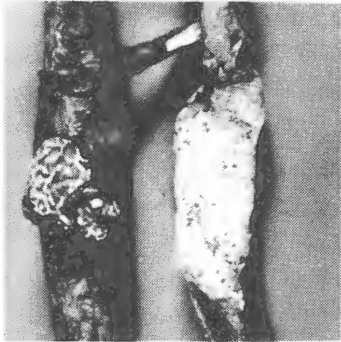


Forest Tree Diseases of Virginia

September 1973

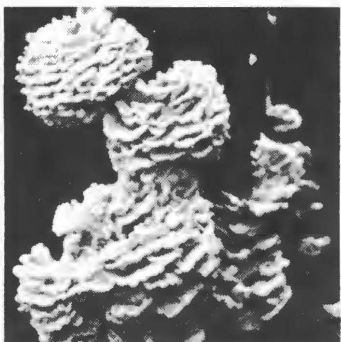
MR-FTD-11



RUST



DECLINE



DECAY



CANKER

Littleleaf Disease of Shortleaf Pine

by

John M. Skelly

Extension Specialist, Plant Pathology

Virginia Polytechnic Institute and State University

Blacksburg, Virginia

Shortleaf pine, *Pinus echinata*, is considered as one of the four major conifer species in the Southeast. In Virginia, it is found primarily in the Piedmont sections of the south central area of the state. This species accounts for 18 percent of the commercially available volume of pine in Virginia.

A highly destructive disease termed "littleleaf" is prevalent throughout much of the range of shortleaf pine. In the Southeast, timber trees on approximately 15 million acres are seriously affected and trees on another 5 million acres are dead. The results of a 16 year study of the progression of littleleaf within shortleaf pine stands indicated that the percent dead or diseased trees



Figure 1. Thin foliage and initial dieback of littleleaf affected shortleaf pine (right). Note denser foliage of healthy tree on leaf.

increased from 1 to 49 percent within stands that were healthy at the beginning of the study. In stands moderately affected by littleleaf at the beginning of the study this figure increased from 12 to 75 percent by the end of the 16 year period.

Littleleaf disease is the major management problem of shortleaf pine in the Southeast. Stands are seldom affected prior to 20 years of age and the disease is most intense in stands over 40 years of age.

Range: Littleleaf disease of shortleaf and other pines is found throughout the Southeast. Severely affected stands are found in Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Tennessee.

Suscepts: Of the southern pines, shortleaf is the most susceptible. Loblolly pine is less susceptible but in localized areas severe damage is possible. Although other pines such as Virginia, pitch, slash, and longleaf may be susceptible, the disease is not of economic significance in these species.

Symptoms: The disease was named "littleleaf" due to the primary symptom of shortened, yellow needles developing on affected trees (Figure 1). Early symptom expression is difficult to discern from nutrient or water deficiencies. However, as the disease progresses, the foliage becomes sparse and tufts of needles are all that remain on branch terminals. Needle length may be reduced from a normal 3-5 inches to 1/2 inch in length. During more advanced stages twigs, and branches die throughout the crown.

Diseased trees may produce abundant crops of cones, but these are very small and usually contain only a small number of viable seeds. The average tree affected by littleleaf will die within 6 years after the first visual symptoms appear, but some may die in as short a period as 1 year.

Of considerable importance in the economic impact of littleleaf is the drastic but slow reduction in annual increment that occurs in affected trees.

Stands affected by this disease tend to "breakup" and a general decline in the overall appearance of the stand occurs. Affected trees rarely recover from the effects of the causal complex.

Cause: Littleleaf is caused by a combination of poor soil water drainage and subsequent attack of the fine feeder roots of pines by the soil inhabiting fungus Phytophthora cinnamomi. This fungus is widely distributed throughout the soils of the Southeast.

Poor internal drainage of soil water from the site may be due to the recurrent cycles of farm - forest which has been typical in the agricultural areas of the United States. Erosion of top soil

through tillage and the development of clay hardpans in Piedmont soils has resulted in minimal conditions for growth of pines. Advanced soil deterioration resulted in lowered fertility, increased acidity, destruction of needed physical properties, and a resultant increase in pathogenic fungi or bacteria in the poorly drained soil. Littleleaf is severe in silt or clay soils but is seldom found in sandy or other well drained soil types.

The causal fungus requires abundant moisture to survive and to produce the motile spores that infect the fine feeder roots. As new root tips and very young feeder roots are attacked and killed, the absorption of nitrogen is reduced and a slow reduction of growth and yellowing of the foliage follows.

The relationship between poor soil drainage and root infection explains why the disease is confined to the heavier soils of the Piedmont area.

Control: Practical control of littleleaf is based upon early diagnosis of the disease before stand stagnation and breakup occurs. Periodic salvage of affected stands or areas within stands will minimize losses. Cutting schedules have been suggested by U. S. Forest Service. It must be pointed out that no rule applies to all situations and caution must be used in determining the best policy. To minimize financial losses due to littleleaf the following have been suggested: 1) where only an occasional tree is affected, light cuts should be made at least 10 years apart; 2) when 10 to 25 percent of the stand is diseased, cut on at least a 6-year cycle removing all affected trees or those suspected as having littleleaf; 3) when more than 25-30 percent of the stand is exhibiting littleleaf symptoms, all commercial shortleaf pines should be cut; and 4) when the stand is a mixture of shortleaf pine and other more resistant species such as loblolly, the latter should be retained to regenerate the stand for future years.

Long term control of this disease may be possible through improving soil conditions. This may be done by conversion of affected areas to hardwoods such as yellow poplar, a species that returns large quantities of nutrients to the soil through annual leaf litter. However, economics could prohibit such management practices. The conversion of severely affected stands to more resistant species such as loblolly pine may be a more immediate solution to the control of this disease in the forest situation.

Fertilization with large amounts of inorganic nitrogen has proven effective in alleviating the symptoms of littleleaf. Such practices although not economically sound in the forest situation can save trees in landscape situations or at least extend their life by many years. Rates of 1 ton of 5-10-5 commercial fertilizer plus 0.5 ton of ammonium sulphate per acre are recommended. The fertilizer should be applied in the spring to an area approximately 50 feet in radius around individual trees. Applications should be made on a 3 year cycle.