California Avocado Society 1941 Yearbook 26: 46-47

Avocado Trunk Cankers

W. T. Horne, L. J. Klotz, and M. B. Rounds
Citrus Experiment Station, Riverside

Various types of cankers have been observed and reported on avocado trees (1). Some occur on green stems, some on trunks, and some on roots. Probably the earliest of these was observed by K. A. Ryerson (May, 1914), and reported by H. S. Fawcett (2). Dr. Fawcett (3) isolated a fungus resembling the lemon gummosis fungus and showed by inoculation that this was the cause of the trouble. The lemon gummosis fungus caused a similar canker when inoculated into avocado stems. However, when the avocado canker fungus was inoculated into citrus trees no canker developed. This organism was identified by J. T. Barrett (4) in 1916 as **Phytophthora cactorum. C. O.** Smith (5) secured infection on avocado with both **P. cactorum and P. citrophthora** in 1937. During the late winter of 1940 the third author observed a similar canker doing considerable harm in the Whittier-Puente area. Several visits were made to the same locality by the authors. It was reported by interested growers that only the Spinks variety was affected, but that many trees of this variety had been killed and others were going rapidly. Bearing trees of good size developed striking symptoms.

More or less of a whitish sugary material appeared on the surface with numerous gum-like masses 1/4 inch or more in diameter. The gum-like drops and a moist exudate over the surface give the affected area a striking reddish color. Apparently the trouble starts near the base of the tree and extends upward but the origin and extension of the cankers were not studied in detail. Practically the whole trunk may be conspicuously stained for several feet up.

On cutting in at the margin of the reddish area the surface of the living bark is dead and dark but the deeper portion appears normal. On going back from the margin the dark part becomes deeper until at several inches the whole bark and cambium are dark and dead. Evidently the disease is at first superficial in the living bark and only gradually penetrates to the cambium and wood.

The second author isolated and identified from pieces of affected bark three fungi: **Phytophthora citrophthora,** the lemon brown rot and citrus gum disease fungus; **Phytophthora cactorum,** the walnut crown rot fungus; and **Botryosphaeria ribis,** the Dothiorella fungus which causes fruit rots and other diseases in avocado and citrus. The first author isolated a fungus from avocado trunk canker on Nabal in San Diego county, material sent by Jean C. Miller. This fungus is closely akin to the first two mentioned and was identified by V. A. Wager as **P. cinnamomi.** The Nabal canker was reported as evidently killing the tree.

Inoculations were made on a number of avocados and walnut trees at the Citrus Experiment Station from April 29 to May 17, 1940. Materials used as inocula were pure

cultures on agar (usually glucose-potato-agar) introduced into wounds made in the bark to the wood with a cork borer 5.5 mm. in diameter. The area to be inoculated first had the rough bark scraped away to living bark, and the surface wet with alcohol. The cork borer was sterilized by dipping in alcohol and flaming before each operation The piece of bark removed by the cork borer was discarded, the hole filled with the indicated inoculum and the surface covered with a piece of adhesive tape of which the inner surface was passed through a flame just before applying. Inoculated bark was cut out and final notes made July 22, 1940. The results are shown in table 1.

TABLE I

Results of Inoculating Avocado and Walnut Trees at the Citrus Experiment Station with Three Species of Phytophthora and with the Dothiorella Fungus

Inoculum	No. of inoculations	No. positive	No. doubtful	No. negative	Size of largest lesion mm.	Size of largest lesion inches
On avocado: Phytophthora citrophthora	31	28	3	0	113x11	4.5x .4
Phytophthora cactorum	27	22	1	4	70x15	2.8x .6
Phytophthora cinnamomi	17	14	2	1	148x17	5.8x .7
Botryosphaeria ribis (Dothiorella)	25	12	4	9	26x11	1.2x .4
On walnut: Phytophthora citrophthora	3	3	0	0	147x18	5.7x .7
Phytophthora cactorum	3	2	1	0	71x12	2.8x .5
Phytophthora cinnamomi	3	3	0	0	315x24	12.4x .9
Botryosphaeria ribis (Dothiorella)	3	3	0	0	43x116	1.7x4.6

This study confirms the earlier work of Fawcett. It also shows that this type of canker disease still occurs and may be of importance. In addition, it brings out the fact that one variety, the Spinks, appears to be very susceptible. This fact might not seem to be of great significance as this variety is not now highly esteemed, but it is probable that some other more valuable varieties may also be found to be susceptible. The study also shows that three different species of Phytophthora are capable of becoming active parasites of the avocado under the conditions of this experiment, and it suggests that under some circumstances they may cause injury in other ways, such as by attacking the roots in the soil.

While the three species of Phytophthora and the Dothiorella were shown to be capable of aggressive attack on the avocado, in only one case did the Spinks canker, as observed in the field, develop in truly characteristic manner. This was in inoculation on Spinks bark with the fungus **P. cactorum.** Whether the other inoculations under more favorable conditions and with more time would also have developed the same sort of surface aspect is not known.

Control measures have been recommended at various times based on experience with citrus gummosis disease and citrus foot rot. The writers have not carried out studies in this part of the problem nor are they familiar with operations carried on where it is known that specifically this kind of canker was involved. Crown and root cankers have been treated by various persons, notably by Dean Palmer in San Diego County, and this work was followed to some extent by the first author, but the cause of the cankers was never specifically proved. Where the disease is causing trouble, avoiding to heap up the soil in contact with the base of the trunk of the trees, careful control of soil moisture, and the generous use of bordeaux about the crowns should be tried as

preventives. Surgery—meaning cutting away all visibly affected tissue plus a small margin of normal tissue, together with the use of disinfectants should be employed for visibly established cases. The Phytophthora fungi are sensitive to copper, so that bordeaux is likely to have a good effect in this case as a preventive if applied to the trunk and root crown and to the soil about the base of the tree.

1. University of California Experiment Station Bul. 585, pp. 24-28, figs. 9-11, 1934.
2. Fawcett, H. S. Bark diseases of avocado trees. California Avocado Assoc. Ann. Rpt. 1916: 152- 154. Also, in California Citrog. 2(3): 22-23. 1916.
3. Fawcett, H. S. A Pythiacystis on avocado trees. Phytopathology 6:432-435. 1916.
4. Barrett, J. T. Pythiacystis related to Phytophthora (Abstract) Phytopath. 7-150. 1917.
5. Smith, O. O. Inoculation of some economic plants with Phytophthora cactorum and Phytophthora citrophthora. Phytopath: 27:1106-1109. 1937.