

Pheromone Traps and Other Methods in Assessing Pine Beauty Moth (*Panolis flammea* Schiff.)

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Abstract

The objective of this research was to evaluate different methodologies for quantifying pine beauty moth (*Panolis flammea* Schiff.) populations in pine stands of Southern part of Lithuania. Evaluations were conducted in selected pine stands by assessing the following: pupae (in the litter); larvae (falling from trees after chemical knock down); and adult insects (using pheromone traps). Analysis of evaluation methods indicated that the populations can be assessed most accurately by using the counts of larvae. This method is used when outbreaks occur or aerial spraying of insecticides is needed. Assessment of pupae in the litter is the most suitable method for silvicultural purposes; the use of pheromone traps is less precise than the other two methods.

Key words: Pine beauty moth, population, assessment

Introduction

The pine beauty moth (*Panolis flammea* Schiff.) is one of the most serious defoliators of pine. The entomological and forest protection literature provides reviews of previous studies which describe observations on this pest and methods for forecasting its abundance however they are rather imperfect. Very often mass outbreaks are observed too late, forecasts are inaccurate, there is not enough time to conduct control activities. Thus control measures are often ineffective and mass outbreaks spread over thousands of hectares. The elimination of these outbreaks requires additional expenditures, and control activities may have an adverse influence on forests and non-target organisms.

Pine beauty moth (*P. flammea* Schiff.) infestations in Lithuania were increasing almost geometrically in the 20th Century (1100 ha in 1922, 4200ha in 1953, 27000 ha in 1979, 44800 ha in 2000). The purpose of this study was to compare methods used to evaluate populations of the pine beauty moth.

Methods

Observations were conducted in pine stands of the Druskininkai forest enterprise where the pine beauty moth damaged up to 70-100% of needles. A 100 ha area was divided into 100 equal squares in April, 2001. The number of pupae in the litter was determined at each point of two 0.25x1.0 m plots placed under each of 6 trees. The pupae were grouped according to their sex, and the presence of disease and the level of parasitism was measured. During the adult flight period, pheromone traps ("Panador") were placed in each plot. They were checked on 27 April, 3 May and 21 May.

A count of larvae was conducted using a "Chemical knock-down" method. At each point on 2001 05 30, a tree was selected and two 0.5 X 1.0 m blankets were placed under it on opposite sides of the trunk. The trees were sprayed with a ten times greater dose of Arrivo pyrethroid insecticide. A count of dead larvae was made 10 days after spraying. The trees were cut down so that their crowns fell on polyethylene sheets so that larvae remaining in the crowns could be counted.

Results

Counts of pine beauty moth pupae made early in the spring before emergence of adults has shown that pupae in the study area were distributed rather unevenly. The general ratio of females and males in the area was 1.9:2.3. This indicated that the mass outbreak is already in the third stage. The studies showed no essential differences in the dependence of male and female pupae ratio on the total number of pupae. However, there is a tendency that when the number of pupae in the litter is greater than 10/m², their ratio is in favor of males.

Studies on flight dynamics of pine beauty moth were determined also in the same places by using pheromone traps. Males were found mostly in the places where females accumulated after emergence, or if they were not present there, males responded to a synthetic attractant. For the sake of convenience, traps can be placed at a height of 3-4 m. For calculating the abundance of males in the crowns, the coefficient is 7.8.

Determination of the location where the most intensive flying of females occurred could be ascertained only by secondary methods – according to the place of egg laying, i.e. where larvae were the most abundant in tree crowns. It appeared that areas of larval abundance did not coincide with where pupae occurred or where males were caught by pheromone traps.

We observed that the high density of the population seems to have moved to the northwest from the initial location of pupae; this may be related to the prevailing winds during the flight period of the moths. The counts of larvae accurately reveal the current state of the population at the place of infestation but they are hardly suitable for forecasting damage intensity in the following year, or for planning future protection measures.

Conclusions

1. Methods that are currently applied to evaluate pine beauty moth population densities reveal accurately the present state of the population, but they are hardly suitable for long-term forecasting.
2. Counts of pupae in the spring is the most accurate method for forecasting current densities of pine beauty moth.
3. Pheromone traps, at best, are suitable only to determine the periodicity and intensity of flying adult males and for convenience, they can be placed at the height of 3-4 m.