Walnut Branch Wilt

reduction of disease in four-year experiment in Tulare County orchard

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Branch wilt—a destructive fungus disease of English walnuts in California—may be reduced by relatively simple changes in cultural practices. These changes involve: *1*, removing all diseased branches from the tree each year; *2*, fertilizing soil with a nitrogenous fertilizer; and *3*, providing adequate soil moisture by irrigation throughout the growing season.

Branch wilt disease first attracted attention in the southern part of the San Joaquin Valley and spread throughout both the San Joaquin and Sacramento valleys and in certain parts of southern California, although not in the walnut-growing districts along the coast. So far, the disease has been most severe in Tulare County where it has caused extensive damage to many trees.

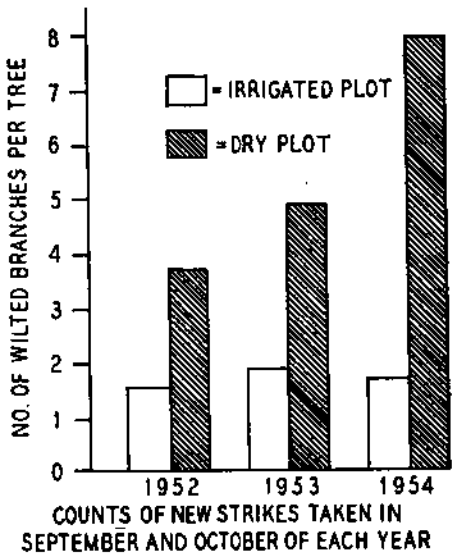
Branch wilt is characterized by the withering and dying of the leaves on certain branches in the tree. Usually the smaller outermost branches are affected first. From midsummer to early fall, these suddenly die but retain their leaves which turn deep brown. The bark and wood of affected branches turn dark brown to almost black; the outer corky bark becomes loose and breaks away in patches, exposing a black powdery layer of spores of the causal fungus *Hendersonula toruloidea*.

Because the spores are blown about by wind and washed about by rain, they are the principal means of spreading the branch wilt fungus through the orchard. They are deposited in cracks in the outer corky bark where, under proper condition, they germinate and send slender threadlike strands into the branch. When these mycelial strands enter the sapwood, they produce a condition which interferes with the conduction of water to the leaves.

Trees low in vigor are the first to contract the disease and usually in a more severe form than vigorous trees. Crown gall, crown rot, and improper cultural practices all contribute to the reduction in tree vigor. Serious outbreaks of the disease in the walnut-growing districts of Tulare County followed several years of scanty winter rainfall, with a resulting drop in the water table. Since certain orchards were more severely affected than others, it was thought that in these orchards summer irrigation did not provide adequate water for the best growth of the tree.

To test this supposition, two experimental plots were established in an orchard where the disease was well established and was attacking additional branches each year. In one plot, available soil moisture was maintained throughout the growing season. In the other plot, the trees were allowed to deplete the available soil moisture and remain dry for a considerable period in summer. In both plots, the diseased branches were removed from the trees and a nitrogenous fertilizer at the rate of 125 pounds of nitrogen per acre was applied to the soil in the dormant season.

Comparison of irrigated and dry plots.



To obtain a record of soil moisture, soil samples were taken in both plots at weekly intervals during the growing season. In two of the four years of the experiment, seepage from a nearby canal prevented the exhaustion of available moisture in the dry plot below a depth of 4′. The wet plot, which was irrigated at monthly intervals, had available moisture at all depths throughout the growing season.

The response of the trees to the change in cultural practices became apparent the first year and continued throughout the experiment. In both plots, foliage color—following application of nitrogen—improved. In the irrigated plot, the leaves remained darker green later in the season than in the nonirrigated plot. Also, in the irrigated plot the number of newly infected branches averaged 1.6 per tree—during the last three years of the experiment—compared with 5.4 per tree in the nonirrigated plot.

Another result of adequate soil moisture was apparent in the quality of the nuts when delivered to the packing house. The nuts from the irrigated plot showed a higher percentage of light-colored kernels and fewer shriveled kernels than those from the nonirrigated plot.

The results of this experiment illustrate a case where it was possible to reduce the incidence of branch wilt by simple changes in cultural practices.

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growing season was over. There was no visible damage to the flowering plants in the areas sprayed with 2,4-DP and 2,4,5-TP.

There was no appreciable difference in the yield of seed among the nasturtium plots. However, owing to method of harvest—each plant is handled separately—there were twice as many recoverable seed in the areas which had been treated with a material that killed the morning-glory, such as MCP and 2,4-D.

In the case of the zinnias, a different yield picture was obtained. The number of ounces of seed harvested from 25′ of two beds, two rows to the bed were: MCP, 15.0; 2,4-D, 12.5; 2,4,5-T, 10.0; 2,4,5-TP, 9.0; 2,4-DP, 10.5; Check, 7.5. These figures are the averages of two replications. They appear to show that the yield was increased in the sprayed areas due possibly to less competition from the morning-glory for moisture and nutrients.

The 2,4-D plot yielded slightly less than did the MCP due perhaps to the excessive damage caused to the young seedlings by 2,4-D.

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The above Progress report is based on State Projects 4114 and 4122.