

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.

Field plots measuring approximately one acre per replicate are laid out in turfgrass areas and treated using standard application equipment. 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 in September following treatment.

Field trials in 2002 and 2003 using a sprayable pheromone formulation developed by 3M showed that the effect of sprays declined after about 10 days, making two sprays applied about 14 days apart necessary per season. Two applications of 5 or 20 g ai/acre each reduced OB male trap captures by 74-88% and OB larval populations by 68-74% without difference among application rates.

Although 3M stopped formulating the pheromone, two new sprayable formulations were developed in 2004 by Suterra LLC and compared at 2 x 10 g ai/acre. Both formulations reduced OB male trap captures by 68 to 70%, but only one formulation reduced grub densities by 56% (Figure 1). As in previous years, the reduction in grub densities was statistically not significant due to high variation, particularly in the untreated plots.

A granular pheromone formulation was also tested in small plots (60' x 60' with one trap in center) with only trap captures determined. The small size of the plots allowed placing an untreated and a treated plot into each experimental area

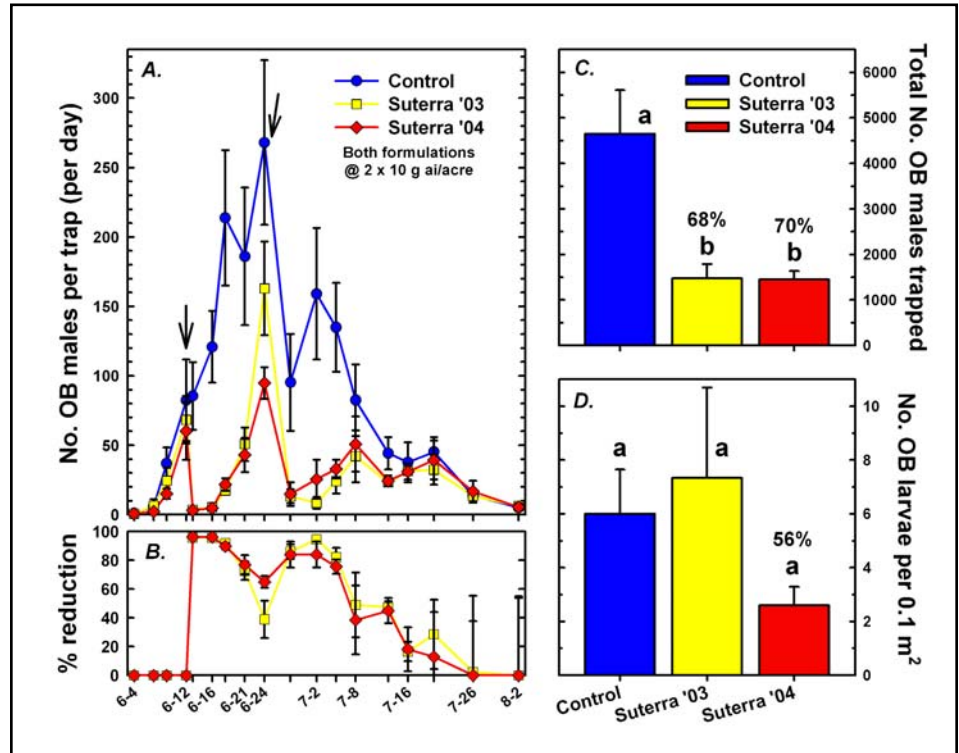


Figure 1. Field season 2004 oriental beetle mating disruption trial: A. Twice-weekly male trap captures (arrows indicate application dates), B. Percentage reduction in twice-weekly trap captures, C. Total trap captures, D. Larval densities in late September.

(rough between tees and fairways). However, our data suggested that 100' to 120' between plot borders was not sufficient to prevent interactions, thus invalidating our observations.

An experiment conducted in 2003 clearly showed that irrigation (0.25") was necessary to minimize the binding of the pheromone on the grass foliage. Binding would be problematic if grass clippings would be removed after mowing as is often done on fairways. Because we first had to determine which of the new formulation used in 2004 was the most effective for OB mating disruption, we did not conduct experiments for Objective 2 in 2004.

In 2003, athletic shoes walked for 30 minutes through areas treated with 1x 30 g ai/acre of the 3M formulation attracted high OB male numbers if walked at one day after treatments (DAT), but very few

males if walked at 8 DAT. In 2004, athletic shoes were walked through areas treated with both Suterra formulations at one DAT. Again, numerous males were attracted to the shoes without difference between formulations. However, neither in 2003 nor in 2004 was any "bug nuisance" reported from the treated golf courses.

Summary Points

- Oriental beetle mating disruption in turfgrass appears to be feasible using very low pheromone rates.
- Effective mating disruption is likely to require two applications during the flight period.
- Shoes walked through areas sprayed with pheromone within a few days of spraying attract significant OB male numbers. However, no "bug nuisance" was reported from the treated golf courses.