MAPLE LEAF CUTTER POPULATION SAMPLING PROCEDURE

RPOSE: To determine average number of MLC leaf miners per leaf in order to estimate degree of current year defoliation as a basis for control recommendations in a sugarbush. The survey procedure is not intensive, and the field sampling, lab work and estimate of defoliation can be accomplished in less than one day for the average size sugarbush. Speed is important since there will be only a short period of time between when sampling can be done and control action must be taken. Also taken into consideration when developing this procedure was the fact that several sugarbushes may have to be sampled within this short time period. With this method one person could do several bushes within that time frame. Although a more intensive sampling procedure will increase accuracy of results, this abbreviated method will still provide you with much more reliable information on which to base a control recommendation to the landowner than will a walk-through observation of the sugarbush..

EQUIPMENT NEEDED:

FIELD: Extension pole pruners, sheets of aluminum foil(]4X]0") for packaging leaf samples, large bag(any type), marking pen, blank paper, pencil, clipboard.

LAB: Desk mounted magnifying glass or low power microscope, data sheets, sharp pointed instrument.

FIELD PROCEDURE: Randomly select dominant or codominant sugar maples for sampling. One sample tree for every two acres of sugarbush will be sufficient. Sample trees should be located to adequately represent the entire bush. If the bush is on a slope, be sure to sample trees at all elevations. Remove 2 branches, at least 2 feet in length, randomly selected, from each sample tree at a height of 20-30 feet. Randomly select one leaf cluster(4 leaves) from each branch. Package each leaf cluster in a sheet of aluminum foil and bag it. Draw a sketch map of approximate sample tree locations as you proceed through the bush. Number each tree on the sketch and put this same number, with the marking pen, on the packaged leaf samples. This will help you to identify areas of the bush that have a heavier population. Sample trees do not need to be marked as they will not have to be re-located.

LAB PROCEDURE: The larvae count must be done in the lab or office. It is best to do the count the same day they are collected, however they can be stored in a refridgerator overnight if necessary. Using a low power scope or magnifying glass, examine each leaf and record on the data sheet the number of live and dead larvae and number of cuts made. A sharp pointed instrument should be used to open each mine and probe the larva to determine whether it is alive or dead. Careful attention must be given to this step since natural mortality of the mining larvae will likely exceed 50%. Should you count dead larvae as live this may result in an inaccurate estimate of defoliation. This is the reason why the counts cannot be done in the field using the naked eye.

Recording the number of cuts made will assist you in estimating how much time remains before control action, if recommended, must be taken. Once your count is completed, divide the total number of live larvae by the total number of leaves examined to find the average number of live insects per leaf. The table below will give you an estimate of expected defoliation and will tell you whether further sampling is needed.

# of live larvae/leaf	expected defoliation[1]	action/recommendati
less than 1	codes 0 - 1	no further sampling needed
1 to 2	codes 2 - 3	re-examine bush[2] in about 1 week
more than 2	codes 3 - 4	control action[3] warranted

(1) DEFOLIATION RATING CODES: code 0 - No obvious defoliation
code 1 - 1-25% defoliation
code 2 - 26-50% defoliation
code 3 - 51-75% defoliation
code 4 - more than 75% defoliation

(2) With a count of 1 to 2 larvae per leaf the amount of defoliation/damage could be variable. Consider factors such as: A) Overall condition of the foliage. Trees with thin, small or off-color foliage may look severely defoliated even if feeding damage was only in the moderate range. It is easy to underestimate the degree of defoliation with this situation. B) Soil/site conditions and other stress factors should be considered when assessing possible impact of MLC defoliation, particularly when count is within this range. Lastly,continuing mortality of late-stage miners seems to make it more difficult to estimate defoliation within this range. This is why you should re-examine or re-sample the bush in about one week to get a better idea of what is happening.

(3) defoliation should exceed 50% which will probably warrant contro action if the bush is currently being tapped. Still, other factors may need to be considered.

TIME TO
MPLE: It will take approximately 2 weeks from the time the larvae begin emerging from the mines until control operations can start. (At leas 50% of the MLC population emerging from their leaf mines and actively cutting and feeding on the leaf surface) In order to have sufficient lead time to set up a spray operation you will want to sample just prior to emergence from the mines beginning. This is

the last week in June in Central Vermont, but even within small geographical areas microclimatic effects have been shown to influence emergence from the mines so sampling times can vary from area to area. Sampling too early will cause you to over-estimate the amount of defoliation as natural mortality will continue up to the cutter stage and possibly behond.

TIPS:

1. Unlike many defoliators, dispersal of MLC is limited even when the insects are in the cutter stage.(possible exception may be very heavy populations) This will allow you to identify a range of defoliation within the same bush if the population varies from one area to the next. Remember, if you figure an average number of insects per leaf for the entire bush with a variable population your estimate of defoliation will be off, so take this factor into consideration.

2. When examining larvae, if many appear darker color and show little movement when probed, they are in poor health and natural mortality may be high.(I have seen it as high as 73% of the population) It will be difficult at this time to determine how many will survive so you will need to re-sample later.

GROUND: The data used in developing this survey method comes from work done in 4 sugarbushes located in Braintree and Fayston, Vermont over the period 1981 through 1984. Additional data and information comes from previous studies and trials done on Maple Leaf Cutter in Vermont over the past 10 years. Further refinement of the sampling method and parameters for estimating defoliation are needed and work on this will continue in 1985.

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LITERATURE CITED

1. Parker, B.L. and H.B. Teillon. 1982. Maple leafcutter control in Vermont: Orthene and Bt. Vt. Agr. Exp. Sta. RR 18. 7pp.

2. Ross, D.A. "Bionomics of the Maple Leaf Cutter" Reprinted from the Canadian Entomologist, Volume 94, Number 10, October 1962

MAPLE LEAF CUTIER POPULATION COUNT — SAMPLE

Town BRAINTREE Sampling Date 6/26/84

Landowner Kevin Hall (Lower) Crew Lackey Pre SPRAY

Tree# Leaf#	Live	Dead	Cuts
T1			
1	0	0	0
2	0	0	0
3	0	0	0
4	2	0	0
Total	2	0	0
T2			
1	0	0	0
2	0	0	0
3	1	0	0
4	2	0	0
Total	3	0	0
T3			
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
Total	0	0	0
T4			
1	0	0	0
2	0	0	0
3	0	0	0
4	2	1	0
Total	2	1	0

TREE 1 CLUSTER 2	Live	Dead	Cuts
1	2	0	0
2	1	0	0
3	1	0	0
4	1	1	0
Total	5	1	0
TREE 2 CLUSTER 2			
1	1	0	0
2	0	0	0
3	0	0	0
4	0	0	0
Total	1	0	0
TREE 3 CLUSTER 2			
1	4	0	0
2	3	0	0
3	1	0	0
4	0	1	0
Total	8	1	0
TREE 4 CLUSTER 2			
1	0	0	0
2	2	0	0
3	1	0	0
4	2	0	0
Total	5	0	0

Tree# Leaf#	Live	Dead	Cuts
T5			
1	0	0	0
2	2	0	0
3	1	0	0
4	1	0	0
Total	4	0	0
T6			
1	0	0	0
2	0	0	0
3	1	0	0
4	0	1	0
Total	1	1	0
T7			
1	3	0	0
2	7	0	0
3	13	0	0
4	3	0	0
Total	26	0	0
T8			
1	0	0	0
2	0	0	0
3	0	0	0
4	0	1	0
Total	0	1	0

TREE 5 CLUSTER 2	Live	Dead	Cuts
1	0	0	0
2	1	0	0
3	2	0	0
4	0	1	0
Total	3	1	0
TREE 6 CLUSTER 2			
1	1	0	0
2	4	0	0
3	1	0	0
4	4	0	0
Total	10	0	0
TREE 7 CLUSTER 2			
1	6	0	0
2	9	0	0
3	4	1	0
4	7	0	0
Total	26	1	0
TREE 8 CLUSTER 2			
1	0	2	0
2	0	0	0
3	2	0	6
4	5	0	0
Total	7	2	0

SUMMARY OF DATA: Total Leaves Examined 72 Total Live 121

MAPLE LEAF CUTIER POPULATION COUNT

Town _____ Sampling Date _____

Landowner _____ Crew _____ _____SPRAY

Tree# Leaf#	Live	Dead	Cuts
T1 1			
2			
3			
4			
Total			
T2 1			
2			
3			
4			
Total			
T3 1			
2			
3			
4			
Total			
T4 1			
2			
3			
4			
Total			

TREE 1 CLUSTER 2	Live	Dead	Cuts
Total			
TREE 2 CLUSTER 2			
Total			
TREE 3 CLUSTER 2			
Total			
TREE 4 CLUSTER 2			
Total			

Tree# Leaf#	Live	Dead	Cuts
T5 1			
2			
3			
4			
Total			
T6 1			
2			
3			
4			
Total			
T7 1			
2			
3			
4			
Total			
T8 1			
2			
3			
4			
Total			

TREE 5 CLUSTER 2	Live	Dead	Cuts
Total			
TREE 6 CLUSTER 2			
Total			
TREE 7 CLUSTER 2			
Total			
TREE 8 CLUSTER 2			
Total			

SUMMARY OF DATA: Total Leaves Examined _____ Total Live _____

Average Number of Live Insects per Leaf _____ (# Live ÷ Total Leaves)