

A. Grant Data:

Category: Northeast Regional IPM Competitive Grants Program (RIPM)
Title: Integrated Pest Management of Pest Ants in the Urban/Suburban Landscape
Project Director: Dr. Eleanor Groden
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States Involved: Maine, New York, Delaware
Grant #:
Year Grant was awarded: 2006
Length of the grant: 24 months plus 12 month no-cost extension
Funding Amount: 150,055

B. Non Technical summary

Pestiferous ants in the suburban/urban exterior landscape are often overlooked in pest management programs, but they can cause considerable problems for homeowners, businesses and schools. These problems include a) nuisance and health issues associated with stinging and biting incidences, b) damaging plants directly or through the act of tending Homopteran species, and c) contributing to interior nuisances and structural damage by exterior nesting species. One of these ants, the European fire ant, is an invasive species that has become a serious pest in many coastal communities in Northern New England. Populations have also been found in Massachusetts, Vermont, and New York. A limited amount of information is available on the distribution and management of this species, and with increasing concern for the development of more environmentally friendly techniques to manage insect pest, we developed this project. We proposed to investigate 1) the potential management of *M. rubra* populations around buildings and homes, 2) Survey PCOs, homeowners, master gardeners etc. in the NE to determine the most commonly encountered pestiferous species in the landscape, and 3) develop and distribute region specific information on pestiferous ant species and options for “least toxic” management options.

C. Introduction

Most pestiferous ant management programs focus on structural pest ants, neglecting and underestimating the potential problems that ants in the exterior landscape can cause. The invasion of fire ants, *Solenopsis invicta*, in the southern United States has increased awareness of ants as landscape pests and their effects on public health and the economy. Currently, another fire ant, *Myrmica rubra*, is slowly invading the northeastern United States and causing concern among homeowners, businesses, and communities. Densities of this aggressive, stinging ant can average 1.4 nests/m² with 300 to 10,000 foragers per nest. These high densities drive people out of their yards and displace native fauna. A need exists for safe and effective means of managing this pest, with a focus on preventing further spread.

Toxic baits with delayed activity have been found to be effective for managing pestiferous ant population. The delay in activity allows ants to collect the toxicant and feed it to the rest of the colony before they succumb to its effects. Using bait stations to distribute bait reduces the environmental, health, and safety risk sometimes associated with broadcasting baits.

A broader knowledge of ant species considered landscape pests in the Northeast, including the European fire ant, will help us to develop better management strategies. To date, there is not a comprehensive database pestiferous landscape ants in the Northeast. There is also no centralized source of information that the public can access to aid them in identification and management of pestiferous ant species they may come in contact with. We aim to address both of these problems in this study.

D. Objectives

Research

- R1)** Develop and evaluate “least toxic” strategies for homeowners and businesses for management of European fire ant, *Myrmica rubra*, using bait station strategies.
- a) Determine the effective land area serviced by individual bait stations.
 - b) Determine the time required for successful transfer of bait from foragers to the rest of the colony.
 - c) Field test the optimal bait strategy for management of *M. rubra*.

Extension

- E1)** Survey pest control operators in participating states and extension workers throughout the NE region to determine the most common reported species of ant causing problems for home owners, businesses and schools
- E2)** Develop a web-based key to the common ant pests in the Urban/ Suburban landscape in the NE region
- E3)** Develop and distribute web-based and printed materials for home owners and businesses (Including control Operators) on common pestiferous ants in the Urban and Suburban landscape and its management

E. Approach

Research

- R1 b)** Colony Feeding Study: We used marked diets to compare the rate at which different nutrients are transferred from foragers to queens, brood and other workers.
- R1 c)** Cafeteria Study: We conducted research to examine seasonal variation in nutrients exploited in the field by comparing forager collection of different nutrients (Lipid, Sugar, Protein, and Carbohydrate) embedded in a standard diet matrix in field based choice test.

Extension

- E1)** For the survey, each state received 500 ant sampling-kits before seasonal ant activity began to distribute between PCOs, homeowners, master gardeners etc.

F. Progress

Research

- R1 b)** Colony Feeding Study: Samples have been collected and are currently being processed and analyzed. May and June data is presented below.
- R1 c)** Cafeteria Study: Field samples have been collected and analyzed. Results are presented below.

Extension

E1) In Maine, kits were distributed among pesticide operators (20%), Master Gardeners (10%), Extension Offices (65%), and directly to public (5%). In NY, kits were distributed among pesticide operators (5%), Master Gardeners (20%), Extension offices (65%), and IPM coordinators (10%). The returned ant samples were identified and the sender contacted with the result. We also tracked the nature of the complaints/concerns, frequency of receiving certain species and origin of samples. We have determined which ant species are causing the most concern for landowners in Maine and New York (presented below).

We continued to monitor our extension e-mail account Ants.IPM@Maine.edu to channel the information on ants and ant control. We answer ant related concerns; give information about the ant biology and management options by phone, e-mail, or standard mail. Other extension activities include talks and presentations at PCO meeting, field days with master gardeners, tradeshow for lawn professionals, presentations to School IPM groups, and scientific meetings. Finally, we have updated our fact sheet about *M. rubra* history, behavior, identification and management with the most current management information.

G. Results

Research

R1 b) Colony Feeding Study: Preliminary results demonstrate that transfer of nutrients throughout all life stages was immediate, by two hours after diet introduction in most cases. Results from May and June demonstrate that sugar is an important nutrient that helps fuel foraging after diapause. We observed a general trend of preference for sugars, over lipids and proteins for the month of May, in the diet of all life stages. As the season progresses, sugar becomes less important relative to protein, which increases to fuel egg laying by the queen and brood development. For the month of June, preferences for sugar are no longer reflected as other nutrient needs have increased. We are currently processing samples from assays conducted during July through October.

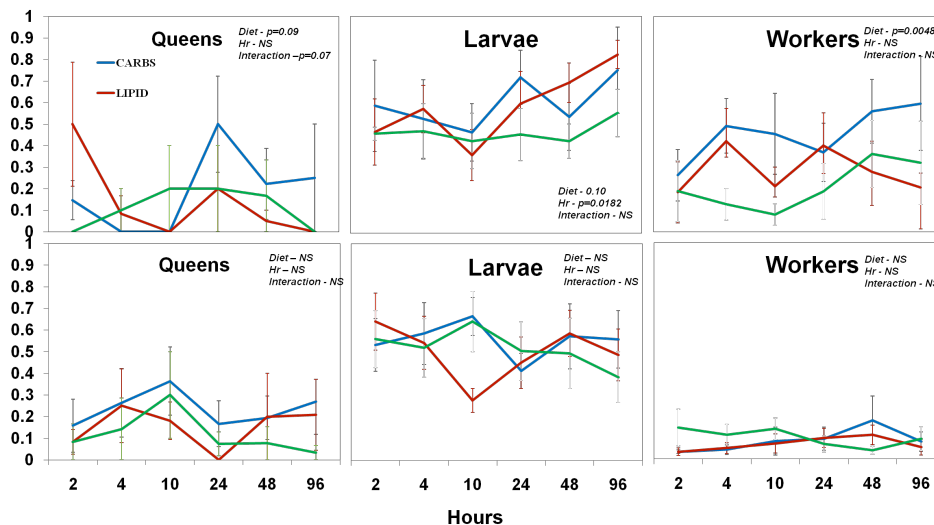


Figure 1. Transfer of single nutrient-based diets (lipid vs. protein vs. sugar) from foragers to other workers, larvae and queens in a *M. rubra* colony. The top three graphs represent data from May and the bottom series are from June.

R1 c) Cafeteria Study: At the start of postdiapause (early May) all diets were consumed in equal volumes. By late May, sugar and carbohydrate diets were consumed more than protein diet. During the reproductive period (June, July and August) we observed a decline in preference for sugars to a stronger preference for protein. During prediapause we initially observed a strong preference for protein, but by early October, there was no detectable preference between the protein, sugar and carbohydrate diets.

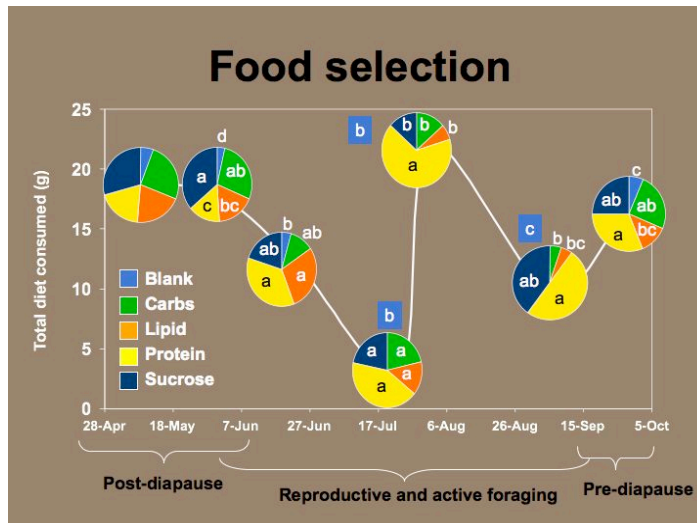


Figure 2. Cafeteria Experiment: Seasonal changes in food preference of *M. rubra* foragers in field based choice test.

Extension

In Maine 17% of mailers were returned (83 of 500), representing 15 of 16 Maine counties. Fourteen of the samples received were from indoor ant complaints leaving 69 samples used for analysis. Most (91%) of the samples originated from privately owned properties and the majority (50) of the samples originated from coastal counties of Maine. Four genera were represented in the samples and the two most common species found in Maine complaint samples were *Formica exsectoides*, the Allegheny mound ant (25 samples) and *Myrmica rubra*, the European fire ant (16 samples). *M. rubra* complaints include stinging, swarming and damaging plants, while the *F. exsectoides* complaints include biting, swarming / worried about invading house, and damaging plants.

In New York, we received 98 outdoor pestiferous ant samples representing 20 of 62 NY counties. These samples included returned mailers and those collected from properties after receiving phone complaints. Most (88%) of the samples originated from privately owned properties and the majority (49) of the samples originated from central NY. Fourteen genera represented in the samples, with the most common pestiferous ant species found in New York were *Tetramorium caespitum* (21 records), *Camponotus pennsylvanicus* (7 records), *Lasius neoniger* and *Tapinoma sessile* (6 records each).

In both Maine and NY, complaints were sometimes not reflective of the potential threat of the species collected. For example, *T. caespitum*, *M. rubra*, and *F. exsectoides* are all unlikely to damage plants, which was a common complaint accompanying samples of these species. *L. neoniger* and *F. exsectoides* are both unlikely home invaders and many people were concerned that these species might become invaders. The need for educational materials on species specific ant biology and their true damage potential is evident in the disconnect between sample species and nature of the complaint. Our next step is to develop such materials for the northeast region.

H. Impacts

We have been very successful raising awareness of the differences between beneficial and pestiferous ants in the landscape. Since the term “pest” is very subjective for most of the ant species, we are providing our stakeholders information about ant behavior, benefits that ants provide in managed ecosystems and consequences of control actions necessary for clients to make informed decisions about controlling ants in the landscape. In the case of *M. rubra*, since it is an aggressive invasive pest, we are educating the public on specific-ant behavior, ecological effects of invasion, and control tactics. Among the management techniques recommended we make sure to include both cultural methods, and chemical methods. However, much of our emphasis is focused on prevention.