

Management of Key Insect Pests of Golf Courses, Lawns, Sod
Farms and Athletic Fields in Michigan

A
Research
Proposal to the
Michigan Turfgrass Foundation

by

Dr. David Smitley
Department of Entomology, Michigan State University

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Introduction

This research project is designed to address the most critical pests of turfgrass in Michigan. In my preproposal I listed 6 pest problems that need to be addressed. The MTF research committee discussed all 6 projects and decided the following 4 projects were of the highest priority.

Grubs of Japanese beetle, European chafer, oriental beetle, masked chafer, June beetle and Asiatic garden beetle continue to be the most damaging group of insects to turfgrass in Michigan. Insecticides have similar activity against all of the white, C-shaped larvae of scarab beetles that we call "white grubs". Research is needed to determine which products are the most effective, and when they should be applied (**1. Insecticide Control of Grubs**). At the same time, we also need a more permanent solution to the extensive outbreak of exotic white grubs in Michigan, especially the Japanese beetle. Insecticides provide an immediate remedy to turf damage, but we also need to know what is causing the outbreak and how to bring populations under natural control (**2. Biological Control of Japanese Beetle in Michigan**). Golf courses are under intense pressure to provide flawless tees and greens. One of the biggest headaches for superintendents is the mounding produced by ants and earthworms. Industry has invested in research tests to develop products for use against grubs, but not for ants and earthworms, leaving superintendents with very little information about how to minimize these problems. Testing is needed to find cost-efficient strategies to keep ant and earthworm mounding under control (**3. Management of Ants and Earthworms on Golf Courses**). Every time we think we have a handle on the turf pest problems in Michigan, another one pops up. Last spring Dr. Jon Gelhaus, an entomologist with the Academy of Science, reported that he found a new exotic pest in Farmington, Michigan: a European crane fly. We need to sample golf courses in the Detroit area to find out how large of an area is infested, and what kind of damage it is causing (**4. A European Crane Fly in Michigan**). A description of these research projects and the support needed to do this work in 2006 follows.

1. Insecticide Control of Grubs. Many new products are being developed and marketed for control of grubs in turfgrass, including several new neonicotinoid insecticides. One of these products, Arena, is providing grub control comparable to or sometimes even better than Merit. One objective for 2006, is to determine the best time of year to apply Arena. Industry provides most of the funding for this research, but additional support is needed from MTF to add standard treatments for comparison to the new products, and to add treatments made at different times of the season. Industry does not pay for testing of established products.

Funding requested for 2006: \$4,000

3. Biological Control of Japanese Beetle in Michigan. In the late 1990's Japanese beetle populations seemed to be settling down in the northeastern states while they were raging out of control here in Michigan and the rest of the Midwest. Apparently some natural enemies were keeping Japanese beetle under control to an extent that grub damage to turf was becoming rare in New Jersey and Connecticut. In 1999 I received a Project

GREEN grant to survey Japanese beetle grubs in Michigan and Connecticut to determine which natural enemies to introduce. We found two insect parasites of Japanese beetle and three pathogens that were active in Connecticut but absent or very scarce in Michigan. In 1999 and 2000 we sampled 12 golf courses in Michigan for Japanese beetle and introduced natural enemies at 6 of them (Table 1; the other 6 golf courses were control sites). Japanese beetle grubs were above a working threshold of 10 grubs/ft² at 7 of the 12 golf courses (Figure 1).

Figure 1. Density of Japanese beetle larvae in fall of 1999 and 2000 at 12 golf courses in Michigan.

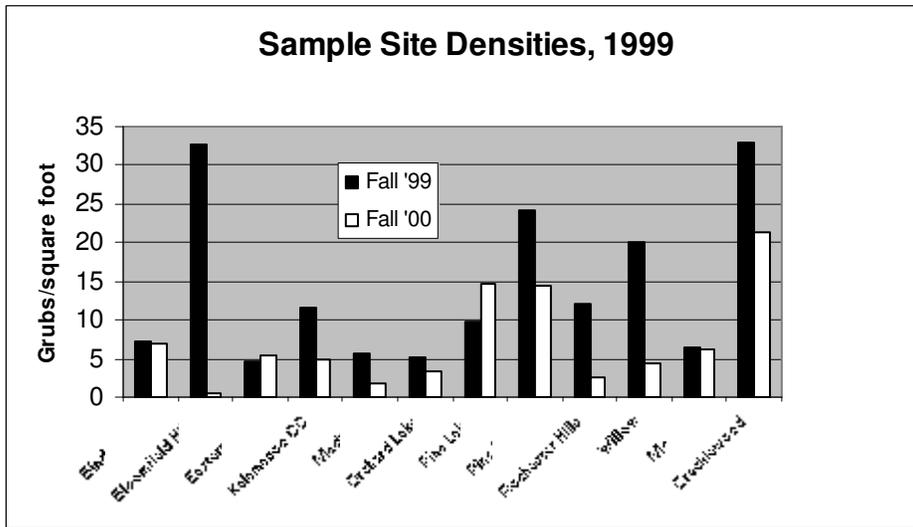


Table 1. Parasites and pathogens of Japanese beetle introduced into Michigan research sites in 1999 and 2000.

Natural enemy	Number of parasites or infected grubs	# Sites	Introduction date	Source
Parasitoids:				
<i>Istocheta aldrichi</i>	1000	4	July 1999	Massachusetts
	3950	3	July 2000	Massachusetts
<i>Tiphia vernalis</i>	500*	5	June 2000	Tennessee, Ohio
Pathogens:				
<i>Ovavesicula</i>	2250	5	Sep1999	Massachusetts
<i>Entoderma</i>	31	1	Sep 1999	Connecticut

* An additional 40 *Tiphia* were released into emergence cages at Collins Road, MSU.

We successfully introduced *Ovavesicula* at 3 of the test sites. This pathogen has now had enough time to establish and build to infection levels that impact Japanese beetle (5 years). Now we need to return to the original introduction and control sites at 12 golf courses and sample for Japanese beetle larvae and the introduced parasites and pathogens. By comparing the incidence of pathogens and parasites and the density of Japanese beetle larvae at the introduction sites with the same at the control sites, we will be able to evaluate how successful the introductions were, and the impact they are having on Japanese beetle in Michigan. Furthermore, sampling for pathogens and parasites in 2005 should allow us to find a good location for a field day where representatives from each part of the state will be invited to come and collect natural enemies of Japanese beetle for distribution in their own County.

Amount requested from MTF for 2006: \$5,000 (MTF funding will be used to show industry support for a Project GREEN proposal for \$40,000 per year for 3 years)

2. Management of Ants and Earthworms on Golf Courses. The purpose of this project is to determine which pesticides are most effective in suppressing ant and earthworm mounding on golf course fairways, tees and greens. In 2004 and 2005, we made some good progress on identifying some effective products available for ants and earthworms. Some questions that still need to be addressed are: 1) how effective is Merit in suppressing ants? 2) does Arena provide any ant suppression?, and 3) what is the most cost-effective treatment for earthworms?

Funding requested for 2006:

Ants.....\$3,000
Earthworms..... \$3,000

4. A European Crane Fly in Michigan. In 1998, a new species of European crane fly was found in the Pacific Northwest. The new species, *Tipula oleracea*, is closely related to the serious crane fly pest that was introduced to the Pacific Northwest earlier this century, and is known regionally as the "European crane fly", *Tipula paludosa*. A survey of the damage caused by *T. oleracea* in western Washington State estimated the cost of current home-owner applied crane fly pesticides to be nearly \$13 million annually. This is also a serious golf course pest.

In May, 2005, Dr. Jon Gelhaus, Associate Curator of Entomology for the Academy of Natural Sciences in Philadelphia, contacted me about the recent identification of *Tipula oleracea* from Farmington Hills, Michigan. This is the same species recently discovered in the state of Washington. It is an important turf pest, and may require pesticide treatments on golf courses. Some golf courses around Toronto may also be infested, and the Dr. Gelhaus is attempting to get samples from them. What is needed at this time is funding to purchase 10 light traps to be placed at 10 different golf courses in southeast Michigan. I will show the superintendents how to empty the traps into bottles of alcohol, so we can pick them up at the end of September and October. The cost of the light traps will be \$200 each (total of \$2,000), the cost of travel to the golf courses to set the traps and collect samples will be 3,000 miles @ .38/mile = \$1,140, and

the cost of labor to pick-up collections and sort-out crane flies to send to Philadelphia for identification is 60 hours at \$10/h = \$600. Total cost of project is \$3,740.

Summary of projects and funding requested for 2006:

1. Insecticide control of grubs on golf courses.....	\$4,000
2. Management of ants on golf courses.....	\$3,000
Management of earthworms on golf courses.....	\$3,000
3. Biological control of Japanese beetle in Michigan.....	\$5,000
4. European crane fly in Michigan.....	\$3,740
 Total amount requested from MTF:.....	 \$18,740