

Some Negative Aspects of Using Bacillus thuringiensis Berliner In Operational Programs Against The Gypsy Moth (Lepidoptera:Lymantriidae)

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Operational programs to suppress gypsy moth populations in residential and recreational areas first began in New Jersey in May of 1980. Bacillus thuringiensis was used on approximately 17,000 acres applied at the dosage rate of 8 B.I.U.'s in one gallon of water per acre. Two treatments approximately one week apart were applied.

The insecticide B.t. was used previous to 1980 in pilot test programs, but because of the high cost of materials and erratic results the Department could not recommend it as the viable alternative to chemical pesticides. However, more recently with improved formulations and lower costs it has become more feasible to utilize B.t. in operational programs.

Despite B.t.'s increased efficacy over earlier formulations, there are still a number of negative aspects to consider when used in operational programs. One of the negative aspects of most concern is the narrow "spray window" available to properly control second and third instar larvae especially if there is a prolonged hatching period. However, even when it is applied when the larvae are the proper size, rainfall and/or prolonged cool weather can reduce its efficacy because of the material washing off foliage and the lack of feeding which occurs by the larvae during cool weather conditions.

Additionally, even though we have reduced the number of applications from two to one per spray season, it still is applied at the rate of approximately one gallon per acre which means more operational hours are necessary to complete the work than the low volume chemical insecticides.

Another negative aspect of major concern is the wide variability in efficacy depending on the health and vigor of the gypsy moth population. Building populations of the gypsy moth, where the egg masses are large and the numbers exceed 1,000 egg masses per acre, are much more

difficult to control with B.t. than declining populations of the pest. Declining populations are found when the insect is under stress due to starvation and disease and egg masses are small. Bacillus thuringiensis tends to be more successful under these conditions. Because of this variability, the New Jersey Department of Agriculture occasionally has to re-spray areas containing high building populations because larval reductions were not sufficient to prevent re-infestation of these areas of the following season. This re-treatment sometimes amounts to nearly 50% of the spray block.

Although insecticide costs are greater for B.t. than for the chemical insecticides, the cost is not the major concern when towns make their selection. The effectiveness of the material seems to be the greater concern to town officials. The reason being is that there are certain notification and legal procedures which must precede the spray operation and if after all these requirements are met, the results are not good in terms of foliage protection and population control, the towns will sometimes switch to the more effective chemical insecticides the following season.

Another negative aspect of the B.t. spray is its slow knock-down ability. Residents in the sprayed area believed that once spraying is done, the larvae should rapidly disappear from the area and no further nuisance should exist. This rarely occurs when B.t. is used and some residents complain that the insecticide is not working.

One minor aspect of the insecticide B.t. that is considered negative is a fact that it is very difficult to see on the foliage. Therefore, if residents believe a skip has occurred, it is difficult to verify because the B.t. is virtually colorless on leaf surfaces.

Evaluating the efficacy of B.t. by the New Jersey Department of Agriculture has been done each season since its introduction in 1980 using tar paper bark flaps and comparing results of larval counts in treated and untreated areas at the same time. The best control of larvae during any one season occurred in 1982 when a 70% average larval reduction in all treated areas was accomplished. The lowest larvae reduction of caterpillars had occurred in 1983 when only 40% reduction in larval numbers were observed. Apparently, the woodlands where B.t. was used in 1983, contained extremely high and healthy populations of the gypsy moth and the results were not as good as in previous years.

Finally, the Department does recognize the fact that stickers can increase the residual life and effectiveness of the B.t. application. However, the stickers that work the best are also the most difficult to remove from car surfaces and does present a negative factor since most of the spraying is done in residential areas. For this reason, the Department has used stickers (Plyac or Nu-Film) which are able to be washed off car finishes more readily.

In conclusion, there are a number of negative aspects of using B.t. sprays in residential areas. However, in general, B.t. does not offer good foliage protection, and therefore, the objective of preventing tree loss in these areas is met. The New Jersey Department of Agriculture will continue to recommend and encourage the use of B.t. in spraying operations. However, we do feel towns should be given the opportunity to select the insecticide in a voluntary program, especially when all the aspects of B.t. are considered.