

A Pest Survey System for Forest Nurseries

Thomas F. Smith and Coleman A. Doggett

*Pest control forester, North Carolina Division of Forest Resources, Goldsboro,
and senior staff forester, North Carolina Division of Forest Resources, Raleigh.*

A recently developed systematic insect and disease survey for forest nurseries involves inspecting seedlings in sample plots for indications of pest problems. Surveys are conducted at strategic intervals, when all parts of sample plants are examined for evidence of pest injury. Tree Planters' Notes 43(1):14-16; 1992

A number of different seedling inventory and inspection systems have been used in forest nurseries (Belcher 1964, Landis and Karrfalt 1983). The North Carolina Division of Forest Resources has historically used a system of life history and inventory plots to monitor seedling quality, as well as growth and inventory in division nurseries operated by the division. The life history plots are supplemented by systematic team inspections designed to pinpoint any seedling problems. Although pest problems are considered during inspections and inventories, they are not the primary focus of the inventory systems. Because of this, a supplemental system was developed to locate and provide early warning of insect and disease problems. The system has been in place since 1985. It supplements the traditional inspections and gives pest control personnel an opportunity to systematically examine seedlings for pest problems at optimum detection times.

Methods

The sampling system that was developed requires three pest inspections per year. The first inspection is conducted just after seed germination, a second in the middle of the growing season, and a third just before lifting. Seedlings carried beyond one growing season in the nursery bed have additional inspections each year, conducted in the early spring, mid-growing season, and early fall.

During the inspections, a systematic sampling scheme is used. Numbers of sampling plots required may be based on seedlot or nursery bed length. If seedlot is used as a basis for the inspection, a minimum of four plots are taken per seedlot. If over 122 m (400 feet) of bed length is planted in a single seedlot, one additional plot is taken for each addition

305 m (1,000 feet) of bed length. When seedlot sampling is impractical, samples are based on bed length, with one sample being taken per 305 m (1,000 feet) of bed length.

A plot is measured using a standard 15-cm (6-inch) wide nursery counting frame (figure 1). All trees in the frame are counted and examined for evidence of insect or disease damage.

The early sample (taken just after germination) requires a simple surface examination. The two subsequent examinations are destructive and involve digging the seedlings so that entire plants may be examined. Leaves or needles, buds, stems, and roots are carefully scrutinized for pest problems and in addition, mycorrhizal occurrence is noted. The Seedling Pest Inspection Form is an example of the form used for data collection. The early sample normally requires 3 to 5 min per plot, and the latter destructive samples require 4 to 10 min per plot. When pest problems are found, they are identified and quantified whenever possible. Most identification, particularly when diseases are involved, requires laboratory analysis. As soon as problems are found, nursery personnel are notified and appropriate action is begun. Integrated pest management strategies are preferred when alternatives are available.



Figure 1—Using a standard nursery counting frame to survey beds in a North Carolina Division of Forest Resources bare-root nursery.

Seedling Pest Inspection Form

Nursery _____ Field _____

Species _____ Seed lot _____

1. Newly germinated

Date _____

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
Location							
Total							
Damping off							
Insects							
Disease							

Comments _____

2. Mid-summer

Date _____

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
Location							
Total							
Needles							
Buds							
Stem							
Roots							
Mycorrhizae							
Other							

Comments _____

3. Hardened-off

Date _____

	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7
Location							
Total							
Needles							
Buds							
Stem							
Roots							
Mycorrhizae							
Other							

Comments _____

Plots checked by _____

Discussion

The pest inspection system is a useful supplement to normal life history plots. It offers an opportunity to systematically examine all parts of seedlings at critical periods in their development. The number of samples is kept at a minimum to reduce the number of seedlings lost through destructive sampling. The survey is designed to be an early warning system and not a statistically sound sampling system. A number of pest problems have been located through the survey. Some of the insects found to date during the inspections include tipmoth,

bagworm, cricket, webworm, and pine bark adelgid (aphid). Diseases include damping off, fusiform rust, pitch canker, chlorosis, and chemical damage. So far, overall damage by pests has been low, averaging .5 to 1% of sampled seedlings.

Literature Cited

- Belcher, E. W. 1964. The use of history plots in the nursery. *Tree Planters' Notes* 64(February):27-31.
- Landis, D.; Karrfalt, R. P. 1983. Improving seed-use efficiency and seedling quality through the use of history plots. *Tree Planters' Notes* 38(3):9-15.