

FOREST TENT CATERPILLAR, ITS MANAGEMENT AS AN URBAN PEST IN VIRGINIA

by P.B. Schultz

Forest tent caterpillar, *Malacosoma disstria*, has been an important pest of forest, orchard, and shade trees for many years. It occurs throughout most of the United States and Canada where it feeds on a variety of hardwoods, including trembling aspen, gum and several oak species. This insect overwinters in the egg stage, and hatching begins from March to May about the time the tree buds begin to swell. Complete defoliation has been reported in forest settings (Hodson 1941). The first three instars are gregarious feeding on one small group of expanding leaves, migrating to surrounding foliage as needed. During the fourth instar, the larvae feed more independently, and congregate during the day on silken mats which they form on the branches and trunks. As they approach maturity they disperse and wander in search of food and pupation sites. Pupation occurs in folded leaves and crevices, and the adult moth emerges from May to July depending on latitude. There is one generation per year.

Outbreaks occur approximately every 10 years in the Northeast states and usually subside after 3 to 4 years (1). Weather factors and parasitism contribute to the population decline. A general outbreak was observed in Virginia in 1930-32 (1). The city of Norfolk, Virginia has been aggressive in street tree planting, beginning in the 1930's. Norfolk, with its 283,000 residents and 66 square miles has an estimated 200,000 oaks planted on public property. In 1988 an unprecedented outbreak of forest tent caterpillar occurred throughout the city. While defoliation was barely visible, citizen complaints of large numbers of migratory caterpillars crawling on sidewalks and streets resulted in immediate spraying of street trees with acephate. As larvae continued to be observed, there were complaints about the ineffectiveness of the insecticide applications. This prompted a study to determine the efficacy and residual activity of selected insecticides, including several readily available to the general public.

Methods & Materials

Field study. Twenty four willow oak, *Quercus phellos*, approximately 25 ft high were selected for evaluation. Trees were located on city property in Norfolk, VA. and infested with 300 or more fourth or fifth instar forest tent caterpillars on the trunks. Treatments were aerosol formulations: acephate (Whitmire PT-1300), cyfluthrin + tetramethrin + piperonyl butoxide + MGK 264 (Laser A), encapsulated diazinon (Whitmire PT-1500), pyrethrins + tetramethrin + piperonyl butoxide, phenothrin (Sumithrin); and liquid formulations: carbaryl (Sevin SL), and cyfluthrin (Tempo); and an untreated check. The aerosols were applied directly to the larvae and surrounding trunk until the trunk glistened. Carbaryl and cyfluthrin were applied to the larvae and the trunk of the tree to the point of runoff using a one gallon B & G compressed air sprayer at 20 psi. Aerosols were applied 25 April 1988, and evaluated 6 hrs and 24 hrs post-treatment. Liquid treatments were applied 26 April 1988, and evaluated after 24 hrs. There were three replicates per treatment. Efficacy was determined by counting dead and live larvae on the trunks and at the tree base. Larvae were counted as dead if nonresponsive to probing.

Laboratory study. A laboratory study was conducted to determine residual activity of the insecticides used in the field study. Insecticides were applied 5 May 1988 to analytical filter paper to saturation, allowed to dry, and placed in 100 mm petri plates. Field-collected fourth and fifth instar larvae were introduced into the dishes, 10 larvae per plate, four replicates per treatment. Dishes were examined after 24 and 72 hrs and the number of live larvae was recorded.

Results & Discussion

The results indicated that all formulations of insecticides controlled FTC larvae (Table 1). The aerosol formulations provided excellent larval con-

trol after six hours; however, the reappearance of larvae within 24 hrs on several trunks indicated the absence of residual activity with several aerosols. Interestingly, larvae killed with pyrethrin + tetramethrin + piperonyl butoxide remained attached to the tree at least 24 hrs after treatment. The appearance of large numbers of larvae 24 hrs after application indicated a migratory behavior pattern within the tree. Daily observations of 12 Norfolk trees confirmed caterpillar migration within individual trees. Larvae congregating on side branches moved toward the main trunk, while those on the main trunk migrated downward and dispersed.

Laboratory study. After 24 hrs, the only insecticidal treatment with survival was Sevin SL, with a

Table 1. Percent mortality of forest tent caterpillar larvae six and 24 hours after insecticide application.

<i>Treatment and rate</i>	<i>6 hrs</i>	<i>24 hrs</i>
Acephate 3%A (Orthene PT 1300)	93	72
Cyfluthrin 0.04% + tetramethrin 0.72% + piperonyl butoxide 1.0% + MGK 264 1.0% A (Laser)	100	85
Diazinon 1%A (Knox-Out PT 1500A)	98	88
Pyrethrins 0.176% + tetramethrin 0.081% + piperonyl butoxide 1.05% A	100	91
Phenothrin 0.5%A (Sumithrin PT 1400)	99	90
Carbaryl (Sevin SL) 32 oz/100 gal.	-	95
Cyfluthrin (Tempo 2E) 1.5 oz/100 gal.	-	100
Check	0	0

mean of 5.4 larvae. All treatments provided total control after 72 hrs. Aerosol applications in the enclosed petri plates provided better control than in the field. Prolonged residual activity in this study could be the result of greater insecticide absorbency of the filter paper and the absence of solar radiation in the laboratory environment.

In summary, all treatments were effective against the forest tent caterpillar. Most surviving caterpillars observed had migrated from unsprayed areas. Migratory behavior of the larger larvae led to incorrect conclusions by the general public that the treatments were ineffective. Initiation of spray program against a new urban street tree pest is a sensitive issue, especially when it occurs in response to citizen outcry. Our research indicates that the use of aerosols by homeowners can complement any municipal spray program, reducing public expenditures. In addition, effectiveness of such a program is greatly enhanced by citizen education on the life history and behavior of the pest.

Literature Cited

- Hodson, A.C. 1941. An ecological study of the forest tent caterpillar, *Malacosoma disstria* Hubner, in northern Minnesota. Minn. Agric. Exp. Stn. Tech. Bull. 148.

*Associate Professor of Entomology
Hampton Road Agric. Exper. Station
1444 Diamond Springs Road
Virginia Beach, Virginia 23451*