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Cause and Control of Important Avocado Diseases

Wm. T. Horne
Citrus Experiment Station, Riverside

This paper is intended to supplement the discussion given by Mr. Dean J. F. Palmer at the Avocado Institute at La Habra on March 8th last.

Bulletin 585 of the University of California College of Agriculture, "Avocado Diseases in California," came from the press about the middle of March and may be useful in a number of ways. It should not be regarded as a completed work, but it furnishes a point from which study may go forward. I hope no one will feel obliged to accept the ideas there presented—what I should desire, rather, is to get the facts and to correct any errors which may exist. Among things which may be noted in this bulletin is the frequent reference to articles in the Yearbooks of this Association. The Yearbook for 1928 especially may be regarded as a classic. It contains three articles which have been of unusual significance in our work, namely, one by Dr. Haas on tipburn and salt; and two by Dr. Coit: (1) on pests and diseases, and (2) sun-blotch.

In Mr. Palmer's paper given at La Habra, he referred very briefly to the importance of injuries due to unfavorable soil and climate. This discussion may with profit be expanded somewhat. Among troubles due to unfavorable soil may be mentioned the injury due to excess water. We believe this injury is really due to lack of air because too dense subsoils prevent escape of excess water. Where the soil saturation continues through a long period a slow decline of the tree occurs. Foliage becomes sickly and twigs slowly die back from the ends and the tree is usually lost. This trouble I have called Melanorhiza or water injury. It is my belief that this is the most frequent cause of loss of avocado trees throughout tropical and subtropical countries. Various other trees die under comparable conditions, as citrus and walnuts, but the avocado is particularly liable to water injury.

Asphyxiation is occasionally observed in California and is believed to be a quick response to temporary soil saturation. Leaves and tender green parts wilt, suddenly and dry up. Usually there is a rapid recovery. Tipburn is most frequently due to excess of common salt as shown by Dr. Haas for the avocado, and by Haas and Thomas for citrus. The previous work on tipburn was particularly useful in connection with studies of dothiorella rot on account of the propagation of the dothiorella fungus in the dead parts of the leaves.

Chlorosis or loss of color of avocado trees in soils with an excess of lime may be a very serious trouble. Unless drainage can be secured the disease probably can not be corrected. With drainage, the application of sulfur or iron sulfate should be helpful.

The avocado tree apparently is not sensitive to large amounts of nitrogenous fertilizers

as is citrus, which in some cases may develop exanthema. The avocado bears heavy applications of fertilizer provided, of course, the caustic effect of some materials is avoided.

Dothiorella rot of the fruit is familiar to most of you. A discussion of our experiments for control of this trouble is given in a bulletin by myself and Mr. Palmer recently sent to Berkeley for publication. Sprays are helpful, either bordeaux or sulfur, but they do not need to be applied until the fruit is one and one-half inches in diameter. This would probably be in July or early August. For further information see your farm advisor. A detail which might well have attention **now** is to prune out the dead twigs, as the causal fungus propagates in them. Also, if much tipburn exists its control should be studied (again see your farm advisor). While dothiorella rot is usually a local problem, the fungus occurs over our whole avocado area and some rot may appear in what are usually considered our most approved avocado-producing districts.

Sunblotch is often obscure but evidence accumulates that it is very persistent in the affected tree, although the new growths of the tree may seem to have outgrown or recovered from it. In Dr. Parker's work we have not certainly had any diseased seedlings from planting seeds from diseased trees. However, one reliable report gives 3 diseased to 27 good seedlings from such planting. This is as we might expect in a virus disease, namely, that seedlings from affected plants are either free of the trouble, or occasionally give a few diseased individuals. This trouble is less menacing than it appeared in 1928. Many trees show more or less recovery, and it has not spread rapidly. When first observed, there was no assurance that it might not become as disastrous as peach yellows.

It is well worth while to make every reasonable effort to avoid disseminating sun-blotch in future plantings, and we have much faith in the efficiency of selecting disease-free mother trees from which to take buds and scions. We hope something may be done by this Association in encouraging such selection. We believe we can cooperate to a limited extent in judging the freedom from sun-blotch, and other qualities of the mother trees.

Many conditions and behaviors of the avocado remain unsolved. This is particularly true of such things as excessive shedding of young and of mature fruit, and breakdown of the living tissue as in Thompson spot, Challenge decline, Puebla internal blackening, and others. Also, various defects at softening, such as scald and failure in storage, merit study. Some of these problems need the plant physiologist's attention, and we hope more plant physiology work may be done.

We feel that the plant pathologists have been fortunate in the avocado work. We have had excellent support and several menacing troubles have turned out less serious than feared. A substantial new industry has been established with good promise of usefulness to all our country, and also, with promise of reasonable return to the growers. We think that we have done our best but the pathologists did not make or save the avocado industry. Credit for the existence of the industry in California must be given to this Association, and to the fine people who have cooperated in it. There is still much to do and we hope that the California Avocado Association may continue to work and prosper and to give much enjoyment to us all.