Fumigants & Pheromones

Insects Limited, Inc.

Patrick Kelley, BCE

Dead Insects on Sticky Boards Attract Carpet Beetles

Blunder Traps for Monitoring - There are a couple of good reasons why a pest management specialist might want to monitor for insects using un-baited sticky boards in storage areas.

First, monitoring tells us how much insect activity we have in that specific location. Secondly and even more importantly, a trained eye can determine if the insects in the traps are the kind that put our stored-products at risk.

This information allows us to make informed decisions on how to best lessen those risks.

A field cricket has become stuck and died on a sticky blunder trap

Un-baited sticky traps are often called "blunder traps" since there is nothing drawing an insect into them except for the fact that they are positioned at that location.

Insects and other invertebrates simply blunder into the traps as they crawl or fly about the room. Typical "bug" captures in a blunder trap can vary greatly and often include spiders, crickets, ground beetles and other occasional invaders coming in from outdoors. These types of bugs tell us that we don't have adequate seals at the bottoms of our doors and insects are entering from outdoors. Other insect activity in the traps, such as silverfish, booklice or numerous stored-product pests indicate that we have a pest issue that needs to be addressed immediately.

Dead Insects as a Food for Carpet Beetles – It is well-known that carpet beetles feed on and destroy the natural fibers in wool carpets as well as other objects that contain feathers, fur, wool, hair and hide. What is less well-known is the fact that carpet beetles also love to feed on dead insects. The proteins that they find in dead insect carcasses provide the nutrition and energy that they need to quickly develop and reproduce.

If left in place for a long period of time, the larger insects that accumulate in the blunder traps can become a food attractant to carpet beetles and other dermestid beetles. A cricket or other large insect stuck onto the outer edge of a sticky trap allows the carpet beetle larvae to crawl right up to it and begin feeding on it. The larvae seldom get caught in the glue themselves as the long protective hairs on their bodies warn them of sticky areas to avoid. Also, as they begin to feed on the dead insects, the circular fecal pellets that they produce after feeding cover the glue surface and give the larvae a safe platform to crawl over.

For the occasional larva that does get stuck in the glue, it often escapes after shedding its skin and leaving the outer skin stuck in the trap while the live larva crawls to safety on top of the dead insect in the trap or off the glue completely.

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A Varied Carpet Beetle larva (lower left) feeds on a dead cricket stuck to a blunder trap

If you are monitoring specifically for carpet beetles, the best route to take is to use a dermestid attractant lure in a pitfall trap such as the All Beetle Dermestid Beetle Kit. https://store.insectslimited.com/all-beetle-dermestid-beetle-kit This trap design draws the larvae in but also helps keep the carpet beetle larvae from escaping the traps.

The use of blunder traps is still recommended as they continue to provide beneficial information about where the bugs are coming from or if they are infesting any nearby products.

As a pest manager, you don't want to leave older blunder traps that are filled with insects in place. These bug-filled traps become a food source for carpet beetles and other dermestid beetles and they should be replaced with clean sticky traps. A trap covered with crickets, spiders, ground beetles and other invertebrates should be replaced if any dermestid activity is found on it. This allows you to see where the most recent activity is occurring and removes any chance of the monitoring traps adding to a pest problem. Read the activity in your traps at regular intervals and make sound decisions based on what you find.

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Now is the Time to Install Mating Disruption

A female Indian meal moth can lay 400 eggs in her life and can have up to 4 generations per year. That is a potential 1,6000,000,000 Indian meal moths in that year! These disturbing numbers help us realize that gaining control of this damaging insect pest should occur sooner rather than later. Pheromone mating disruption is one option that can help control pest populations of this moth species.

To attract males to her for mating, a female Indian meal moth will produce and release pheromones from her abdomen. The pheromone release creates a plume that is carried in the wind. The plume allows male moths to use their antennae to follow the pheromone back to the source and to physically locate females. Mating disruption dispensers release large amounts of pheromone into an area, masking the natural pheromone coming from the female moths. This flood of pheromone makes it difficult for males to locate females. The stadium illustrations below help illustrate how this concept works. Since males cannot find females to mate with, fertile egg laying is reduced resulting in subsequent lower populations. By reducing the population of Indian meal moths, mating disruption can help protect your commodity, products and reduce customer complaints of insect infested product.

Imagine you are trying to locate your friend at a stadium. Your friend lights a flare to indicate their location. You follow the smoke trail until you find them.

Now imagine flares and smoke trails everywhere at a stadium. There is no way for you to find your friend. Mating disruption works similarly by masking the natural pheromone trail making it difficult for males to locate females.

Indian meal moth populations typically fluctuate with temperature and humidity. In Indiana, USA, we typically see Indian meal moth populations begin to increase around late March. Below is a graph of Indian meal moth pheromone trap captures in a 300,000 ft^2 seed warehouse

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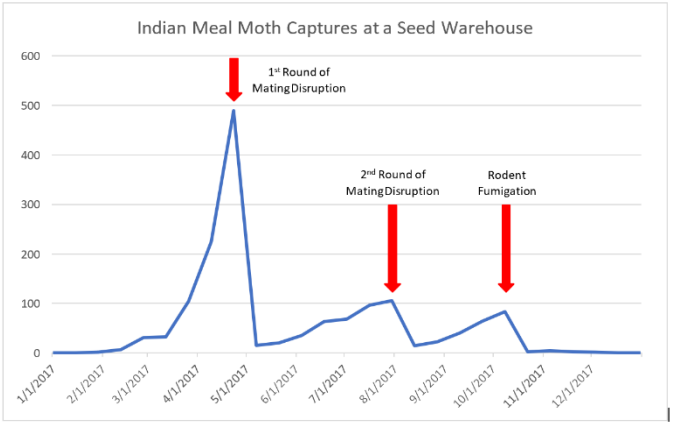
in 2017. You can see populations beginning to increase around the end of March when outside temperatures average around 60°F at 80% humidity. Mating disruption was applied as a response to increasing Indian meal moth populations on April 23rd. After 2 weeks, Indian meal moth captures in standard pheromone traps dropped from 489 to 15 individuals. This is a 97% decrease. Installing mating disruption dispensers prior to the increase in populations could have prevented the 1st generation of mating insects from ever emerging, resulting in lower numbers for the rest of the year. It is never too soon to install these powerful (yet low toxicity) chemical tools.



Indian meal moth (Plodia interpunctella) captures in pheromone traps at a 300,000 ft^2 seed warehouse in 2017

NoSurvivor hanging trap with bullet lure used to monitor Indian meal moth activity at the seed warehouse (Indian meal moth Kit).

Mating disruption is labeled for use on stored grains, processed grains (flour in mills and bakeries), pet food, nuts, tobacco, dried fruit, chocolate and other confectionary products. It targets the Indian meal moth (*Plodia interpunctella*), Mediterranean flour moth (*Anagasta (Ephestia) kuhniella*), Almond moth (*Ephestia cautella*), and Tobacco moth (*Ephestia elutella*). Dispensers should be attached in grid patterns according to the labeled rate. While pheromones used in monitoring traps are exempt from EPA registration, those same pheromones used as mating disruption are a labeled pesticide. Dispensers will typically emit effective amounts of pheromone for approximately 90 days.

Pheromone monitoring should be continued throughout the application to provide feedback on the results. Remote monitoring traps like the SightTrap will provide real-time data on moth population

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increases and will better show the relationship of temperature and humidity with insect populations.

To order or for more information about mating disruption or the SightTrap, contact Insects Limited Research Associate, Ethan Estabrook, BCE at E.Estabrook@InsectsLimited.com or 317-896-9300.

Indian Meal Moth Spotlight

Adult Indian meal moth (Plodia interpunctella)

Description

- Adults are bi-colored with a cream/yellow at the base and a copper/dark gray color on the outer portion of the wings
- About 12-14 mm wingspan length and 6 -7 mm body length

Life History

- Females lay 200-400 eggs for about a 7-10 day lifespan
- Infestation can establish at temperatures as low as 64°F (18° C), but development is prolonged
- Optimum development takes place around 86°F (30° C) at a relative humidity of70%

Damage

- Feed on cereal, corn, rice, sorghum, spices, nuts, dried commodities and wheat
- Larvae eat broken kernels of grain and grain dust
- Larvae leave silky webbing that can contaminate commodity and clog machinery
- Webbing can result in condensation that causes increased humidity and micro-habitats for toxic molds
- Adults fly which allow easy dispersal for infestations in other areas
- Infestation can lead to heating and increased moisture levels in grain

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Selecting the Proper Pheromone and Trap

Within the last decade Insects Limited, Inc. has introduced several multi-species monitoring devices. While this makes things easier in the field, it might cause some confusion while ordering. Selecting the correct pheromone and trap is essential for conducting a successful insect monitoring program.

For your ordering convenience, Ethan Estabrook, BCE created an easy to follow chart. To follow the chart, simply locate the insect you are monitoring along the first column. Follow along the row until your finger gets to an "x." Trace your finger up to identify the trap and lure that will work for your monitoring program.

You will notice there are multiple kits and lures available for certain insects. It will be up to you to determine the trap and lure combination that works best for your individual situations, and as always, contact an Insects Limited representative if you need guidance.

Insects Limited's Available Pheromones

www.InsectsLimited.com

	Pheromone Lures	Pantry Patrol Gel	Stored Product Beetle (SPB)	Multi Species (PTE) Bullet	Dermestid	Indian Meal Moth / Ephestia spp.	Moth Suppression	Mating Disruption (Allure MD)	Webbing Clothes Moth	Casemaking Clothes Moth	Angoumois Grain Moth	Cigarette Beetle	Red & Confused Flour Beetle	Warehouse / Khapra Beetle	AA Carpet Beetle	Black Carpet Beetle	Varied Carpet Beetle	Fruit Fly Trap
	Pheromone Lures	IL-1705-10	IL-1805-10	IL-108-10	IL-3051-10	IL-103-10	IL-105-10	IL-106-25	IL-123-10	IL-223-10	IL-753-10	IL-503-10	IL-303-10	IL-203-10	IL-243-10	IL-134-10	IL-113-10	IL-1520-12
	Pheromone Kits (Trap with lures)	IL-2700-10	IL-2800-10	IL-408-10	IL-2300-10	IL-164-10	IL-160-10	IL-106-25	IL-120-10	IL-220-10	IL-1100-10	IL-564-10	IL-2700-10	IL-264-10	IL-2110-10	IL-130-10	IL-110-10	IL-1520-12
Moths (Lepidoptera)	Indianmeal Moth (*Plodia interpunctella*)	x		x		x	x	x										
	Mediterranean Flour Moth (*Ephestia kuehniella*)	x		x		x	x	x										
	Almond Moth (*Ephestia cautella*)	x		x		x	x	x										
	Tobacco Moth (*Ephestia elutella*)	x		x		x	x	x										
	Raisin Moth (*Cadra figulilella*)	x		x		x	x	x										
	Webbing Clothes Moth (*Tinea bisselliella*)								x									
	Casemaking Clothes Moth (*Tinea pellionella*)								x	x								
	Angoumois Grain Moth (*Sitotroga cerealella*)										x							
Beetles (Coleoptera)	Cigarette Beetle (*Lasioderma serricorne*)	x	x	x								x						
	Drugstore Beetle (*Stegobium paniceum*)	x	x															
	Red Flour Beetle (*Tribolium castaneum*)	x	x										x					
	Confused Flour Beetle (*Tribolium confusum*)	x	x										x					
	Saw-toothed Grain Beetle (*Oryzaephilus surinamensis*)	x	x															
	Merchant Grain Beetle (*Oryzaephilus mercator*)	x	x															
	Warehouse Beetle (*Trogoderma variable*)	x	x	x										x				
	Khapra Beetle (*Trogoderma granarium*)	x	x	x										x				
	Hide Beetle (*Dermestes maculatus*)				x													
	Black Carpet Beetle (*Attagenus spp.*)				x										x	x		
	Varied Carpet Beetle (*Anthrenus verbasci*)				x										x		x	
	Lesser Grain Borer (*Rhyzopertha dominica*)	x	x															
	Larger Grain Borer (*Prostephanus truncatus*)	x	x															
	Granary Weevil (*Sitophilus granarius*)	x	x															
	Rice Weevil (*Sitophilus oryzae*)	x	x															
	Maize Weevil (*Sitophilus zeamais*)	x	x															
	Cadelle (*Tenebroides mauritanicus*)	x	x															
	Larder Beetle (*Dermestes lardarius*)	x	x		x													
Other	Silverfish (*Lepisma saccharina*)				x													
	Fruit Fly (*Drosophila melanogaster*)																	x

*Insects Limited has other pheromones available, however these are the most popular. If interested in specific species pheromone or custom multiple species pheromone, contact Insects Limited at 317-896-9300.

Click HERE for a larger and clickable PDF version of the chart.

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Insects Affected by Climate Change

At Insects Limited we have observed that insects are sensitive indicators of climate change. They may be the most sensitive indicator to observe.

Whole forests of pine trees in Colorado and Utah are dead because an invasive beetle, called the pine bark beetle, has not only invaded the forest, but have developed multiple generations annually that increase the population exponentially. One generation per year would be harmful to a forest but the female lays 50 to 100 more offspring per year that now destroys the forest. Brown patches of dead pine trees can be seen from aerial photographs in places like the Kenai peninsula of Alaska where four million areas of forest are killed by spruce beetles.

With thunderstorms and lightning flashes increasing, this dead forest is fodder for massive fires like those we have seen in California recently.

Moth eaten sweater

Clothes moths were known 20 years ago to have one generation per year. A female moth lays about 50 eggs per year. Now there are reports of clothes moths laying two generations per year. Multiply 50 individually hatched eggs x 50 offspring from each one of them and you have a destroyed wool sweater or a ruined wool suit.

You may be a sceptic and say that our recent weather is simply a group of single weather occurrences but go back to 1910 where the Purdue Report shows there are more extreme precipitation events and higher average temperature changes now than any other time in the past 100 years. The report shows that global weather change has reached extreme highs for the last several years.

A century ago, 10-15 percent of the precipitation events were extreme. Now, it isn't uncommon for one-third of the region's precipitation to reach extreme levels.

Southern pine beetle damage. Photo by USDA Forest Service.

"Major Forest Insect and Disease Conditions in the United States: 2015" found at https://www.fs.fed.us/sites/default/files/fs_media/fs_document/15627-usda-forest-service-insects-508.pdf