

A Sequential Survey Method For The  
FOREST TENT CATERPILLAR (Malacosoma disstria Hbn.)  
Based on Egg Mass Counts

This insect has one generation a year. It overwinters in the egg stage. Eggs are laid in masses of 100 to 350 eggs. The egg mass completely encircles a twig on the outer portion of a branch. Eggs may be found between August and March.

A method of counting egg masses on sample twigs has been devised which predicts the degree of defoliation to be expected in the spring. Control programs can be based on the expected defoliation.

The plan applies to sugar maple stands in the Northeast.

The procedure for sampling is as follows:

1. Select a stand of trees that is mostly sugar maple. The stand should be at least two acres.
2. Choose 5 sugar maples along roads or open areas with full crowns. The five trees may be close to each other but not touching. With a pole pruner reach into the crown of the first tree as far as the pruner will permit and clip five 30 inch twigs.
3. Count the egg masses on the first twig. If there are less than 8 egg masses on the first twig, count the egg masses on the second twig and accumulate the counts as you go. If the total egg masses for the two twigs do not add to 8, then continue on to the third twig, adding the egg masses until all five twigs are searched and counted. If the total number of egg masses on the five twigs still do not total to 8, continue on to the second tree, clip five more twigs, accumulate the counts and continue on in this manner, clipping five 30 inch twigs from the remaining three trees until 8 egg masses are found. As soon as 8 egg masses are found, stop sampling and continue on to another area. 8 or more egg masses on 25 twigs will result in noticeable defoliation.
4. If the total number of egg masses found on the first group of twenty-five 30 inch twigs still do not total 8 or more, refer to the sequential table. If the total count is 3 egg masses or less, stop sampling. This means that 3 or less egg masses will result in negligible defoliation and you can proceed to another area. If, however, the total egg mass count for the 25 twigs is 4, 5, 6, or 7, the potential defoliation is still undecided and you will have to continue sampling.
5. If the count falls into this undecided category, select a sixth tree and cut five more 30 inch twigs. Count the number of egg masses on the five twigs, and add these to the total from the first 25 twigs. Now refer to the table and you will see that for a 30 twig sample you will need a maximum of 5 egg masses or a minimum of 9 egg masses before a positive category is reached and sampling ceases. If the combined count totals 6, 7, or 8 egg masses, you will have to continue sampling. Continue in this way, clipping five 30 inch twigs from additional trees

until a total of 50 twigs are cut. By this time we have sufficient samples to predict defoliation and can depart from the sequential table. The following rule applies: If the total number of egg masses on fifty 30 inch twigs taken from 10 trees is 11 or less, defoliation will be negligible; if the total is 12 or more, defoliation will be noticeable.

6. Record the number of twigs clipped, the number of egg masses found, and the expected degree of defoliation in the appropriate data sheet.
7. Move to the other side of the stand and repeat the sampling.
8. Go to an area somewhere near the center and take a third set of samples for the stand. By sampling 3 different areas, it is possible to determine if the whole stand will be defoliated to the same degree, or if most of the insects will be in one part of the stand.
9. After a decision has been reached about defoliation in the first stand, go to another stand and sample it in the same manner. If populations of insects are very low, stands may be 5 miles apart. If populations are very high, stands adjoining each other should be sampled to find the limits of the infestation.
10. Give each stand a number. Record this number on a good highway map and on the record form.

TABLE 1

Sequential Plan for Sampling Tent Caterpillar Egg Masses  
on Sugar Maple in the Northeast

| Number<br>of<br>Twigs | Total Number of Egg Masses                     |                      |   |
|-----------------------|--|----------------------|---|
|                       | Number to<br>Give No Noticeable<br>Defoliation | Sample<br>More Trees | Number to Give<br>Noticeable<br>Defoliation |
| 25                    | 3 or less                                      | 4-7                  | 8 or more                                   |
| 30                    | 5 or less                                      | 6-8                  | 9 or more                                   |
| 35                    | 6 or less                                      | 7-9                  | 10 or more                                  |
| 40                    | 7 or less                                      | 8-11                 | 12 or more                                  |
| 45                    | 8 or less                                      | 9-12                 | 13 or more                                  |
| 50                    | 9 or less                                      | 10-13                | 14 or more                                  |
| 55                    | 11 or less                                     | 12-14                | 15 or more                                  |
| 60                    | 12 or less                                     | 13-15                | 16 or more                                  |
| 65                    | 13 or less                                     | 14-17                | 18 or more                                  |
| 70                    | 14 or less                                     | 15-18                | 19 or more                                  |
| 75                    | 15 or less                                     | 16-19                | 20 or more                                  |
| 80                    | 16 or less                                     | 17-20                | 21 or more                                  |
| 85                    | 18 or less                                     | 19-21                | 22 or more                                  |
| 90                    | 19 or less                                     | 20-23                | 24 or more                                  |
| 95                    | 20 or less                                     | 21-24                | 25 or more                                  |
| 100                   | 21 or less                                     | 22-25                | 26 or more                                  |

Chances are that 1 out of 20 stands said to have no noticeable will have noticeable defoliation and that 1 out of 10 stands called "noticeable" will have no noticeable defoliation.

Forest Tent Caterpillar Sequential Sampling

Date \_\_\_\_\_

Stand Number \_\_\_\_\_ Species \_\_\_\_\_ District \_\_\_\_\_

Location \_\_\_\_\_

| Sample Point | Number of New Egg Masses | Number of Twigs Sampled | Degree of Defoliation | Remarks |
|--------------|--------------------------|-------------------------|-----------------------|---------|
| 1            |                          |                         |                       |         |
| 2            |                          |                         |                       |         |
| 3            |                          |                         |                       |         |

Plot No. \_\_\_\_\_ Town \_\_\_\_\_ Country \_\_\_\_\_  
 Owner \_\_\_\_\_ Bush Acres \_\_\_\_\_ Aver Ht. \_\_\_\_\_  
 Aver Diam \_\_\_\_\_ Elev \_\_\_\_\_ Aspect \_\_\_\_\_ Slope \_\_\_\_\_  
 Density \_\_\_\_\_ Reprod \_\_\_\_\_ Grazed \_\_\_\_\_  
 % Maple \_\_\_\_\_ % Beech \_\_\_\_\_ % Birch \_\_\_\_\_ % Other \_\_\_\_\_

Tree 1 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 2 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 3 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 4 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 5 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 6 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 7 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 8 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 9 Branch 1 2 3 4 5 10 Total \_\_\_\_\_  
 Tree 10 Branch 1 2 3 4 5 10 Total \_\_\_\_\_

Grand Total \_\_\_\_\_

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Grand Total \_\_\_\_\_



## **Forest Tent Caterpillar: Miscellaneous Bits from “The Literature”**

Warning: Some of these results are from forest tent caterpillar populations which feed exclusively on aspen

### **History of Outbreaks**

There are records of outbreaks of FTC in the eastern United States since 1797.

### **Life Cycle**

Winter is spent as fully developed larvae inside the eggs.

Newly hatched larvae can survive up to 2-3 weeks without feeding

Later instars are more mobile than younger ones

### **Population Dynamics**

Many factors combine to bring about population decline.

There are about 150 eggs in the average egg mass (range 15-327), so 98.7% of the progeny of one pair of moths have to die to keep the population from increasing. 99.3% have to die to reduce the population by ½.

Partially starved larvae produce smaller moths which lay about half as many eggs as well-fed larvae.

### **Weather**

One report says that egg mortality can be significant at -45 degrees F. Others have observed it to be not significant at -52 degrees.

Weather is a determinant of early stage survival

Early frost can wipe out young larvae

No feeding or growth occurs at 50 degrees F. However, young larvae are able to feed and develop at 59 degrees.

In cool springs, host foliage develops faster than caterpillars, which have to eat more mature foliage, and do poorly

“Sluggish” larvae are more cold-hardy than aggressive ones

### **Parasitism**

Pupal parasitism of 80-90% affects the survival of a generation of forest tent caterpillar. Rates of 50-60% are associated with increasing tent caterpillar populations.

Pupal parasitism by the friendly fly can approach 90% during the 3<sup>rd</sup> year of heavy defoliation

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The rate of pupal parasitism is especially high in the areas around heavily defoliated stands, suggesting that because populations of parasites are high, they are migrating to the surrounding area.

Tachinids find their hosts from volatiles released by damaged leaves.

### **Effect of Forest Fragmentation**

FTC outbreaks last longer in fragmented forests

The higher the ratio of forest edge to forest area, the longer the outbreak

Parasitism is lower in fragmented forests

There is reduced transmission of virus at the forest edge because the virus is inactivated in sunlight.

### **Foliage Quality**

Red maple is not fed on by FTC. Its foliage contains a compound that keeps FTC (originally collected from aspen) from feeding.

Sugar maple has a compound which inhibits forest tent caterpillar growth (these tent caterpillars were from aspen areas).

Young larvae are not able to feed on mature (poplar) leaves

Young larvae cannot survive on birch. The sticky surface of young leaves is thought to be the reason

Fecundity and pupal mass are severely reduced for FTC in severely defoliated aspen stands

Fecundity declines by about 20% when FTC feeds on foliage from defoliated or previously defoliated aspen trees over FTC feeding on never-defoliated trees.

Fecundity of insects feeding on defoliated leaves may be reduced 60-80%.

Defoliation can elevate the content in leaves of tannins and reduce nutrients such as nitrogen and water.

### **Impact on Trees**

Populus species are highly tolerant of defoliation