Adults

Two methods of evaluating adult budworm populations include light and pheromone traps.

Objective:

1. Detect the presence of the budworm.
2. Provide a reliable means to predict larval density.
3. Indicate population trend when operated for a number of years in the same location.
4. Indicate moth invasions by the incidence of unusually high catches on particular nights during a single season.
5. Monitor changes in sparse populations where other sampling methods are impractical.

Time of Year:

Light and pheromone traps must be in place during the entire flight period (eg., late June through July). In Quebec, the BioSIM model (Regniere and Cooke, in press) is used to plan the timing for installation and removal of traps.

Equipment Needed:

1. **Light Trapping:** Commercial or hand-made black light trap, killing agent, cardboard containers with cotton dividers for moth storage (if sorting is to be done by lab personnel), data sheets.
2. **Pheromone Trapping:** Multi-pher pheromone trap, lure, cardboard containers with cotton dividers for moth storage, markers, data sheets.

Procedure:

Light Traps: Catches of female spruce budworm in light traps hung in the forest canopy, coupled with the density of resident females (determined by pupa sampling), can be used as a crude predictor of egg-mass densities over a fairly wide range of population densities (Miller *et al*, 1979). This method saves considerable time over conventional egg-mass sampling (Sanders, 1980).

No firm protocol for light trapping spruce budworm moths exists at present; improvisation on light trap size, design, and placement seems to vary from region to region. Sanders (1980) comments that information on effects of factors such as wavelength and energy output

of light sources, trap design, different responses of the two sexes, trap location (eg., within or above canopy, in clearings, etc), mating and oviposition status and age, and climate is necessary before light trap catches can be used as accurate indicators.

Pheromone Traps: Many northeastern states follow a protocol and use traps provided by the US Forest Service. Multi-Pher traps are baited with a synthetic pheromone (95:5 blend of (E)- and (Z)-11-tetradecenal). The pheromone is imbedded in either a laminated flake or hollow fiber and suspended immediately below the cover inside the trap. Moths that enter the trap are killed by vapors released from Vapona (resin impregnated with dichlorvos) which is placed in the bottom of the trap.

1. Identify pheromone trapping areas. The minimum size stand for a pheromone survey is usually 50 acres and plots should be at least 70% fir.

2. Three pheromone traps are deployed at each site. In Vermont, traps are arranged in a triangular pattern with 40 m between each trap. In New Hampshire, one trap is placed in the center of the plots and two traps are placed in a line on either side of the center tree at a distance of 100 feet. Trees holding pheromone traps should be permanently marked. Trap height is 5-7 feet.

3. Traps are hung in mid-July and retrieved at the end of August. Traps are brought back from the field, emptied, and spruce budworm moths are counted. Moth counts can also be made by weight (Allen *et al*, 1986).

Data Sheets: A typical data sheet is shown on page 60.

Comments:

1. Light trap catches can predict budworm outbreaks while there is still time to plan control tactics or perform silvicultural manipulations to lessen budworm damage.

2. Light traps are relatively inexpensive to make.

3. A major drawback to light traps is that several species of insects are attracted to the light and trapped along with the spruce budworm, so that sorting collections and counting budworm can take a lot of time.

4. For light traps, more information is needed on factors such as (a) different wavelengths and energy output, (b) different trap designs, (c) different responses by the two sexes, (d) trap location, (e) mating and oviposition status and age of adult, and (f) climate. Some of these factors have been examined by Jobin and Coulombe (1992).

5. Pheromone traps are easier to handle and relatively lower in cost than light traps, and they are more specific than light traps, eliminating the need for extensive sorting of trap catches.

6. Pheromone trapping provides ample lead time to plan management activities other than direct control (eg., revised harvesting schedules).

7. Pheromone traps are sensitive to low-level populations (eg., densities of < 1.0 late-instar larvae per 18 in branch tip) and minor fluctuations in them.

8. Pheromone traps are relatively easy to handle and transport.

9. Pheromone and light traps avoid the use of inconsistent sampling units such as surface area of branches.

TOM SBW 2003

Please Read this Carefully!

The new lures from Suterra LLC are different from the lures that were manufactured by Concept INC Concept used to cover the lures in a plastic packet to keep the lure from dispensing its pheromone when it was not in use. You tore the plastic packet open to get to the lure. The lures from Suterra LLC have a clear plastic cover that peals off of the active side of the lure. The active side has a 3-4 mm black dot near the center. The plastic cover must be removed from that dot before the lure will become active. **Please remove this plastic peel off cover before setting out lure.** (see figure 1) The inactive side of the lure has brown paper over a sticky surface. If you have any questions please call George Saufley at (603) 868 7715.

Email From C. J Sanders Ph D.

One caveat that should go out to all users concerns the new Biolures. The modified formulation that they are selling this year comes with a new twist that we haven't seen before. The new lures have a plastic covering over the active surface of the lure (in addition to the brown paper over the sticky surface). **THIS PLASTIC MUST BE REMOVED** before the lure is placed in the trap otherwise no pheromone will be released! See figure 1.

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SPRUCE BUDWORM SURVEY

MAP AREA _____

FIR SPRUCE POINT NO._____

Collectors:_____

Date: _____ Year: _____ Town: _____

Location:_____

Stage: Early larval___ Late larval___ Pupal___ Egg___Overwintering larval___ Adult_____

County	Town	Location	Trap #	# of SBW Adults	# of Other Moths
			1 2 3		
			1 2 3		
			1 2 3		
			1 2 3		
			1 2 3		
			1 2 3		
			1 2 3		
			1 2 3		

TARGET INSECT: ______________ MONITORING SYSTEM --PHEROMONE TRAP DATA - VERMONT

YEAR	PLOT LOCATION PROV. STATE	PLOT LOCATION NO./NAME	PLACEMENT DATE MONTH	PLACEMENT DATE DAY	COLLECTION DATE MONTH	COLLECTION DATE DAY	PHEROMONE TYPE	SAMPLING LEVEL	TREE SPECIES	# TRAP	NUMBER OF MALE MOTHS	OTHER MOTHS					
	0 2									1							
										2							
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										5							
										1							
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TRAP LAYOUT