Mating Disruption of Oriental Beetle 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.

The first objective is to develop OB mating disruption technology using OB sex pheromone formulations. Field plots measuring around one acre per replicate are laid out in turfgrass areas (at least one replicate per site) and treatments sprayed using standard spray 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, mating success of tethered OB virgin females, and OB larval populations in September following the treatment.

In 2002 field trials, the treatment was 20 g ai/A pheromone sprayed one week and three weeks after first males were captured (total 40 g ai/A). In 2003, treatments were (1) 5 g ai/A sprayed one week and three weeks after first males were trapped (total 10 g ai/A) and (2) 30 g ai/A sprayed one week after first males were trapped. All treatments reduced seasonal OB male trap captures by 74-88%. The effect of each spray declined after about 10 days. There was no difference between the 30 g ai/A and 2x5 g ai/A treatments in 2003. Efficacy measurement using tethered OB virgin females left in the field for four to six days did not work in both years and will be replaced by direct observations. Oriental beetle larval populations were reduced by 68-74% in both years without difference among application rates.

Objective 2 is to determine the
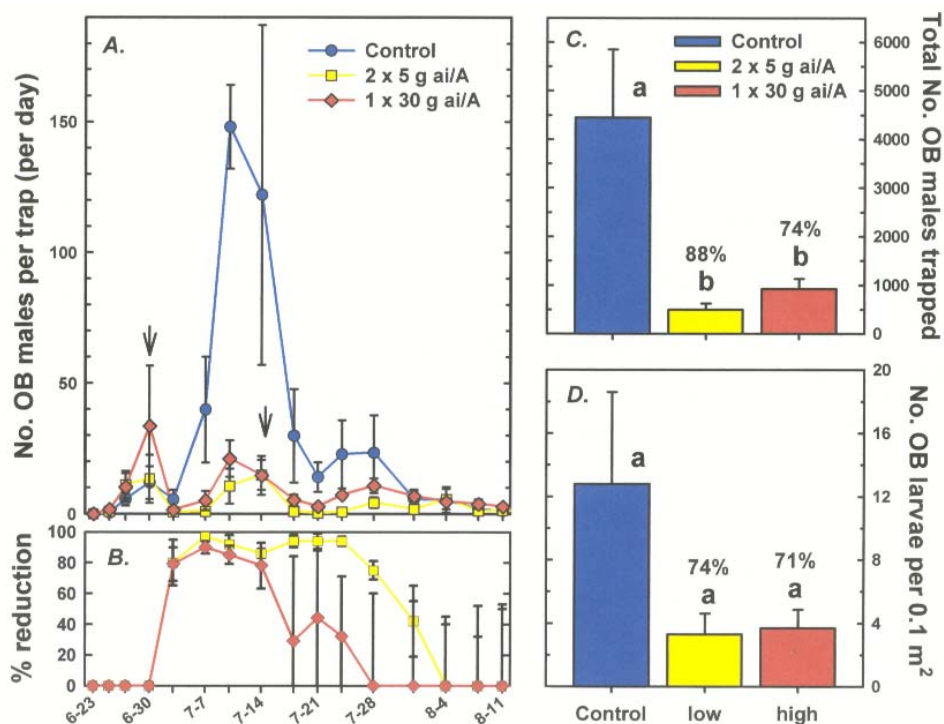
Field season 2003 oriental beetle mating disruption trial: A. Twice-weekly male trap captures (arrows indicate application dates), B. Percentage reduction in twice-weekly trap captures, C. Total trap captures, D. larval densities in mid-September.

effect of post-application irrigation and mowing on pheromone persistence. In 2003, 3'x3' turf plots were hand-sprayed with 30 g ai/A followed by 0", 0.125", and 0.25" of post-application irrigation. To determine if the pheromone was washed from the foliage and stems into the thatch (thereby reducing potential removed by clippings removal), stems and leaves from sample cores were collected, and the amount of pheromone extracted from them analyzed using GC (Gas Chromatography) analysis. These data are still being analyzed.

Objective 3 is to determine whether OB sex pheromone adsorbs to shoes and causes nuisance by attracting OB males to golfers. In 2003, athletic shoes were walked for 30 minutes through the replicates treated with 1x 30 g ai/A at one and eight days after treatments (DAT). In bioassays in untreated turfgrass areas, one-DAT shoes attracted high OB male numbers, eight-DAT shoes attracted only few males, and unexposed shoes attracted no males. These observations correspond with the amount of sex pheromone extracted from the shoes. However, no 'bug nuisance' was reported at the golf course used as one of the sites in 2003.

Summary Points
● OB 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 within a few days of treatment with high rates of sprayable pheromone attract significant OB male numbers, likely resulting in 'bug nuisance' of golfers.
● Lower rates of twice-per-season applied sprayable pheromone formulations are likely to attract only few OB males.