

# Fumigants & Pheromones

Issue 99  
Summer 2011

Routing:

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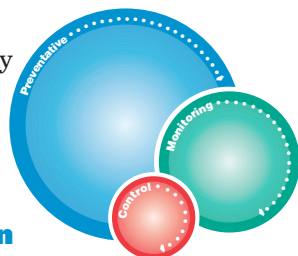
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*Celebrating 30 Years in Business • 1981-2011*

## Happy Birthday!

Fumigation Service and Supply, Inc. and Insects Limited celebrate their 30th year in business. We want to thank our partners who have helped us along the way.

At Fumigation Service & Supply and Insects Limited, we believe that a pest management strategy should focus on *prevention, monitoring, and control.*



### Monitoring and Prevention

Pheromones have been the center piece for Insects Limited. Insects Limited has been the leader in pheromone technology for 30 years. Pheromones have emerged to be an important tool for pest management in stored products. It wasn't always that way. David Mueller, FSS/IL founder stated:

*"In the beginning some people joked about the idea of using sex attractant pheromones. Some people predicted they would never make it."* Insects Limited now synthesizes and supplies quality pheromones to 60 countries worldwide. These sensitive monitoring tools have been an important technology to determine if the population of a pest insect reaches a level to warrant a pesticide treatment **or not**. It has changed the 'spray by the calendar' mentality into a more data driven pest management strategy.

### Control

When a pest population warrants a treatment, fumigants are the best tool to *penetrate* into structures and commodities without leaving a dangerous residue without harming the environment. Most grain based food we produce worldwide has been fumigated. Fumigants can be hazardous and even deadly. Safe use of fumigants takes experience and continuous training. These FSS managers along with experienced and licensed fumigators treat hundreds of commercial structures and grain bins yearly. Safety is of vital importance in every step of the way when preparing and performing fumigation. FSS's safety record is superior.

### Mission Statement

Twenty years ago this mission statement (see right) was written by the FSS/IL employees on a train ride to SC Johnson's Headquarters in Racine, WI. Every word was carefully crafted by the group. Since written in 1991, we have used this statement as our guiding principles.

In celebration of our 30th year in business, everyone at Insects Limited and Fumigation Service & Supply want to thank you, our customers, partners, and friends, for helping us grow our company.



*FSS managers attending a recent safety meeting. Top row: Todd Wilhelm, Indianapolis; Jeff Moorhead, Chicago; Merle Bennett, Indianapolis; Mel Ulrich, Ft. Wayne; Ryan Yutz, Indianapolis; Pete Mueller, Bloomington, IL; Jeff Waggoner, Cincinnati. Bottom row: Nathan Stocker and Dave Mueller, Indianapolis. Curt Lilleodden, Cedar Rapids, not pictured.*

### Mission Statement

In all, our aim is to strive for quality service, provide the absolute best products available worldwide, to be a respected world-class organization, and maintain profitability with innovation, alternatives, and education.

VISIT US AT: [www.insectslimited.com](http://www.insectslimited.com)

# Insect Resistant Packaging: The Last Line of Defense Part 2



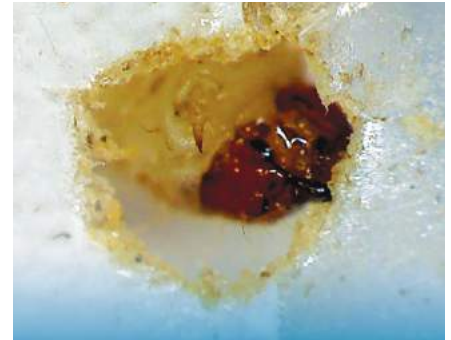
By Alain VanRyckeghem, BCE  
 Technical Director  
 InsectHelp@aol.com

There is a multitude of materials that can be used for consumer packaging. They can be graded into five categories according to levels of protection from penetrating insect pests.

Modern packaging incorporates multiple layers and thickness of mixed materials such as those listed in the table below. The purpose of these designs includes better preservation, longer shelf life, enhanced graphics, resealable closures, and user convenience. There are however, many food packages that still have nothing

more than dry food product in a single layer Kraft paper box or cellophane wrapper. Why would food manufacturers still do this kind of thing?

Once the food package leaves the warehouse, the food manufacturer has lost a significant degree of control over that product. One cannot accurately gauge the level of sanitation in a distribution center or retail store. The manufacturer cannot foresee a retailer's improper product rotation or lack of pest control services, or placement next to other infested materials. The manufacturer must however, satisfy the consumer's expectation of pest free food. That manufacturer has a Branded name product and if a consumer cannot feel confident in that product they will remember that brand as one to avoid rather than one to purchase. To that end, the retail package that a manufacturer uses to proudly sell its product is the **Last Line of**



Indian meal moth larva chewing out of a polyethylene food package.

**Defense.** The difference between profit and loss (from recall) can literally be the thickness of the dollar bill (100 microns).

Why does an insect attack one package over another made of the same material and containing the same food products? The answer is odor; insects live in a world of odors and the escape of food odors from a puncture, loose seal, or badly designed package is the main reason they choose one

(continued on page 6)

Level of Protection from Penetrators	Examples of Packaging Materials
Impervious to attack	Vacuum sealed jars and tin cans
Insect proof	Polycarbonate; Polyethylene terephthalate (PET) Polyester; nylon plastics
Insect resistant	Cellulose Acetate Polyamide Polyethylene (250 microns = 10 mil) Polypropylene Polyvinyl chloride
Susceptible to attack	Acrylonitrile Polylactic acid (new biodegradable plastics) Polyethylene (125 microns)
No protection from attack	Ethylene vinyl acetate Kraft Paper Corrugated paperboard Paper/foil/polyethylene Polyethylene (25-100 microns =1- 4 mil) Polyvinylidene chloride (Saran)

Table 2. Common packaging materials and the level of protection they provide from insect penetrators.

## Dave's Soapbox



**Superior pest management starts when we begin feeling like insects.**

How does it feel to be cold blooded? How do you find a crack to crawl into during the hottest part of the day when the surface reaches over 110 degrees? What does it feel like to have a breeze blowing on your fragile wings that causes you to find shelter until it subsides? What does it feel like to see a light at night and be programmed to fly to a tiny opening into a food processing plant from which the light comes from? What does it smell like when a wisp of pheromone crosses an antennae? What does it feel like to have to lay 100 eggs a day in locations where there is a food source and protection from predators and parasites? What does it feel like to know how to survive like your ancestors have done for millions of years?

Humans are warm blooded animals who seek conditioned air in all we do and in all seasons year round. We get into our cars and immediately turn on our air conditioning. We place screens, fans, air conditioning, and tinted window to keep the warm temperatures under control in the hot summer months. We insulate our homes, wear thick wool clothing, and turn up the thermostat in the winter months. We survive in places like Alaska, Antarctica, Minnesota, and even at 35,000 ft. because we create livable conditions.

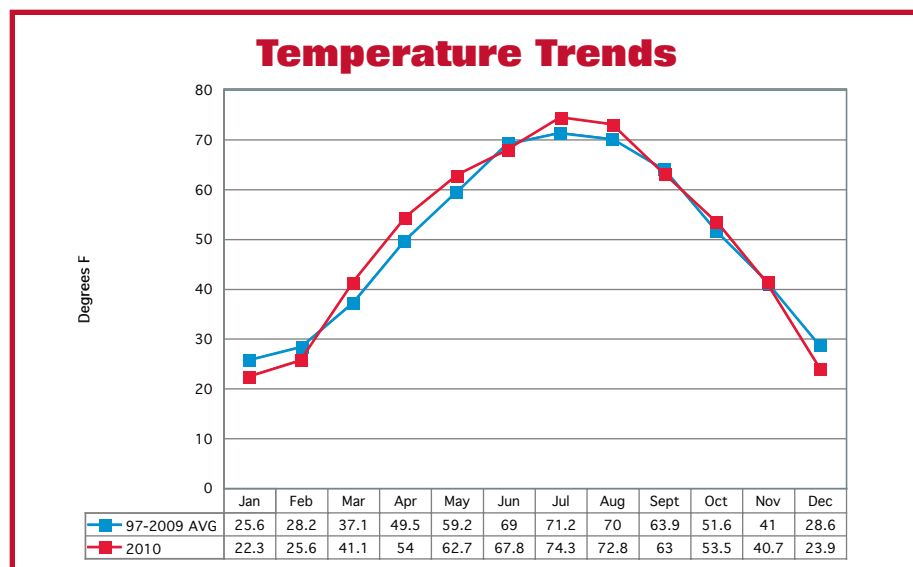
### Pest Management Tip

Superior pest management should include the use of outdoor and indoor temperatures to predict

insect outbreaks. It is basic biology but we often overlook how important temperature is to the development of insect populations.

In this chart below, the 12 year average mean temperature in a Midwestern city is denoted by the blue line (1998-2009). The average mean temperature for 2010 at this location is designated by the red line. Notice that the temperatures in 2010 were 2-3 degrees higher than the previous 12 year average mean high temperature. When you compare the two lines, it shows that 2010 was an extremely hot summer. The months of March, April, and May allowed for the insects to emerge early and reach the second generation fast. Remember that insect development is directly dependent on temperature. Most insects can

*Reproductive potential:* If a female Indian meal moth can lay 400 eggs per female. The normal time it takes these 400 eggs to hatch in one week, larvae two weeks, pupae one week and emerge as a reproductive adult moth in as short as one month. If you get three generations in an average year, that number can grow exponentially,  $400 \times 400 \times 400$ . Mathematically this is about 64 million biologically active offspring. In 2010 we had six months where the average mean temperature was 2-3 degrees warmer than the average of the previous 12 years (see chart). If you add the fourth generation, like we did in the Midwestern region of the United States in 2010, you theoretically could reach 27 billion moths in one summer.



**Temperature is an important factor in insect development.**

(R. Yutzy)

stay active if the temperatures are above 60-65° F (18-20° C). If the temperatures stay above 65 degrees at night, the insects can then stay active 24 hours a day. The night time active insects will accelerate their population growth and the pest problems in stored products begins to reach a critical mass.

Just look at the number of insects circling a light pole in on a hot night. That activity is directly proportional to their life cycle.

**Finally, I hope you are starting to 'feel' like a cold blooded insect. Understanding indoor and outdoor temperatures can offer data driven predictions that leads to a reduction of customer complaints.**

Where to start? Go to [www.weather-warehouse.com](http://www.weather-warehouse.com) and start with your hometown in 2011.

*A. K. Mueller*

# Comparison Phosphine Pellets



**By Pete Swords**

*Pheromone Chemist  
p.swords@insectslimited.com*

Recent studies conducted at our facilities were aimed at investigating the integrity and longevity of phosphine pellets produced by three different major manufacturers. The purpose of this being to determine which pellet has the most stability and at the same time capable of releasing phosphine gas at standard concentrations for an efficient amount of time. The three top manufacturers which were included in the testing were the following: Drexel Drex-PH3 Phosphine Pellets™, Weevil-cide Phosphine Pellets™, and Degesch Phostoxin Phosphine Pellets™.

In order to determine the integrity of the pellets, four canisters of pellets for each manufacturer were randomly chosen from different cases that were shipped at separate times. Each canister was emptied into sifters where

they were shaken so that the residual dust could fall through and be collected to be weighed. Total weights of the pellets from each canister were recorded along with each respective dust total. The following data table shows the results obtained from four separate trials for each manufacturer. Drexel and Degesch both claim to provide 1kg of pellets, while Weevil-cide provides 1.5kg.

For each manufacturer, it is important to look at the weight to dust ratio. As the data above shows, Drexel has the best weight to dust ratio of 437:1 (0.23%) which means that there is only 1 gram of dust for every 437 grams of pellets. Weevil-cide was second in weight to dust ratios having 1 gram of dust for every 162 grams of pellets (0.62%) and Degesch was third at 1 gram of dust for every 117 grams of pellets (0.85%). Drexel Drex-PH3 Phosphine



*Like grain, the quality of solid phosphine fumigants can be compared by the amount of dust, broken pieces and foreign material. One other important comparison is the time it takes to release the phosphine gas. Here is a head-to-head comparison of three common phosphine fumigants used worldwide.*

Pellets showed to have the best integrity out of all three as well as provided at or more than the claimed value provided at 1kg. Weevil-cide also provided more than the claimed 1.5kg for each trial while Degesch Phostoxin provided less than 1kg for each trial completed.

## Phosphine Pellet Comparison

A pellet time release study was conducted on the three major phosphine pellet manufacturers which included Drexel Drex-PH3™, Weevil-cide™, and Degesch Phostoxin™ phosphine pellets. This test was to determine the decomposition of each pellet brand.

**Methods/Materials** Each pellet brand had four pellets from separate flasks taken randomly and placed in 200mL glass containers 2 feet apart. Each flask was monitored approximately every half hour with a Dräger PAC 3000. The PAC 3000 was held directly above the glass containers

Drexel Drex-PH3 Phosphine Pellets			Weevil-cide Phosphine Pellets			Degesch Phostoxin Phosphine Pellets		
Trial	Wt. of Pellets (g)	Wt. of Dust (g)	Trial	Wt. of Pellets (g)	Wt. of Dust (g)	Trial	Wt. of Pellets (g)	Wt. of Dust (g)
1	1011.7	1.1	1	1508.2	6.4	1	994.9	7.6
2	995.6	5.0	2	1507.7	13.8	2	997.9	8.0
3	1002.7	2.1	3	1507.2	8.6	3	996.1	10.8
4	1006.1	1.0	4	1503.9	8.4	4	996.2	7.6
Average	1004.025	2.3	Average	1506.75	9.3	Average	996.28	8.5
Weight to Dust Ratio 437 : 1			Weight to Dust Ratio 162 : 1			Weight to Dust Ratio 117 : 1		

Figure 1 Dust Comparison of 3 major phosphine pellet manufacturers.

containing the pellets. The temperatures were 54-57° F and the relative humidity was 55% Rh.

**Results** Data was recorded for 3 days. Break down trending could be seen with a higher concentration of phosphine for the first four hours and then the gradual tailing off for 2 days (See Figure 1 below).

**Conclusion** All three major phosphine pellet brands had the same trending of phosphine release over an extended period of time. Each manufacturer had an average phosphine release ranging from 1.8-2.0 days. **From this study, there has no significant difference in pellet longevity between the three phosphine pellet brands used.**

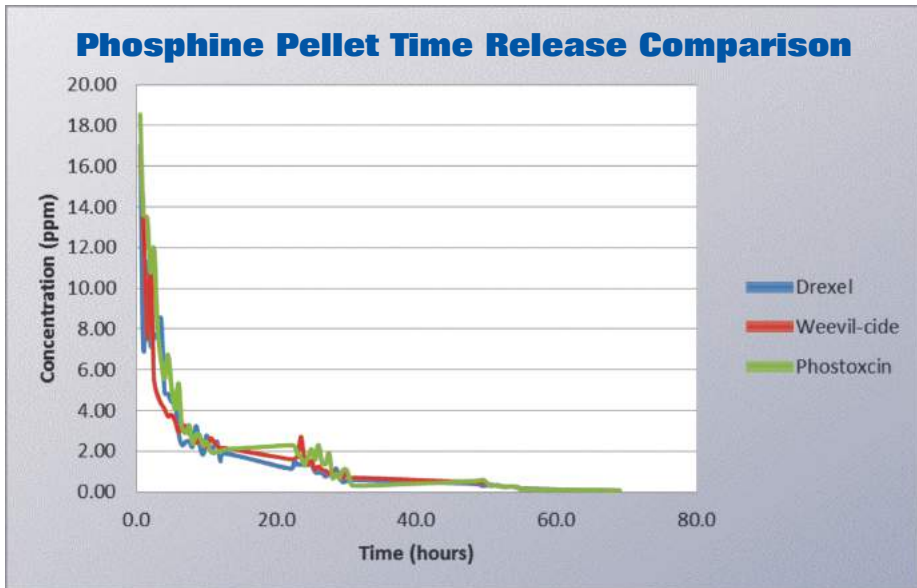


Figure 1 Pellet time release of all three major manufacturers under similar conditions.



### Top Ten Retailers in USA

1. WalMart
2. Kroger
3. Costco
4. Home Depot
5. Target
6. Walgreen
7. CVS Caremark
8. Lowe's
9. Sears Holdings
10. Best Buy

40 years of Stored Product Protection experience captured in these two books by entomologist David Mueller

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*Austin M. Frishman*  
Austin M. Frishman, Ph.D., BCE

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INCORPORATED

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## Quotable Quotes

*“Any child can tell you that the sole purpose of a middle name is so he can tell when he’s really in trouble.”*  
— Dennis Fakes

*“If you watch a game, it’s fun. If you play it, it’s recreation. If you work at it, it’s golf.”*  
— Bob Hope

## Insect Resistant Packaging

(continued from page 2)

package over another. The majority of consumer complaints come from products that have been invaded by a food pest; much fewer cases are from active penetration of insects through packages. It is a rare occurrence that food products are actually manufactured or packaged with active and viable insects. The risk of infestations come post production and packaging. This is why the packaging material is critical; it is the last line of defense to keep the food pest free.

A food manufacturer must have good stewardship for its brand; it must protect the product beyond its own walls. The manufacturer should envision long storage, poor sanitation, rough handling, and even invasions from the “evil insect hoards.” Great food in great packaging develops a great reputation which can only lead to great profits.

## New Commercial Pest Control Changes

- 1** All rodenticide products that you receive from the manufacturer must be sold in specific sizes and must carry new required label changes. Existing products can be used until it runs out. If you have old and newly labeled products, follow the label on the container you are using.
- 2** Products that use the word ‘only’ for certain species like Norway Rat, roof rat, and house mouse, cannot be used against rodent pests not on the label. (ie. deer mice).
- 3** Any treatment site like a fence line or dumpster more than 50 feet from the structure can no longer be baited.

There are several minor changes in the commercial and consumer rodenticides. Always read the label to be in compliance of federal pesticide laws. If you have questions, contact the manufacturer or your distributor.



*All general use rodenticides must be used within 50 feet of buildings. The exception is for the use of second generation anticoagulants around agricultural buildings.*



Cigarette beetle

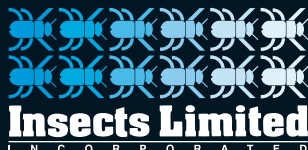


Notice the difference in their antennae.



Drugstore beetle

Even though these two pantry pests look similar, they are attracted to different pheromones. Insects Limited provides quality pheromones for these two beetles and many more.



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800.992.1991



By Patrick Kelley, ACE  
p.kelley@insectslimited.com

The earliest warming days of spring through the hot summer and into the chilling autumn, flies continue to plague commercial businesses, homes, and museums alike. Of the more than 110,000 species of flies on this planet, most are not considered pests and some are quite beneficial. A few, though, can cause emotional and economic stress as well as propagate disease. Each different type has its own unique environment in which it will thrive. In order to eliminate the flies, we need to remove the source of their existence. Once we have identified the pest, our job to eliminate it becomes much easier as we can then know what environment this particular fly comes from. There are several species that I come across quite frequently in museum settings. Here are the top 5 with some tips on identification and elimination.

**House Fly, *Musca domestica*:** This is likely the most common fly worldwide.



House fly adults have 4 dark stripes on the thorax and are 7 mm in length. They commonly infest the places where people live and spend time. They can be found breeding in anything from spoiled food to manure. The key to control is sanitation and exclusion. (See article: "The Exclusion Conclusion" in *Fumigants and Pheromone Issue 94*)

# Preserving Our History

## Flies, Flies and More Flies

Our philosophy:

**"Start with  
the Insect  
First"**

Call Insects Limited with  
your questions on flies.

**Moth Fly, *Psychodidae*:** This distinct looking and relatively small (3 mm) fly has the appearance of a moth because its entire body



and wings are covered with hairs. Moth flies primarily breed in drains or sewer pits, feeding on gelatinous organic material. The key to control is to eliminate their food sources in the drains by thorough cleaning and an application of microbial foam that breaks down the bio-gel.

**Common Fruit Fly,**



*Drosophila melanogaster*: Restaurants and food sales in museums are very commonplace, as the revenue and enjoyment that the visitor's experience is essential. Unfortunately, fruit flies commonly come into the building closely behind the food. They will feed on spoiled fruit and vegetation as well as the sugary drinks at the soda fountain. Removal of their food sources and rotation of produce is essential.

Traps can keep the large numbers down on this small 3 mm fly.

**Fungus Gnat, *Sciaridae*:**



These slender flies can look a little like a miniature mosquito at 2 - 6 mm in length. They

are commonly found in office spaces and anywhere else where live plants are kept. These flies live and breed in soil where they feed upon the fungus and moist organic matter. They will thrive under certain soil conditions if the plants are being over-watered and the soil is constantly wet. Control is possible if the plants are removed or if the soil is allowed to completely dry and treated with diatomaceous earth.

**Cluster Fly, *Pollenia rudis*:**



This fly is medium in size (7-9 mm) and can come into structures in large numbers during the months of August and September. Yellow hairs on their upper thorax help identify them from other flies. Eggs are laid singly in the soil outdoors and the emerging larvae will locate an earthworm and bore into it. This parasite will feed on the worm for 3 weeks before pupating. They look for man-made structures to over-winter. The best control method is preventing them from being able to enter your building. If they do get inside, light traps can be very effective.

References: S.A.Hedges, "Field Guide for the Management of Structure-Infesting Flies," G.I.E.Inc., 1998

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3. Fruit Fly: Michael Ashburner, Encyclopedia of Life 4. Fungus Gnat: Copyright ©2005 Richard Leung, BugGuide.net 5. Cluster Fly: © Thomas Murray - BugGuide.net

## MEETING CALENDAR:

# Indy



**May 16-18, 2012**

*"Pest Management Around the World"*

**\*\*\* May 16-18, 2012**  
**10th Fumigants & Pheromones**  
**Conference and Workshop**  
**"Pest Management Around the World"**  
**Indianapolis, IN USA**

**See You There!**

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



## Indy 2012 Keynote Speaker



Dr. Gebisa Ejeta, World Food Prize laureate, helped to develop at Purdue sorghum that is reducing hunger around the world, primarily in his native country of Ethiopia.

### Other speakers:

Paul Fields, Ph.D., *Canada*  
 David Mueller, BCE, *USA*  
 Keith Delpont, *Zimbabwe*  
 Darka Hammel, Ph.D., *Croatia*  
 Michael Doyle, Ph.D., *USA*  
 Kim Kemp, *USA*  
 Bobby Corrigan, Ph.D.  
 Dieudonne Baributsa, Ph.D.,  
*Nigeria*  
 Alain VanRyckeghem, BCE,  
*Canada*  
 David Liszka, *Poland*  
 Pawel Swietoslowski, *Poland*  
 Agustin Barrutia, *Argentina*

*More speakers to be announced.*

## 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: Peggy Rutkowski, Fumigation Service & Supply, Inc., 16950 Westfield Park Rd., Westfield, IN 46074 USA.



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### Fumigation Service & Supply, Inc.

16950 Westfield Park Road  
 Westfield, IN 46074-9374 USA  
 (1) 317-896-9300  
 e-mail: [insectsltd@aol.com](mailto:insectsltd@aol.com)  
 websites: [www.insectslimited.com](http://www.insectslimited.com)  
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