

# EFFICACY OF GYPSY MOTH MATING DISRUPTION TREATMENTS IN THE SLOW-THE-SPREAD (STS) PROJECT

Kevin W. Thorpe

USDA, ARS, Insect Biocontrol Laboratory, Bldg. 011A, BARC-West, Beltsville, MD 20705

## Abstract

The National Slow-the-Spread of the Gypsy Moth Project (STS) is a coordinated effort by the USDA (Forest Service and APHIS) and 10 state governments (NC, VA, WV, KY, OH, IN, MI, WI, MN) to slow the rate of spread of gypsy moth, *Lymantria dispar* (L.), populations into uninfested areas. Using an extensive grid of pheromone traps, gypsy moth populations along the leading edge are detected and delimited, and if certain criteria are met they are treated with insecticides or mating disruptants. The project was pilot tested from 1993 to 1998 and was fully implemented in 1999. Initially, most acres were treated using *Bacillus thuringiensis* (B.t.). By 2000, mating disruption using the gypsy moth sex pheromone, Disparlure, became the primary treatment tactic. Application rates for mating disruption of 30 g active ingredient per acre were used exclusively until 2000. Based on field tests showing high levels of efficacy at lower doses, mating disruptants were applied at 15 g/acre starting in 2001, and at both 15 and 6 g/acre starting in 2002. Based on criteria developed for use in the STS decision support system, an analysis of the treatment results for the years 1993 to 2001 (prior to the use of the 6 g/acre rate) showed that the success rate for blocks treated with mating disruption was greater than for blocks treated with B.t. (Sharov et al. 2002, J. Econ. Entomol. 95: 1205-1215). The objectives of the analyses reported here are: (1) to extend the evaluation of STS treatment success through the year 2003; (2) to evaluate treatment success in blocks treated with different mating disruption application rates; and (3) to identify factors (e.g. block size, pre-treatment moth density, population growth trends, etc.) associated with reduced treatment success.

Based on criteria established in the STS decision support system, the success rate of all treatments combined (including blocks rated as partially successful) ranged

from 85 to 95% from 1994 to 2003. Using the same criteria, treatment success ranged from 88% for B.t. to 100% for mating disruption at 6 g/acre. Treatment success was 93% and 95% for mating disruption at 15 g and 30 g/acre, respectively. However, it is important to note that B.t. tends to be used more often in STS on smaller blocks and on those blocks that have a higher pre-treatment moth density, so the comparison may be biased. Of the blocks considered successful or partially successful by the STS decision support system, average moth density was reduced in 98% of the mating disruption blocks treated at 30 g/acre, in 90% of the blocks treated at 15 g/acre, and in 69% of the blocks treated at 6 g/acre. Moth density declined in 80% of the blocks that were treated with B.t. and were considered successful. While this may be an indication that lower mating disruption application rates result in reduced efficacy, there are many potential sources of bias that could also account for the differences among the treatments. For instance, the 6 g/acre rate for mating disruption has been used only in the past two years. The majority of treatment acres during the past two years have been in the extreme north of the STS project area. Therefore, it may be that gypsy moth populations are responding differently to treatments in this newly-invaded area. There is some evidence to support this idea. In Wisconsin, 32% of the successful or partially successful blocks experienced increases in moth density, compared to only 3% in states other than Wisconsin. Interestingly, there also appear to be differences in the growth of surrounding untreated populations. In Wisconsin, 82% of the successful or partially successful blocks experienced increases in moth density in areas adjacent to the blocks, while this number was 40% for all blocks in other states. Subsequent analyses will focus on comparisons of gypsy moth population dynamics over larger areas in Wisconsin versus other regions.