

OLD AND NEW DISEASE PROBLEMS IN SOUTHERN FOREST NURSERIES

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Perhaps the oldest disease problem in southern forest nurseries is damping-off and the newest, nematode injury. Papers on damping-off began appearing in the 1870's while nematodes have been worrying us a mere 10 or 15 years. This is not to say that nematodes are new. We just didn't recognize their importance until we had nematologists. Mycologists--people who identify fungi--have been on the payroll since the Irish famine and were looking at larch canker before the Civil War. At the turn of the century, blister rust and chestnut blight gave them their first real start. So the old diseases of forest nurseries are caused by fungi. Nematologists, on the other hand, were rare until after the second world war. Tear gas and then other soil fumigants produced the crop responses which eventually made nematology a respectable profession.

Old-timers in the forest nursery business had few of the headaches of modern nurserymen. They grew a few thousand seedlings. If they didn't get a stand, they would have simple reasons--heat, drought, frost, wind, poor seed, weary soil, birds, weeds. They didn't need Ph.D's with microscopes to explain their losses. When the crop failed, it was no great loss. They just moved to fresh soil and prayed for better weather.

Today's nurseryman has lost his alibies. His seed lots are of known germination, his droughts are non-existent except when the irrigation pump breaks down, his weary soil is fertilized and chemicals control his birds and weeds. So when his crop is damaged by disease, he has to face it squarely. Most nurserymen will have to reckon sooner or later with losses from damping-off, root rot, rust, needle or leaf blights, chlorosis, and nematodes.

Fortunately, damping-off is less serious in the south than elsewhere. Bright sunshine and warm weather give the seedlings a fighting chance against the soil-borne fungi providing the soil is well drained and warm and does not have a pH above 6.0, a high nitrogen content, or too much organic matter. If damping-off is a problem, soil fumigation is a sure cure and treating seed with thiram or spraying young seedlings weekly with thiram, captan, or a mercurial fungicide may help. The new methods are a big improvement over the old acid or formaldehyde drenches. In the future, some biological controls such as the bacteria-treated peat used in Russia may replace chemical treatments. At present, the losses are not great enough to justify the expensive research which would be needed.

Root rot is a late attack by the same fungi which cause damping-off plus a few others. It gets worse as nurseries produce successive crops of seedlings because fungi which live on pine roots multiply in the presence of their favorite food plants. Trees with root rot continue to die in plantations and we can expect to hear more of this. Small losses can be

tolerated but eventually most nurseries will have to fumigate to control it. Methyl bromide, Brozone, or Trizone are the preferred fumigants but nurserymen have had success with Vapam or Mylone. Whatever the fumigant used, success depends on confining the chemical long enough to do the job. Plastic covers are the most common means, but a water seal applied with care can do the job. Root rot has been with us for years, but still might be called a new disease because it often becomes important suddenly in nurseries which have produced good trees for 10 or 20 years.

Fusiform rust is a universal problem throughout the belt south and east of the fall line. Until resistant trees are available the Ferbam spray program from emergence until the middle of June will have to continue. Spray every week and twice a week if it rains is the general formula. There aren't that many infection periods but proposals to spray only before predicted rains have not been taken seriously. Addition of nickel sulfate to the spray improves efficiency. It is most important that high pressures, adequate gallonage, and enough spreader-sticker be used so that the plant is completely covered with a film of fungicide. If a nurseryman is unavoidably caught with infection in part of the nursery, these trees should be dug late in the season. Many infected seedlings in the beds do not show symptoms until late in the winter. A few years ago there was excitement about systemic fungicides which could be sprayed once, taken up by the plant, and render the trees immune. They didn't work but I still think the search should continue. Pine seedlings immunized to rust are worth a big gamble. Consider the value of a seedling crop guaranteed to stay free of rust for 2 or 3 years in plantations.

The leaf and stem blights cause some damage on longleaf pine, white pine, juniper, Arizona cypress, and many hardwoods. Foliar sprays control them. So many new chemicals are now available that the old standbys, Bordeaux for longleaf and Ferbam for white pine, and mercurys such as Merbam for juniper and Arizona cypress may soon be replaced. Actidione, Cyprex, Polyram, and Manzate look good against cherry leaf spot; Phaltan controls one of the Arizona cypress blights; and Actidione may replace Bordeaux against brown spot on longleaf. In general, the wise nurseryman will stick with his old materials as long as they work. The new fungicides can be reserved for emergencies.

Chlorosis is a disease which can truly be called the new disease because it didn't develop under the old starvation regime of nursery production. Today we all fertilize and because depleted nurseries need phosphorus we usually include a high percentage of this element in the mix. This is fine for agricultural crops which are poor absorbers of soil phosphorus. But pine trees can get phosphorus which is unavailable to other crops. On many fertilized nurseries they get too much. Phosphorus in excess ties up iron and causes the yellowing that worries so many nurserymen. Those who face this problem can correct it by spraying with iron chelates, but the cheapest solution is to leave phosphorus out of the fertilizer mix.

This simplified explanation of chlorosis ignores the kinds caused by too much calcium, magnesium, manganese, or aluminum, too little nitrogen or nematodes, but these are easily distinguished by sampling soils.

Nematode injury is another new disease but I will leave this subject to a newer and much more competent pathologist, Dr. Ruehle, who follows me on this program.

Altogether most nurserymen know how to cope with the old disease problems. It is only when a new one develops that they need advice from a pathologist. Pathologists have answers to all of them. Some may even make sense at your nursery.