NSRC Progress Report 2021

Pheromone-based Monitoring and Control Program for Browntail Moth in the Northeast

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Project abstract

Browntail moth populations in Maine have seen population growth spurts every 15 years or so, but these were quickly controlled or declined and failed to cause extensive damage. In 2015, populations exploded to 100-year highs, causing both forest and human health problems. Since then, the moth has spread across 4 million acres of Maine, Nova Scotia, and New Brunswick. This outbreak has caused over 150,000 acres of hardwood defoliation and tree mortality in areas that have experienced repeated years of defoliation. In addition, caterpillars have toxic hairs that cause severe rashes and respiratory problems in humans. The hairs go airborne, so direct contact with caterpillars is not required for serious symptoms, and outbreaks negatively impact tourism and outdoor recreation.

NSRC researchers will contribute to a browntail moth management plan by developing a monitoring program using mating pheromones. This program will be used to detect current and future outbreak populations prior to buildup and allow for rapid control measures. Pheromones will be used to test if a mating disruption control program is an effective management option. Results will aid federal, state, and regional managers in developing plans to reduce browntail moth populations and their impacts in our region.

Summary of progress in 2021

Conversations with Trécé Incorporated were initiated prior to the start date of the project to discuss their ability to synthesize browntail moth's (BTM) female sex pheromone. Trécé donated traps and lures, and

the University of Maine provided funds to initiate a pilot study during BTM's flight season starting in July 2021 (prior to the start date of this grant). The objective was to test 2 lure purities and 2 trap types (Fig. 1) to determine the optimal setup for the monitoring program that will begin in summer 2022. Although the onset of BTM's flight season was missed, results showed significant preference for the highest purity lure (> 95% pure; Fig. 2). Based on the pilot study's results, the

field season.



study's results, the *Trap types used for comparison of adult male browntail moth* preferred lure will be used *captures: a plastic Uni trap (a.), and a Delta trap (b.).* during summer 2022's

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Interviews for a Ph.D. position were conducted, and the new graduate student joined the Forest Entomology lab at the University of Maine in January 2022. The main part of their dissertation will focus on research funded by NSRC.

Problems or changes

The only change has been the addition of a summer 2021 pilot study testing lure purity and trap type.

Collaboration with USDA FS

Forest service collaborators have participated in meetings via zoom to provide recommendations for project success.

Plans for 2022

Multiple projects will be initiated during summer 2022's BTM flight season:

Trap Designs – catch numbers from the summer 2021 pilot study were lower than what was expected. Although these low numbers could be due to missing the peak of the flight season, the color of the trap could also be playing a role. It is well-documented that BTM is strongly drawn to lights at night leading us to believe that white traps could result in a stronger visual cue than the green traps used in the pilot study. In addition, we will test traps that have larger openings to release a more uniform plume around the trap.

Monitoring Program – using the high purity lure found to be the most effective at capturing BTM males during the 2021 summer season, and Trécé's Pherocon 1C white traps, we will set up monitoring sites at 18 sites across Maine. Sites will have different densities of BTM, but similar densities of available hosts (oak, cherry, beech, etc.). Male BTM will be collected from these sites throughout the flight season (July-August). Once leaves fall off the trees in the winter, sites will be revisited to determine the number of BTM winter webs around a fixed radius from the trap. Preliminary analyses will examine whether there is a correlation between male catches and BTM winter nests.

Lure Load Rate – tests will be conducted to determine the load rate of the pheromone that results in males not being able to find a virgin female BTM. This is the preliminary step needed to test mating disruption.



Percent of male browntail moths caught for each trap and lure combination from a total of 72 traps set up across Maine in 2021. The traps were indicated using a "U" for Uni trap and "D" for Delta trap. The lures were indicated using a "high" for the high-purity lure (>95%) and "low" for the low-purity lure (<95%). For example, "U-high" indicates a Uni trap with a high-purity lure.