

An Update on the Caterpillars of Eastern Massachusetts: What to Expect in 2006



The past several years have resulted in much higher than normal population levels of many caterpillar species that have become problematic by defoliating trees and shrubs. Although a statewide problem, this phenomenon is especially severe in the southeastern portion of the state extending out through Cape Cod and the islands. It has been estimated by the Massachusetts Department of Conservation and Recreation (MDCR) that in 2005 nearly a quarter million acres of the state was defoliated by gypsy moth and forest tent caterpillar (combined). Another 21,000 acres was defoliated by winter moth caterpillars, although recent winter moth pheromone trapping has indicated that the actual number is probably much higher than reported. In many areas, gypsy moth, winter moth and forest tent caterpillars were all feeding on the same plants in mixed populations, thus making it very difficult to sort out which one was the primary feeder. The following is a quick summary of the major caterpillar pests that are now so prevalent, how to identify them, and their management.

Based on field observations (egg count, moth flight etc.), it is anticipated that 2006 will bring high numbers of gypsy moth, forest tent and winter moth caterpillars.

Gypsy Moth (*Lymantria dispar*). This introduced species has been in Massachusetts for more than 130 years but has not reached near-statewide outbreak proportions for about 25 years. This is mostly due to a beneficial fungus (*Entomophaga maimaiga*) which originated from Japan that has a devastating effect on gypsy moth caterpillars, especially when the weather is wet and somewhat cool during late May into early-June. Although last May was rather wet statewide, June experienced hot and dry weather so the fungus did not perform as expected there. As a result, gypsy moth populations are now building to damaging numbers. Unless *E. maimaiga* is **extremely** effective this spring, it is expected that gypsy moth will cause much defoliation statewide.

- **Primary host plants:** All oak species are the preferred hosts but this pest has a very extensive deciduous host range and will even feed on evergreens if stressed for food.
- **Over-wintering stage:** Gypsy moth spends the entire winter as an egg in a slightly fuzzy, tawny-colored egg mass that contains hundreds of eggs. These egg masses can be found on tree trunks, rock walls, and just about anywhere.
- **Immature stages:** Gypsy moth caterpillars hatch when we have accumulated 90-100 growing degree days. In the Amherst area, the historical calendar date is May 7th but this can vary by weeks when we experience cooler or warmer than normal spring temperatures. When gypsy moth caterpillars first hatch, they are extremely tiny and easily carried to new host plants by wind. Once they become larger, which usually occurs within a few weeks, they are dark-bodied, moderately hairy, have a head capsule with yellow marking and 5 pairs of blue dots followed by 6 pairs of red dots running the length of their backs. No other caterpillar in the Northeast looks like the gypsy moth because of these markings. At maturity, gypsy moth caterpillars can be upwards to 3" long and may consume as many as 5-6 oaks leaves per day per caterpillar.
- **Pupation:** Pupation begins around the third week of June and may extend into early July. Adult moths begin to appear by the fourth week in June and may still be found in late July and sometimes into early August. Adult gypsy moths do not feed; therefore they do not cause any plant injury nor is treatment recommended or effective in this stage.
- **Management:** Collecting and destroying egg masses does very little to control this pest. *Bacillus thuringiensis* Kurstaki (B.t.K.) works very well against the younger caterpillars but not the older ones. For the first three instar stages, gypsy moth

caterpillars have an all-black head capsule but when they molt into the fourth instar stage, they develop yellow markings on their heads. B.t. works best when the head capsule of gypsy moth caterpillars is all black. Insecticidal products that contain Spinosad as the active ingredient work well on caterpillars of all life stages. Many chemical pesticide products (pyrethroids, organophosphates and carbamates, in particular) are labeled for treatment of gypsy moth caterpillars. Lastly, Insect Growth Regulator (IGR) products, such as those that contain tebufenozide, also work well against gypsy moth (commercial applicators only).

Forest Tent Caterpillar (FTC) (*Malacosoma disstria*) is a native caterpillar species and has not been seen in outbreak proportions for more than 100 years in Massachusetts, until now. For the past 2-3 years, this species has been in damaging numbers primarily in portions of southeastern Massachusetts but now it is quite prevalent statewide. Egg mass counts during the winter months of 2006 indicate that this species is now in huge numbers statewide. These caterpillars can achieve sizes that rival that of gypsy moth. However, while this caterpillar is dark and moderately hairy, it has a series of white “key-hole” shaped spots running down the length of its back and not the paired blue and red dots that are typical of gypsy moth.

- **Primary host plants:** Oaks and maples are preferred but, like the gypsy moth, they can be found on numerous species of deciduous host plants. In eastern Massachusetts, they currently seem more prevalent on oaks while in western Massachusetts, as well as in much of Vermont, this pest is a serious pest of sugar maple.
- **Over-wintering stage:** Like gypsy moth, this pest over-winters in the egg stage. However, egg masses of this species are nowhere near as large and appear as small pieces of blackish-brown charcoal or Styrofoam that are wrapped around small stems of host plants. The ends of these egg masses are squared and give a rather “barrel” appearance to the cluster of eggs.
- **Immature stage:** Caterpillars of FTC first appear soon after bud break and leaf expansion (mid-late April). When occurring in large numbers, they can often be seen during the day clustering in huge numbers on tree trunks or on major scaffold branches. As the caterpillars become larger, they produce copious amounts of silk that are threaded throughout entire trees. This becomes very apparent once trees are completely defoliated.
- **Pupation:** Caterpillar feeding ends in early to mid-June and pupation begins. Adult moths will start to appear by late June into July. Adult FTC moths do not feed. Rarely do these moths get any attention.
- **Management:** FTC caterpillars can be treated the same as gypsy moth caterpillars:
 - o B.t.K for the younger instar stage caterpillars
 - o Spinosad products for all caterpillar stages
 - o Labeled chemical insecticides
 - o Insect Growth Regulator (IGR) products, such as those that contain tebufenozide, also work well against forest tent caterpillar (commercial applicators only).

Eastern Tent Caterpillar (ETC) (*Malacosoma americanum*) is another native caterpillar and this one, unlike the other two listed above, makes a very noticeable silken web, specifically in the crotches of branches. This web is used for thermal protection during cold periods in the spring when the caterpillars are active. During sunny and warmer days, ETC will venture out from the web and feed on foliage.

- **Primary host plants:** This pest is very specific to *Malus* (apple) and *Prunus* (cherry)

- species and may sometimes be found on cotoneaster.
- **Over-wintering stage:** Like the other caterpillar species listed above, ETC over-winters in the egg stage. The egg mass is very similar to that of forest tent caterpillar and is also wrapped around small twigs. Where the FTC egg mass is squared at the ends and found on a wide variety of host plant species, that of ETC is tapered at the ends and primarily found on *Malus* and *Prunus* species. The eggs hatch at about 50 growing degree days (mid-April in MA) or when the foliage of the host plant is emerging from the buds.
 - **Immature stage:** Caterpillars are very similar to the forest tent caterpillar but ETC has a long white stripe down the length of its back. Larvae emerge from the web on warmer days and feed openly. Caterpillars are active into late-May or early June.
 - **Pupation** occurs starting in late May and adult moths appear a few weeks later. However, the adults do not feed and usually go un-noticed.
 - **Management:** Monitor for new webs, which can be physically removed at night or on cool days when all of the caterpillars are inside. These can then be stepped on and squashed, buried or burned, **once off of the plant**. NEVER burn webs while they are still attached to the plant; fire can greatly injure tree bark!
 - Eastern tent caterpillars can be treated the same as gypsy moth or forest tent caterpillars:
 - o B.t.K for the younger instar stage caterpillars
 - o Spinosad products for all caterpillar stages
 - o Labeled chemical insecticides
 - o Insect Growth Regulator (IGR) products, such as those that contain tebufenozide, also work well against eastern tent caterpillar (commercial applicators only).

Fall Cankerworm (*Paleacrita vernata*) is another native caterpillar species that will appear in large numbers rather suddenly, create defoliation problems for several years, and then subside rather dramatically after that. It is classified as being a looper or an inchworm. Fall cankerworm caterpillars are usually green and have 3 pairs of prolegs (abdominal legs), with the first (most proximal) pair being very short. Therefore, it is said that fall cankerworm caterpillars have 2 1/2 pairs of prolegs, which is a very distinct feature in their identification. During periods of high population numbers, fall cankerworm caterpillars can also be a very dark color. Currently, this pest is in rather large numbers in much of southeastern Massachusetts, Cape Cod and Martha's Vineyard.

- **Primary host plants:** This species has a rather wide deciduous host plant range but prefers, oaks, maples, birches, and crabapples as well as many other species.
- **Over-wintering stage:** Like the others listed above, this species also over-winters in the egg stage. These eggs will appear in small clusters that are on small stems or they are sometimes found on the bark of host trees. This species, like winter moth, is unusual in that the adult moths appear in late November into December to mate and for the females to lay eggs. Adult moths do not feed. The male moths of this species are brown with a light tan spot near the outer edge of each wing. The females of the species are completely wingless.
- **Immature stage:** Fall cankerworm caterpillars hatch after bud-break and leaf expansion of the host plants (mid-late April) and feed into June. In Massachusetts, they seem to favor oaks but their host plant range is rather large.
- **Management:** Fall cankerworm caterpillars can be treated the same as gypsy moth or the others listed above. This pest does not make a silken web.

- o B.t.K for the younger instar stage caterpillars
- o Spinosad products for all caterpillar stages
- o Labeled chemical insecticides
- o Insect Growth Regulator (IGR) products, such as those that contain tebufenozide, also work well against eastern tent caterpillar (commercial applicators only).

Winter Moth (*Operophtera brumata*) was first discovered in the eastern United States by Deborah Swanson in the mid-late 1990s. The established population of this species in Plymouth County was the only other known U.S. infestation of this pest outside of the Pacific Northwest. Since that time, researchers at the University of Massachusetts have worked to delineate the geographic range of winter moth and to seek a natural form of control. Currently, it appears to be well established in Massachusetts from the Worcester area eastward, including the greater Boston area, North Shore, South Shore, most of Cape Cod and Martha's Vineyard. All counties of Rhode Island have winter moth as well. Recent pheromone trapping has detected male winter moths in southeastern New Hampshire and in a few areas of coastal Maine. One find in southeastern Connecticut has also been discovered. Being an introduced species, it currently has no known natural controls here, such as parasites and predators.

- **Primary host plants:** Winter moth caterpillars have a fairly wide deciduous host plant range in North America, which includes, but is not limited to: maples, apples, crabapples, oaks, birches, blueberries and many others.
- **Over-wintering stage:** Adult winter moths appear starting at Thanksgiving time and may be active into January whenever the weather is mild, hence the name "Winter Moths". After mating, the almost wingless females deposit eggs loosely on bark, in bark crevices, and throughout a tree. By late winter or early spring, these tiny eggs turn orange-red and eventually blue-black just prior to hatching.
- **Immature stage:** Winter moth caterpillars hatch from the eggs approximately mid-April just as the buds of their host plants are beginning to swell. Upon hatching, the tiny larvae seek swelling buds and will wriggle into those buds and commence feeding. They feed in both flower and vegetative buds. This is where winter moth becomes a very serious potential pest of blueberry and apple crops: "no flowers = no fruit". Once the buds open, winter moth caterpillars then become "free-feeders", feeding on foliage like all of the other caterpillars listed above. Feeding will continue until about the third week in May and sometimes into early June, depending on how cool or warm the weather is in the spring. Winter moth caterpillars are green and achieve a full-grown size of about one inch. Like fall cankerworm, winter moth is a looper (inchworm). Unlike fall cankerworm, winter moth has 2 pairs of prolegs (2 1/2 pairs for fall cankerworm).
- **Pupation:** Once the caterpillars are finished feeding, they drop from the host plant to the soil and pupate almost instantly. They will remain in the soil in the pupa stage until they emerge as adult moths starting in late November.
- **Management:** Where blueberry and apple crops are concerned, a late winter / early spring application of a dormant oil spray may be partially beneficial for managing the eggs of winter moth that are on the host plants. Some growers also add a registered chemical insecticide to the oil to manage any newly hatching caterpillars that the oil did not reach. Oil application for homeowners most likely will not offer the desired level of protection to their large trees and shrubs. In addition, for both blueberry and apple growers, along with homeowners, it is important to note that winter moth eggs will be virtually everywhere and the larvae can (will) eventually move to the plants

that were treated earlier with oil. Once the winter moth caterpillars are within the buds, there are virtually no controls and this is a frustrating time for commercial growers and homeowners alike. The hope is that the weather at that time will be warm and that buds open and grow quickly, thus diminishing the potential for much damage. Once the buds are open, winter moth caterpillars can be treated like all of the other caterpillars listed above:

- o *Bacillus thuringiensis* Kurstaki B.t.K for the younger instar stage caterpillars
- o Spinosad products for all caterpillar stages
- o Labeled chemical insecticides
- o Insect Growth Regulator (IGR) products, such as those that contain tebufenozide, also work well against eastern tent caterpillar (commercial applicators only).

Final note on caterpillar management: For those species that may climb into their host plants, such as winter moth, gypsy moth and forest tent caterpillars, as well as adult female winter moths and fall cankerworm female moths, there is the consideration of banding the trunks of host trees to prevent (or, at least, diminish) invasion. Here are a few points to weigh when opting to use such banding techniques.

- Never apply a sticky substance directly to the trunk of a tree. Many are petroleum based and can lead to phytotoxic (plant injury) effects.
- Always have some sort of fibrous packing behind the band to prevent the insects from going between the back of the band and the tree trunk (i.e. make sure the bark crevices behind the band are filled).
- In areas of high-density caterpillar populations, bands can fill up with an hour or two thus allowing others to crawl over the stuck bodies and achieve easy access to the rest of the tree.
- Caterpillars often are moved from tree to tree via wind currents and may never come into contact with sticky bands.

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<p>DISCLAIMER: Pesticide registration status is subject to change and varies from state to state; therefore the authors, UMass Extension, Plymouth County Extension, and the Univ. of MA cannot assume liability for recommendations. It is the responsibility of the applicator to verify the registration status of any pesticide BEFORE applying it. THE LABEL IS THE LAW: ALWAYS READ AND FOLLOW THE LABEL WHEN APPLYING PESTICIDES. Use of product names does not imply endorsement. WARNING: PESTICIDES CAN BE POISONOUS. Read and follow all directions and safety precautions on labels. Handle carefully and store in original containers.</p>
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