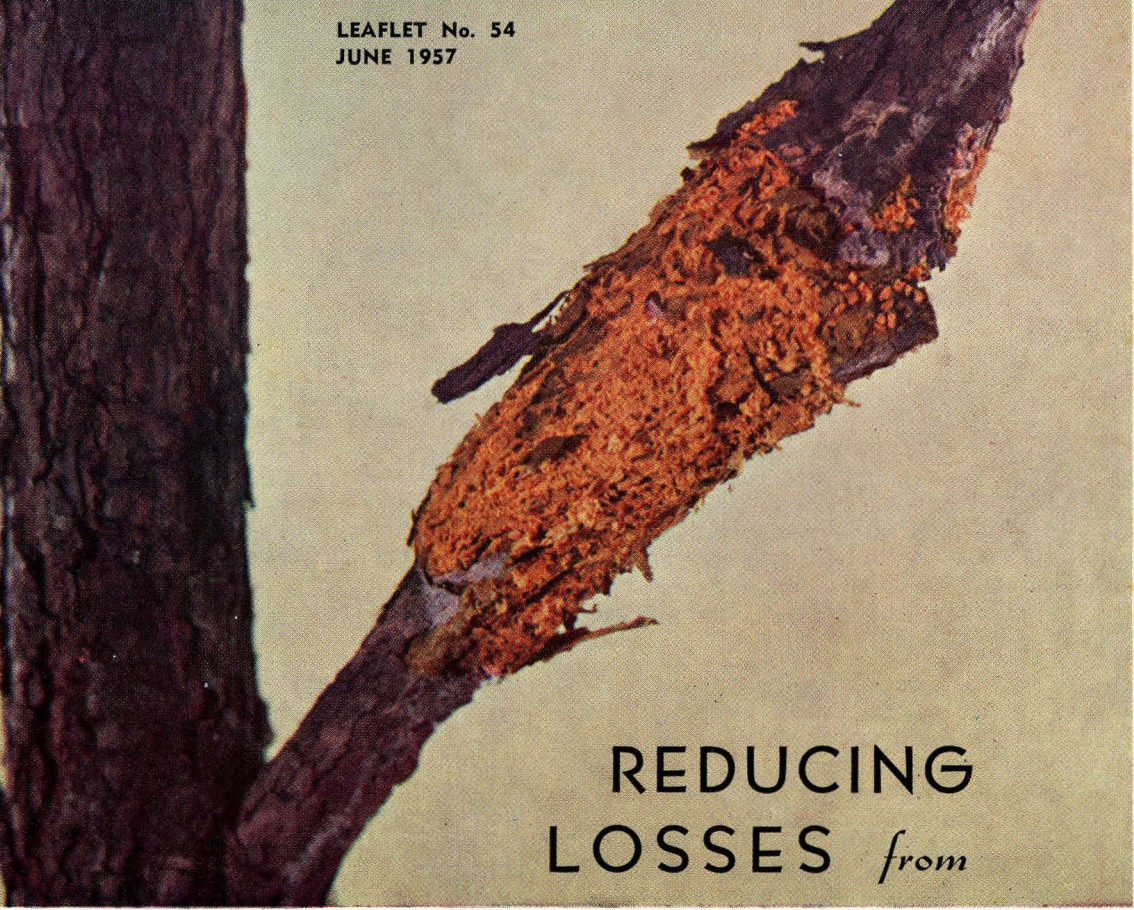


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REDUCING  
LOSSES *from*

*Southern Fusiform Rust*

*Agricultural Experiment Station of the*



ALABAMA POLYTECHNIC INSTITUTE

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# REDUCING LOSSES

from

## *Southern Fusiform Rust*

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**T**HOSE SPINDLE-SHAPED swellings you see on slash, loblolly, and longleaf pines in Alabama are warning signs of a disease. It is commonly known as southern fusiform rust, and it is caused by a fungus.\*

Southern fusiform rust is found in most areas of Alabama. However, it occurs most often in the Piedmont and Coastal Plain regions. It is in these areas that the disease is an important factor to be considered in growing pines. Income losses resulting from this rust may be large unless preventive steps are taken.

In nurseries, where millions of small pines are grown each year, this disease is controlled by spraying. The small trees are sprayed with chemicals once or twice a week from time of seed germination until early summer. This method is practical only for nurseries. In forests, the disease might be controlled by removing all oak hosts and cutting all infected pines. However, this is not practical. At present, the most practical approach is to do the things that will keep income losses from the rust low.

### **HOW to REDUCE INCOME LOSSES in FORESTS**

Income losses caused by southern fusiform rust can be greatly reduced by the following measures:

**Thin Early.** Early thinning permits utilization of the worst infected trees as soon as they reach usable size. All infected trees need not be cut in one thinning, since this may thin the stand too much and cause a reduction in total growth. Trees that are not bad risks and that are needed to fully utilize growing space are left until the next thinning. Many trees with rust infections may be left to grow for several years before becoming bad risks. It is important that stands not be thinned too heavily. Overthinning, with the resultant reduction in total growth, is a major factor in income losses from rust infection.

Trees with only branch infections present no major risk. Those with small cankers on one side of the stem are good risks. Trees having small, slightly swollen cankers all around the stem are not bad risks. Such trees may be left for more growth. Bad risk trees are those with large stem cankers, or with bends or deeply sunken places at the

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\**Cronartium fusiforme* (A. and K.) Hedgc. and Hunt.

cankers. These bad risk trees are removed in periodic thinnings to avoid loss of salable trees.

**Thin Often.** By thinning often, the worst infected trees are removed before they are lost. Failure to cut marketable trees before they are lost is another major cause of income losses from fusiform rust.

**Prune Infected Branches.** In young, open stands, pruning branches with infections closer than 18 inches to the stem helps hold down stem infection. This prevents branch infections from growing into stem infections. Several prunings are needed for plantations or natural stands during the time they are 2 to 7 years old. Although not generally practical, this practice can be useful for holding down stem infections in open stands.

**Plant Enough Trees.** It is important to establish an adequate stand of trees. After infected trees are removed, there should be enough uninfected trees left to fully occupy the land. For example, a plantation with 1,000 trees per acre could have a more than average amount of rust infection and show little loss of income. On the other hand, serious loss would result from an average amount of infection in a plantation with only 200 trees per acre.

Research by this Station has shown that planted slash and longleaf pine do not survive as well as planted loblolly. For this reason, poorly-stocked plantations are more likely with slash and longleaf than with loblolly. Where poor slash survival has occurred, this species should be planted closer than loblolly.

Other results show that (1) fast-growing stands have more rust infection than slow-growing stands, and (2) there is a higher percentage of infection in thin than in thick stands. Thus, owners of open stands of fast-growing trees should be alert to prevent income losses.

## HOW *the* DISEASE SPREADS

Southern fusiform rust cannot spread from pine to pine, but must have another in-between host. Oak trees are the other hosts. Water, willow, and laurel oaks are the most important ones. Others that may be hosts are blackjack, bluejack, southern red, turkey, and live oaks.

The infection cycle, from pine to oak and back to pine, is usually completed in the spring. First signs of this infection cycle appear on pines in early March. Cankers on pine trees produce masses of orange-colored spores resembling powder (see cover photo). These spores are blown to leaves of oak trees, where they grow. Later in the spring, brownish, hair-like bristles are produced on the lower surface of the leaves. These bristles produce spores, also carried by the wind, that can infect pines. Infection of pines usually takes place on new needles, or on the tender new stem and branch tips.

## HOW RUST INFECTIONS DEVELOP *and* GROW on PINES

When pines are infected, the fungus penetrates the living inner bark and begins to grow. This causes the familiar long, spindle-shaped swelling or canker. Infection can take place on the main stem or on branches. It may show up first as a swelling on one side of the stem or branch, or as a swelling all around the stem or branch. In any event, the canker usually grows until it encircles the stem or branch. As they grow, the cankers lengthen. Limb cankers, especially those near the stem, tend to grow toward the stem. When the fungus reaches the stem, a new stem canker will be formed.

As a stem canker grows, the fungus sometimes kills a portion of the living bark. Growth of the live portion of the stem will cause a sunken place to develop at the canker, severely weakening the tree. Other stem cankers merely grow into large swellings. These infec-

tions also weaken trees, but not as much as do the sunken-face cankers.

In young pine stands, branch cankers that are 18 inches or more from the stem are not considered important. There is a good chance that the fungus will never reach the stem. If less than 18 inches from the stem, the branch canker may lengthen and infect the stem.

### **SOME FACTORS INFLUENCING AMOUNT *of* INFECTION**

A study of southern fusiform rust infection in pine plantations in the Alabama Coastal Plain Region was recently completed. Five- to 16-year-old slash, loblolly, and longleaf plantations that had never been cut were examined.

This study showed that amount of infection was influenced by the following: (1) species of pine, (2) year of planting, (3) number of trees per acre, and (4) rate of height growth. The manner in which each factor influenced the amount of rust infection is given below.

**Species of Pine.** There was no important difference between the amount of rust infection on slash and loblolly pines. Longleaf pine had much less infection than either of the other two.

Nevertheless, things more important than rust infection usually determine the species of pine to be planted.

**Year of Planting.** The year that trees were planted strongly affected the amount of infection found on them. Some years' plantings had an average amount of infection, whereas others had large or small amounts. It is probable that varying weather conditions during late winter and spring caused this year-of-planting effect. A good or a bad year was the same for all species. It is impossible to predict whether a future year will be good, average, or bad for planting.

**Number of Trees.** The percentage of trees having rust infection decreased as the number of trees per acre increased.

**Rate of Height Growth.** The amount of rust infection in plantations increased as the rate of height growth increased. Plantations on good sites grew faster and had more rust than plantations on poor sites. This does not mean that only poor sites should be used for growing trees. Good sites are capable of yielding much more income; however, one should be especially alert to reduce losses from rust on the better sites.