

ML 2015 Project Abstract

PROJECT TITLE: MITPPC Sub-project #9 Characterizing dispersal of larval gypsy moth to improve quarantine regulations

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LEGAL CITATION: ML 2015, Ch. 76m Sec. 2, Subd. 6a

APPROPRIATION AMOUNT: \$35,000

Overall Project Outcomes and Results

The European gypsy moth is an invasive insect that feeds on over 300 species of trees and shrubs. Management guidelines within a national quarantine recommend that wood products, such as timber being harvested and moved from the forest, are staged within a buffer zone area devoid of any host vegetation during harvesting operations. This buffer zone reduces the likelihood that late instar gypsy moth larvae will pupate nearby, emerge as adults, mate, and lay eggs on the wood. In practice, this buffer zone is 100 feet in radius, but this distance was established with limited understanding of the movement ecology of gypsy moth larvae. We conducted laboratory experiments at the University of Minnesota to determine how host type and food deprivation affected movement of gypsy moth caterpillars. During outbreaks, food can become scarce as larvae strip trees of foliage. Larvae were raised on one of five foods: oak, tamarack, Norway maple, sugar maple, or artificial diet. Subsets of larvae were also deprived of food for zero, 24, or 48 hours. After the food deprivation period, late instar larvae were placed on the servosphere. Larvae raised on oak, a preferred host, were unlikely to move unless starved. They moved farther and faster the longer they were starved. In contrast, when larvae were raised on less preferred hosts, they were more likely to move without prior starvation. These results suggest that feeding on optimal hosts provides gypsy moth larvae with the energy and nutritional requirements to move more quickly to more food when there is none immediately available. Thus, risks of larvae crossing a regulatory buffer zone may increase where an outbreak results in complete defoliation of preferred hosts. Results from this laboratory study were integrated with a federally-funded field study to inform best management practices of this invasive species in Minnesota.

Project Results Use and Dissemination

This work has been shared with national regulatory officials at USDA APHIS who are revising the national gypsy moth management handbook at a time when the insect continues to invade Minnesota. This work was also been presented at two conferences with resource managers and other research staff:

Upper Midwest Invasive Species Conference Oct 15-18, 2018. Rochester, MN. Wittman, J.T., Kees, A.M., and B.H. Aukema. Characterizing the movement behavior of gypsy moth (*Lymantria dispar*) caterpillars using a servosphere.

ESA/ESC/ESBC Joint Annual Meeting Nov 11-14, 2018. Vancouver, BC. Wittman, J.T. and B.H. Aukema. Effects of host foliage on the movement behavior of larvae of gypsy moth *Lymantria dispar*.

One scientific journal article has been submitted:

Wittman, J.T. and B.H. Aukema. (201x) Foliage type and availability alters the movement behavior of late instar European gypsy moth *Lymantria dispar* (Lepidopera: Erebidae). *Journal of Insect Behavior* Submitted Nov 22, 2018.