Fumigants & Pheromones

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Fireflies

Most animals signal to attract a mate—fireflies use light instead of noises like crickets or pheromones like moths and beetles. Firefly females sit on a twig or plant stalk and flash back when they see the right kind of male flash. The male will come to her and they will mate. Every species of lightning bugs have a different pattern – whether their flash goes vertical, horizontal, quick flashes, or long flashes or like a group in Vietnam, all males flash at the same time. At least one species of firefly is known for the female luring in males of other species by imitating their female's flash pattern and then eating them when they arrive.

PHOTO: FIREFLIES.ORG

Firefly (lightning bug); there are over 2000 species of fireflies worldwide.

How do fireflies make light?

When two chemicals react, releasing energy which is used to stimulate a release of light photon from an unstable molecule, a light is produced. In a firefly's tail, one finds two chemicals: luciferase and luciferin. Luciferin is heat resistant, and it glows under the right conditions. Luciferase is an enzyme that triggers light emission. ATP, a chemical within the firefly's body, converts to energy and initiates the glow. All living things, not just fireflies, contain ATP. This reaction has been turned into commercial purposes in the form of 'glow sticks' and in labs for detection of biomolecules like proteins.

Fireflies are found on almost every continent.

Fireflies love warm, humid areas. Because of this, they thrive in tropical regions as well as temperate zones (they come out in the summertime in these environments) on all continents except Antarctica. Fireflies thrive in forests, fields and marshes near lakes, rivers, ponds, streams, and vernal pools. They need a moist environment to survive.

On a warm summer night, turn off the television and lights in/on your house and take chairs to your backyard or nearby park and enjoy with your family one of nature's finest free performances… *'Fireflies in the Summer.'*

Source: Fireflies.org

Bad Bugs... Using Bioassays

by Alain VanRyckeghem, BCE
Technical Director

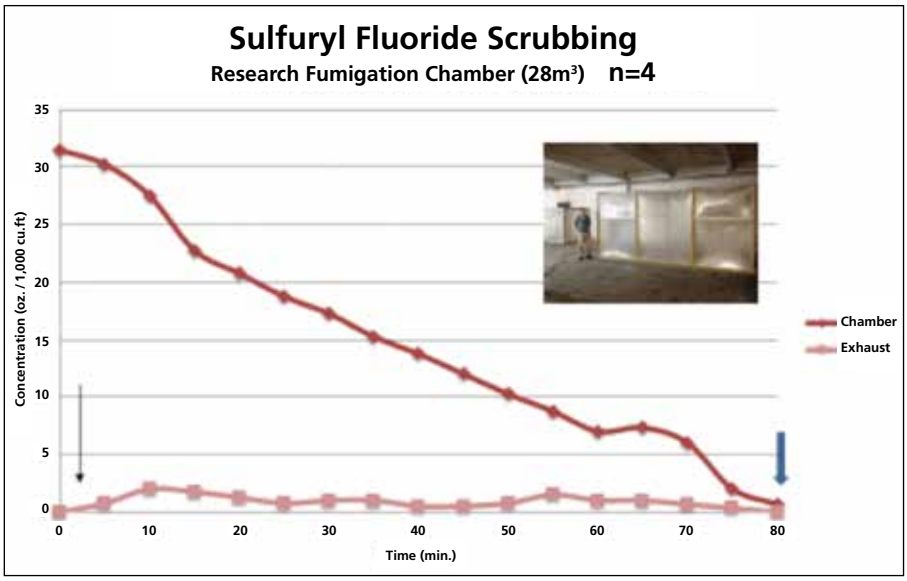
In the fumigation industry, we say, "if you are not monitoring, you are not fumigating." Essentially this means that you are guessing that you will have sufficient gas to have an effective kill of the target pest. Fumigators rely on gas monitors to know how much gas is present in a facility or space that is under gas. We also rely heavily on the use of live insects or 'Bioassays' to tell us if the fumigation was effective.

Different stages of insects require different levels of gas for a kill; often the egg stage requires higher doses or longer exposures. The most effective tool to determine a level of control for the pest is to place vials of eggs, larvae, or adults in a structure to be fumigated. Ideally, the site of infestation will be the source of these insects, because that site may have beetles/moths with some resistance to certain fumigants or pesticides. If you are able to collect on-site insects for your bioassays you will have the right species as well as the local population characteristics (like resistance if it is present). In most cases the insect bioassays are prepared from outside sources with lab reared cultures and are usually adult red or confused flour beetles. Some suppliers can provide other stages and species when available.

This technique can also be used to evaluate the effectiveness of a fogging application. The fogging bioassays are usually adult confused flour beetles. The holder has openings that allow droplets of fogging insecticide to contact the beetles. By placing the bioassays under, behind, or inside equipment and rows of pallets, you will get a true understanding of the limitations of fogging. Bioassays may reveal that you have used a concentration of Vapona or pyrethrin that is too low to kill beetles, but was sufficient to kill moths. Beetles protected under pallets or equipment can have very high survival rates. Bioassays can help you improve your fogging application techniques and choice of fumigants.

Alain VanRyckeghem, Technical Director, filling bioassay vials with flour beetle eggs.

The Swords Scrubbers are being installed worldwide for methyl bromide and sulfuryl fluoride fumigations. It offers boundary line safety to bystanders and lowers regulatory concerns. Here are some recent results from the scrubber on sulfuryl fluoride:



Insects Limited's Bullet Lure for clothes moths captures both male and female moths.

New Multi-Lure from Insects Limited captures over 20 species of stored product insects.

Dave's Soapbox

...for what it's worth

by David Mueller

11th Fumigants & Pheromones Conference

The theme of the 11th Fumigants & Pheromones Conference was ***Pest Management Around the World***. The speakers covered a wide variety of topics from an international pest management perspective. Invited speakers included: Bobby Corrigan, Stan Ignatowicz, Dave Mueller, Otto Mück, Alain VanRyckeghem, Rikiya Sasaki, David Liska, Vasilis Sotiroudas, Austin Frishman, Axel Heptinne, Arda Taner, Stan Buckley, Shashank Nagaraj, Annette Johansson with Ashes, the dog, Pat Kelley, Pete Mueller, Alexander Zrely, Gennady Zakladnoy, and Frank Arthur.

Pest management and stored product experts attended from Argentina, Australia, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Israel, Italy, Japan, Jordan, Lebanon, Lithuania, Malta, Mozambique, Netherlands, Nigeria, Philippines, Poland, Russia, Singapore, Sweden, Taiwan, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, and Zimbabwe.

I will have many lasting memories from this conference and two that stand out the most for me. One was when the three speakers on the grain fumigation panel from USA, Russia, and Ukraine finished their formal presentations and were being asked questions from the audience. Professor Gennady Zakladnoy from Russia walked across the stage and invited Alexander Zrely from the Ukraine to join him to answer questions together. The audience went quiet, but the spirit of coopera-

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160 people from 34 countries and six continents came to Krakow, Poland to learn about the latest advancements in stored product pest management. The Fumigants & Pheromones Conference is held every two years. The next conference will be in Adelaide, Australia in March 2016.

Fruit Flies

GreenWay Fruit Fly Trap is the newest product from Insects Limited.

Dr. Jim Fredericks, technical director for the National Pest Management Association (NPMA), recently stated in Pest Management Magazine: "Traps and lures can reduce populations and provide insight to where the fruit flies are abundant; but to gain control in accounts such as restaurants or bars, kitchens, and food processing operations you need to work with clients to identify breeding locations and remove the fermenting organic matter in which the developing larvae live and feed."

"Much of the fruit fly's success can be attributed to its biology. The speed at which fruit flies are able to complete their life cycle has a significant effect on management efforts. A female fruit fly is able to produce hundreds of eggs in her short 40 – 50 day lifespan. Fruit flies require only seven to ten days to develop from eggs to adults, so suppressed adult populations quickly rebound."

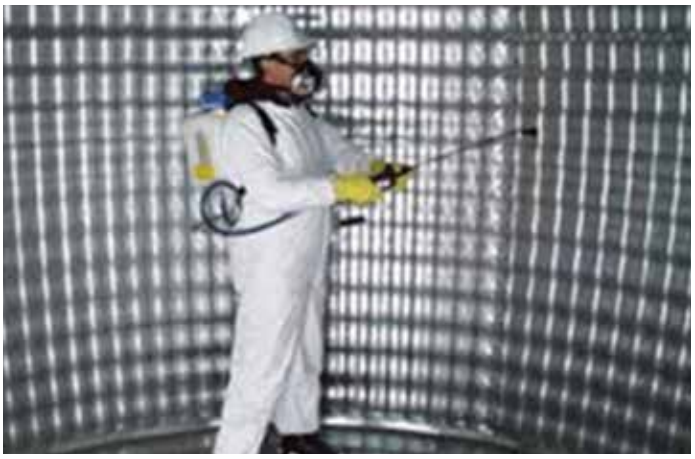
Fruit flies become a real nuisance in homes and commercial operations where wet drains and floors trap moist organic matter. These become the breeding sites. To control fruit flies, one must eliminate these moist and damp breeding areas that are normally dark and hidden (drain, under rubber mats, aging vegetables and fruit).

The new and improved Fruit Fly Trap from GreenWay is designed for kitchens, restaurants, and bars where fruit flies are commonly found during the warm months of the year. This new formulated trap lures the male and female adult fruit flies into the specially designed funnel. After entering the trap, the fruit flies can't escape. They then are attracted to the non-toxic liquid lure and drown. The trap should be checked every few days to see how many flies are being captured. Each trap is designed to last one whole season and then it can be discarded in normal trash.

Empty Bin Treatments

by Pete Mueller

It is important to keep in mind that a fumigation is still the best, most effective way, to control an established infestation.



Managing stored grains requires the use of various techniques to ensure that the quality of the grain does not deteriorate over time. Relatively few insecticides are currently labeled for use in or on stored grain, however, insecticides are only one option in an arsenal of strategies used to protect our stored commodities. Good sanitation, regular sampling, temperature/air flow management as well as making sure that only sound and dry grain is being placed into bins are all measures that should be included in a complete program. Bin facilities also play an important role in determining whether grain quality is maintained. Facilities should be inspected regularly for deterioration of any type. Four insecticide treatment options in stored grain include: 1. Applying insecticides as an empty-bin spray 2. Treating the entire grain mass with a liquid spray or dust (protectants) 3. Treating the top of the grain mass (top-dress treatment) 4. Fumigation.

Empty-bin Sprays

Empty-bin sprays are recommended in grains bins that have difficult areas to clean or if there has been a history of insect problems in those bins. These treatments provide a deterrent to insects that may be attracted to the storage facilities and also provide control of the insects not removed during the cleaning operation.

A few of the labeled products and their active ingredients that can be used as empty bin treatments include:

Centynal™ – deltamethrin

Centynal is a suspension concentrate that provides an effective knock down with a long lasting pyrethroid residual. Centynal can be used as a tank mix with Diacon (S methoprene). Methoprene is an insect growth regulator.

Tempo SC Ultra – cyfluthrin

Tempo can be used to treat warehouses, production facilities, storage areas, rail cars, truck beds and other areas where products are stored before filling with the product. Cleaning of all areas prior to use of Tempo will increase levels of control for this pyrethroid. Tempo is not for direct grain application.

Storicide II – deltamethrin and chloropyrophos-methyl

Storicide II is only labeled for treatment of surfaces of empty grain bins that will contain wheat, oats, sorghum, or rice (not corn or popcorn). Application should be made only after equipment, bins and buildings have been thoroughly cleaned and are insect free. Deltamethrin is a pyrethroid while chloropyrophos-methyl is an organophosphate that was used in the product Reldan for many years.

Insecto and others – diatomaceous earth (DE) and/or silica gel dusts

Dust applications should be made only after equipment bins and buildings have been thoroughly cleaned and are insect free. Use of a compressed air or electric blower to apply dusts can be effective. Some applications allow users to reverse the grain bin fans and apply product to the empty bin until the powder is seen coming out the top of the bin eves. DE is an organic pesticide that is made of small diatoms that absorb the oils in the insect's body and causes a lethal dehydration to occur.

Refer to the individual product label for a list of the insects controlled and current recommended dosage rates.

***Remember to always read the label. Some states like California and New York may have different labels and labeling instructions.*

Dave's Soapbox

continued from on page 3

tion was loud. The second moment that I will always remember from Krakow was when my son, Pete Mueller, offered a solid presentation full of practical grain fumigation tips and techniques to a group of international fumigators and received high marks on the evaluation sheets for the conference. That made dad proud.

After the meetings, the group was bused to one of the original UNESCO World Heritage sites at the Wieliczka Salt Mines where the gala dinner was held in a 450 year old salt mine whose salt was used to preserve food throughout Europe. The final day of the conference held excursions to various historical sites in and around Krakow including famous Auschwitz.

I believe this was by far the friendliest and most enjoyable conference we have organized since our first international conference in Lübeck, Germany in 1993. The attendees at this meeting came to visit old friends, learn about practical ideas to improve their business, brought their families for a vacation (holiday), and to see a part of the world that they have not seen before. *Golden Krakow did not disappoint us.*

If you missed this year's conference, the 12th Fumigants & Pheromones Conference will be March 6-9, 2016 in Adelaide, Australia. *"I hope you get a chance to experience this conference someday. It is fun, family friendly, global, and educational."*

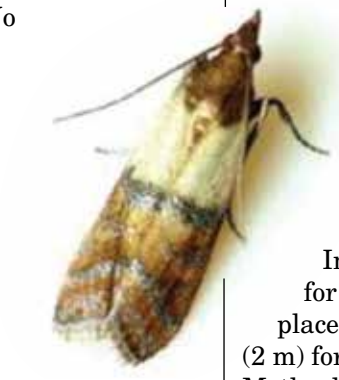
D. K. Mueller

Practical Use of Pheromone Traps

in Warehouses and Food Processing Facilities

Excerpt from ***Stored Product Protection... A period of transition*** *by David Mueller*

Pheromone traps are effective tools for monitoring stored product pests, especially stored food moths like the Indian meal moth. Pheromone traps are most often used in large food warehouses and food processing facilities. Effective use of pheromone-baited traps require much more than simply placing the traps. No specific number of traps is correct for any particular warehouse to detect the presence or absence of insect pests.



Some warehouses do not have steel vertical support beams, and in these cases the pallet racking or other means can be used to create a natural grid for a pheromone trapping program. Many warehouses have fire extinguishers set evenly around the warehouse, thus offering sites for traps.

The size of the grid will vary with the type of trap and facility, but as a general rule intervals of about every 50 feet (17 m) will produce good results. If a facility is fully stocked with food products or seems to have an infestation, the interval distance should be reduced to 25-30 feet (7-10 m) to improve coverage and enhance the probability of detecting small outbreaks. Traps should also be placed near potential insect harborages such as corners, beams, entry, and interior corridors.

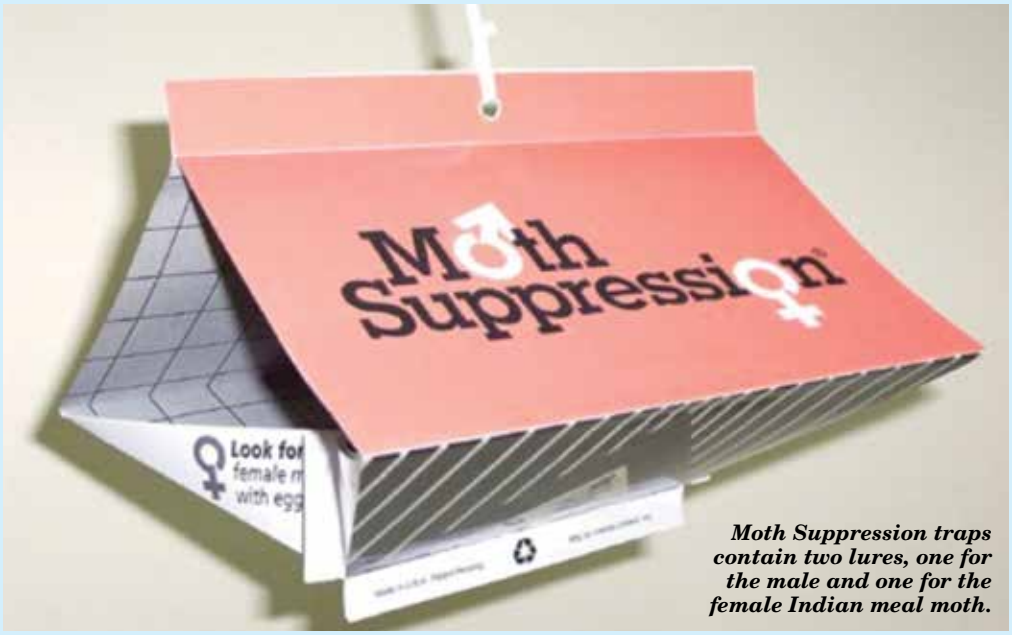
In typical situations, traps for flying insects should be placed at a height of about 6 feet (2 m) for servicing convenience. Moths, however, can fly at ceiling heights where it is often warmer. Traps need only to be placed at these heights if easily accessible with stairs. Avoid placing traps near exterior doors and windows to avoid possibly luring insects inside from outdoors.

Monitoring Tips for Pheromone Traps

- Place traps on a grid
- Place traps at eye level
- Check traps weekly
- Remove all old insects from traps weekly
- Write the date of the new lure on the trap
- Keep thorough records

Moth Suppression Traps Attract and Capture Male and Female Moths

Most lures will still have some pheromone remaining in them after eight weeks. The old lure can be left in the trap and a new lure can be placed next to the old lure. Old discarded lures should be placed in a sealed plastic bag and discarded in an outdoor trash receptacle. If you keep old lures for further use, store them in foil-lined pouches and keep them refrigerated. It is very important to use equally aged lures for each site that is being monitored. If a new lure has to be used due to a lost trap, keep in mind that it will likely be more attractive than older traps. This can create misleading information, false hot spots, poaching from other traps, and inaccurate population spikes. Replacement of all lures at one time gives more comparable and accurate trap counts.



Moth Suppression traps contain two lures, one for the male and one for the female Indian meal moth.

Many times, a trap may become inaccessible or lost behind pallets of product. During some weeks, these "buried" traps may have to be skipped when record keeping is performed. If the trap must frequently be skipped, it should be moved to a more easily accessible location.

The use of pheromone traps should not be limited to large food warehouses and food processing plants. They can be useful as well in smaller facilities, such as restaurants, grocery stores, movie theatres, health food facilities, pet stores, and even private homes. A few well-placed traps can be an early warning system to detect newly arrived infested goods and help prevent wider insect infestations.

CHILL OUT. It is important to be flexible when starting a pheromone trapping program for the first time. You must be prepared to move traps, add traps, and adjust the trapping program in a building that is being monitored. Once a location is established as a quality site, then regular observations can provide consistent and comparable data for months or years to come. If you change the trap location, you should be careful not to rely heavily on historical trap catch data as the new location is capturing insects under different conditions.

Placement of floor-level traps is much more challenging than with hanging traps. There is a natural funneling effect on crawling insects as walls and barriers meet at the corners. These are prime locations for pitfall and glue-board traps. Other prime locations for sticky floor-level traps are at door entrances. These traps often do not need to be baited with pheromone or food and act as "blunder traps."

Equipment that processes food often has spills or accumulations and is highly susceptible to new infestations. Placing floor traps in those locations is important. The challenge to placing traps in these prime locations is that they are exposed to these conditions.

Ask Insects Limited to help you design the right combination of trap type, lures, location, and strategy that would work best in a particular account.

NEWSLETTER

Home of Charlie

Fumigants & Pheromones is published by Fumigation Service & Supply, Inc. and Insects Limited, Inc. We hope that the information that you receive from this newsletter will help you in your business, and you, in turn, will support our business efforts. If you have an associate who would be interested in receiving this newsletter, please contact the address below. We would welcome any comments or suggestions for topics. Address correspondence to: Peggy Rutkowski, Fumigation Service & Supply, Inc., 16950 Westfield Park Rd., Westfield, IN 46074 USA.

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CALENDAR OF EVENTS

** September 22-24, 2014; Nestle Purina Food Safety Symposium, Denver

** September 17; International Association of Operating Millers (IAOM), Grand Rapids, MI

** October, 4-6; Methyl Bromide Alternatives Meeting (MBAO), Orlando, FL

^ October 21-24; National Pest Management Association, Orlando, FL

* November 4-6; Kentucky Pest Control Conference, Lexington, KY

** November 24-28; 11th International Working Conference on Stored Product Protection, Stored Product Conference, Chiang Mai, Thailand

** December 3-6; IAOM Africa District, Cape Town, South Africa

** January, 12-14, 2015; 74th Purdue Pest Management Conference, W. Lafayette, Indiana

*** March 6-9, 2016; 12th Fumigants & Pheromones Conference; Adelaide, Australia

* attending
^ exhibiting
** invited speaker
*** organizer