

# Fumigants & Pheromones

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Winter 2010

Routing:



EPA Award Winner  
Best of the Best

A Newsletter for the Insect Control & Pest Management Industry

## Mice

By David K. Mueller, BCE

Excerpt from *Reducing Customer Complaints in Stored Products*.

The house mouse (*Mus musculus*) is a prolific breeder: indoors, mice breed year round. A female mouse can be sexually mature 1-1/2 months after birth, can produce 6 babies per litter, and can have as many as 10 litters in a year. That's 60 new mice just from one pregnant female. If you assume that half of her offspring are also females that will each be producing 10 litters, you can see what you are up against.



*Mice are a symptom of a condition. Change those conditions and they will leave or die.*

*Mice have extraordinary physical abilities:* They can jump to the floor from a height of 8 feet and run up some vertical surfaces. They have excellent balance. If they do fall, they land on their feet. They can climb and run along pipes, cables, and electrical lines. They can even travel for a considerable distance upside down. They can swim. They can adapt to almost any kind of environmental conditions, even surviving for generations in a frozen meat

locker. Their small body size allows them to easily stow away and be transported to new sites. They can squeeze through a slot-like opening that is little more than 1/4 inch (7 mm). These capabilities allow mice to easily move into a building and then move from floor to floor. You can see why it's hard to completely mouse-proof a building.

Mice are rarely restricted by food or water. Mice will feed on a wide variety of food, so they're not limited by a particular food source. They don't need very much food to survive. A mouse eats an average of 1/10 ounce (3–5 grams) of dry food a day. Mice are nibblers, feeding 20 or more times a night at multiple sites. When a water supply is not readily available, mice can survive from the moisture in their food.

House mice are the most common rodent pests in our urban landscapes and have been labeled as a "mammalian weed" by researchers and rodentologists. Millions of dollars are spent every year managing the house mouse by pest managers and 'do-it-yourselfers.' But that is what



*Newsletter is now  
in full color!*

makes the house mouse such a formidable foe, particularly in the fall and winter months when these cryptic pests enter our structures seeking heat, food, and refuge.

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# Bad Bugs...

## Brown Recluse Spider

(*Loxosceles reclusa*)



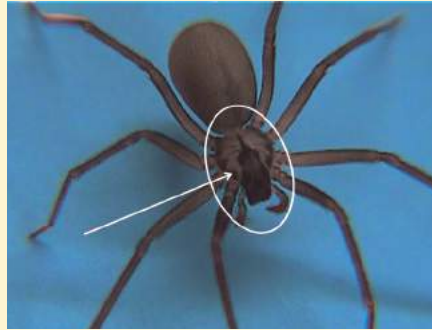
By Alain VanRyckeghem, BCE  
Technical Director

This past summer of 2010 was one of the longest hot summers on record. It was a very favorable year for insects and spiders to have multiple generations and expand their range of activity. The brown recluse spider is an example of one pest that showed increased activity in the territories of Fumigation Service & Supply, resulting in three bites to its employees.

The brown recluse spider lives outdoors under logs, woodpiles, rocks and debris. As such they can withstand a range of living temperatures and often can reside indoors from crawlspaces to attics. They have limited range that is gradually expanding. They essentially occur in the central mid-west and southern states.

### Appearance

Two distinctive features help identify this spider from other similar spiders. They have only 6 eyes that are arranged in three pairs in the front of the cephalothorax (head and thorax). On adults there is a dark pattern on the cephalothorax that resembles the shape of a violin; it is less



obvious on smaller young spiders. They are a light brown with a slightly grayish abdomen. Adults are usually the size of a quarter or smaller with the legs spread out.

### Biology and Behavior

These recluse spiders hide during the day and are active at night to search for other live or dead insect prey they feed on. They do not make webs, but their shed skins can often be caught in other spider's webs. The males and juveniles are the ones that roam around the most. Females will stay in a hideout with egg cases. These spiders love to hide in homes with a lot of clutter and things stored on the floor. Spiders can live for 2–4 years and shed their skin 5–8 times while growing; females will produce about 5 egg sacs with 40–50 eggs as an adult.

### Medical Importance

The spider is not considered aggressive but will bite if handled or confined against the skin. The bites are small and may not be noticed until 3–8 hours later when a large red, swollen, or tender spot develops. The bite can produce a small necrotic lesion (small white blister) that quickly becomes bluish and sunken as

the skin begins to die away. The lesion may expand to several inches across over the next few days and weeks. **Early medical attention is critical to suppressing the expansion of the lesion.**

Reactions may become more severe, but contrary to popular believe there have been no reported deaths that can be verified as having been caused by the spider bite in the US. Collecting the spider for identification is the most important thing a person can do to help their situation.

### Management

Prevention is critical if you live in areas where brown recluse spiders occur or near those regions. Inspection, Sanitation, and Exclusion are the three key things that can be done in and around homes to prevent the spiders from taking up residence. While wearing protective gloves, use a flashlight and vacuum to suck up all eggs sacs, spiders, webbing etc. throughout the home indoors and out. Remove clutter from the floors of the house, basement, garage, closets. Keep your clothing, shoes and personal items off the floor (especially at night) Seal up openings, gaps, cracks and access vents in crawl spaces and around the doors, windows, and attic to prevent entry. Remove clutter and debris, woodpiles, and other materials from the base of the home.

Glue boards are easy tools that can be placed in basements, attics, closets, and under furniture to capture wandering spiders. Check them regularly for identification. If an infestation occurs consider a professional application of residual synthetic pyrethroid insecticide and a light application of pyrethrin to flush out spiders and expose them to insecticides and glue boards. Keep monitoring and repeat if necessary.

## Dave's Soapbox

...for what it's worth



Cooperative Bulk Handling does a great job exporting our grain with a guarantee of nil insects. We banned chemical protectants in the early 1980s so the grain is also chemical residue free but that in turn increases our reliance on phosphine.

It's suggested this is a dangerous situation of relying almost completely on one chemical but I have the view that it is just a matter of manipulating the storage environment to ensure a complete control of all stages of the insects' life cycle. Even the highly resistant flat and rusty grain beetles (*Cryptolestes*) from Eastern Australia are more susceptible in warmer conditions so the fumigation timing becomes critical. In Western Australia I strongly recommend fumigation straight after harvest which is when the grain is warm and then leave the silo sealed to prevent reinvasion. If the storage is not sealed to a gastight standard then it is almost impossible to completely control the internal atmosphere and there will be either leakage or ingress depending on the atmospheric and storage pressure at the time.

for the fumigation procedure so it should have some appeal to grain store managers. To retain the use of phosphine at the professional and farmer level then we must only fumigate in tested sealed structures. However we know that unsealed phosphine fumigations occur daily around the world and yet fumigators say they are not getting a control.

You mention the use of sulphuryl fluoride to 'break' the cycle, it is my understanding that once the strong resistant gene has been selected it remains in the local population, so unless you can eliminate all insects locally the gene remains active. If the bad habits of unsealed fumigation is carried over into SF, how long before we see a resistance develop to that chemical?

In WA we are not immune to the escalation of phosphine resistance. Over the last 30 years we have sampled at random from farms and central storage and tested the insects to find we now have around 40% weak resistance to phosphine averaged across species. However our most common species red flour beetle (*Tribolium castaneum*) has been advancing at a faster rate and is now at about 70% weak resistance.

To reverse the trend toward higher levels of resistance it was a relatively simple matter of applying basic management principles, good hygiene around the storage complex, sealing and pressure testing the silos, applying the label recommended dose and then monitoring the resultant gas development. So far the insects have been controlled but we will continue to monitor the situation.

Phosphine is a terrific grain protection and could be around for many years but only if it is applied in a tested sealed storage can the fumigator have the confidence it has controlled all stages of the insect 'first time every time'.



2010 was an amazing year for fumigation. FSS fumigated over 200,000,000 bushels of stored grain, 12,500 containers of food and logs, and 300,000,000 cubic feet of space. This is 35% more than was performed by FSS in 2009. As we approach our 30th year in business, I want to stop and thank our customers, friends, and our service providers for all they have done to make this a safe and profitable year.

**"Merry Christmas and Happy New Year from Insects Limited and Fumigation Service & Supply."**

David Mueller

Insects can form resistance to pesticides like humans can become resistant to antibiotics. After a while they just stop working. Fumigation resistance is an important subject because the grain and stored products we grow, harvest, and store are often shipped to locations around the world. Those insect resistant genes then spread to other countries. The lack of good alternatives to phosphine fumigants could cause great economic loss **if** we lose valuable and proven fumigants like phosphine. It would cost over \$100 million dollars to develop a replacement for phosphine fumigants if they could pass the restrictive regulatory hurdles. *Here is a letter that directly relates to this subject from Chris Newman, Department of Agriculture and Food of Western Australia:*

Dear David,

I was interested in your 'soapbox' comments on the longevity of phosphine and would like to add mine 'for what they are worth'!

As you may be aware in Western Australia we rely on phosphine for our exported grain which comprises about 80% of the grain harvested in the state.

Dealing with what we know in gas tight storages is a simple matter—ensure the store is correctly sealed to a recommended pressure test, load in the correct dosage and recirculate the gas and then monitor to ensure all parts of the store reach the desired protocol. Reducing the need for 'top up' or repeat fumigations makes this a lower cost operation

## New Angoumois Grain Moth Pheromone Proves Successful



**By Pete Swords**  
Pheromone Chemist,  
Insects Limited Inc.

The Angoumois Grain Moth (*Sitotroga cerealella*) is most commonly a destructive pest of crib-stored and shelled corn but will feed on wheat, rice and other

seeds. Today the Angoumois grain moth can be found in most regions throughout the world including Europe, Brazil, China, Indonesia, Japan, Samoa and the United States. This is due to larvae boring and feeding on the inside of the kernels going unnoticed during international and local shipments. Infestation of stored cob corn can begin in the field but is more prevalent in crib-storage where females begin to lay eggs atop kernels throughout the area.

Larvae emerge and proceed to eat their way inside of the corn kernels where they begin consumption of the germ located within. These pests can cause considerable damage leading to reduction in grain weight and quality.



At Insects Limited, the development and trials of a new pheromone/attractant for the Angoumois grain moth has been completed. This effective, fast acting pheromone created a great response from the insects emulating the Indianmeal moth pheromone / trap combination. Go to [www.insectslimited.com](http://www.insectslimited.com) for more information.

## Is That Place a Confined Space?



**By Ryan Yutzky**  
Safety Coordinator

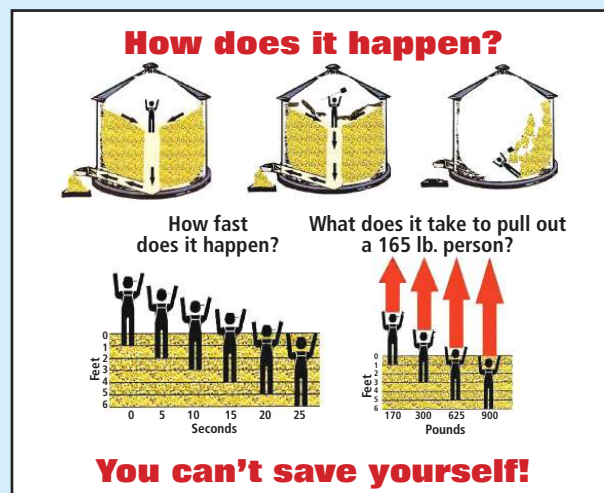
Although confined space entry has always been an important safety concern, recent near-miss accidents and even deaths have put it in the regulatory spotlight. These events have prompted agencies such as OSHA to focus their inspections on confined space entry and fall protection regulations. Many companies have chosen to go over and beyond required OSHA standards in hopes of preventing themselves from becoming a part of the statistics and exorbitant fines. Because of this, employees, contractors, and subcontractors need to be aware of its importance and understand that adherence to site-specific polices are merited and are ultimately in place for their benefit and safety.

Nearly half of all confined space deaths have been those of rescuers. No one should ever enter a confined space to attempt a rescue unless that person has been trained to do so and has all the necessary protective equipment available to do so. Never think that it is alright to enter a confined space just because it looks OK. When lives are at stake it's always better to take all precautions necessary to send everyone home safe at the end of the day.

Confined space characterizes any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. It includes, but is not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, tunnels,

pipelines, and open top spaces more than 4 feet in depth such as pits, tubs, and vessels. If an employee is expected to enter any such space he must be instructed as to the nature of the hazard(s) involved.

Because confined spaces have an unknown atmospheric environment, it is essential that entrants wear proper breathing apparatus along with retrieval lines. In some cases a fall protection system is necessary and must include a full body harness and lanyard of appropriate length. There must always be an assistant assigned to someone who is entering confined space so that continual contact is made with the individual in case of an emergency.



*Because of recent deaths from entrapments in grain bins, it is important to understand what a confined space is.*



By Patrick Kelley, ACE

After discovering that insects are eating away at your personal goods or museum objects, you are faced with the dilemma of how to get rid of the live bugs. Options include a wide range of treatments such as anoxia (low oxygen), inert gas, carbon dioxide, detailed vacuuming and exposure to heat. One of the most popular and easiest methods of treatment though is to simply freeze the items in question. This method is non-toxic, time efficient and does not entail extensive staff training. The museum community's use of freezing to kill a multitude of common museum pests has been quite successful. Some museums in the United States have treated thousands of objects with low temperatures and have reported no damage on the types of objects that had warnings previously associated with exposure to cold

# Preserving Our History

## Freezing Infested Materials

temperatures. Freezing insects to death can be one of the best treatment options

The general principle to follow is to expose the objects to temperatures as low as possible, as quickly as possible for as long as possible. The guidelines below will kill the majority of museum pests.

The formation of ice crystals within the bodies of the insects is what causes the killing effect. The reason why many insect species survive through icy winters is because they have time to acclimate their bodies to the cold. The insects increase the concentration of glycerol and sugars in their tissues as the temperatures slowly drop. This has the effect of an anti-freeze within their bodies and it prevents the formation of ice crystals. For this reason, it is best to hold the object that you are going to freeze at room temperature for at least



Freezing insects to death can be one of the best treatment options.

one week prior to the exposure to cold. The thermal shock of the quick temperature drop catches the insects unaware and allows the temperatures to have a lethal effect.

### General Guidelines for a Low Temperature Treatment

- \* Use a freezer that can maintain a temperature of -20°F (-29°C).
- \* Objects should be placed in sealed bags to reduce ice or condensation damage.
- \* Sensitive items can be wrapped in tissue paper before being placed in the bags.
- \* Hold the items at the low temperature for a period of one week or longer.
- \* Large wooden items or dense materials should be left frozen for longer periods.
- \* After removal from the freezer, the items should remain in the sealed bags to prevent condensation.
- \* Once the items reach room temperature for +24 hour period, they can be removed from the bags.
- \* Items become temporarily brittle at low temperatures, so handling should be kept to a minimum until the items return to room temperature.

References for the material used in this article include the following:

Strang, Thomas, J.K., "Controlling Insect Pests With Low Temperature." CCI Note 3/3, Canadian Conservation Institute, 1997.

Integrated Pest Management Working Group, "Low Temperature Treatment Fact Sheet." [Accessed 2, November, 2010] Available at <http://www.museumpests.net/treatment.asp>.

## Fumigation Service & Supply Promotion



Todd Wilhelm has been promoted to Fumigation Manager of the Indianapolis office. Todd is an eleven year veteran of Fumigation Service & Supply, Inc. He has performed hundreds of fumigations including the methyl bromide replacement, sulfuryl fluoride fumigant and third party food facility audits. Todd will now train, plan, and implement commercial fumigations.

Dave Mueller, owner of FSS, stated: *"Todd was promoted because he is one of the safest, most diligent, and thorough fumigators I know. Todd has taken on some of the largest and most complicated structural and commodity fumigations in the country and managed them well. Todd came to FSS as a 19 year old looking for summer work. This is a good example how people evolve and create careers in our company. We look forward to Todd Wilhelm growing even more and serving our customers well as he assumes this new responsibility and position."*

FSS is a 29 year old company that performs specialized pest management services to reduce customer complaints for the brand named food companies throughout the Midwest. If you want to know more about FSS or are interested in a promising career like Todd's, go to [www.fumigationzone.com](http://www.fumigationzone.com).

### Welcome

Insects Limited is the leader in pheromone technology. Insects Limited, Inc. researches, tests, develops, manufactures and distributes quality pheromones and trapping systems for stored product insects. The highly qualified staff also can assist with consultation, areas of expert witness, and training presentations.

Insects Limited, Inc. specializes in a unique niche of pest control that has developed into a business that provides products and services that are mainstream in protecting stored food, grain, museum collections, tobacco, and fiber worldwide. Thank you for taking time to view these products and services on our website.

A visit to Insects Limited's new website will lead to a wealth of valuable information ranging from pest identification to pheromone use. Within the Technical Help section of the site, these articles can be found to help solve your pest inquiries:

- *Pheromones for use in your home*
- *Health food store insect problems*
- *Pet store insect problems*
- *Seed and popcorn industry outline*
- *Food industry pests*
- *Museum and herbarium industry pests*
- *Identification postcards*
- *General pest identification*
- *What are pheromones and how do I use them?*
- *Frequently asked questions*
- *Trap assembly instructions*
- *How to use pheromones*
- *Pheromone tips*
- *Controlling insects without pesticides*

**Visit  
our  
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Website  
for a  
wealth  
of  
information!**

***Pesticides were lost on the battlefield  
of discontent of the 60s.***

— John V. Osmun, Ph.D., Professor emeritus, Purdue University

# Fumigating Grain with New Technique



By **Nathan Stocker**

**H**orn Diluphos System. The HDS method is a modern and safe way to fumigate grain without entering grain bins or other confined space entry locations. Unlike solid phosphine fumigant, this system will allow the fumigator to add gas during the fumigation to ensure successful results.

Metal phosphides such as Phostoxin™ pellets and tablets were the main grain fumigants worldwide since the 1960s. Phostoxin was often used in many different types of grain structures from farm bins to large commercial operations. Cylinderized phosphine such as ECO<sub>2</sub>FUME™ was introduced by FSS and BOC in 1999. It contains 98% CO<sub>2</sub> and 2% PH<sub>3</sub>. A new way to fumigate large grain facilities was introduced in 2003, VAPH<sub>3</sub>OS and the Horn Diluphos System (HDS).

With the HDS system, there is no need to enter the bin or structure to seal or insert solid phosphine pellets, therefore no confined space or bin entry precautions are needed. The fumigant you are putting into the grain is completely gaseous. Because it is completely gaseous, there is no dust, spent material, or disposal once the fumigation is complete.

VAPORPH<sub>3</sub>OS is nonflammable once applied. Unlike metal phosphides, you are not waiting hours or days for an effective



*Circle Pile; temporary storage of 900,000 bushels of corn.*



*Rice Weevil*

concentration of phosphine to build up. The fumigation starts instantly. Accurate dosing to the gram occurs with the HDS. When the gas is applied, it creates a slight positive pressure which forces gas throughout the grain mass, aeration plenum, and through moist grain pockets.

## Case Study

The covered grain pile shown above was fumigated with the HDS machine. The "Circle Pile" is 900,000 bu./25,000 tons. The bottom skirt is sealed with 6 mil. plastic sheeting, tape, and sand. VAPORPH<sub>3</sub>OS is applied into the bottom aeration fans for several hours. Three recirculation systems are installed on the grain mass. This forces gas to reach equilibrium quickly. Monitoring lines are installed with metal piping probed into the grain mass throughout the structure. Readings are taken in real time with the advanced Fosfoquim™ monitoring equipment to ensure



*VAPORPH<sub>3</sub>OS™; 100% cylinderized Phosphine Fumigant and HDS.*

efficacy. When fumigating large structures outdoors, wind and weather are important factors. The structure above required applying add gas to one side of the circle pile to make up for gas movement inside the tarp. Fumigant gas can be moved by either rearranging the recirculation system from high concentration to low concentration, or by adding more gas to the low areas.

# MEETING CALENDAR:

\* December 5-7, 2010  
 NGFA's County Elevator  
 Conference & Trade Show  
 Indianapolis Marriott Downtown  
 Indianapolis, Indiana

\*\* March 22-25, 2011  
 Croatian Pest Control &  
 Agricultural Stored Products  
 Protection Seminar  
 DDD and ZUPP  
 Pula, Croatia

\*\*\* December 8, 2010  
 Fumigation Continued  
 Education Program  
 "Stored Product Protection,  
 A Changing World"  
 Westfield, Indiana

\*\*\* May, 2012  
 10th Fumigants &  
 Pheromones Conference  
 and Workshop  
 Indianapolis, IN

\* December 12-15, 2010  
 Entomological Society  
 of America (ESA)  
 San Diego, California

\*\* June 7-10, 2011  
 Meeting on Cultural  
 Heritage Pest  
 Università Cattolica del  
 Sacro Cuore  
 Piacenza, Italy

\* January 10-13, 2011  
 75th Annual Purdue University  
 Pest Management Conference  
 West Lafayette, IN

\*\*\* January 21, 2011  
 Fumigation Training & Testing  
 Training by Insects Limited & FSS  
 Testing by IN State Chemist's Office  
 Westfield, IN  
 Contact Casey 317-896-9300

## See You There!

\*we will attend, \*\* we will speak,  
 \*\*\* we will organize this meeting

\* February 20-22, 2011  
 118th Annual Convention & Trade Show  
 Grain & Feed Association of Illinois  
 Crowne Plaza  
 Springfield, IL



# Top 10 Beers in the USA

Brand	Percentage of Total Market
1. Bud Light	20.2
2. Budweiser	12.2
3. Miller Lite	8.4
4. Coors Light	8.3
5. Busch	6.0
6. Natural	5.5
7. Corona Extra	4.1
8. Heineken	2.7
9. Miller High Life	2.6
10. Milwaukee's Best	2.4

Source: Euromonitor International (2007)

# Top 10 Alcohol Consuming Countries

1. Czech Republic
2. Ireland
3. Luxembourg
4. Austria
5. Estonia
6. Germany
7. Slovenia
8. Australia
9. UK
10. Slovakia



Source: Euromonitor International (2008)

## NEWSLETTER

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: Casey Hunsicker, Fumigation Service & Supply, Inc., 16950 Westfield Park Rd., Westfield, IN 46074 USA.



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 Permit #14

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