

ECONOMICS OF ROOT ROT

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At first glance, the assigned title didn't convey the clear meaning or intent that the committee undoubtedly had when the program was developed. After some thought, the title became—in the writer's mind, at least—a natural one. One that perhaps should be the primary viewpoint of avocado growers, and also that of the Farm Advisors and others working with growers in the field.

We have seen the economics of root rot at work. It's the dollars and cents impact of the disease. From its industry-wide scope to the grower with a small but commercial planting, evidence of the dollars and cents impact is visible. We've seen it. We'd like to relate some of our actual experiences.

Our basis is this—a conservative estimate of over 2000 individual farm calls where root rot was involved. Of course, many of those calls were repeat visits to the same property—usually with a new owner.

Let us describe some of the situations that we recall—every one of which has an economic lesson. One of the first lessons learned had to do with replanting an area where trees had died from root rot, or avocado tree decline, as it was called in those days. The disease aspect at that time was highly suspected, but unverified by the data that was soon to be developed by Dr. Zentmyer. In this case 90% of the old orchard was 100% dead. A small area of the property had considerable clay in the subsoil—so this area was planted to citrus. Physically, the rest of the soil would pass as suitable for avocados. We were quite pessimistic, but the grower was not, so the new planting was accomplished. Only a few lived into the second year.

When we saw the next owner of the same property — getting ready to replant—we stopped in, out of curiosity. Yes—('twould be avocados)—trees were ordered. Well, spot fumigation was just beginning to be tested in the field—so we got together with Dr. Zentmyer and spot fumigated a number of the tree locations. The trees were delivered in a few days, and I think planting was made in about three weeks—too soon, of course. A number of the fumigated trees died immediately, because sufficient time had not been allowed. The remainder of the untreated trees died within 18 months.

A year later, another owner, and another replant job.

The economic gains in this case were in favor of the nurserymen and the real estate

brokers.

How much better to have found other land uses, or just leave the ground idle! This problem of diseased soil is one of the economic products of the root rot problem. Virtually any other crop will grow well. Houses and poultry do well too.

There are the cases of those who buy and then investigate. I worked with about a hundred cases that run somewhat like the following case:

A letter was received, asking for a farm call on a certain Wednesday, when these people would be down from Los Angeles on their newly purchased three acres of avocados. By their directions to the place, I knew what the situation was, what to expect.

The family turned out to be a wonderful couple, with two children about 4-H Club age—enthusiastic, but just a slight sign of misgivings based on some neighbors' remarks. The man was a telephone company employee and had arranged a transfer so he could raise the family in an environment other than the city. Some ten thousand dollars had been accumulated over the years, most of which went to buy the property—with enough left to finance a house through G.I. or F.H.A. But after 15 minutes talking with them, they could see that their land didn't even have bare land value in an avocado district.

In instances like this—and they are many—one might ask—well, who, other than the individual involved, is hurt. I say the industry suffers, the communities suffer. The Farm Advisor feels that the days spent each month in routine identification and explanation of root rot could better be spent in constructive effort—activity that would result in other growers being able to prevent root rot from getting a start, or from spreading.

There are simple, reliable tests for root rot. Why couldn't we foresee a program of testing? I sold a house recently. Before it cleared escrow, a termite inspection was required. Why couldn't the buyer of an orchard be entitled to assurance of freedom from a soil inhabiting organism that attacks the roots of trees? I'm just raising the question. The conditions appear similar.

One common source of loss is due to a rather general attitude that "it won't happen here." Growers fail to fully appraise their soil conditions and irrigation practice in terms of potential root rot. Root rot comes as a complete surprise, and usually spreads rapidly because of failure to take action, or take it in time to reduce rate of spread of the disease. Several instances can be cited:

(1) One grower had 7 acres of 9-year old trees, very closely spaced overhead sprinklers. Water use was heavy, according to field men who had occasion to know. Trouble started in the upper portion in a swale. The soil was not bad, but irrigation practice was such that some lateral movement did occur, keeping the bottom areas quite wet. Three or four trees showed up at first, and the Farm Advisor's diagnosis was root rot. The possible steps were discussed, stressing the need for modifying the irrigation practice—even some parts of the system. In one year's time, about forty trees were on their way. But, the pay-off was that the overheads were still pouring it on the areas where trees were nothing but skeletons—keeping the fungus thriving, and spreading as rapidly as possible under such ideal conditions. As expected, the place was soon sold.

Our analysis of the situation is that had he a good irrigation system from the start, and had irrigated carefully—he would be free from any trouble today and for many years to come. This all happened in recent years, when there was common knowledge of the disease aspect of the trouble. Even had he acted after our first diagnosis, and thoroughly dried out the area, removed diseased trees, modified his system, and practice, and perhaps—because his particular terrain favored them—made some ditch barriers to fungus spread, he would have had production for many years from 50-100 trees now dying out. Certainly would look like the economical thing to do.

(2) Another grower can point with considerable pride to his fine producing 23-year old trees—one in particular that has 7-8 boxes on the off year —much more on the on-crop phase—usually about 2 of the good crops and one small one. He appears not the least concerned about a spot of root rot three trees away and up-slope. It started about 2 years ago— one tree was removed, two trees were pretty far gone, but still standing. He hopes those sick ones may come back. He says he can't dry the area out because he has overheads. Where's the economy? By failing to face the real problem, and spending maybe fifty or seventy-five dollars in labor and portable irrigation equipment, he jeopardizes surrounding trees, including several with outstanding production records. In that particular orchard—removal of sick trees and complete drying out would go far to reduce the rate of spread of the fungus to a foot or two per year or less.

(3) Then there are the instances of property line differences. They've been with us since the onset of root rot. And they're still with us. One recent set illustrates the moisture fact. On similar soil—not ideal avocado soil—one orchard was eleven years old; the adjoining one 8 years. Three years ago root rot got started in two spots in the 11-year old orchard. A quick action program of complete drying out of the diseased spots and rigid moisture control was adopted. In three years, only one additional tree has shown any distress. His neighbor who fortunately is down-slope from him got into trouble about the same time—but his only reaction to a drooping tree—(first sign of root rot) is to put water on it—thereby enabling the fungus to quickly finish its job on that tree and hurry to the next. He has few healthy trees left.

This movement of the fungus from some spot where it has built up to another spot in the same orchard, or to an adjoining orchard has been well demonstrated. Some examples of this type of occurrence might be cited.

(1) One of my first calls in one district that didn't have a high incidence of root rot was on a 17-year old planting on rather high ground. The planting has some clay underneath part of it. Incidentally, this was our first observation of the terrific amount of gopher runs below the surface where apparently gophers may have been very effective in transporting and spreading the fungus. Young orchards subsequently developed below and on the natural drainage terrain from this infected orchard already show isolated indications of trouble.

(2) Another and relatively recent case resulted from an urgent call in regard to a suspected greenhouse thrips population on a tree or two. We didn't find any thrips but we did see his younger orchard, which was planted below a section of the old orchard that had root rot. Surface and sub drainage could move right across a drive into the young orchard. Two trees in the younger grove were showing signs of trouble. Irrigation

practice in the young orchard appeared to be such as to provide about 50% more water than needed. In about two weeks, real action took place—provisions were made to intercept all surface and sub surface drainage from the old orchard and carry it into a natural ravine. The sick young trees were removed and sprinkler risers permanently capped. There were definite hopes of getting the irrigation practice in line.

You're probably thinking—here's one case where action was in time. But the quirk of this case is that four years previously we had diagnosed the condition in the old planting as root rot. We had pointed out the threat to the young ones—and stressed irrigation. He established ditch barriers in the older planting that were partially effective. If he had taken complete action four years previously he wouldn't be faced with this definite threat and possibility that the fungus is distributed further into the young planting just coming into peak of production.

(3) Numerous examples of how effectively furrow irrigation can spread the disease are as old as the disease itself. Two cases of young orchards, one four years, the other nine years, stand out. From four to eight trees right down the row in the first year—usually takes 2 more years for trees in row above or below to show trouble.

(4) We've seen an avocado nursery located down-slope from a known root rot area. When some nursery trees sold by the nurseryman failed to grow, the expressed reasons were too much or too little water, depending on the variance of the grower from the ideal in mind of the nurseryman. Of course, we know the trees died of root rot, the symptoms were present, the fungus was present by test.

For root rot to go to town, both the fungus and excess moisture conditions must be present. We've watched places for years that constantly have sufficiently moist conditions for trouble. Yet, there is no fungus and no typical root rot. Old orchards are known on "root rot" type of soil, but no root rot, no fungus. There are some known instances—but few—of fungus present—• insufficient soil moisture—no root rot.

But—by way of summary—the biggest economic losses from root rot result from the grower's failure to act in time.

(1) For the prospective grower—the points are:

- a. Locate on well drained soil.
- b. Isolated—certainly not below—any root rot area—present or potential,
- c. Know the conditions under which the nursery trees were grown.

(2) For the grower without any root rot:

- a. Irrigation of a very careful nature.
- b. Knowledge of local spots most likely to give trouble and give them special attention,
- c. If adjacent to a root rot area, past or present, see that a minimum movement of water, soil, gophers, farm advisors, etc., occurs from that place to yours.

(3) For the grower with a small area of root rot:

- a. Remove trees early—there are some instances of partial tree recovery, but not

enough to warrant the risk.

- b. Dry area out completely (usually there is resistance to this).
- c. Maintain a dry barrier around the diseased area; objective, to greatly reduce rate of spread.
- d. Some sites may lend themselves to possibility of establishing ditch type barriers; perhaps even removal of yet healthy trees so as to widen the dry barrier.