

Optimizing Oriental Beetle Mating Disruption Through a Better Understanding of Dispersal Behavior

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Objectives:

1. Examine the dispersal pattern of non-mated and mated oriental beetle females.
2. Explore the dispersal behaviors of male oriental beetle in pheromone-treated and non-treated areas.
3. Determine the distance male oriental beetles travel in response to different pheromone rates and/or sources.

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Project Duration: two years

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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 investigate the dispersal biology of oriental beetle adults in order to improve the efficacy of mating disruption to control oriental beetle grubs in turfgrass.

Before effective application parameters for oriental beetle mating disruption using sex pheromone can be recommended, we need to understand how far oriental beetle females move. Since females should not be affected by their sex pheromone, they may mate outside pheromone-treated areas and migrate into treated areas to deposit eggs.

Female dispersal studies are hampered by the lack of female attractants and the fact that females are active around dusk. Females were placed into the turf-



Males were attracted to females from as far as 100 feet distance in controlled studies.

grass between 5 and 7 p.m. in early July. Most females either dug into the soil or only crawled short distances. Few females alighted but only flew 3-12 feet, after which they either did not alight again or could not be found. We will test fluorescent markers in future observations and look for other improved tracing methods.

Oriental beetle collected from multiple black light traps placed at multiple locations during early to mid-July contained on average $52.0 \pm 2.4\%$ females. These trap captures suggest that female may fly significant distances. Females trapped from selected traps were immediately frozen and will be dissected to determine their mating status.

Oriental beetle male attraction to different pheromone sources was investigated in release and recapture field studies.

Trécé Japanese beetle traps were placed in the ground with only the funnel part above ground in areas that had been treated with Merit in the previous year. The traps were lured with a virgin female placed in a metal mesh cage, red rubber septa with 10 or 30 μg sex pheromone, or one pellet (approx. weight 28 mg) of a dispersible pheromone formulation containing 5% pheromone. This pellet formulation effectively disrupted oriental beetle mating in previous field studies.

Color-marked males were released 12.5 to 200 feet downwind from the traps (100 males per distance). Recapture rates were determined after 24 hours. For each treatment, one replicate was tested on each of three consecutive days with trap locations switched daily. Analysis of variance showed that recapture was higher for the pellet and the septa than the virgin females. Recapture rates declined logarithmically with distance for all pheromone sources. The low recapture rates with virgin females are in part due to the fact that females produce less



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pheromone and call only for a few hours around dusk. Pheromone production may also have been affected by the unnatural female placement in cages.

Males were attracted to females from as far as 100 feet distance. Recapture of unmarked males from the background population was the highest for the pellet ($1,388 \pm 295$ per day), intermediate for the septa ($30 \mu\text{g}$; 682 ± 261 ; $10 \mu\text{g}$: 231 ± 172), and the lowest for the virgin female (96 ± 41). Future studies will examine how pheromone treatment of an area affects oriental beetle dispersal.

Summary Points

- OB males are attracted to pheromone lures and formulation pellets from at least 200 feet distance, but attraction to females is weaker and over shorter distances.
- A 1:1 sex ratio in black light trap captures suggest that female OB may disperse similarly as males. Limited direct observation suggest more limited dispersal.