



The Use of Pheromones in Pest Management

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Sprague Pest Solutions



Overview

- What are Pheromones
- Insect Olfactory Physiology
- Pheromones and Pest Management
- Pheromone Trapping Principles



Pheromones

- Substances that are released into the environment by a member of a species that elicits a specific response in members of the same species.
- Aggregation Pheromones
- Sex Pheromones



Aggregation Pheromones

- Produced by male
- Attract both males, females, adults and larvae of same species
- Act over short distances
- High concentrations may be repellent, spacing phenomena
- Used by species with long lived adults

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Sex Pheromones

- Produced by the female
- Attracts adult males of same species
- Act over long distances
- Used by highly mobile, dispersed species
- Used by species with short lived adults



Olfactory Physiology

- Insects smell with their antennae
- Specific hairs sense specific odors
- Insects are optimized to detect changes in concentration
- This allows them to follow odor gradients

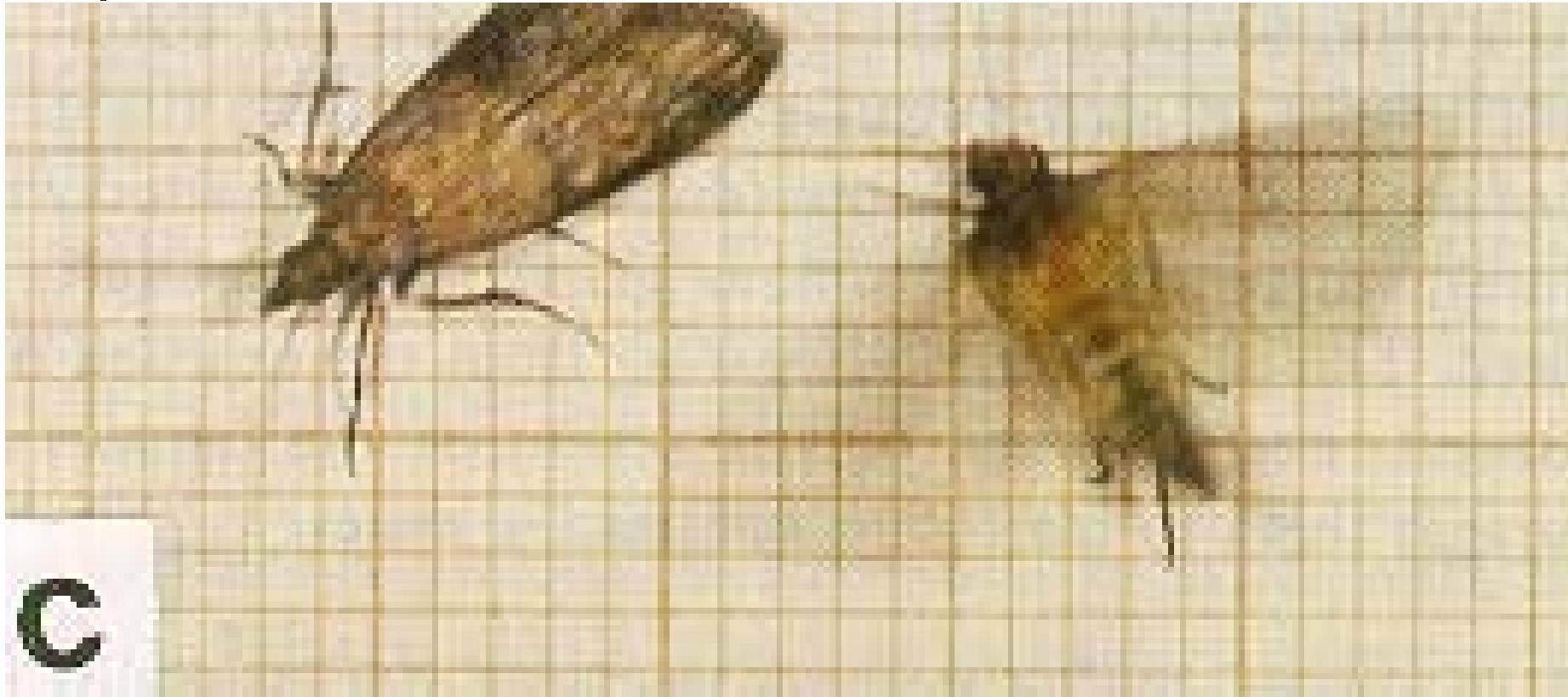
Female Moth "Calling"



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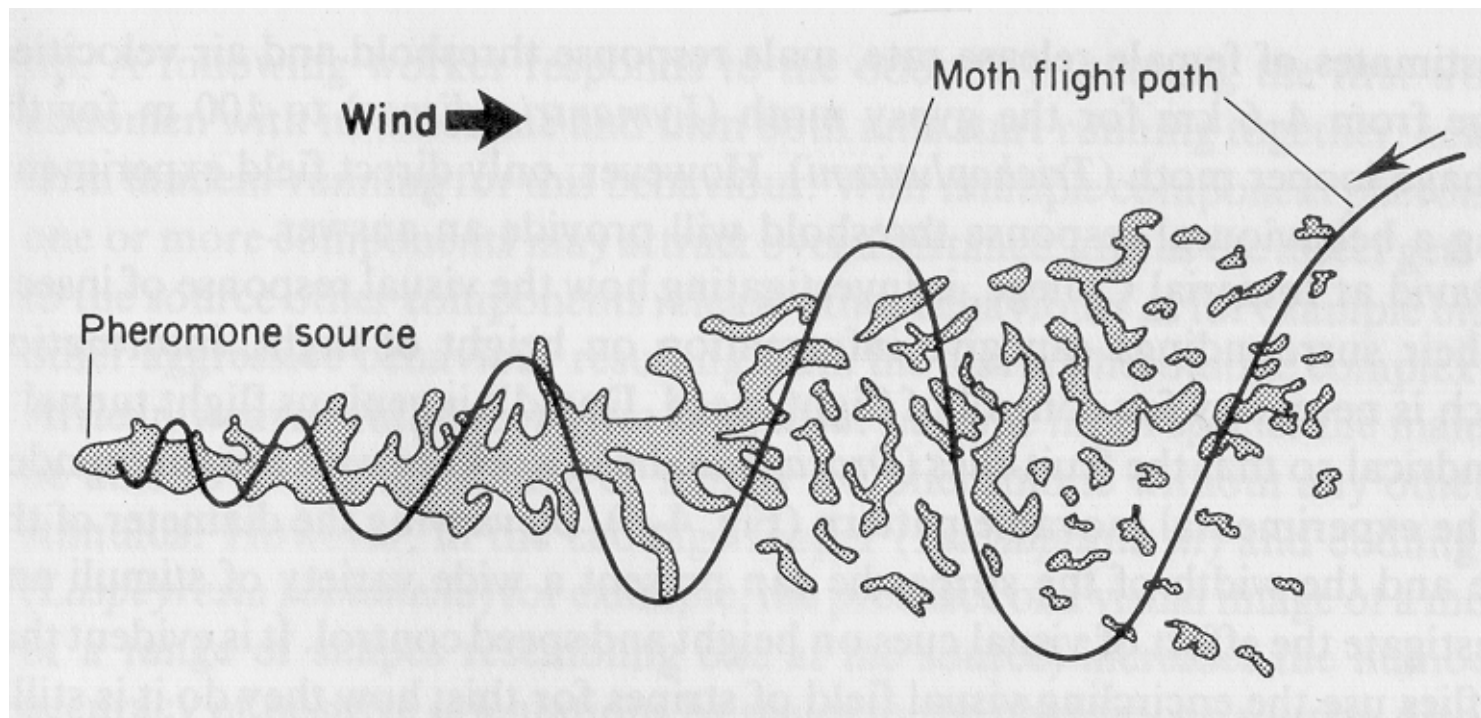
Male Response



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Odor Orientation



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Pheromones and Pest Management

- Types of Pheromones
- Commercial Pheromones that are Available
- Uses of Pheromones
- Types of Pheromone Lures
- Types of Pheromone Traps



Commercial Pheromones

- Stored Product Moth
- Warehouse Beetle
- Cigarette Beetle
- Drugstore Beetle
- Red and Confused Flour Beetles
- Lesser Grain Borer

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Uses of Pheromones

- Detection
- Monitoring
- Mass Trapping
- Mating Disruption
- Attracticide
- Pathogen Dispersion

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Pheromone Lures

- Fiber
- Plastic Tube
- Rubber Septa
- Controlled Release Membrane
- Beads
- Oil Solutions
- Gels

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Pheromone Lures



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Trap Types

- Funnel Traps
- Grain Probe Traps
- Pitfall Traps
- Sticky Traps
 - Box Traps
 - Wing Traps
 - Delta Traps
 - Diamond Traps
 - Discreet Trap

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Funnel Trap



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Grain Probe Traps



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Pitfall Traps



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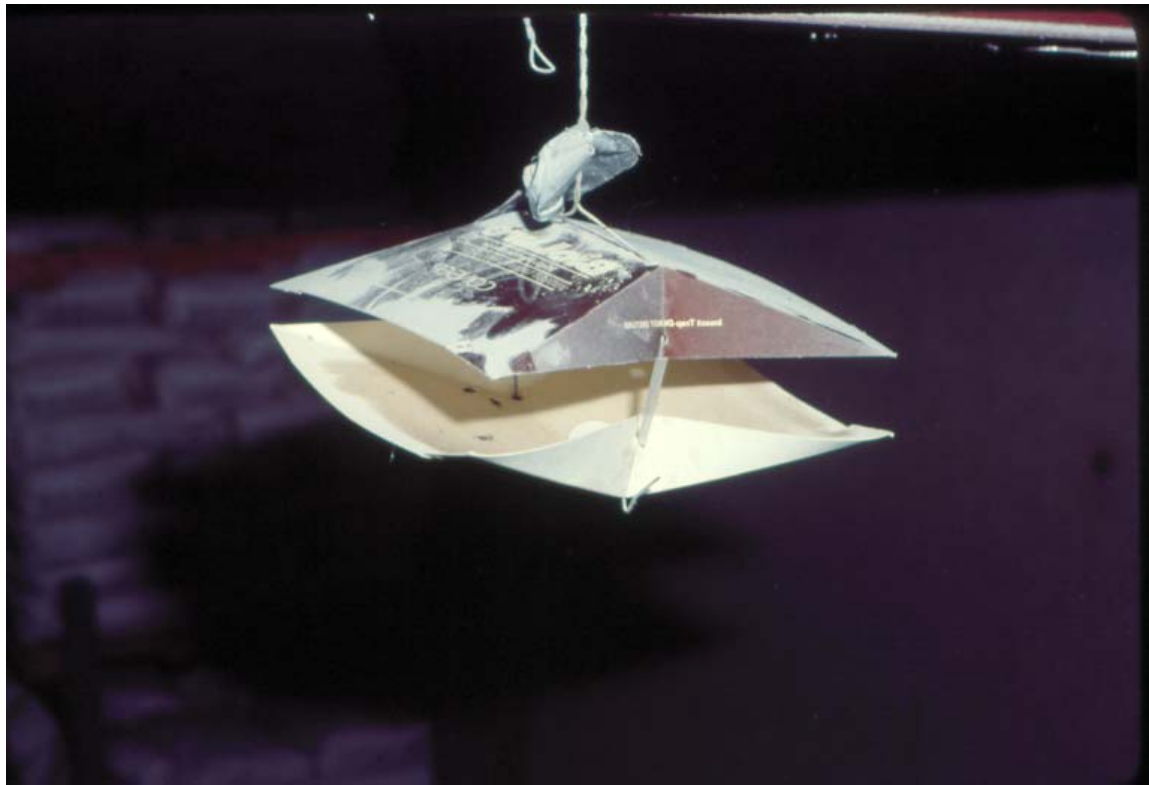
Box Traps



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Wing Traps



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Lures and Traps

- Lures can be used in different traps
- Pheromones are distinct and do not interact
- Multiple, different lures for different species can be used in the same trap

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Additional Attractants

- Food odors enhance the response to pheromones for some insects
- Flower odors increase response to pheromones in some insects
- These attractants may need to be added to trap for it to be effective

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Where the Rubber Meets the Road



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Pheromone Trapping Principles

- Active Space
- Additional Attractants
- Temperature Effects
- Trap Placement
- Trap Density

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Active Space

- The volume of airspace in which an individual will respond to a pheromone.
- Response distance to a trap.
- Related to concentration and release rate of pheromone from its lure.
- Some lures have an active space extending 20 or more feet from trap while others extend only 8 to 9 feet from trap

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Temperature Effects

- Temperature affects insect's response to pheromone
- Below 60 degrees F. reproduction ceases and insects stop responding to pheromone
- Pheromone volatility increases with temperature, therefore detection distance may increase



Trap Placement and Density

- Place at eye level for flying insects
- To cover entire space, place traps about 20 feet apart vertically
- Place traps at least 30 feet apart horizontally
- One trap for every 10,000 to 30,000 square feet
- Place at least three traps in each discreet room or zone
- Watch for air currents

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Specific Insect Programs

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Stored Product Moths



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Moth Lures Can Capture Multiple Species



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Stored Product Moths

- Do not need food attractants
- Sticky traps are best
- Eye level placements are good
- Traps should be placed along walls
- Exterior trapping should be used to verify activity
- Some lures are long range
- Short range lure available which approximates release rate of female moth. They attract over a short range and elicit rapid responses.



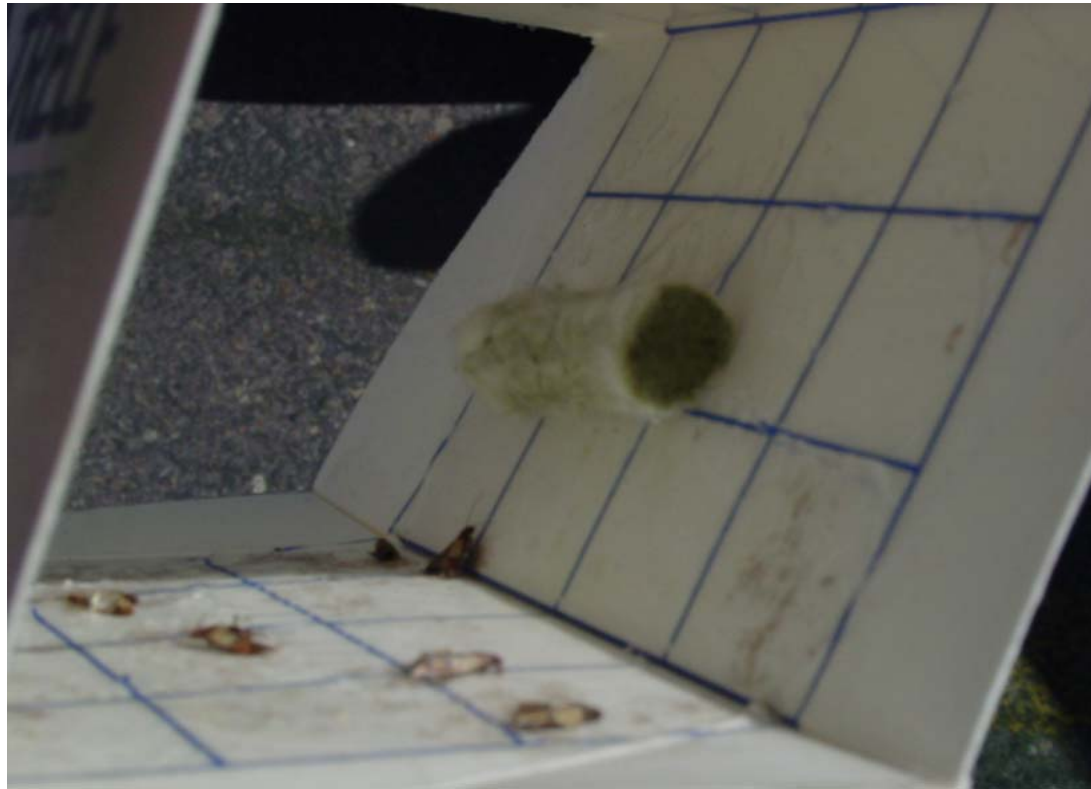
What About Females?

- Moth trapping measures males
- Oviposition traps have been the only means to measure females
- There is a new female lure available which utilizing oviposition stimuli to capture gravid females

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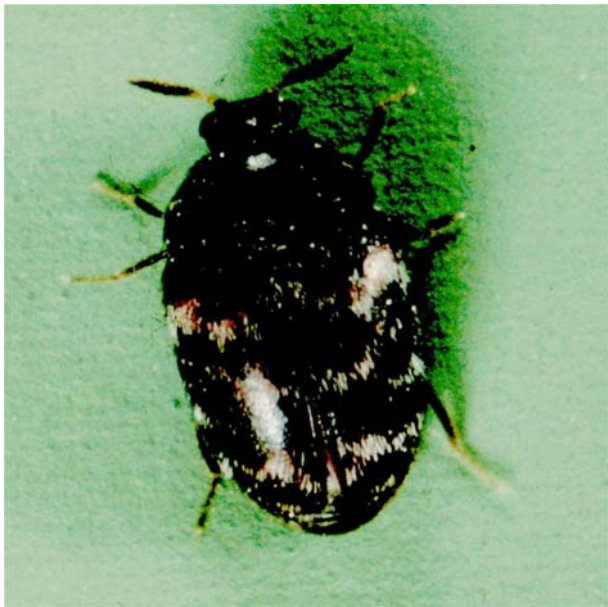
Female Lures; Moth Suppression[®]



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Warehouse Beetle



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Warehouse Beetles

- Strong fliers; traps can be mounted at eye level
- Sticky traps are best although pitfall traps can work
- No additional attractants needed
- Since they are present outdoors, outdoor monitoring is recommended

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Flour Beetles



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Red and Confused Flour Beetles

- Short range attraction; place close together near suspect product
- Must use a food attractant in combination with pheromone
- Pantry Patrol oil works well
- Use pitfall trap (Flitetrak M2) or floor trap
- Not practical for routine monitoring of entire facility; use near susceptible or suspect product

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Pitfall Traps



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Cigarette and Drugstore Beetles



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Cigarette Beetles

- Several different lures available
- Drugstore beetle pheromone is different
- Pheromones used in combination with food attractant work best
- New formulations are being developed

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Sawtooth Grain Beetles



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Sawtooth Grain Beetles

- Commercial pheromone not available
- Pantry Patrol oil will attract them
- Use pitfall traps
- Attraction is short range, place traps 6 to 10 feet apart

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Questions?



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