

Disease Problems in Hardwood Forests of the Lower Mississippi Valley

Tree diseases are one of the major sources of loss to timber growers in the Southern bottomlands. The U. S. Forest Service estimates that, year in and year out, the disease toll in these forests is equal to 15 or 20 per cent of the growth.

Because very little is known about the diseases that cause this tremendous annual loss, the Southern Forest Experiment Station has recently begun to study the pathology of Southern hardwood forests. The work is concentrated at the Station's Delta Research Center, at Stoneville, Mississippi. The Mississippi Agricultural Experiment Station and the Southern Hardwood Forest Research Group are cooperating.

Aim of the research is to improve the estimation of defect due to rot; reduce the proportion of cull material grown; describe and evaluate a variety of stem, leaf, and twig diseases; reduce mortality due to endemic diseases, through prediction and control measures; and minimize mortality due to epidemic diseases that might otherwise become catastrophic.

This article may aid foresters and lumbermen in identifying and appraising important diseases until more detailed information becomes available. As investigation proceeds, diseases not discussed here may prove serious enough to warrant detailed study.

By way of definition, tree diseases are abnormalities, other than those traceable to insects, that impair the growth or utility of the tree. Most diseases are fungus infections. Some, however, are caused by bacteria, mistletoes, or viruses, and some by non-infectious agents like drouths, floods, excess heat or cold, nutritional deficiencies or excesses, and fumes.

Wood Rot

Heart rot is the greatest source of

By E. Richard Toole

Southern Forest Experiment Station,
Forest Service, U. S. Department
of Agriculture

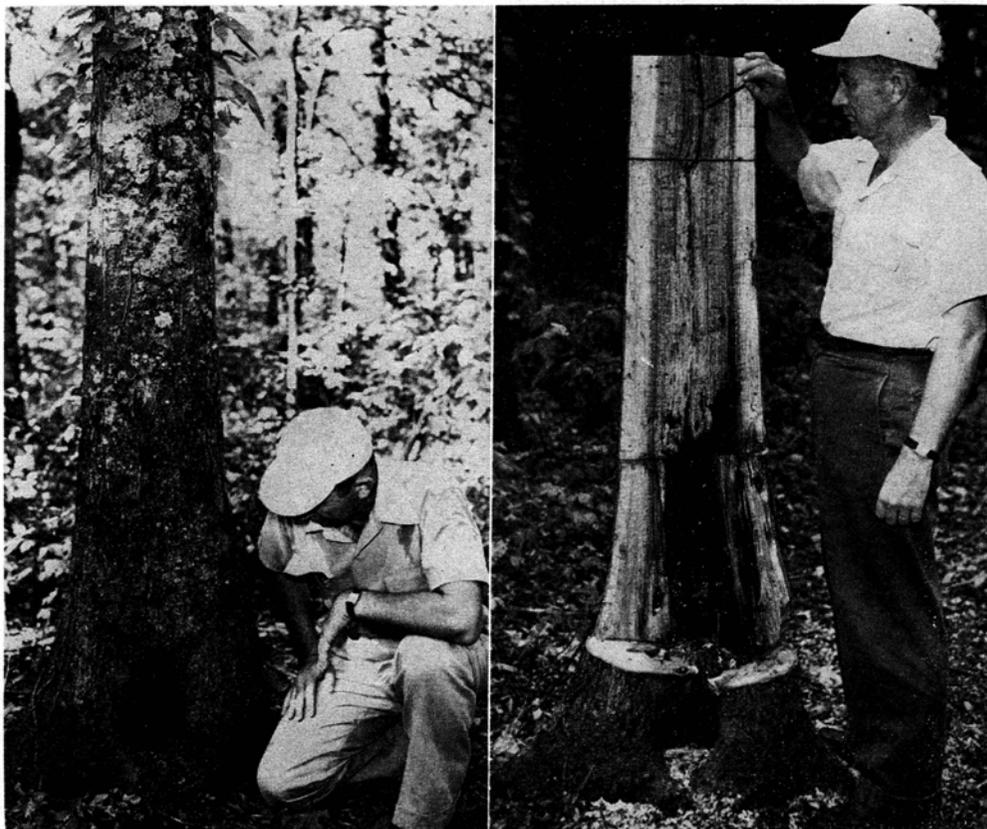
and the most difficult for the forester to evaluate.

About 90 per cent of the heart rot in Southern hardwood forests enters the base of trees through wounds caused by fire. When a ground fire runs through a hardwood stand, only small trees may be killed and it may appear as though little or no damage has been done to the timber. In a few years, however, dead bark falls away from portions of the butts of scorched trees. As the bark drops off, it exposes dead

wood. Fungus spores may come to rest on this exposed wood, germinate, and grow—first through the live sapwood and then into the heartwood. Once within the tree, the rot spreads steadily upward at rates varying from a few inches to nearly a foot a year, depending on the tree species and rot fungus involved. Thus, the most valuable part of the tree is rendered worthless, sometimes within five or ten years.

Patches of bark knocked off through careless skidding produce wounds and rot similar to those caused by fire. Root wounds caused by the trampling of grazing animals may also result in considerable rot.

Rot sometimes enters the tree in the



Left: This 12-inch Nuttall oak was scorched by fire 16 years ago. The open wound measures 6 by 10 inches. Right: The same tree cut open. The hollow extends three feet and the

crown—through decayed branchstubs or limbs that have been broken by ice or wind storms. However, rot from this source is minor in comparison to that caused by basal wounding.

Decay can be reduced considerably by preventing fires, avoiding damage from logging and grazing, and harvesting the trees before they become overmature. More information is needed on the total amount and volume of cull due to rot. Better methods of judging, from external indications, the present extent of internal defect and the amount to be expected at some future date should be of value to the forester.

The relation of age and size of fire scars to rot in young pole stands has been studied in detail for hackberry, Nuttall oak, water oak, sweet gum, and

ash. Research has recently been expanded to include other species and size classes. Preliminary results indicate that within any species the amount of rot increases about in direct proportion to the size and age of wound. Wounds less than two or three inches wide are likely to heal over before decay gains a foothold.

Until more information is available on external indicators of internal defects, foresters without extensive experience will find the estimation of cull in standing trees very difficult.

Cankers

Cankers are localized areas of dead bark on branches and trunks of trees. They are usually caused by a fungus. Cankers are sometimes mistaken for mechanical injuries, but it is possible to distinguish between them. A mechanical injury is free of bark and gets smaller each year as it becomes covered by new callous tissue, while a canker often retains dead bark and usually increases in size. Some types of cankers develop pitted protuberances and others become recessed.

Several of the cankers found on the trunks of bottomland red oaks always have heart rot behind them. The canker caused by *Polyporus hispidus* is sunken and elongated, often reaching a length of several feet. In one Delta forest that had been high-graded, 13 per cent of the willow oak trees had *hispidus* cankers, most of which were in the first log. The cankers made it necessary to cull seven per cent of the cubic-foot volume of the stand and 18 per cent of the board-foot volume.

These cankers were increasing in length about 0.5 foot per year.

Another canker, caused by *Poria spiculosa*, produces swellings around old branch stubs. The heart rot behind this canker increases in length about 0.8 foot per year.

Any merchantable tree with cankers of this type in the butt log should be harvested as quickly as possible, for the rot behind the canker will quickly make the tree a cull.

Sweet Gum Blight

A disease of widespread and increasing occurrence during the last few years is the blight of sweet gum.

The first indication of the disease is a thinning of a part of the crown. This occurs because on individual branches some buds fail to open and those that do open produce dwarfed, yellowish leaves. The ends of blighted branches gradually die, often retaining the dead leaves for some time. Some trees with only a few branches visibly affected one year will be completely dead the following season. In other cases, part of the upper crown and leader dies back gradually, a branch or two at a time, over a period of years.

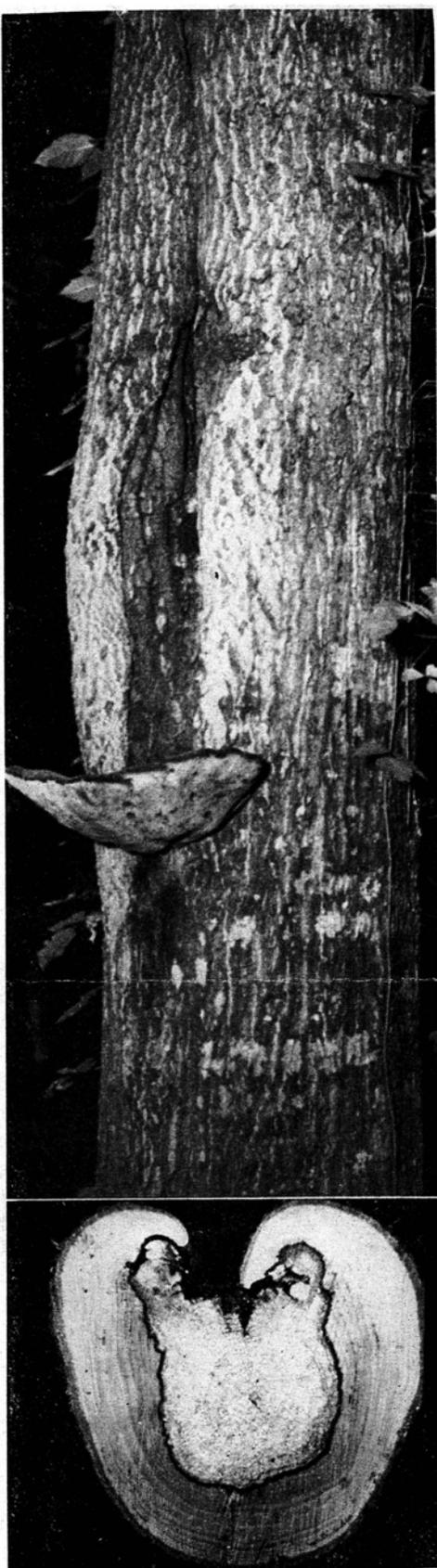
It is not known whether or not sweet gum blight is infectious. If it is, it may become a serious threat to the growing of sweet gum, while if it is due to abnormal climatic conditions, it may subside in the future. When the root system of a blighted sweet gum is examined, as many as 90 per cent of the fine feeder roots are seen to be dead. It is likely that the dying of the tops



Canker, caused by *Poria spiculosa*, on the main stem of a willow oak. The heartwood is always rotten for several feet above and below *Poria* cankers. (U. S. Forest Service photo)



Eighteen-inch overcup oak wounded by fire 21 years before cutting. When the tree was loaded, a seven-foot stump butt had to be made. (U. S. Forest Service photo)



Top: Elongated hispidus canker on the main stem of a bottomland red oak. Bottom: The heartwood behind cankers of this type is always rotten. (U. S. Forest Service photo)

is a result of this high mortality of the fine feeder roots. The killing of the fine roots might be due to fungi, viruses, nematodes, adverse soil-moisture relations, or a combination of these and other factors.

Until the cause of sweet gum blight has been determined, control measures cannot be formulated. However, badly affected trees should be salvaged promptly, if merchantable.

Other Diseases

Although many other diseases attack bottomland hardwoods in the South, they generally have not caused losses as great as those already discussed. Among these diseases, oak wilt, leaf disases, and drought should be mentioned.

Oak wilt has not as yet been found in the most important hardwood forests of the deep South. Its two southernmost extensions are in north Arkansas and east Tennessee. Recent research has shown that *Endoconidiophora fagacearum*, the fungus which causes oak wilt, will not survive in twigs longer than three days at temperatures of 95° F. This fact suggests that the wilt may never be as serious in the warmer sections of the South as it has become farther north.

Hardwoods are attacked by a large number of fungi that spot or kill the leaves. Some of these leaf diseases, when they attack early in the growing season, lower the vigor of the tree so much that growth is seriously reduced. Leaf blister of oak, which is characterized by blistering, wrinkling, and curling of leaves, occasionally causes excessive defoliation.

Anthracnose of sycamore and oaks is another serious foliage disease. The affected leaves may brown and die as they emerge from the bud. Infection on older leaves starts with irregular brown spots which rapidly enlarge, finally killing the whole leaf.

Bottomland hardwoods are particularly susceptible to extreme or prolonged droughts. Large numbers of trees have died in the drought of the past three years. The oaks have been very heavily hit. Mortality has been worst on soils with a hard-pan near the surface, on low sites with a normally high water table, and in places where a relatively shallow clay layer overlies deep sand.

Reprinted from

SOUTHERN JUMBERMAN

issue of December 15, 1954