

## Causes of Failures in Plantations

There are four principal causes of failure of trees to survive after planting, over which the tree planter has control. They are:

1. Too small stock for the planting conditions
2. Allowing the roots of the trees to become dried before they are planted
3. Failure to tamp the soil sufficiently tight around the roots
4. Heavy sod not sufficiently removed at time of planting.

The choice of species and size of planting stock must be adapted to the particular planting area selected. This will be emphasized in the discussion of local planting conditions.

If a tree is planted when the soil is warm enough to cause new growth of root hairs, it becomes established quickly. However, if the ground around the roots freezes deeply before the tree has started new root growth, heavy loss is inevitable. It is for this reason that fall planting should stop before freezing weather sets in, and spring planting should be delayed until the ground has become warm.

Losses may be expected when the roots have been allowed to dry out, or when the soil is not properly packed around them. These losses can be avoided only by reasonable and constant care when the trees are planted. The importance of sod in causing losses is shown in the table on page 10.

Other possible causes for failure of survival are:

1. Extreme drought immediately after planting
2. Heavy freezing of the ground immediately after the trees are planted
3. Heating of trees in bundles while in transit
4. Delay in unpacking
5. Setting the roots improperly in the holes (too deep, too shallow, or crushing the stem of the tree when packing the soil)
6. Flooding due to poor drainage or a very wet season
7. Low spots subject to late frosts (frost pockets)
8. Land wholly unsuited to the species of trees planted on it.

All of the above possible causes of loss, except the factors of drought and freezing, can be avoided if the stock is carefully chosen and the trees are properly planted.

Losses of trees after they have begun to grow occur, and these losses are sometimes difficult to prevent. During years of severe outbreaks of grub worms, young plantations have been attacked heavily. This was observed to be the cause of many trees dying in young plantations in southern Wisconsin during the summer of 1930. After the

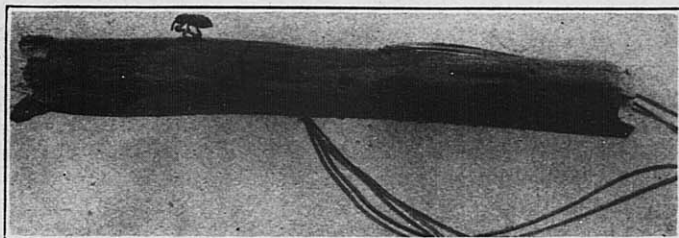
fifth year, the root system of most trees is sufficiently large to withstand some damage from grubs, without the tree dying.

Rabbit injury, porcupine injury, and in some cases deer injury, occur in northern counties. During some winters, especially when snowfall is light, the losses are more noticeable.

### White Pine Weevil

#### *Pissodes strobi*

There are frequent outbreaks of the white pine weevil, one of the worst insect enemies of white pine in Wisconsin.\* While this insect



A portion of a tip of a white pine with the exit holes of the white pine weevil. An adult weevil is on the twig.

does not usually kill the trees outright, by killing the terminal shoot of the main stem, it causes the trees to grow badly forked and crooked and may, under some conditions, render them valueless for lumber.

The weevils are reddish-brown, snout beetles about a quarter of an inch long with white markings on the wings. They pass the winter in the litter beneath the trees. In the spring they emerge and gather on the terminal shoots of the pine, generally on the trunk leader in preference to those of the branches. Here, near the tip, they feed on the bark and the female beetles soon cut tiny holes in it, placing their eggs in these chambers hollowed out of the inner bark. These eggs hatch into larvae which bore downward through the leader and by August have completed their feeding and are ready to pupate in these tunnels. The adult weevils soon emerge and cut their way out of the tunnels through the sides of the branches by making round holes through the walls. Later they hibernate, there being only one generation each year.

This insect can be prevented from doing serious injury under forest conditions. Trees growing in a dense stand are less subject to weevil-ing than those in open stands and also in dense stands the stimulation of straight growth is so strong that practically all weevil injury is outgrown. White pines growing under shade of hardwoods are not usu-

\*The author is indebted to E. L. Chambers, State Entomologist, for information presented here on white pine weevil and white pine blister rust.

ally attacked and therefore the planting of white pine in mixtures with other pines or hardwoods seems to be the logical means of avoiding losses under forest conditions.

### **White Pine Blister Rust**

#### *Cronartium ribicola*

The most serious disease of white pines is blister rust, which was brought into the United States from Europe on white pine planting stock. It was discovered in Wisconsin in 1915, when it was introduced on seedlings grown in Germany, purchased through an Illinois nursery, and since then it has been found in 22 counties in the state.

The rust is spread by wind-blown spores from infected trees to the leaves of currant and gooseberry bushes. From these bushes a different spore is blown to healthy white pine trees.

Blister rust is a deadly tree disease that attacks the white pines only. It can be controlled by removing the currant or gooseberry bushes from the area to be planted, and for a surrounding distance of 900 feet. The cultivated European black currant is extremely susceptible to this rust.

Before the trees are planted, a systematic check for wild bushes on the area is advised so that none will be missed. This check can best be made by a two to five man crew which can begin at a fence, working abreast, and follow parallel strips from this fence. The outside man on each strip should mark the edge of the strip with suitable markers, such as bits of paper which can be attached to limbs on trees or shrubs. On the next strip this paper can be removed by the inside man of the crew and used again on the following strip.

Currant and gooseberry bushes are most easily pulled in early spring immediately after the frost is out of the ground. An ordinary grubhoe can be used effectively in removing the large bushes, but extreme care should be taken so that the larger crown roots that may sprout are not left in the ground.

### **Other Insect Enemies**

There are occasional outbreaks of the Scotch pine scale, the spruce bud-worm, the pine bark louse, and the larch sawfly, but they are by no means as destructive as to discourage the planting work.