

FOREST PEST SURVEYS

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Introduction

Historically, damage from forest insects has played a major role in widespread tree declines. Monitoring pest population trends and resulting tree damage is therefore vital in understanding trends in the health of forests and how forest management exacerbates or moderates the impacts from pests.

The objective of conducting forest pest surveys is to track trends in major insect pest populations as potential stressors to the forest.

Methods

There exists numerous different methods for measuring forest pest populations, and the effectiveness of each method is pest specific. Some forest pests do not yet have reliable, meaningful survey methods developed. At present, the forest pests monitored at the Proctor Maple Research Center (PMRC) include: pear thrips (PT), gypsy moth (GM), forest tent caterpillar (FTC), and spruce budworm (SBW).

SPRUCE BUDWORM AND FOREST TENT CATERPILLAR

These pests are monitored using pheromone traps [multiplier traps with a biolure and a vaportape insecticide], which attract male moths during their flight period, indicating relative population levels in the area. FTC trapping is done using a 5 trap cluster, which was placed in the vicinity of NAMP (North American Maple Project) plots. SBW trapping is done using a 3 trap cluster, which was placed west of the PMRC Lab in a dense spruce habitat. Protocols for these surveys is accordance with that of other statewide surveys for these pests.

FTC traps were set out on Julian Date (JD) 177 (June 26) and collected on JD 227 (August 15). SBW traps were set out on JD 170 (June 19) and collected on JD 248 (September 5). Trap catches were returned to the VT FPR Laboratory in Waterbury for counting and moth verifications.

PEAR THRIPS

PT are a relatively new pest to Vermont sugar maple trees, therefore lack the depth of understanding in relating trap catches to population densities and subsequent damage. At

present 3 different population assessment methods are in operational for monitoring this pest: soil samples for immature population estimates, emergence traps for adult population estimates and timing of emergence, and yellow sticky traps for adult population estimates. All 3 methods were employed at the PMRC [1360 ft. (415 m) elevation].

Soil samples were collected in the fall of 1990 to estimate the overwintering pear thrips population, using field and laboratory protocols previously established for statewide and regional PT surveys (Parker et al, 1990). Basically, 5 sugar maple trees were identified in 1988 as reference points for soil sampling, using a bulb planter collecting tool. Resultant damage assessments are taken on these 5 trees in mid-June.

Emergence traps were used in the spring of the year to monitor PT adult emergence from the soil and to estimate the surviving adult population size, using standard protocols (Parker et al, 1990). Again, the same 5 sugar maple trees are used as reference points for emergence trap placement and comparisons between emergence population size and damage.

Yellow sticky traps were used to monitor the timing and duration of adult PT activity above ground, as well as to monitor trends in adult populations over time in relation to other sites in the region. Standard protocols were developed under the CAPS program (Cooperative Agricultural Pest Survey Program) and consisted of placement of 4 yellow sticky traps at a 1-m height off the ground in the vicinity of 8 sugar maple trees to be used for monitoring bud phenology and PT damage. Weekly trap collections were made, with trap catch counts verified by VT FPR Laboratory staff.

Gypsy moth burlap banded plot was used to monitor GM egg masses present on preferred host tree species. At the PMRC, most of the forest is non-preferred host trees (like sugar maple). A small cluster of poplar trees was therefore used to detect the presence/absence of this pest on-site, and monitor trends in population over time. Protocols for this survey follow standards used in other Vermont GM focal areas. Burlap bands placed at DBH on live trees within the plot attract egg bearing females, who tend to lay their egg masses under or near the burlap. Counts of egg masses in the fall are used to estimate the resident population.

Results

Results of trap catches showed the presence of 3 out of the 4 target pest species, spruce budworm, pear thrips and gypsy moth (Tables 1-2). In addition, hemlock looper (HL), a new forest pest threat in Vermont, was present and captured in both types of pheromone traps. PT soil population and resulting damage for 1988 through 1991 shows a steady decrease in the population, with resulting damage lessened on saplings.

Discussion

Contamination of pheromone trap lures is common. The large GM catches in both the FTC and SBW traps suggest that past handling of gypsy moth pheromone traps resulted in contamination at some point in the distribution of these traps.

The presence of HL in our traps may be a result of the behavior of this insect, which likes the concealment offered by the traps. But this did allow us to detect the presence of this new forest pest on Mount Mansfield.

The presence of GM at this site was not expected, since there is but a small area with preferred host species. But GM do feed on non-preferred hosts, which may be the case at this site.

No sugar maple seedlings were found in 1988, but it is unknown whether this is due to low reproduction or low survival. Other sites in Vermont and the Northeastern region have documented seedling mortality from PT feeding, so this possibility can not be ruled out.

More specific PT damage assessments began in 1991 using NAMP crown ratings for foliage transparency (measurement of defoliation) and dieback (stress impact manifested). Trees with dieback $\leq 15\%$ are considered healthy. Since the average dieback on these trees was 17% , this would indicate that the trees are in a state of light decline. General observations suggest that over the past 3 years the amount of damage from PT to the overstory has lessened, but this is not represented in the gross damage assessments used here (light, moderate and heavy damage).

Context of this study

Statewide surveys presently exist to monitor these 4 pests (Teillon et al, 1991). FTC and SBW are monitored at 8 and 21 sites in Vermont, respectively. FTC populations were low in 1991, with the average trap catch at 0.4 moths/trap. SBW populations were higher than in recent past, an average of 12 moths/trap, but still at low levels with not visible defoliation occurring. Numbers at the Mount Mansfield site, however, were the highest in the state with no obvious explanation.

GM populations in focal areas are monitored at 11 sites in Vermont. In 1991, average populations from these sites was 3 egg masses, the same as that found at Mount Mansfield.

PT soil populations are monitored at ca. 100 sites in Vermont (Teillon et al, 1991). The overwintering population for this year was lower than previous years with resulting damage at low for recent years, as was the case at Mount Mansfield.

Future plans

As survey methods for other forest pests become available they will be implemented at this site. In addition to surveys at the 1360 ft [415 m] elevation, we anticipate expanding elevationally to monitor these pests at other sites on the mountain.

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References

- Millers, I., D. Lachance, W. Burkman & D. Allen. 1991. North American Sugar Maple Decline Project: organization and field methods. Gen. Tech. Rep NE-154. Radnor, PA: U.S. Dept. of Agr., Forest Service, Northeastern Forest Experiment Sta. 26 p.
- Parker, B. L., M. Skinner, S. H. Wilmot and D. Souto. 1990. Proceedings, Regional Meeting: "Pear Thrips Research and Management: Current Methods and Future Plans." South Burlington, VT, November 15-16. Vt. Agr. Exp. Sta. Bull. 697, Univ. Vt., Burlington. 151 pp.
- Teillon, H.B., B.S. Burns and R.S. Kelley. 1991. Forest Insect and Disease Conditions in Vermont - 1991. Agency of Natural Resources, Dept. of Forests, Parks and Recreation, 103 So. Main St., Waterbury, VT 05671-0602. 70 pp.

Table 1. Pest survey results from Proctor Maple Research Center, Mount Mansfield, Vermont, 1991. Four pest surveys are presented: spruce budworm and forest tent caterpillar adult collections from pheromone traps, pear thrips adult collections from yellow sticky traps, and gypsy moth egg mass survey from burlap banded trees.

TARGET PEST	SURVEY TYPE SURVEYED	JULIAN DATES PEST OBSERVED	TOTAL NO. COLLECTED	OTHER PESTS COLLECTED
Spruce budworm (SBW)	Pheromone traps	170-248	59	GM=95 HL= 9
Forest tent caterpillar (FTC)	Pheromone traps	177-227	0	GM=181 HL= 1
Pear thrips (PT)	Sticky traps	091-133	8	-----
Gypsy moth (GM)	Burlap banded trees	289	3	-----

HL=Hemlock looper

Table 2. Pear thrips soil population and associated sugar maple damage assessments for 1988 through 1991, Proctor Maple Research Center, Mount Mansfield, Vermont. Soil population figures are recorded in units of pear thrips per bulb planter of soil to allow for comparisons with other Vermont sites.

YEAR*	PT SOIL POPULATION (AVE. NO./ BULB PLANTER)	RESULTING DAMAGE TO:				
		TREES	DK	TR	SAPLINGS	SEEDLINGS
88-89	17.5	LIGHT			MODERATE	----
89-90	10.6	LIGHT			LIGHT	LIGHT
90-91	0.6	LIGHT	17	15	LIGHT	LIGHT

* = first year listed indicates year of fall soil sample for population assessment, second year of each combination indicates year of spring damage assessment.

PT = pear thrips

LIGHT DAMAGE = 1-30 % of leaves damaged

MODERATE DAMAGE = 31-60 % of leaves damaged

DK = dieback (ave. %) [North American Maple Project protocol

TR = transparency (ave. %) ["]