, pruning, and canopy positioning costs. Many of these vineyards are now coming into production but not much is known about the effects of this canopy system on grape production or composition. At Bethel Heights Vineyard, a trial was established on Pinot noir to compare upward vertical canopies to downward vertical canopies and also to investigate the responses of grapes to several levels of sun exposure.

Cluster exposure was fairly uniform in the upward growing canopy. The trial was cane pruned and the canes were tied flat along the fruiting wire. The fruit was concentrated in a narrow band above the fruiting cane and leaves were removed along the east side of the row. The fruit was in direct sun only in the morning. The fruit exposure on the downward canopy was much more variable. The canes were tied flat, but in early summer the shoots were positioned downward. This resulted in a range of cluster exposures. Basal clusters on some shoots were on top of the canopy in the full sun while other clusters were in the interior of the canopy in lower light levels. In our analysis we are comparing the wine quality of the two systems as well as the effects of the different exposures observed in the downward growing canopy. There are several questions that need to be answered. Is there a difference in the wines made from the two canopies? Are the clusters that have been fully exposed to the sun different than clusters inside the canopy? Are berries on the tops of those clusters different than berries on the bottoms of those clusters? If only the exposed berries are different, is the proportion of them large enough to affect the wine from the whole canopy? This trial will continue for at least one more year.

TRELLIS SYSTEM

A trellis trial was established at the Lewis Brown Farm in 1984 with four varieties and five trellis systems. The plot has been very useful as a demonstration plot. It was constructed with different materials and with different wire configurations to give growers an opportunity to see some different options. This year we may also include several bird netting systems. Both permanent and removable

over the vineyard systems will be tried.

1988 will be the first year all the trellis systems will be in production. so far the major differences have been establishment costs and the difficulty of training some of the more elaborate systems. Wine will be made from selected treatments in future years but this year only yield component and grape compositional analysis will be done.

Canopy management research is one of the top priorities of the OSU viticulture research program. Growers interested in participating in this effort by having trials in their vineyards or by offering suggestions or comments are encouraged to contact Porter Lombard, Steve Price, or Bernadine Strik.