HARDWOOD NURSERY INSECTS

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Knowledge of insect pests in hardwood nurseries is in its infancy. Regeneration research at the Southern Hardwoods Laboratory has so far dealt largely with eastern cottonwood. Therefore, this paper emphasizes cottonwood insects and deals only briefly with pests of other species. Natural and cultural controls are discussed but chemical controls are omitted, since they are the subject of R. C. Morris's presentation.

COTTONWOOD INSECTS

More than 100 species of insects feed to some extent on cottonwood (personal communication from R. C. Morris, Stoneville, Mississippi). Fortunately, only a few cause economically important damage at present.

The cottonwood leaf beetle (Chrysomela scripta) is probably the most injurious pest of cottonwood in the Mississippi River Valley. Both larvae and adults feed on the succulent stem tissues and foliage in terminals and branch ends. Whole plants are seldom completely defoliated, but the terminal may be damaged or killed back as much as 2 feet. Growth loss, heavy branching, and deformed stems are the result.

When cottonwood leafs out in early spring, the beetles emerge from hibernation and begin to feed, mate, and oviposit. Each female deposits up to 800 eggs, and as many as 7 generations may develop per year in Mississippi (personal communication from R. B. Head, Mississippi State University, State College). Moreover, closely spaced, vigorously growing nursery stands provide a large concentrated food supply for the insect. When heavy broods of adult beetles overwinter successfully, populations may build quickly during early spring.

Natural enemies, particularly the ladybird beetle (Colleomagilla maculata, which feeds on both eggs and larvae, usually suppress the spring population and hold it to sub-economic levels for much of the year. In the late summer, however, control by these predators declines as a result of movement to other hosts, aestivation, or other reasons. Hence the leaf beetle frequently reaches damaging numbers during late season.

Chemicals may be required when natural controls fail. It is important, though, that natural enemies be given adequate time to act during early season. Foliar applications of pesticides also kill the predators, thereby eliminating any chance of biologically suppressing the leaf beetle. If chemicals are used during early season, repeat applications (up to a dozen) are usually needed throughout the growing season.

Adult leaf beetles overwinter around rootstocks and under leaves and other debris inside and around the edges of the nursery. The potential problem during the following growing season is lessened by any cultural practice that destroys the hibernating beetles directly or exposes them to winter temperatures and their natural enemies.

The clearwing borer, Parathrene dollii, is also a pest of cottonwood. Larvae overwinter in galleries within the stems and rootstocks. They pupate and transform to adult moths the following summer. Moths emerge throughout the growing season, but peaks occur in May and August. Although broods overlap, there apparently is a single generation per year.

Borer attacks may be found at almost any point on the stem but are most common around the base. Infested stems may be swollen or appear galled or cankered. Losses occur through breakage of weakened stems, entry of stain or canker fungi, and general weakening of the roots.

In nurseries, borer populations in 1-year-old stems and rootstocks are usually light, but sizable numbers build up in 2-year and older stools. These infested stumps serve as the principal reservoir for the clearwing borer. After several harvests, every stump in the nursery should be pulled and new borer-free cuttings planted. The stumps should be destroyed to kill the overwintering borers. Clearing the entire nursery of old rootstocks eliminates the main source of reinfestation. The annual harvests of cuttings should be inspected and infested cuttings culled and destroyed. In the field, cottonwoods are most susceptible at ages up to 3 years (Abrahamson and Newsome 1972); if cuttings are pest-free, plantations should escape serious attack.

The cottonwood twig borer (Gypsonoma haimbachiana) tunnels in the pith of terminals, stunting and distorting the growth and often killing the terminal buds (Morris 1967). It infests trees of all ages, but the greatest damage is to young plants.

Although it is an important pest in plantations, especially on poor or marginal sites, the twig borer usually is not serious in nurseries. Its many natural enemies and low fecundity are partly responsible, but its light overwintering population at nursery sites is perhaps the most important single factor. Since the cuttings are harvested and shipped to planting sites during the dormant season, the overwintering larvae--whether first instars in hibernacula along bark ridges or older larvae in stem galleries--are carried away from the nursery. Thus, the infestation during the following season comes mostly from outside the nursery. Clearly discarded cuttings, small branches, stem tips, and twigs should be destroyed to kill the overwintering borers.

Three other stem borers in young cottonwood include Oberea schaumi, O. delongi, and Paranthrene tricincta. Their attacks may cause stem breakage and allow entry of canker fungi. Destroying infested cuttings, twigs, and other refuse from cutting operations helps to alleviate borer problems.

The cottonwood borer (Plectrodera scalator) primarily attacks root crowns and shallow roots of older trees. However, where nurseries have been established in areas of high infestation, and particularly if infested older trees are nearby, considerable girdling of small stems has been noted.

During times of low moisture, eriophyid mites and leafhoppers may appear on young cottonwood. They greatly reduce vigor and may check growth completely for short periods. Leaves heavily attached by mites may drop prematurely, but infestations are usually alleviated by heavy rain.

Another cottonwood insect was noted this year by Abrahamson and Morris. It is a leaf-feeding weevil (Curculionidae) that oviposits and develops in the midrib and tissues of tender leaves. The apical portions of damaged leaves turn dark and become very noticeable. Little is known of the weevil's potential as a pest.

Other leaf-feeding species that deserve brief mention include the viceroy butterfly (Limenitis archippus), smeared dagger moth (Acronicta oblinita), poplar tentmaker (Ichthyura inclusa), blotch leaf miner (Paraleucoptera albella), and cottonwood sawfly (Nematus populi).

SYCAMORE INSECTS

Several insects occasionally feed on sycamore, but only a few are known to cause much damage. The sycamore lacebug (Corythucha ciliata) is a sap-feeder that lives on the undersurface of the leaves. There may be two or more generations per year. Light feeding stipples the upper surface of the leaves. Heavily infested leaves may turn white and drop prematurely. Damage is usually most severe during dry weather.

Leafhoppers 1/, chiefly of the species Erythroneura (Eratoneura) lawsoni and E. (E.) arta, sometimes are numerous on individual plants. Like the lacebugs, the leafhoppers also feed on the ventral leaf surface. Infested leaves become chlorotic and mottled, and eventually turn yellow and brittle.

The giant ragweed stalkborer (Papaipema nebris) has been found occasionally in young sycamore. Its larvae tunnel in the tender terminal, where a single larva may destroy several inches of the terminal or even kill the entire plant. Although the problem appears minor at present, sizable borer populations often build up in the primary host, giant ragweed. Thus, the borer may become a serious pest of young sycamore.

YELLOW-POPLAR INSECTS

The tuliptree scale (Toumeyella liriodendri) is among the most important insects of yellow-poplar (Burns 1970). This sucking insect feeds primarily on twigs and buds, causing injury by removing large quantities of phloem sap. Sparse foliage with low vigor is the most common symptom, but severe infestation may kill the leader or entire plant. Although a pest in young plantations, the scale is not expected to be serious in nurseries.

The yellow poplar weevil (Odontopus calceatus) feeds on buds and foliage. Its larvae mine the leaves, causing a burned appearance, but the greatest damage is from feeding by the newly emerged adults.

OAK INSECTS

Although many defoliators, leaf rollers, and leaf miners are common on the oaks, most of what is known of these insects has been recorded in natural stands. For example, the variable oak leaf caterpillar (Heterocampa manteo), orange-striped oakworm (Anisota senatoria), elm spanworm (Ennomos subsignarius), and

1/ Identified by Dr. L. W. Hepner, Miss. State Univ., State College.

walkingstick (Diapheromera femorata) have all caused damage in the South during recent years. Nurseries, however, are likely to be attacked only when surrounded by an infested natural stand of oaks.

GENERAL FEEDERS

White grubs, the larvae of common May or June beetles (mostly Phyllophaga spp.), live in the soil and feed on the roots of various plants. Heavy grub damage is generally first noted in late summer and early fall when seedlings turn color and die--as if they had been killed by drought. A gentle tug on such seedlings will pull them up and reveal that laterals and taproots have been chewed off or girdled: The adults sometimes cause minor damage by feeding on leaves of nursery stock.

Grub populations tend to build up on open land that has been idle for a year or more. Lands occupied by grasses or small grains are more attractive for oviposition than are areas in crops such as clover or soybeans.

Problems with white grubs can be reduced by excluding grasses from the rotation plan and making sure that new land converted to nursery is grub-free. Soil-applied chemicals provide direct control.

The southern corn rootworm (Diabrotica undecimipunctata howardi) is another soil-inhabiting pest that commonly damages seedlings. The larvae may partially or completely girdle the stem just below the soil surface. As a preventive, the soil should be kept free of grass a few weeks prior to planting.

The lesser cornstalk borer (Elasmopalpus lignosellus) is a widely distributed species that occasionally injures hardwood seedlings. Gall-like growths occur at points of injury on the lower stems, causing the trees to die or break off.

Cutworms (family Phalaenidae) eat roots as well as stems and foliage near the ground. They usually hide in the soil during the day and feed at night. Clean cultivation, both before and after planting, reduces populations.

LITERATURE CITED

Abrahamson, L. P., and L. Newsome. 1972. Tree age influences trunk borer infestations in cottonwood plantations. Forest Sci. 18:(in press).

Burns, D. P. 1970. Insect enemies of yellow-poplar. USDA Forest Serv. Res. Pap. NE-159, 15 p. NE Forest Exp. Stn., Upper Darby, Pa.

Morris, R. C. 1967. Biology of Gypsonoma haimbachiana (lepidoptera: Olethreutidae), a twig borer in eastern cottonwood. Ann. Entomol. Soc. Amer. 60:423-427.