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TEXAS ROOT ROT IN ARIZONA

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Over Wintering of the Organism—Control Measures—Cultural Practices and Resistant Crops Discussed

REPEATED experiments by a number of research workers who have studied the disease show that the organism is not carried in or on the seed. The fungus is confined to the roots in all susceptible plants, although it occasionally advances up the stem an inch or two above the soil line. Thus the organism must overwinter either in the roots or in the soil. Since it cannot be isolated from roots even two or three weeks after they have been killed, the fungus must pass the winter in living roots. All experimental evidence tends to substantiate this conclusion. The roots of cotton, okra, and some perennial weeds are known to carry the organism through the winter months, and it is very probable that almost any susceptible plant whose roots survive the winter will do likewise. A perennial morning glory with small pink flowers is an important weed carrier in Texas, but fortunately it is not found in Arizona.

Control Measures

The control of Texas root rot is one of the most difficult problems confronting the plant pathologist today. Since the parts above ground are not attacked and the disease is not carried by the seed, only control measures for soil inhabiting parasites need be considered. There are five possible lines of attack and some progress has been made along each of them.

1. Soil Sterilization:

Soil disinfection by heat or chemicals is effective, but decidedly limited in its application, on account of cost and difficulties of adapting it to field conditions. Formalin (1 pint to 20 gallons of water) applied at the rate of two gallons per square foot greatly reduces root rot and will often entirely eliminate it from small areas, such as flower beds or yard plantings. Steam sterilization of soil for greenhouse benches or plant beds is effective.

2. Cultural Methods:

Fall plowing is effective in greatly reducing the amount of root rot if done so as to throw the live roots out of the ground where they will dry out, killing both host and parasite. No method of plowing has been found which will throw all the roots out on top of the soil, and even hand pulling of all visible roots does not remove all of them as some are always buried. The important feature of this treatment is to allow the soil to dry out thoroughly and this is only possible when winter rains are light or infrequent. After drying the roots may be plowed under without danger of reinfesting the soil.

3. Use of Fertilizers:

Extensive tests have been made in Texas with various commercial and natural fertilizers and with sulphur, lime, and a variety of other substances. No definite control was secured from either light or heavy applications of commercial fertilizers, or applications of lime or sulphur in amounts up to five tons per acre. A heavy top dressing of manure is known to greatly reduce the loss from root rot but the amount necessary is not practical on an economic basis. Cottonseed meal has also reduced the damage from root rot.

4. Rotation with Resistant Plants:

Crop rotation has been one of the most successful methods of combating soil inhabiting organisms but there are certain difficulties in applying this method. There are two principal difficulties, both arising from the fact that the disease attacks such a large proportion of our field crops, truck crops, fruit and ornamental trees, flowers and even weeds. Perhaps the most important of these difficulties is that Arizona farmers, working irrigated lands where production costs are high, find it difficult to change to resistant crops, either because of lack of a profitable market or lack of equipment and training to grow such crops success-

fully. Another difficulty in eradicating the root rot organism from the soil is that ordinary agricultural practice, whether land is allowed to lie fallow or is planted to a resistant crop—either cultivated like corn or not cultivated like grain, in nearly every case leaves enough susceptible weeds to carry over the organism.

The length of rotation necessary to eliminate or greatly reduce root rot varies with local conditions, but at least three to five years is recommended.

The following plants are either highly resistant or immune to Texas root rot and are recommended for planting in infested soil. The list is tentative and changes are necessary from time to time as new data is secured. The plants are classified for convenience in reference.

Field Crops—

Small grains—wheat, oats, barley.
Corn and sorghums—Milo, Hegari, etc.

All grasses
Iron cow pea
Brabham cow pea

Truck Crops—

Onions and garlic
Asparagus
Cucurbits (Melon family)
Pumpkin, squash, cucumber and melons—cantaloupe, muskmelon, cassaba, watermelon.

White potato

Fruit Trees and Small Fruits—

Citrus fruits—orange, grapefruit, lemon, lime

Dates
Pomegranate

Currant
Blackberry

Strawberry

Shade Trees—

All palms—canary palm, fan palm, etc.

Cypress—Arizona cypress, Italian cypress, etc.

Hackberry

Osage orange

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Ornamentals—

- Yuccas
- Oleander
- Honeysuckle
- Crape myrtle
- Arbor Vitae

Perennial Flowers—

- Bulbs—hyacinth, tulip, narcissus
- Calla lily
- Cannas and gladioli
- Mint family—mint, catnip, sage (Salvia)
- Shasta daisy
- Geranium
- Periwinkle (Vinca)

Annual Flowers—

- Carnation and pinks
- Cosmos
- Nasturtium
- Sweet alyssum
- Stocks
- Watercress
- Four o'clock
- Larkspur
- Snapdragon
- Pansy and Violet
- Cypress vine
- Moon flower

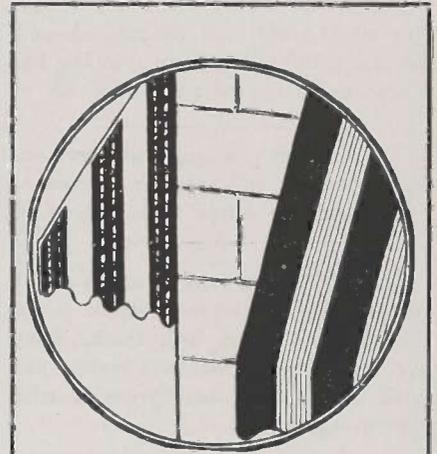
The following plants have proven to be very susceptible to Texas root rot and should be avoided where the field is known to be infested. This is particularly true of long-lived plants like orchard trees for the disease is almost certain to break out

in one or more places and spread until it kills the whole planting. This usually occurs before the orchard comes into profitable bearing. The following are very susceptible: Fig, mulberry, black walnut, pear, apple, jujube, Chinese elm, poplars, bottle tree, privet, soy bean, sweet potato, cotton and okra.

5. Resistant Strains:

The possibility of finding or breeding resistant strains of the most important economic plants is our greatest hope for the future. Resistant cotton and resistant alfalfa would greatly reduce the annual losses from root rot and aid materially in limiting the spread of the disease. The experiment station is now conducting selection work on Pima and Acala cotton grown on severely infested soil, but the results will not be available for several years at least. It would be, of course, impossible to develop a resistant strain of every susceptible plant as over one hundred and seventy-five hosts are known at present and new ones are found every year.

While Texas root rot remains one of our most important plant disease problems, enough is known at present to enable growers to avoid costly errors, and it will no doubt yield in due time to scientific research as have other plant diseases no longer dreaded.



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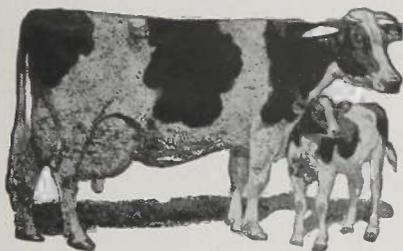
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