What to do about...

Texas Root Rot in Pecans

by R. B. Streets, Sr.*

If anyone should try to "invent" a "super" plant disease, he could hardly outdo the destructiveness of Phymatotrichum Texas Root Rot. Nor, could he find a disease as difficult to treat.

The culprit causing the disease known as Texas Root Rot is a soil-borne fungus (Phymatotrichum omnivorum). It attacks more than 2,000 kinds of broad-leaved plants, and it does its work only in the southern states along the United States and Mexico border. It has not been reported in any other part of the world.

Two conditions which favor its occurrence are (1) an alkaline soil low in organic matter, and (2) mild winters.

There are three ways to combat Texas Root Rot—prevention, chemical treatment and rotation with crops which are not susceptible.

**Avoiding Root Rot**

It is far cheaper and more satisfactory to prevent root rot infestation than to bear the expense and labor of treating it.

The presence of Root Rot can be accurately determined only by growing very susceptible indicator plants in soil for two years before you plan to plant long-lived tree crops.

Alfalfa, or cotton, make the most practical indicator plants, because you need not lose the use of the land during the test period. There are other good test plants, but who needs a thousand acres of okra?

If cotton is used as the test plant, look for and map the spots of dead plants within the field. Do this at the end of the growing season near October first. The areas of dead plants indicate quite accurately the presence and extent of Root Rot infestation in the field.

The most accurate way to make a permanent map of the infested areas of a field is the use of aerial photography. Color film gives the best results. Keep the pictures for records because the root rot infection will remain in the same field for many years.

Mark off these areas in the field where Root Rot occurred and plant to monocot plants, which are immune to Texas Root Rot. Some of these include: grain crops and forage sorghums, corn, millet and other grass type plants.

Root Rot can be greatly reduced in subsequent years using this rotation. When a response is obtained, a one-year rotation is sufficient. It is wise to plant immune plants a second year, particularly before investing in the planting of a long-lived fruit or nut tree.

Another means of preventing Root Rot is to inspect nursery stock before planting. It would be careless to introduce the Root Rot fungus into an otherwise clean field.

**Treatment of Spot Infestations**

A good treatment is the acidification of alkaline soils. The addition of large quantities of organic matter or some sulphur and ammonium sulphate will accomplish this. It is necessary to treat the roots to their extremities. This is known as the drip line. Dig a basin to confine the ammonium sulphate solution to the root zone.

A small tractor with a border disc may be used around the drip line of the tree for two or three times to form a border.

Spread the manure two to three inches deep within the basin. It can be fresh and full of straw for that which is needed is the rapidly decaying organic matter. Scatter one pound each of ammonium sulphate and soil sulphur over the manure for each ten square feet of area.

When these ingredients are in place, flood the area with three to four inches of water to leach the ammonium sulphate down into the root zone.

Pecan trees are amazingly tolerant of heavy applications of ammonium sulphate as well as ammonium phosphate.

Usually by the time one becomes concerned about the health of a tree, it has already lost from 60 to 80 per cent of the roots to Root Rot. Thus, to balance the tree top with its reduced root system remove from 50 to 75 per cent of the foliage and branches.

The tree will quickly grow a new top if the treatment is successful.

There is always the problem of detecting infected trees before root damage becomes extensive. We have found that a slight yellowing is an early sign. This symptom is not usually recognized by grower as Root Rot connected.

A tree with small, or sparse, foliage usually indicates that it was infected the previous fall. When in doubt, treat the tree because the cost is small compared to the cost of replacing it. The material used in the treatment is all plant food except for the excess of sulphur.

As one might expect, trees in early or light stages of infection respond more promptly and with less loss of production. Ideally, a grower should not let his trees go beyond the early stage before applying the treatment.

Remember that recovered trees are surviving on a damaged root system. These trees need a followup treatment, a booster of ammonium sulphate about the first of May each year. This is about the time when an active Root Rot season begins. This followup rate of application should be one pound of ammonium sulphate for each ten square feet of space within the drip zone. Then, irrigate.

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New Canker Disease Found in Pecans

by R. B. Hine, J. E. Wheeler and E. L. Clark

During the spring of 1969 a canker disease of pecans that occurred in commercial plantings in the Sahuarita and Continental areas of Pima County was identified and shown to be caused by a species of the fungus, 

Cytospora. Approximately 150-200 trees failed to leaf out during April and May and were shown to be killed by fungal infections that girdled the main trunk. Cankers were also numerous on scaffold and other branches. The disease was scattered throughout a four thousand acre planting but occurred primarily on 2 and 3 year-old trees. Although the disease is common on a large number of other trees including apple, apricot, cherry, peach, plum, walnuts, and a number of native Arizona trees including cottonwood, it has never previously been reported on pecan. To the authors' knowledge, this is the first published report of the disease on pecans in the United States.

The fungus pathogen needs injuries to gain entry into host tissue. Infections on the main trunk of 2 and 3 year-old trees were common. The most likely injury-factors for fungal infections were either winter-low temperature damage, a late spring frost during 1968, summer-sun burn, or pruning injuries. The extent of canker development was determined by superficially removing the bark from suspected diseased areas and noting the sharp delineation between healthy and diseased tissue (light and dark colored wood, respectively). Orange spore masses in long chains were microscopically visible in the cankered areas. The spores are extruded from small, black, pinhead-sized fungal structures, partially imbedded in the diseased bark, called pycnidia. These air-borne spores, which are produced during periods of moisture, are the primary sources of infection. Original inoculum probably came from diseased native trees in the area as examinations of a large number of newly planted native trees were disease-free, indicating healthy planting stock. The disease occurred on the varieties Barton, Bradley, and Western Schley.

(Root Rot in Pecans)

Unfortunately, there are no known pecan varieties found to be resistant to Root Rot.

Planting Replacement Trees

When a tree is lost from Root Rot infestation, the soil can be prepared prior to the planting of a replacement tree. Dig the tree hole 8 by 8 by 2.5 feet, a hole which will yield 80 cubic feet of soil. Twenty pounds of soil sulphur, ten pounds of ammonium sulphate, and eight cubic feet of manure should be distributed through the soil.

Fill the hole in the following manner alternating the layers:

- **Step one**: put one inch of manure on the bottom of the hole upon which you scatter some of the sulphur and ammonium sulphate.

- **Step two**: place two inches of the soil on top of the manure.

- **Step three**: repeat step one. **Step four**: repeat step two. Continue building alternating layers until the hole is filled to four inches from the top. Flood the depression to settle the soil and make sure it is thoroughly soaked.

Wait one month, then apply water before placing the replacement tree into the hole. If you are impatient, plant the new tree in the treated hole making sure that the roots do not come in contact with the treated soil. Use untreated soil around taproot.

This method has been used successfully for 25 years in planting replacement trees.

The variety, Riverside, used as a rootstock, appeared to be disease free.

**CONTROL** — Sunburn damage to young trees prior to adequate canopy development may be reduced by application of reflective materials to reduce trunk temperatures. Various dilutions of latex paint (white, indoor) with water have been recently used in other states to reduce the incidence of Cytospora canker in stone fruits. The material may be sprayed or painted on the trunk and scaffold branches. Winter injury may be reduced by preventing excessive tree growth late in the fall caused by late fertilization and irrigation. Pruning, if possible, should be done in early spring so that active growth and subsequent callus formation may reduce the period of susceptibility to fungus infection. Diseased wood, because it is a source of inoculum, should be removed. Pruning wounds should be treated with a wound dressing. Although the efficacy of fungicide applications to pruning wounds in pecans has not been determined, it is reasonable to believe from studies in other trees that this would be a valuable control measure. Tools used in the pruning operations should be dipped in a disinfectant such as alcohol, formaldehyde, or sodium hypochlorite. Mechanical, herbicidal, or other types of injury should be avoided.

Because the fungus is inactive during the summer, inoculation studies will be initiated in the fall to determine if differences in disease tolerance exist in pecan varieties adapted to Arizona growing conditions.

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