The Tuliptree Scale

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The tuliptree scale (*Tourmeyella liriodendri* (Gmelin)) may be a serious pest wherever yellow-poplar or tuliptree (*Liriodenron tulipifera* L.) grows. It can weaken, distort, or kill trees (fig. 1). It can also limit natural regeneration of yellow-poplar, particularly in "old field" environments. Though found on trees up to 27 inches d.b.h., it appears to be most damaging to trees less than 5 inches d.b.h. In addition, the insect excretes a sweet liquid called honeydew, which is a medium for the growth of sooty molds and which attracts hordes of wasps, ants, and other noxious insects.

Hosts and Range

The range of the tuliptree scale is from New York and Connecticut to Florida and west through the Mississippi Valley. The scale is also found in California on yellow-poplars planted for shade and as ornamentals.

Besides its principal host, the scale is found on linden and native and cultivated magnolias (*Magnolia grandiflora* L., *M. soulangeneana* Soul.). In Florida it occasionally becomes a serious pest of banana shrub (*Michelia fuscata* Blume) and is found on cape jasmine (*Gardenia jasminoides* Ellis), loblolly-bay (*Gordonia lasianthus* (L.) Ellis), buttonbush (*Cephalanthus* L. spp.), and walnut.

Description

The scale is most noticeable in the field in the partially grown or mature female stage. A mature female is ¼ to ½ inch in diameter and hemispherical in shape, usually irregularly so from crowding during growth (fig. 2). Color ranges from light grayish green through dark brown to black. When a live female tuliptree scale is squeezed or opened, the contents appear blood colored and semiliquid. Mature and immature females differ only in size.

The young, called "crawlers," are born alive. The crawlers are small, about the size of a common pinhead. Their color ranges from gray to black.

The adult male is small, inconspicuous, dark brown, and two-winged. Immature males cannot be distinguished from immature fe-

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Figure 1.—Basal sprouting from a yellow-poplar tree killed back by a scale infestation.

males until shortly before pupation. As pupation starts, the male becomes oval in shape and light tan in color. The pupal cover of the male consists of a white, opaque membrane that may remain attached to the tree after the male has emerged.

Life History

Tuliptree scale normally has one generation per year, but has been found in all stages of development during the winter in the southernmost part of its range.

In Pennsylvania and Ohio it overwinters as a second instar nymph. This stage is generally found on less exposed areas of branches and on both branches and trunks of saplings. Feeding and development resume with the advent of warm weather.

The male scale pupates in late May or early June, emerges in mid-

F–507372

Figure 2.—Tuliptree scale crawlers on female scales.

June, and then mates with partially grown females. Generally, females bear livng young in September and early October. A single female may produce as many as 3,500 crawlers during a period of 45 days. Crawlers are active for several days, during which they move all over the host and may be carried from tree to tree by wind. They then insert beaks, cling tightly to the bark, and pass the winter. Once beaks are inserted into plant tissue, legs degenerate and the scale can no longer move about. Crawlers tend to attach themselves to wood less than 4 years old.

Evidence of Infestation

When trees are dormant, the tiny immature scales can be found attached to the underside of young twigs and branches. Dried husks of the past season's mature female scales may also be found. Trunks

and branches of young trees that have been heavily infested for 1 or more years have a charred appearance as though burned.

During the summer months infestation is indicated by presence of the scale and often by large amounts of honeydew. The honeydew drips from the growing scale and covers foliage, branches, and the ground below the tree (fig. 3). This excretion soon dries to a glistening lacquerlike surface, which serves as an ideal medium for black, sooty mold fungi. The resulting gray or black appearance of the leaves is another good indication of scale infestation.

Damage

Tuliptree scale damages trees by removing sap. An infestation can kill the lower branches of mature

F–507373

Figure 3.—Honeydew excretion by tuliptree scale.

yellow-poplars. Entire trees up to about 5 inches in diameter have been killed. As few as 32 female scales have been known to kill 3-year-old saplings. The terminal shoots of the saplings that do survive a scale attack are commonly killed, often resulting in a permanent crook which makes the tree worthless for future use as veneer or lumber (figs. 4 and 5).

Biological Control

Various biotic factors have been reported to control outbreaks of the tuliptree scale. Pathogenic fungi have helped to control the scale, but

F-507370

Figure 4.—Scale-caused terminal death makes tree worthless.

F-507369

Figure 5.—Crook resulting from scale.

none have been identified with the exception of *Aschersonia cubensis* (Berk. and Curt.), which was found to be pathogenic to the scale in Florida.

Insects found attacking the scale include four parasites and four predators. The hymenopterous parasites are *Aphycus flavus* (Howard), *Anicetus toumeyellae* (Milliron), *Cocophagus flavoscutellum* (Ashm.), and *Coccidoxenus mexicanus* (Girault). The predators are the larva of the moth *Laetilia coccidivora* (Comst.) (fig. 6), the fly *Baccha costata* (Say), and larvae and adults of the ladybird beetles *Hyperaspis signata binotata* (Say) and *Chilocorus bivulnerus* (Muls.).

So far, environmental factors have kept tuliptree scale from becoming epidemic. The scale frequently kills trees in local outbreaks and has the potential of becoming an extremely dangerous pest of yellow-poplar reproduction in the Eastern United States.

Control Method

The tuliptree scale can be controlled by several methods. A dormant spray containing a superior-grade oil can be applied in the spring before new growth starts. The mixture should be 1½ cups of oil in each 3 gallons of water. It should be applied to the bark with a low pressure sprayer in March when temperatures are above 40° F. and

F–507371

Figure 6.—Larval webbing of moth predator of tuliptree scale (circled).

no freezing temperatures are forecast for the next 24 hours. Yellow-poplar is very susceptible to oil injury; hence, care must be used in formulating and applying the oil sprays.

Scale crawlers may be controlled by repeated spraying with malathion at 10-day intervals. Two-thirds of a cup of 25-percent wettable powder or 3 tablespoons of 57-percent emulsifiable concentrate in 3 gallons of water should be used. The bark should be thoroughly wetted using a low pressure sprayer.

Injury can be reduced by scraping the female scale from small trees and removing heavily infested parts of the plant.

Caution: Malathion is a toxic chemical. Store in plainly labeled containers and handle in strict compliance with manufacturers' instructions. Overdosage is dangerous to humans, fish, and wildlife, and can result in contamination of land and water habitat.

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