FUNGUS PATHOGENS IN FOREST NURSERIES

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The mere presence of a fungus pathogen in your nursery should be of little concern to you until the fungus infects a crop plant and causes appreciable damage. A fungus pathogen may cause disease of such non-crop plants as nutgrass, crabgrass, or dog fennel. The brown spot fungus is probably in many of your nurseries during most years but causes little if any real damage to your loblolly or slash pine crops. Ferbam sprays offer some degree of control of this pathogen in slash and loblolly but Bordeaux mixture may be needed to control this disease in longleaf plantings.

Needle cast fungi are seldom a problem in loblolly and slash pine nursery stock but are capable of causing problems. Many foliar pathogens are present in nursery plantings during most years but cause little damage as is the case with powdery mildew of cotton-wood and Cercospora leaf spot of black gum. Arizona cypress and red cedar blights are a source of some concern in nursery plantings. These blights are best controlled with mercuric fungicides which have been taken off the market. John Rauschenberger may have more to say about the removal of the more effective fungicides from the market.

Air pollution is a relatively new disease to many people. Some of you have been made aware of this disease because of its presence in your nursery or seed orchard. White pine and Virginia pine are more susceptible to air polluntants than are slash and loblolly and unless you have planted White or Virginia pines you may not have noticed air pollution injury at your nursery. Air pollution may be caused by SO_2, ozone, hydrocarbons (ethylene, peroxy acetyl nitrate), and several other gases. These gases cause problems when they accumulate at high concentrations such as occurs during weather inversions. The symptoms of air polluntants on conifers are very difficult to distinguish but certain broad leaf plants can be used to distinguish between pollutants. Herbicide injury and symptoms of other foliar problems may be confused with that of air pollution.

Another newly recognized disease in nursery plantings is *Diplodia* canker of sycamore, cottonwood, and sweetgum. The fungus, *Diplodiagossypina*, causes a serious disease of silage cellulose plantings. Cottonwood is more susceptible to this fungus than are

sycamore, sweetgum, or yellow poplar. The fungus enters the tree thrugh wonds and although its presence in nursery plantings may cause little mortality, damage is seen in plantations established from infected nursery stock.

Cylindrocladium root rot is a disease of yellow poplar, white pine, Fraser fir, and black walnut. The roots and sometimes the stems of seedlings are attacked by this fungus. Foliage of diseased seedlings turns yellow, dies, and falls off prematurely. Cylindrocladium scoparium, C. crotalariae, and C. floridanum may cause the disease. Fumigation with high rates of methyl bromide and chloropicrin mixtures are suggested for control of this disease.

Most of you recognize the need for nitrogen in growing a crop of trees. Excessive nitrogen applications can cause problems. Chlorosis may be caused by applications of nitrogen or slag, by poor drainage of rain and irrigation water, the application of salty water, excessive heat, or by fungus pathogens. The death of young seedlings may be the result of sunscald, or damping-off, or both. The fungi that cause black root rot often cause damping-off in young seedlings. Most of you recognize the symptoms of black root rot on slash and loblolly seedlings. Sclerotium bataticola, the primary pathogen causing black root rot, attacks over 300 species of plants including most of the vegetable, cover and tree crops grown in nurseries. The disease on most plants other than pine seedlings is known as charcoal rot.

The most serious disease of loblolly and slash pine in the Southeast is fusiform rust. At the last nurserymen's conference, I mentioned a study of mine in which Plantvax appeared to provide better control of fusiform rust than ferbam. In a 1970 test of Plantvax, ferbam, Vitavax, and Benlate at the Davisboro Nursery approximately 50 percent of check trees were infected. This was a better test than the 1968 test aththe Morgan Nursery near Byron, Georgia in which only 11 percent of check trees were infected. The results of this latest test at Davisboro show ferbam to be the superior fungicide and further show that the three fungicides Plantvax, Vitavax, and Benlate have little if any systemic activity against the fusiform rust fungus.

As Don Marx has indicated, the fumigation of nursery soil eliminates beneficial mycorrhizal fungi from soil which could lead to disease problems since certain mycorrhizae offer protection against certain root pathogens. The reduction of the population of a pathogen from soil by inadequate fumigation could be worse than not having fumigated at all. Because fumigation kills both the pathogen and its antagonists, inadequate fumigation could eliminate a pathogens competition and allow its population to exceed that in existence

before fumigation. Post-plant applications of fungicides are often needed after fumigation because of inadequate fumigation. In areas where Pythium root rot is known to exist before fumigation, applications of such fungicides as Terracap at planting, is often justified because of inadequate fumigation.

Nematode problems are often seen in forest nursery plantings. A stunt nematode problem was first noticed at the Morgan Nursery near Byron, Georgia in 1959. Although the area has been fumigated several times since then, stunt nematodes are still a problem in this area. Dasanit and similar materials have shown promise as post-plant treatments for root knot and other nematodes.