

Mating Disruption of Oriental Beetles with Pheromones

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Objectives:

1. To develop oriental beetle (OB) mating disruption technology using OB sex pheromone formulations.
2. To determine the effect of post-application irrigation and mowing on pheromone persistence.
3. To determine whether OB sex pheromone adsorbs to shoes and causes nuisance by attracting OB males to golfers.

Start Date: 2003

Project Duration: three years

Total Funding: \$60,774

The oriental beetle (OB) is the most important turfgrass insect pest in New Jersey, Connecticut, Rhode Island, and southeastern New York. Our overall objective is to determine the feasibility of mating disruption technology for OB management on golf courses.

Oriental beetle male flight is monitored using Trécé Japanese beetle traps lured with OB sex pheromone. Efficacy of treatments is determined by measuring OB male trap captures and OB larval populations. Field trials in 2002 through 2004 using sprayable OB sex pheromone formulations resulted in up to 87% reduction in trap captures of OB males and 74% reduction of OB larval population. The effect of the sprayable pheromone formulation declined after about 14 days, making two applications during the flight period necessary.

Because of the limited efficacy and persistence of sprayable formulations, we are now developing dispersible OB pheromone formulations. We tested three dispersible formulations each at 5 and 20 g ai/acre applied once just before the onset of major beetle flight in a small-plot experiment. There was no significant effect of pheromone rate on the number of OB trapped. The formulations produced by Suterra and ChemTica provided significant reduction of trap captures during most of the major flight period, resulting in 78% and 79%, respectively, reduction in total captures (Figure 1). A formulation produced by USDA provided significant reduction for only 14 days, resulting in a 60% reduction of total captures.

OB larval populations were not affected by the pheromone application. However, this was expected due to the small size of plots (0.25 acres compared to 1 acre in 2002 - 2004), resulting in a much stronger border effect due to immigration

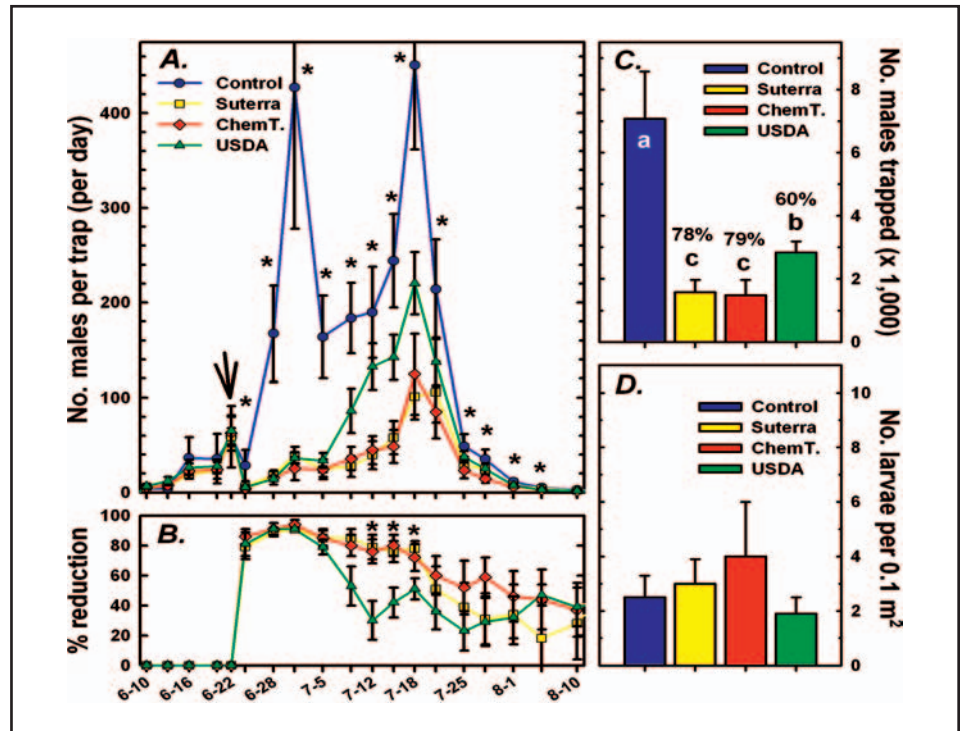


Figure 1. Field season 2005 oriental beetle mating disruption trial: A. Twice-weekly male trap captures (arrows indicate application dates; asterisks indicate significant differences among treatments), B. Percentage reduction in twice-weekly trap captures, C. Total trap captures, D. larval densities in late September.

of mated females. Limited irrigation in several of the untreated control plots probably also reduced OB larval population in an unusually dry summer.

These results are encouraging as only slight changes in formulations and application techniques may improve mating disruption efficacy to high levels with a single-seasonal application at economical rates. Future experiments should test improved formulations in large-plot experiments.

An experiment conducted in 2003 showed that irrigation (0.25 inches) was necessary to minimize binding of pheromone to grass foliage. Binding would be problematic if grass clippings are removed after mowing. However, binding is not an issue with dispersible formulation that sift through to the soil/thatch surface. Rather, future experiment would need to examine the effect of mowing height on the persistence of dispersible formulations.

In 2003 and 2004, athletic shoes walked through pheromone-treated areas attracted high OB male numbers if walked at one day after treatments (DAT), but very few males if walked at 8 DAT. Contamination should be very unlikely with dispersible formulation but should be tested in future experiments.

Summary Points

- Oriental beetle mating disruption in turfgrass appears to be feasible using very low pheromone rates.
- Dispersible formulations persist longer than sprayable formulations and require only one seasonal application for effective mating disruption.
- Sprayable formulations result in contamination of shoes walked through treated areas that can attract significant OB male numbers. However, “bug nuisance” should not be an issue with dispersible formulations.