Pruning-Time Studies on Grapes

southern California investigations on relationship between vine pruning time and the so-called grape bud mite problem

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Vineyard pruning-time studies in southern California—for the season of 1950 and confirmed in 1951—have shown a relationship between pruning time in head-pruned vineyards and the incidence of so-called bud mite injury. This term was adopted in California following general acceptance of a diagnosis in which the grape bud mite, a physiological strain of *Eriophyes vitis* (Pgst.), was designated as the causal agent of certain growth abnormalities and crop losses in vineyards.

The results of these pruning-time studies show that a reconsideration of this problem with emphasis on its viticultural aspects is appropriate.

There is a generally existing relationship between time of pruning and time of leafing-out of the vine. If vines are pruned very late, they tend to leaf out later than when pruned in midwinter—January or February. If vines are pruned very early a comparatively late time of leafing-out results in some, though not all, instances. This relationship is interpreted as physiological response of vine.

Under southern California conditions the relationship between both early—November 1–15—and late—March—pruning and late leafing-out, as compared with midwinter—January or February—pruned vines, was consistent during the past two seasons in experimental head-pruned vineyards. December-pruned vines leafed out earlier than November- or March-pruned vines.

The results of replicated pruning-time studies in southern California have shown that growth abnormalities included under the term—grape bud mite injury—have been reduced greatly—and in some instances virtually prevented—by pruning late in head-pruned vineyards. Comparable effects were also obtained in this area by pruning early. No information is at hand as to whether any relationship exists between the time of pruning of cane-pruned vines and incidence of symptoms on shoots developing from buds on the canes.

Briefly, the symptoms are as follows: *1*, shortened basal internodes; *2*, a tendency toward zigzagged growth in the affected basal part of the cane; *3*, breaking of basal lateral buds of shoots leading to strong lateral growth and witches broom formations; *4*, a reduced yield and *5*, on Mataro, leaf malformations. Distorted leaves are confined to the basal portion of the shoot. A chlorotic spotting of the leaves has also been observed on Mataro in association with pruning-time responses. Observations on leaf symptoms on other varieties are incomplete.

Symptomologically related vine conditions apparently occur in most California grape-growing areas.

Because of the sporadic nature of the appearance of these symptoms and because of the obscure nature of the relationship of pruning time to their incidence, pruning time has not previously been investigated as a predisposing factor or conversely as a preventive measure. In a previous pruning-time trial at Davis, it was recorded that a very late pruning time increased yield in a Muscat vineyard in which these growth abnormalities were unreported.

Apparently many varieties are involved. Pruning-time responses have been observed on Malaga, Muscat of Alexandria, and Mataro in southern California and on Carignane and Zinfandel by investigators in Sonoma County. The following trial was superimposed upon plots of a pruning-time trial for the 1950 season involving 6,000 Mataro vines near Cucamonga.

One hundred vines in each plot—six replications—which had been pruned for the 1950 season in the first part of November, January, February or March and all of the vines in the December plots—200—were pruned at the same time for the 1951 season. An exception was the March pruning which was delayed until March 26 in 1951 as compared with March 3 for 1950. This delay corresponded to the lateness of the beginning of the 1951 season as compared with 1950. The other half of each plot, pruned in November, January, February or March for the 1950 season, was pruned in a different month for the 1951 season according to the following schedule: vines pruned in November 1949 were pruned in February 1951; those in January 1950 were pruned in March 1951; February 1950—November 1950; March 1950—January 1951. Thus, favorable pruning times for the season of 1950, which resulted in relatively high yields, were followed by unfavorable pruning times for the season of 1951. Similarly, unfavorable pruning times for 1950, which resulted in low yields, were followed by favorable pruning times.

Through the co-operation of a vineyard company at Cucamonga, the same crew carried out the pruning operation on all plots, leaving two buds per spur and an average of eight spurs per vine.

Observations were made in all plots

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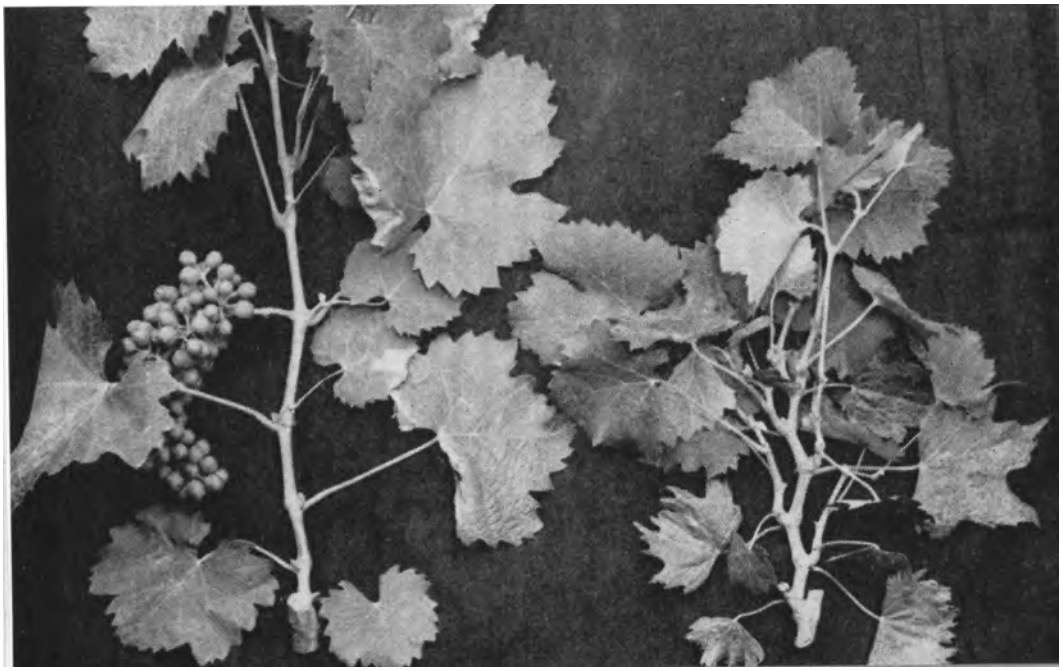
Mataro variety. *Left:* normal, predominating in November- and March-pruned plots. *Right:* showing severe symptoms, found mainly in January- and February-pruned plots.



WALNUT

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In areas where the codling moth is not a serious problem, the DDT wettable powder may be omitted from the spray, but the amount of standard lead arsenate should be increased from two to three pounds.

The air carrier used at Linden was equipped with a volute, and had an air capacity of at least 40,000 cubic feet per minute.

Various concentrations of insecticides and different volumes of spray per tree were tested. With some of the DDT sprays, a liquid depositor—multifilm L.—was substituted for dry DDT depositor and oil. There were 18 large trees to the acre.

Mixed with 500 gallons of water were:

10 pounds 50% DDT wettable powder
3 pounds DDT dry depositor
3 gallons light summer oil emulsion.

Applied at approximately 24 gallons per tree—about 400 gallons per acre—this spray gave the best control—0.25% infested nuts.

When in the same mixture the amount of 50% DDT wettable powder was raised to 20 pounds, and the rate of application lowered to 11 gallons per tree—approximately 200 gallons per acre—control was almost as good—0.4% infestation.

Substituting liquid depositor for the DDT dry depositor and oil resulted in less efficient control. Mixed with 10 pounds 50% DDT wettable powder, and applied at a rate of approximately 23 gallons per tree, 0.7% of nuts were infested; 20 pounds 50% DDT wettable powder at 11 gallons per tree gave 0.75% infestation.

A standard lead arsenate-DDT combination resulted in the poorest control—0.9% infestation. Applied at 24 gallons per tree the mixture consisted of:

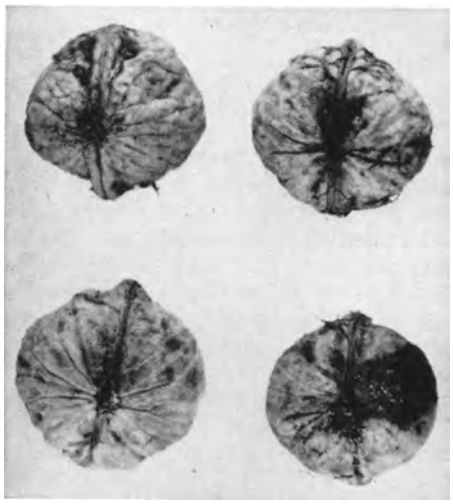
30 pounds standard lead arsenate
5 pounds 50% DDT wettable powder
5 pounds safener
3 pounds DDT dry depositor
3 gallons light summer oil emulsion.

Commercial tests at San Jose gave similar results. All sprays were applied with an air-carrier sprayer at the rate of 350 gallons per acre. Best control—0.8% of infested nuts—was achieved by:

8 pounds 50% DDT wettable powder
2 pounds DDT depositor
2½ gallons light summer oil emulsion
400 gallons water

When the amount of 50% DDT wettable powder was reduced to four pounds, and 24 pounds of standard lead arsenate added 1.6% of nuts were infested. When 24 pounds standard lead arsenate was used alone, infestation of nuts rose to 2%.

In both the Linden and the San Jose tests best control resulted with the DDT spray where the amount of 50% DDT wettable powder applied per acre ranged between 7½ and 8 pounds. In no case did any of the treatments result in a serious increase of orchard mites or frosted scale.



Typical exit holes made by codling moth larvae in the blossom end—top—and stern end—bottom—of walnuts. Note frass on nut at the bottom right.

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GRAPE

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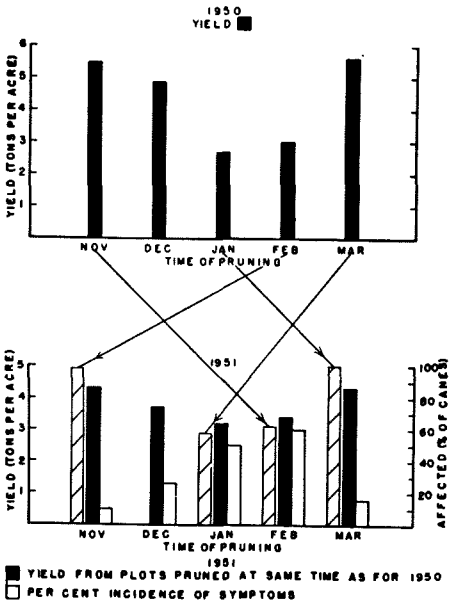
on the comparative status of bud and shoot development in the spring.

The symptoms were not so prevalent or so severe in any of the plots in 1951 as they were in comparable plots in 1950. This may be due to seasonal variation.

The data presented in the chart in the column on the right show that in 1951 there again existed a relationship between time of pruning and incidence of symptoms. This relationship was the same as for the 1950 season indicating that midwinter—January and February—pruning times are unfavorable in southern California head-pruned vineyards subject to the described symptoms. Improvements in yields ranged up to 1.1 tons per acre in 1951 favoring very late or early pruning times. The two-year average shows an increase of two tons per acre per year in favor of late and early pruning as compared with January.

The increasing effect on yield by a favorable pruning time is greater following a low yield. The decreasing effect on yield by an unfavorable pruning time is somewhat greater following a high yield.

The general pattern of response to pruning times was observed in two other Mataro vineyards subject to the condition and similarly in two Muscat of Alexandria vineyards in southern California during the 1951 season. In two additional Mataro vineyards the symptoms were rare in all plots.



The season before the trial began, this vineyard was pruned in February which gave the unusually low yield of 1.2 tons per acre for 1949, a very severe season for symptoms. Top: Yields resulting from different times of pruning for season of 1950, a severe year for symptoms. Bottom: Yields resulting from different times of pruning for season of 1951, a moderate year for symptoms, incidence of which is shown.

The existance of a relationship between the incidence of the symptoms and the time of head pruning—removal of the apical portion of the previous year's cane—and the concomitant effects of pruning time upon time of leafing-out, constitute evidence in support of an interpretation of this vineyard malady as one involving the physiology of the vine and the relationship of the vine with its environment.

Available evidence does not establish that bud mites are the sole or the principal cause of such growth abnormalities. According to present information, no feature of the life history or seasonal history of bud mites would account for a relationship between pruning time of the vine and injury by mites. It is not inferred that bud mites can not cause symptomologically related disturbances, but their importance as a factor in grape production is subject to re-evaluation.

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