Scaly Bark Disease of Citrus

nine-year study of seven older orange orchards indicates advance of psorosis may be faster than is generally believed

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Psorosis—scaly bark—is a progressive disease which may take several years to render a tree unprofitable or completely nonproductive. Nevertheless, it can take a bearing tree out of production faster than replants can be brought into production.

Out of a total of 6,056 trees examined—in a study of seven orange orchards, ranging from 36 to 56 years of age, in the Azusa district of Los Angeles County—701 trees originally showed bark lesions of psorosis. When a second survey was made—nine years later—174 new cases of scaly bark had developed, bringing the total number of diseased trees to 875. At the beginning of the study, 54 trees were in Stage *1* of the disease. After nine years, only six trees had remained in the first stage; the rest had become more advanced cases.

Average production of all 875 diseased trees dropped from an estimated 2.8 boxes to 1.9 boxes per tree. By comparison, normal trees had averaged—over a 10-year period—slightly under four boxes per tree for navels and 3.7 boxes for Valencias. Twenty-year-old Valencia replants yielded less than two boxes per tree, while 27-year-old navel replants had an average yield of 3.5 boxes.

Affected trees were classified into one of four stages. Stage *1* trees showed the first signs of bark lesions with little or no top deterioration. Stage *2* trees were intermediate, ranging from one seriously affected limb to ½ of the bearing surface destroyed. Stages *3* and *4* trees were definitely unprofitable.

Of the 174 new cases of psorosis which had developed during the nine years, nearly 20% had declined into the unprofitable stages; 10.3% were still in Stage *1*, 70.1% had declined to Stage *2*, 19.0% to Stage *3*, and 0.6% to Stage *4*.

Of the 54 trees initially classified as Stage *1*, 11.1% showed no further deterioration after nine years; 46.3% had declined to Stage *2*, 20.4% to Stage *3*, 5.6% to Stage *4*, and 16.6% had been pulled.

The 234 trees originally classed as Stage *2* showed a similar decline into less productive stages. During the nine-year period, 47.0% showed no change. However, 22.6% had declined to Stage *3*,

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Progress of Psorosis in 7 Orchards During the Nine-year Period 1945–1954

1945 Survey: Number of trees in each stage				1954 Survey: Showing progress of disease into more advanced stages: Number of trees in each stage				
Normal	Stage I	Stage II	Stage III	Stage I	Stage II	Stage III	Stage IV	Pulled
174 trees (100%)				18 trees (10.3%)	122 trees (70.1%)	33 trees (19.0%)	1 trees (0.6%)	
	54 trees (100%)			6 trees (11.1%)	25 trees (46.3%)	11 trees (20.4%)	3 trees (5.6%)	9 trees (16.7%)
		234 trees (100%)			110 trees (47.0%)	53 trees (22.6%)	16 trees (6.8%)	55 trees (23.5%)
			413 trees (100%)			238 trees (57.6%)	38 trees (9.2%)	137 trees (33.2%)

A normal orange tree.

Tree in Stage *1* psorosis, with recently developed bark lesions on trunks and limbs, but not yet showing deterioration of top.

Tree in Stage *2* psorosis. Up to one half of the tree has become unproductive as the result of dying back of main limbs and branches.

Stage *4* psorosis. Production is nil.

Tree in Stage *3* psorosis. Up to three fourths of the original bearing surface has been destroyed—a submarginal producer.

Soil fumigant chemicals are poisonous—and dangerous—unless reasonable care is exercised. If the manufacturer's directions are followed carefully—and accurately—handling fumigants should not cause trouble.

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BARLEY

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from the federal government at a per unit value cost identical with the per bushel value issued to the producers. Periodical deposition of certificates with the government by processors—according to the amount of malt beverages produced—would provide an effective control.

Statistical estimation for the period of study implies that such a plan under like conditions—a price target of 110% of parity on the malt market and with no intervention in other channels—would increase returns to the industry by about 10% with fixed supplies and perhaps by a larger percentage with variable supplies. Benefits could be distributed equitably with no production control necessary. A producer could grow barley in any amount, but that in excess of his allotment would be worth the feed price only, because support would be limited to the allotted portion of the crop.

Free market prices for barley would not be materially affected by increased barley supplies, so the differential between target price and free market prices —the value of the certificate—in any given year would not be significantly changed. Thus, the direct cost involved to finance the program would remain fairly stable and largely independent of barley supplies. In contrast, year to year changes in the value of the certificates would be largely attributed to changes in the price of corn.

During the period under study, the interest of producers of competing commodities—such as corn—would not have been seriously affected. Increased barley supplies at the end of the period would not have significantly changed the relative proportion of barley and corn in the total feed grain concentrates. Sales of malt beverages, as a result of increased costs, would have dropped less than 0.5%. With respect to administrative feasibility, there would have been no major problems encountered.

Some inequity—as a result of probable production expansion—undoubtedly would have resulted under dual pricing. Statistical supply-response analyses indicate that output response to higher price expectations would have been different in the various areas depending largely upon alternative crop availabilities. Supplies of barley in the North Central States appear to have been more responsive to higher prices than in the Pacific region.

Long run benefits from the malt outlet during 1948–1954 would have been identical for all barley producers because the value of the certificate would have been the same for all growers. If this benefit were distributed over the whole crop, the resulting weighted average value of the crop—the price per bushel—would have been relatively smaller in areas where production expanded more than in areas where output under the impact of dual pricing expanded only little. This also implies that the certificate plan under consideration would have had some constraining influence upon output expansion.

A two-price system with an assumed 110% of parity in the period under study would have affected between 25%–30% of the California barley crop and would have increased the gross value to the producer over 10% in most years without significantly affecting prices on the feed market.

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GRAPE LEAF FOLDER

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Phosdrin and a pyrethrin-rotenone mixture. Also tested were pyrethrin additions to a 2% parathion dust. The pyrethrin supplements did not appear to improve the performance of parathion.

In a third brood plot applied on August 30, the following reductions of larval populations were obtained as compared to a check: 2% methyl parathion, 92%–98%; 4% Diazinon, 89%; 2% parathion, 85%; 4% Trithion, 47%. In another vineyard, 2% parathion and 2% Phosdrin dusts were compared. Parathion gave the greater reduction. Neither Diazinon, Trithion, Phosdrin nor endrin are currently licensed for use on grapes.

The work on this project has not clarified all of the problems involved. One can not suggest that all grape growers apply chemical treatments for the control of first brood larvae since, in some vineyards, there is generally little or no first brood infestation. Moreover, the application of chemical control measures in the first brood offers no certainty that control measures will not again be necessary in subsequent broods. Good control of the first brood will reduce the size of the second brood. It is believed by many in Tulare County that second and third brood applications are to be preferred over first. In this locality, 2% parathion dust has provided 70%–90% reduction in leaf folder infestations in second and third broods. In comparison, cryolite dust has been inferior.

None of the presently available materials has given complete control of any brood of larvae. Obviously, larvae that are not killed will cause some further damage. Moreover, leaf rolls and other parts of the leaves upon which the larvae have fed will continue to turn brown and dry up even though the application of an insecticide kills the larvae and prevents further feeding. Thus, unless the vines are growing vigorously, they will continue to show increased leaf folder injury for some time after any chemical treatment is applied.

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D. F. Barnes, Marketing Research Division, Biological Sciences Branch, USDA, Fresno, established the dates of the grape leaf folder broods.

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6.8% to Stage 4, and 23.5% had been pulled.

Of the 413 trees previously designated Stage 3, 57.6% showed no change, 9.2% had declined to Stage 4, and 33.2% had been pulled.

Thus, by the end of the nine-year period, 14.45% of 6,056 trees examined were affected with symptoms of psorosis. The disease accounted for the complete loss of 3.32%, while an additional 6.49% were reduced to a state of unprofitable production. The new cases—174—which developed during the study period amounted to 2.87% of the total number of trees examined. If these trees continue to decline at the same rate as the earlier cases, 40% of them will have become firewood in another ten years.

Notwithstanding its slow advance—which, however, may be more rapid than is generally believed—psorosis should be recognized as a major cause of declining production in many of the older orchards.

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