HARDWOOD NURSERY DISEASES

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Although nursery diseases of hardwoods have not been studied as intensively as those of conifers, much information is available. My talk will be limited to the infectious diseases, most of which are caused by various fungi. I will discuss them under the following headings: Damping-off, root rot, leaf diseases, and top blights and wilts.

Damning-off

Damping-off, or rotting of young seedlings near the groundline, is caused by fungi of several genera, but the most important are Rhizoctonia, Pythium, and Fusarium. When the seed is rotted or the seedling killed before it emerges from the soil, the disease is called pre-emergence damping-off. When the seedlings are affected after they appear above the ground, the term post-emergence damping-off is used.

The loss from pre-emergence damping-off is difficult to detect and has frequently and erroneously been attributed to poor seed. The presence of germinated seed with decayed radicles is a good indication of pre-emergence damping-off.

Post-emergence damping-off of hardwoods is generally quite different from that of conifers. The infected seedlings usually do not become flaccid and topple over. Instead, they remain upright, gradually wilt, break off, and finally are blown away. Losses are most severe when the seedlings are in the cotyledon stage, and as soon as the first true leaves are fully developed, the critical period is past.

Field observations and greenhouse tests indicate that the elms, black locust, mulberry, willow, Russian olive, sweetgum, and tupelo gum are susceptible, while green ash, catalpa, hackberry, most oaks, and walnut show high resistance.

The severity of damping-off is affected by environmental conditions such as temperature, moisture, and soil pH. Control may be attained through modification of nursery practice, seed treatment, soil sterilization, or fungicidal treatment of the soil.

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Modification of nursery practice.--Covering the seed deeply with soil favors damping-off. In addition, the type of covering is important. If local soil is used, sub-soil is safer than topsoil. Early sowing should enable the seedlings to get past their most vulnerable stage before the onset of warm weather, when the fungi are most active.

Seed treatment.--Since fungi found on seeds may attack the developing seedling, surface sterilization of the seed is of value. Among the many products that have been successful are cuprous oxide, zinc oxide, and tetramethylthiuran disulfide. They may be applied as powders or by pelleting the seed.

Near-sterilization of the soil by chemicals such as methyl bromide and formaldehyde controls damping-off. The treatments are expensive and may not be justified on the basis of damping-off control alone. With methyl bromide, there are additional benefits in weed control and an apparent increase in available nutrients.

Fungicidal treatment of the seedbed.--It seldom is worthwhile to apply fungicides to the seedbeds after the disease has appeared. Prevention is more effective. The chemicals mentioned for seed treatment are all suitable.

Root rot

Root rots are caused by a number of fungi. Some can be avoided by proper selection of the nursery site. One example is the cotton root rot caused by Phymatotrichum omnivorum which attacks most of our hardwood species. It is common in Texas and the Southwest but has not been found north of the Red River in Oklahoma. A root disease caused by the shoestring fungus (Armillaria mellea) is especially prevalent on areas that have recently been cleared; a site on which the pine stumps have infected roots should not be used for a nursery. Among other fungi that have been found associated with root rot are Corticium and Fusarium. No definite controls are yet known. Excessive organic matter and poor aeration probably contribute to infections.

Leaf diseases

Leaf diseases may prevent seedlings from reaching usable size by the end of the growing season. They also interfere with the accumulation of food reserves and thus increase susceptibility to injury by frost and drought.

In the Great Plains, species of Prunus and Fraxinus are most susceptible. Species of Prunus are infected with a leaf spot commonly called shothole, caused by the fungus Coccomyces lutescens. This disease can be controlled with 5 to 7 sprayings of Bordeaux mixture (3-4-50). It is important that spraying be started early in the spring and repeated every 7 to 10 days.

Adisease that causes premature defoliation of ash is caused by a species of Marsonia. This disease--often called rust--can be controlled by spraying with Bordeaux, but applications must begin when the leaves are half grown.

Other leaf diseases that at times become serious include powdery mildew on oaks, anthracnose on sycamore and oak, and melampsora rust on cottonwood.

Top blights and wilts

Blights and wilts occur sporadically and are difficult to control once they become established. They are favored by conditions which lead to poor aeration and high humidity.

Phytophthora parasitica causes a blight that has killed black locust in some nurseries. Bacterial blight of mulberry caused by Phytomonas mori is sometimes damaging in the Southwest. At times, verticillium wilt of maple becomes serious.

DISCUSSION TO: Glenn Peterson and Richard Toole

Q. I've heard some discussion of your superior tree work and we are contemplating using cotton seed meal in our soil in planting our superior tree seedlings and I wondered if anybody would know if there was any effect of increasing the possibility of causing root rot here?
(No answer).

Q. What's the advantage of cotton seed meal?

COMMENTS by Mr. Smith:

One advantage is the availability of nitrogen over an extended period of time without a rapid release. So you have it with a longer time period without having to apply nitrogen so often – that's our main reason.

Q. Why not use Ureaform nitrogen and accomplish the same thing?
A. (Peterson) That's pretty slow to release. The temperature there has to go up quite a way before you get much release. That's our experience with it.

COMMENTS by Mr. McNeel:

I don't know the answer, but as Billy Gaddis just mentioned here if its good for sugar cane, its good for anything--just slow sodium nitrogen. I believe T.V.A. has published a publication on a study they made on quick available nitrogen and as far as they could find, it didn't make any difference – no particular effects – ammonium nitrate did about the same as the rest of them did.

COMMENTS by Mr. Smith:

If I remember correctly, the experiment done by T.V.A. was as a dressing to the seedbed in the growth of the seedlings. This that I am referring to is over a little longer than the tree itself. Also, in answer to this urea, Dr. Boyce did some work but I'm not sure that it was Ureaform. They got burning in black walnut.

COMMENTS by Mr. Peterson:

Concerning cotton meal, one can expect an increase in damping-off with many organic materials. So I think you certainly have to be careful. It's well documented – you get an increase in damping-off, both conifers and broadleafs, with increased nitrate nitrogen and a lot of organic materials. So you certainly got to expect this. I don't know about work on this.

There is one thing I didn't mention that I see now I might have; that is, virus diseases in broadleaf seedlings. By and large, you find

viruses when you look for them. All the fruit trees have a number of viruses, but people ignored them for a number of years. Very few virus diseases have even been found on conifers. It's not too well established that there are any, but there must be and the same can be said for most broadleaves. The people in tree improvement are certainly going to run into this thing. As far as the nurseryman is concerned, the only danger would be if they are seed-transmitted. We are working on one now on western chokecherry which usually kills out infected trees in 2 or 3 years. So far we don't have any evidence at all that it is seed-transmitted.