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Psorosis—scaly bark—is the primary killer of citrus trees in California.

In an analysis of 220 orange orchards, 7.8%—or 15,100—of the 193,545 trees examined showed bark lesion symptoms of psorosis. The severity of the disease ranged from beginning stages, with but slightly depressed yields, to advanced stages where affected trees were little more than stumps, with no yields. In some mature orchards, 49% of the trees showed symptoms, although in a few of the better orchards, only 0.6% of the trees were affected.

In order to help growers and appraisers evaluate the long-range productive capacity of a given orchard, an investigation was conducted to determine the amount of crop depression that can be expected from each successive stage of the disease.

Affected trees were classified into one of four stages.

Stage *1* trees showed the first evidence of the disease, with bark lesions on the trunk or on one or more limbs, but with very little dieback of the branches or deterioration of the top.

Stage *2* trees had one or more main limbs so seriously affected that they bore very few fruit. Since this stage had the widest range of severity of the four classes, it was further broken down into stages *2A*, *2B*, and *2C*. In most cases, trees classified as *2A* had one main limb affected. Trees in Stage *2B* had two or three main limbs—or up to ⅓ of the tree—out of production. Stage *2C* trees had up to ½ of their bearing surface destroyed.

Stage *3* trees had lost an estimated ½ to ¾ of their limbs or bearing surface and were considered to be submarginal producers.

Stage *4* trees had usually lost most of their original limbs. The small amount of fruit produced was mostly on suckers originating on the trunk or on the stubs of what were formerly scaffold limbs. Some of the trees were little more than stumps, contributing practically nothing to the yield of the orchard.

In order to find out the approximate bearing efficiency of an orchard in which psorosis appears to be the principal cause of crop reduction, the yields—during the harvest season of a good crop year—of 153 Valencia trees affected with scaly bark were compared with the yields of 153 normal trees.

The average production of trees in each stage of psorosis was calculated as a percentage of the average yield of normal trees. The graph on this page shows the degree to which yields were reduced by each progressive stage of the disease. Trees in Stage *1* showed only a slight reduction in yield, averaging 99.5% of a normal crop. The average yield of all trees in Stage *2* was 65.1% of a normal crop, *2A*'s yielding 76% of normal, *2B*'s 60.6%, and *2C*'s 47.4%. The production of trees in Stage *3* was 28% of normal.

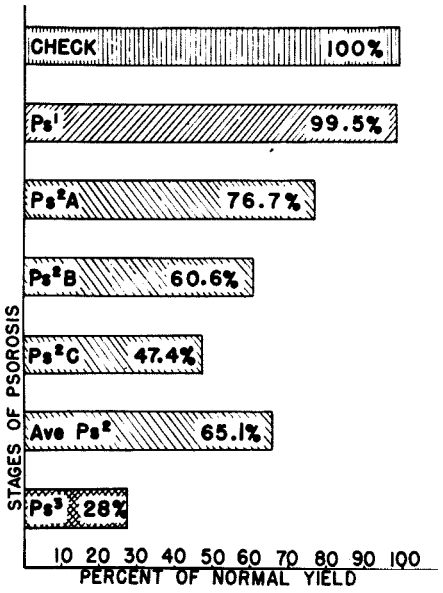
Although the number of trees in the comparative study is relatively small and was taken in only one crop year, the data clearly point out the role that psorosis plays in reducing Valencia yields even in favorable crop years.

By knowing the approximate bearing capacity of trees in each stage of the disease—expressed as a percentage of normal yield—it is possible to estimate the depressive effect that psorosis has in any given orchard.

For example, an analysis survey of an 8-acre Valencia orchard revealed that 33% of the trees had scaly bark, with 16.4% in Stage *1*, 15% in Stage *2*, and 1% in Stage *3*. In addition, 1% of the tree spaces were blank and 5% were nonbearing replants. Since no other disease appeared to be active in the orchard, it was assumed that these replants represented losses resulting from the removal of psorosis-affected trees.

The five-year average yield of bearing trees in the orchard was 5.6 boxes per tree. The estimated reduction in yield caused by psorosis was calculated by multiplying the number of trees in a

Effect of Progressive Stages of Psorosis on Valencia Orange Yield



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

Tree in Stage *2A* psorosis. Bark lesions are present and marked deterioration has taken place in one of the main scaffold limbs.

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given stage by 5.6 boxes by per cent of yield for that stage. For example, there were 75 trees in Stage 2. Thus, 75 trees multiplied by 5.6 boxes multiplied by 65.1%—the yield factor for Stage 2 trees—equals 273 boxes. Normal yield for these 75 trees would have been 420 boxes. After figuring the reduced crop from the remaining diseased trees, blank spaces, and nonbearing replants, the calculated loss of fruit in the entire orchard amounted to 12% of a normal crop—or 88% as much fruit as it could have produced had it been free of disease. This is equivalent to a complete loss of the fruit crop from 0.94 acre of an 8-acre orchard.

The progress of psorosis is slow and unspectacular but deadly. There is no known cure for the disease, but a few simple practices can do much to slow its advance into unprofitable stages. The first step to be taken by a grower is to make a tree by tree survey of the orchard. Infected trees—and their stages of psorosis—should be shown on a simple orchard map. All trees in stages *1* and *2A* may be considered worth treating to prolong their bearing life. It is questionable if it pays to treat more advanced cases.

The progress of psorosis can be delayed either by scraping or by treating bark lesions with DN-75. The latter treatment is simpler and less costly. The most effective results come from treating the trees in the early stages, preferably as soon as the first bark symptoms appear. To do this requires an orchard survey at least once every two years—a management practice that should be standard with all growers.

Of the 193,545 trees examined in the appraisal survey, 15,100 had psorosis bark lesions, and of these, 5,600—or 37%—were in the first stages of the disease and would have benefited from treatment. Yet there was little evidence that growers were using any measures to prolong the bearing life of the trees.

In a study of the progress of psorosis made in certain orchards—totaling 75 acres in the Azusa district of Los Angeles County—26.0% of the trees which were rated Stage *1* in 1945 had progressed to stages *3* and *4* by 1954, and by that time 16.7% had been removed. During this 9-year period, an additional 2.8% of the trees developed as new cases of psorosis.

If these figures hold true for most of the older orchards of southern California, then of the 5,600 Stage *1* trees found in the appraisal survey, 2,391 trees will become unprofitable and 935 of these will be pulled within the next ten years. Furthermore, 5,419 new cases of psorosis will—by then—have appeared among the 193,545 trees surveyed.

Trees that are pulled are usually replaced with a replant, at least in orchards that are to remain in production for the next several years. To prevent replants from becoming casualties of psorosis, citrus growers should only use trees propagated from buds taken from parent trees registered by the State Department of Agriculture Nursery Service as free of the disease. Since the virus causing psorosis is not spread from tree to tree to any important extent, the grower can insure against future loss by planting trees which are not carriers of the disease.

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

Tree in Stage 3 psorosis. With up to three fourths of the bearing surface destroyed, the tree is a submarginal producer.

Stage 4 psorosis. Production has stopped. Tree should be replaced with a replant propagated from virus-free parent trees.