

# Forest Health Fact Sheet

## Forest Tent Caterpillar

### Introduction

Forest tent caterpillar (FTC), *Malacosoma distria* Hubner, is native to North America and is a defoliator of hardwood trees in Pennsylvania. This is a cyclic pest in Pennsylvania with populations occasionally reaching outbreak proportions. In 2010 forest tent caterpillar was responsible for more than 470,000 acres of defoliation in public and private woodlands of north central and northeastern Pennsylvania. It was responsible for more damage than all other defoliation agents in 2010. When populations are high FTC can cause complete defoliation of affected host species.

### Description and Lifecycle



FOREST TENT CATERPILLAR  
EGG MASS



FOREST TENT CATERPILLAR  
COCCOON



FOREST TENT CATERPILLAR  
ADULT

Like other species of Lepidoptera, it undergoes a complete life cycle and has four life stages- egg, larva, pupa, and adult. FTC completes one life cycle each year in Pennsylvania. Unlike the similar eastern tent caterpillar, FTC does not make a silk tent as its name suggests. Eggs are laid in a cylindrical mass surrounding a twig in early or mid-summer. Egg masses contain an average of 150-200 eggs and are coated with a foam-like substance called spumaline. Egg masses are preferentially deposited on upper canopy twigs. The egg stage is the overwintering stage for FTC, and egg masses are present until larvae hatch out in early spring.

FTC larvae first start to hatch out in April in Pennsylvania, often at the same time the leaves of host trees first start to appear. Local climate variation may hasten or delay the hatch in certain areas. The larval stage is the main growth stage for FTC and is also the life stage that causes damage. When a caterpillar larva grows, it must periodically molt to accommodate its new size. The periods between molts are referred to as instars. FTC larvae complete five larval instars over a five to six week period.

The larvae are generally dark in color, have long hairs, blue stripes, and white markings. The white marks can be

variable in shape, but are often described as "footprint-shaped" or "keyhole-shaped", and are dorsally located. These markings are the main diagnostic feature of FTC larvae. There are many similar looking caterpillar species including the eastern tent caterpillar, *Malacosoma americanum*, and the gypsy moth, *Lymantria dispar*. The eastern tent caterpillar can be identified by the presence of a "white stripe" in place of the "footprint-shaped" marks. Gypsy moth can be recognized by its' paired red and blue spots.



FOREST TENT CATERPILLAR LARVA



EASTERN TENT  
CATERPILLAR



GYPSY MOTH

The last larval instar seeks a protected area, such as a bark crevice, and spins a whitish, silk cocoon, about an inch long, and pupates within. The pupal stage lasts about three weeks and is usually complete in mid-June in Pennsylvania. It is during this stage that metamorphosis into the adult form occurs.

Adult FTC moths are small, with a wingspan ranging between 1 to 1.5 inches. FTC moths are pale yellow-brown, with two thin, dark-brown, vertical stripes on the forewing. Sometimes the area between the two lines on the forewing is shaded brown. Adults live for about five days, and in that time mate and deposit new generation of eggs.

### **Hosts**

FTC will feed on a number of tree and plant species throughout its range. In Pennsylvania the preferred host species differs by region. Historically, outbreak populations have occurred on sugar maple and aspen in northeastern and north central Pennsylvania, and on red and scarlet oak in southern Pennsylvania. FTC will feed on species such as ash, birch, cherry, and basswood, but they are less preferred. Red maple and coniferous species are avoided by FTC.

### **Damage**

FTC causes damage during its larval stage by defoliating host species. Most trees recover from one or two seasons of FTC defoliation. Resulting damage includes severely reduced growth, some branch dieback, and reduced sap flow. Multiple seasons of defoliation can lead to mortality. When combined with other stressors like anthracnose, drought, or other defoliators, mortality can occur in as little as one season. Even though historically, more oak has been defoliated in Pennsylvania, sugar maple is the species most severely affected.

Damage to host trees is most severe during outbreaks. Major outbreaks have been recorded periodically in Pennsylvania since the mid-1930's. The most notable include: a 204,800 acre event in Southwestern Pennsylvania on oak from 1969 to 1972, a 29,000 acre event on sugar maple in Northeastern Pennsylvania in the early 1980's which caused 50 percent mortality of over story sugar maple, and 180,000 acres in 1993-1994 on sugar maple in the north and oak in the south. Again, in the 1993-1994 outbreak, sugar maple mortality was high in Northeastern Pennsylvania, with some landowners reporting over 90 percent mortality. This was attributed to impact of additional stressors in the form of anthracnose and an early season frost.

Outbreak populations usually collapse after a few seasons due to the buildup of populations of natural enemies like parasitic flies and wasps. One fly in particular, *Sarcophaga aldrichi*, or friendly fly, is extremely important in hastening an FTC population collapse. Friendly flies parasitize the pupae of FTC, disrupting completion of the life cycle. In FTC outbreak years, numbers of friendly flies can reach nuisance levels, and they are readily noticed when they swarm on people, animals, and property.

Some naturally occurring pathogens like nuclear polyhedrosis virus (NPV) and the fungus *Furia crustosa* have been shown to negatively affect FTC populations. However, these pathogens are not usually considered to be significant in the collapse of large FTC populations.

Sometimes, conditions for all factors that affect FTC populations allow for an outbreak population to last as many as six years. Because many factors influence the longevity of an outbreak, it is difficult to accurately predict how many years a given outbreak will last.

## **DCNR and Forest Tent Caterpillar**

### **Surveillance and Monitoring**

The DCNR records damage caused by forest tent caterpillar (FTC) as part of our forest insect and disease reporting system, and our aerial forest pest surveillance program. A final damage assessment is reported as severity by township in our annual forest pest conditions report.

## **What Can I Do**

### **Controlling Forest Tent Caterpillar**

Before controlling any pest, you should take the time to answer some basic questions and gather some information.

#### **Know Your Pest**

A proper identification of your target pest is essential. In many areas, FTC can be confused with similar species. In some cases, FTC may be present, but a different pest may be causing the damage. Pennsylvania landowners can always get help identifying pests by contacting their county cooperative extension office, appropriate state agencies, or private industry professionals.

#### **Know How the Pest Affects You**

Chances are if you have identified FTC, then you have suitable host species. But that does not mean you are at risk for severe damage or mortality. It is extremely important to know the composition of your forested land, and what your goals are for managing it. For example, if your forest tract has a high percentage of sugar maple, and you manage it for sap production, your land will be affected far more than if your forest tract has a low percentage of sugar maple and is being managed for wildlife cover. Perhaps you don't have forest tract, but only one or two trees on your property. This will present you with different options to consider.

In any case, you need to decide if the pest might cause you unacceptable loss. It is a good idea to attempt to predict next year's defoliation using egg mass surveys annually, whether you have experienced defoliation or not. Most forest entomologists with FTC experience agree that this is the best way to predict a possible outbreak. Few, however, agree on the best way to do egg mass surveys. Methods include counting egg masses in treetops with binoculars or cutting down individual trees to count by hand. The egg mass counts are compared with the numbers of host trees and their sizes. Each method has its drawbacks, and no method has a 100 percent rate of success. Several different protocols for homeowners are available on various state websites, which are listed on our links page. We encourage you to review these and decide what will work best for your situation. One rule in predicting outbreaks does seem to hold true: If you go to the edge of a stand of trees containing host species and find FTC egg masses on lower vegetation, you will likely have a problem the next spring.

#### **Explore Your Options**

If you have determined that you are at risk for unacceptable loss, then control may be the option for you. There are a few different types of control to consider.

#### **Mechanical Control**

If you are only dealing with a few trees, it is possible to attain effective control by simply removing and

burning egg masses in the fall or winter. This is not always possible if the trees are large, and it is important to remember that FTC prefer to lay their eggs in the upper canopy. Creating a physical barrier is another method that can provide relief to individual trees. This can be done by creating a band, around the trunk of the tree, using kitchen plastic wrap coated with petroleum jelly or a sticky substance (similar to fly paper), after larvae have hatched. The barrier will prevent FTC larvae from migrating up and down the trunk, and afford some protection. In general, mechanical controls are not practical in a woodland setting.

### **Biological Control**

Formulations of the bacteria *Bacillus thuringiensis* variant Kurstaki (Btk) are effective against FTC larvae if application is timed correctly. Btk is not toxic to humans, and is highly specific as it only affects the larva of Lepidoptera. Applications should be made according to label directions when larvae are young. This can be performed on a few trees by individual landowners or by commercial tree care companies. If you elect to use a tree care company, it is a good idea to get at least three estimates, and ask for local references.

If a large number of trees are to be treated, aerial application of the bacteria may be needed. This is a much more complicated matter, requiring a good amount advanced planning. Often collaborating with other landowners on an aerial spray project is a good idea, as it will help to lower the price, and consolidate some of the work involved. Although aerial applicators can be hired directly by private landowners, it can be a good idea to work through a private consultant. Consultants will add to the cost of a project, but will reduce the workload required to manage a successful spray operation.

### **Chemical Control**

Many commercially available chemical insecticides are labeled for control of FTC, and are effective. As with any pesticide application it is important to read and follow all label instructions. It is also important to note that most of the chemical insecticides are not specific to FTC or even to only Lepidoptera larvae. They may also affect beneficial insects, predators, and parasites. For more information on the proper selection and use of insecticides, contact the Pennsylvania Department of Agriculture or your county cooperative extension office.

### **Silvicultural Control**

No matter what your situation, long-term silvicultural practices can help you to avoid severe impact by FTC and most other pests as well. Healthy trees can often withstand even severe pest outbreaks, so planting and managing for tree species that are well suited to your land and climate will help. It is also a good idea to learn from history. In Pennsylvania, FTC outbreaks are cyclic, and have defoliated hundreds of thousands of acres of mostly oak. Oak, however, is not the species most impacted, and often survives FTC outbreaks. Conversely, severe mortality has resulted on the comparatively small amount of defoliated sugar maple, particularly in the northeastern part of the state. In this area, managing for tree species other than sugar maple will lessen the impact this pest will have on your land.