

Hardwood Defoliating Caterpillars of North Georgia

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Many insects found on the foliage of hardwood trees are "host-specific;" that is, they feed only on certain host species' foliage. Others are considered general feeders, preferring a variety of meal types. Outbreaks of defoliating insects can be quite extensive and may last for several years. The extent of defoliation and the time of year when the defoliation occurs determine the severity of effects on trees. Defoliation that occurs during spring leaf expansion can deplete nutrition reserves needed for tree growth. Since leaves are the food factories for the tree, their removal during the early or middle part of the season delays or prevents the manufacture of new food. However, defoliation occurring in late summer is not as damaging to tree health because leaves are close to senescing. Some defoliators reach outbreak proportions periodically, with outbreaks lasting between two and ten years.

The following are brief descriptions of some common hardwood defoliators in Georgia:

Black-dotted brown moth (*Cissusa spadix*)

High numbers of this oak defoliator were observed feeding on oak trees in middle and north Georgia during 2009-2012. This moth is native to Georgia, but until recently had never been recorded in such high numbers.

Hosts: Oaks, including bur, post, red, water, and white oaks. Caterpillars have also been reported to feed on blackjack, pin, and willow oak – although feeding has not been confirmed on these species. Caterpillars may also feed on dogwood and red maple.

Distribution: Throughout eastern North America, from Canada to Florida, west to Kansas and Texas.

Life cycle: Little is known about the life cycle of this insect, although it does have four stages including egg, larva (caterpillar), pupa, and adult. Adults fly in very early spring before the trees have flushed leaves. Tree defoliation is caused by the caterpillars (Fig. 1), which move about "inchworm style" (see cankerworms below). The caterpillars feed throughout early spring and conclude their feeding sometime in late April-May. They have black shiny heads with gray bodies and light colored lines running down their sides. Caterpillars are nocturnal and spend



Figure 1. Black-dotted brown moth larva.
Image source: Scott Griffin, Georgia Forestry Commission

most of the daylight hours hiding on the ground around the tree or under flaky bark. Birds and other predators strip the flaky bark off the trees, especially white oaks, in search of these caterpillars. This does little to harm the tree, as the inner bark is still intact, although it can be quite alarming to see piles of bark around one's favorite tree. Most of the caterpillars hiding on the ground will seek shelter under debris around the tree. As soon as it is completely dark, caterpillars can be observed making their way back up the tree to consume leaves until early the next morning. Small black pellets of frass (excrement) produced by the caterpillars that drop down from the tree's canopy sound like falling rain.

Tree Damage: This spring defoliation event has a minimal effect on the overall health of the tree. Most trees that fall into this category call on energy reserves and sprout another set of leaves after the caterpillars are gone. Problems arise for the tree when this one event combines with other stress events, such as drought, root damage from construction, other insects, diseases, or repeated spring defoliations.

Cankerworms (*Paleacrita vernata* / *Alsophila pometaria*)

Cankerworms are commonly known as "loopers" or "inchworms" because of the way they move by arching their backs and "inching" forward.

Hosts: Apple, ash, beech, birch, elm, hickory, maple, and oak.

Distribution: Cankerworms are native to North America, and are a common pest from Nova Scotia to Georgia and west to Texas.

Life cycle: Spring cankerworm, *Paleacrita vernata*, and fall cankerworm, *Alsophila pometaria*, are often confused. Adult female moths of both species are unusual looking because they have no wings, while males have tan wings. They are about 7/16 inch long. Mature larvae are 3/4 inch long and vary in color from green to reddish brown to black, with one or more stripes of white, green or black. The spring cankerworm has two pairs of prolegs (legs on abdominal segments) while the fall cankerworm has three pairs (Fig. 2). The fall cankerworm emerges from the soil as an adult moth in the fall. Females climb trees and attract flying males to mate with them, and lay about 100 brownish colored eggs in a tight cluster on tree trunks, branches and twigs. Eggs hatch from April to May at about the time the host buds are opening. Spring cankerworms pupate in the soil, and do not emerge as adults until the next spring. Both species' eggs hatch at about the same time. There is one generation per year. Outbreaks of both species often last several years before declining.



Figure 2. Fall cankerworm larva, dark phase.

Image source:

<http://www.fs.fed.us/r8/foresthealth/forestpests/jpg/falck2.jpg>

When disturbed or when food supplies are depleted, cankerworms often drop from tree canopies on silken threads. Once they reach the ground they begin a search for new food sources, or find a place in the soil where they spin tough cocoons made from silk and soil particles.

Tree Damage: Many hardwood species are defoliated by cankerworms, including oaks, elm, apple, maple, basswood, cherry and hickory. In some cases, defoliation can be very severe, completely eliminating all leaf material.

Common oak moth (*Phoberia atomaris*)

This oak defoliator was also observed in high numbers during 2009-2012 in middle and north Georgia. Similar to the black-dotted brown moth, this moth is native to Georgia but had not been observed in such high numbers until recently.

Hosts: Many oak species, and possibly dogwood and red maple.

Distribution: This moth has been found from Massachusetts to Florida, and west to Kansas and Texas.

Life cycle: Life-history and appearance of the common oak moth is very similar to that of the black-dotted brown moth, and their caterpillars are so similar that genetic testing is required to tell them apart. Both species can occur in the same area and on the same tree. The caterpillars are nearly an inch long, thick bodied, and hairless. They have black markings, notably paired black triangles down the back, and irregular brown lines down the sides. The common oak moth and black-dotted brown moth produce only one generation per year.

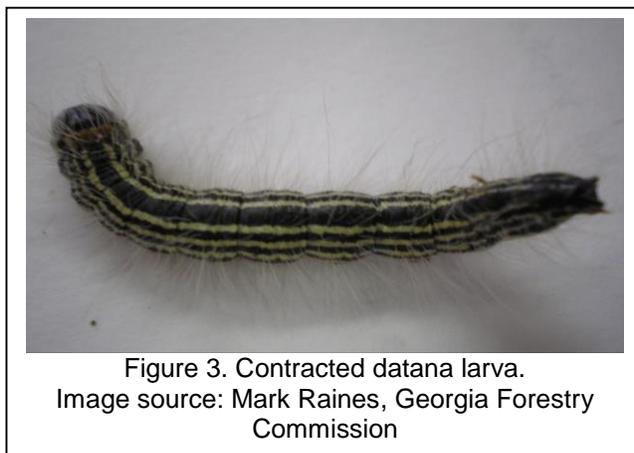
Tree Damage: Oak trees can be completely defoliated, resulting in subsequent refoilation. Defoliated trees that are in poor condition may die, while others will decline or recover, depending on environmental conditions during the next few growing seasons. If necessary, shade and ornamental trees can be protected with any insecticide labeled for caterpillars.

Contracted Datana (*Datana contracta*)

Hosts: The contracted datana is reported to feed on blueberry, hickory, oak, sycamore, and witch-hazel. It has also been found on laurel, sawtooth, and water oak.

Distribution: This species is found in most areas east of the Mississippi River, north into Canada.

Life cycle: Contracted datana overwinters as a pupa in the soil. Moths emerge in summer-late July and early August. Females lay eggs in single-layer masses on the undersurface of leaves. Newly hatched larvae skeletonize leaves, while older larvae (Fig. 3) consume the entire leaf, except for parts of the midrib and larger veins. Caterpillars are present during August and September, and only one brood occurs per year. Larvae feed as a colony, defoliating one branch then moving to another. Larvae arch their bodies into a “C” shape when alarmed.



Tree damage: Infestations generally occur on open-growing shade or ornamental oaks. Defoliation is usually limited to only a few branches; the primary loss is reduction of the aesthetic quality of urban landscape trees.

Linden Looper (*Erannis tiliaria*) and Eastern Oak Looper (*Phigalia titea*)

Loopers are relatively common defoliating caterpillars found throughout Georgia.

Hosts: Host species include ash, cherry, elm, hickory, maple, and the red and white oak groups.

Distribution: Loopers are found throughout eastern North America.

Life cycle: Adults emerge and lay their eggs in early spring. Eggs hatch at about the time of bud break, and the young larvae begin feeding on the expanding foliage. Feeding continues for approximately six weeks, after which mature larvae enter the soil and pupate. Mature larvae are about 1.5 inches long. The linden looper has a rusty brown head, a tan back with numerous wavy black lines, and yellow sides (Fig. 4).

The eastern oak looper has a tan head and body, with many lengthwise, black, wavy lines. The larval segments have small, hairy tubercles (Fig. 5). Coloring of both loopers varies with population densities. Male moth wings are light gray to tan, with wavy lines, and a span of 1-1.5 inches. Linden looper females are wingless, and the eastern oak looper female has wing pads, but cannot fly.

Tree damage: Loopers cause defoliation in the spring. Early evidence of feeding is small holes in the expanding leaves produced by young larvae. Older larvae consume the entire leaf, except the midribs and major veins. Heavy defoliation usually occurs in May and June and can cause growth loss and mast reduction. If coupled with other stresses, this defoliation may cause tree mortality. The greatest impact of these insects is often felt in public use areas where defoliation reduces the aesthetic value, and droppings by larvae create a nuisance.



Figure 4. Linden looper larva.

Image source:

<http://www.forestryimages.org/browse/detail.cfm?imgnum=5203015>



Figure 5. Eastern oak looper larva.

Image source:

<http://www.forestryimages.org/browse/detail.cfm?imgnum=0907045>

Oak worms

Oakworms are common throughout Georgia and do considerable damage in forest and landscape trees. Common species are orange-striped, pink-striped, and spiny oakworms. They are voracious feeders, and where abundant, quickly strip the trees of their foliage. Since defoliation takes place in late summer to fall, however, forest stands of white and red oaks are generally able to survive with only minimal growth loss or crown dieback. The greatest damage is the aesthetic impact and nuisance created by caterpillars in urban areas.

The **orange-striped oakworm** (*Anisota senatoria*) feeds on various oaks and sometimes birch and hickory. Mature caterpillars are just over 1.5 inches long, black with eight longitudinal orange-yellow stripes (Fig. 6). They also have two black spines on the second thoracic segment and smaller spines on each succeeding segment.



Figure 6. Orange-striped oakworm larva. Image source: http://www.marylandinsects.com/images/Orange-striped_Oakworm.JPG

The **green-striped mapleworm** (*Dryocampa rubicunda*) prefers maples but will feed on boxelder and oaks where they grow intermingled with maples. Full-grown caterpillars are about 1.5 inches long, pale yellow-green with cherry-red heads.

The **fall webworm** (*Hyphantria cunea*) is a very common defoliator of pecan, sourwood, and persimmon. The caterpillars construct ugly nests of silk around the leaves on which they feed. (Fig. 7) The caterpillars can be removed by hand on small trees, but larger orchard trees need to be sprayed using high-pressure equipment.



Figure 7. Nest of fall webworm. Image source: <http://www.agardenforthehouse.com/>

The **Eastern Tent Caterpillar** (*Malacosoma americanum*) is normally identified by the silk tent spun in the branch and twig crotches of apple, black cherry, and crabapple trees (Fig. 8). The tents do not cover



Figure 8. Nest of eastern tent caterpillar. Image source:

http://commons.wikimedia.org/wiki/File:Eastern_Tent_Caterpillar_%28tent_far%29.JPG

and enclose the leaves. The caterpillar is dark brown or black with a pale yellow stripe running the length of its body, and it may grow to be nearly 2 inches long.

Defoliation normally begins in early April and ends by late June. Attacked trees do not sustain severe damage and will normally recover.

Do not use fire to burn eastern tent caterpillar or fall webworm from the tree. More damage is produced from burning than is sustained from defoliation. The webs are

aesthetically unappealing but little damage is done by the caterpillars.

Control:

As with most native pest outbreaks, natural control mechanisms such as predators and disease normally catch up with and reduce the population of this pest. If it does return, high value trees that have been impacted over multiple years will benefit from some kind of protective treatment. Physical barriers and/or microbial/biological and chemical pesticides can be used to control caterpillars.

- **Physical barriers** include items that prevent caterpillars from climbing back up the tree. Most commonly, a band is placed around the tree and a sticky substance is smeared on the band. There are commercially available tree bands and a sticky substance called Tanglefoot® on the market or barriers can be created in other ways (Fig. 9). At nightfall, the returning caterpillars will bunch up below the barrier and can be physically destroyed or sprayed with a contact insecticide.



- Various insecticides for caterpillars are available at garden/farm supply centers. **Microbial/biological pesticides** contain living organisms that must be consumed (eaten) by the pest. They are most effective on small, young caterpillars. As caterpillars mature, they become more resistant to microbial pesticides. The most common microbial and biological insecticide is *Bacillus thuringiensis* (Bt). Bt occurs naturally in soil and on plants. It is harmless to people, animals, and plants, but does affect caterpillars. Bt is applied to the canopy of the tree, where it is consumed as the caterpillar feeds. Caterpillars become paralyzed, stop feeding, and die of starvation or disease. **Chemical insecticides** work by incidental contact or by being consumed. These chemicals can potentially impact a variety of beneficial insects (such as honeybees), so they should be used wisely. Some chemicals commonly found in products labeled for caterpillars include acephate, cyfluthrin, methoxychlor, carbaryl and diflubenzuron. Always read and follow the label when applying any insecticide.

Trunk Banding - One widely known method of treating cankerworms is the use of sticky barriers applied to tree trunks. As the wingless females crawl up the trunk to lay eggs, they are trapped in these sticky bands. There is little evidence that this method is worthwhile, even in areas where most trees have been banded. The possible exception is on a tree that is isolated from other cankerworm-susceptible trees.

Although the practice is sound in theory, it generally fails because of one or more of the following reasons: (1) people do not clean and renew the sticky material as often as the bands become crowded with caterpillars; (2) people fail to recognize and band for the two species (one moving up the tree in the fall, the other in the spring); (3) unbanded trees in an area may produce young cankerworms that can readily blow to banded trees on silk threads. Further, the sticky material is expensive, messy to work with, and tends to mar the appearance of the trunk for a long time.

How to band a tree

In order to be effective, all trees need to be banded (Fig. 10).

Step 1: Install a strip of cotton or insulation around the tree at least three feet from the ground and below the lowest limb.

Step 2: Position a band of roofing felt over the strip and attach it to the trees with a staple gun. Avoid using staples on small, young or thin-barked trees. Instead, use electrical tape to hold the bands.

Step 3: Using disposable gloves and a putty knife, put a film of Tanglefoot® (glue) directly on the band, approximately 1/8" thick.



Figure 10. The fall cankerworm will be trapped on the tree band as it climbs the tree trunk. Image source: <http://www.forestryimages.org/browse/detail.cfm?imgnum=4723057>

Tanglefoot® should be applied after most of the leaves have fallen. If the trap becomes clogged with leaves or insects, you should clean it, renew the Tanglefoot® or install a new trap. The bands should be removed during the first week of February. There are other banding products available at some stores. For example, Bug Barrier™ is also effective against the fall cankerworm, and its design and convenience are often preferred. In addition, there are private contractors who can be hired to install tree bands.

If you have questions about a forest pest or control and management recommendations, please call your local forester: <http://www.gfc.state.ga.us/about-us/contact-us/county-units/index.cfm>.

Information obtained from:

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USDA Forest Service Region 8, Forest Health Protection (<http://www.fs.fed.us/r8/foresthealth/idotis/insects/Indloop.html>)

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