FDA & PHEROMONES

The Food & Drug Administration's (FDA) position regarding pheromone traps was established in a recent letter from Fred R. Shank, Ph.D., Director, Center for Food Safety and Applied Nutrition.

As Dr. Shank states, "We (FDA) do not consider the presence of insects in an insect population monitoring device as evidence that food has been prepared, packed or held under unsanitary conditions or that the food itself is filthy." Dr. Shank goes on to say that the proper use of these devices offers an excellent adjunct as prevention and detection procedures and would provide FDA and management an excellent opportunity to discuss sanitation in general and to work together if there is an infestation present.

Female Dermestid beetle releasing pheromone. The back legs help fan the pheromone plume. Photo by Wendell Burkholder, Ph.D.

In the past the FDA inspectors did not have an established policy indicating how to treat insects found in pheromone traps. Consequently, many companies refused to use insect traps in their facilities in fear that their presence would be used against the facility in a condition exam.

Recent letters from FDA concerning the use of insect traps.

These letters from FDA are important because it exempts insects found in traps as being considered as filthy unless the traps are used inappropriately. By utilizing the results of properly placed and maintained pheromone traps, early insect infestations may be detected and controlled using minimum quantities of pesticides.

A tremendous amount of work was done by a group of people to encourage Dr. Shank to establish this baseline position for the FDA. Dr. Vera Krischik, USDA, FGIS, was instrumental in organizing this effort. The list of contributors to this effort is long; however, Dr. Wendell Burkholder, George Okumura, David Galliart, letter writers from the major food companies, Dr. Elizabeth Campbell, Dr. Wendell Roelofs, the Grain Insect Interagency Task Force, and Eli Lilly & Company should be acknowledged for their support and persistance.

ARTICLES IN THIS ISSUE

- Dave's Soapbox
- Pyrethrin Update
- Methyl Bromide Update
- Mean, Clean, Phosphine
- Interpreting Pheromone Trap Catch
- Entomology
- Insect I.D.
- Control vs. Monitoring
- Mallis Handbook
Dave's Soapbox

... for what it's worth.

"... one more piece of sausage, please."

Hope. What a great feeling we get inside when something happens which promises a better world for each of us and our families. A good example of this is occurring in Eastern Europe today. People throughout the world are filled with hope.

The conditions in Eastern Europe will impact the grain, food, and seed industries in the United States. Imagine coming home from work to a supper of wheat and barley porridge or potato soup and bread... each day and once a week you may enjoy a piece of meat to eat. Imagine waiting in line for hours to get soap or toothpaste. I can't imagine this quality of life day-in day-out, year-in year-out. We complain if our 16 oz. T-bone isn't cooked to perfection. What a great feeling we get inside when something happens which promises a better world for each of us and our families.

The American government will come forward to offer the people of Eastern Europe and any freedom yearning country the chance for a better quality of life. American agriculture will be asked to provide the grain to make the bread and butter, fatten the livestock and offer a variety of foods that we take for granted. The American government will come forward to offer the people of Eastern Europe and any freedom yearning country the chance for a better quality of life.

The American government will come forward to offer the people of Eastern Europe and any freedom yearning country the chance for a better quality of life.

The pyrethrin shortage has now been with us for almost 3 years and the future is not very encouraging. Today the world wide supply of natural pyrethrin is increasing—very slowly. This small increase is being consumed by the increase in World demand for pyrethrin products driven by a trend towards safer insecticides.

The supply of pyrethrin has not risen to meet market demand because the price given to the African farmers has not been sufficient to entice the farmers to switch from food crops that feed their families to pyrethrin plantings for cash.

In 1990, I believe we will see the pricing structure change to entice the farmers to increase their pyrethrin plantings. At Micro-Gen we anticipate the supply to be very tight with little to no chance of seeing bulk 3% pyrethrin available in 1990.

Methyl Bromide Information Update

Dr. Vern White has been a valuable resource person for the fumigation industry for over twenty years. Vern is no longer working with Great Lakes Chemical Corp. Vern "retired" from his position on November 1, 1989. He was chairman of the methyl bromide industry board and spent a lot of time recently on the re-registration of methyl bromide. Vern is in the process of moving from Indiana to Georgia. Vern, best wishes and the fumigation community will miss you. We appreciate what you have done in the past and wish you well.

Concentrations of Methyl Bromide Inside Flour Mills and in the Atmosphere Around the Mills During and After Fumigation

by E.J. Bond and T. Dumas, Research Centre, Agriculture Canada.

Abstract

The concentrations of methyl bromide established in three flour mills during fumigation varied according to the size and condition of the structures and to the weather conditions on the days of the treatments. In a 15-hour exposure, the concentrations in the mills dropped by 75% or more, even when additional fumigant was added to supplement that originally applied. During aeration, a maximum concentration of 25 ppm was recorded at a distance of 25 m (80 ft) from one mill in the first five minutes and at 20 minutes the concentration had declined to 7 ppm.

<table>
<thead>
<tr>
<th>Time (min.) after aeration</th>
<th>Concentration (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>beginning of aeration</td>
<td>Site 1</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>45</td>
<td>7</td>
</tr>
<tr>
<td>90</td>
<td>6</td>
</tr>
</tbody>
</table>

The PEL for methyl bromide is 5 ppm (ceiling).

Two questions arise: 1. How close to inhabited structures can we safely use methyl bromide? 2. Do we need to wear respiratory protection outdoors in some situations?

Methyl Bromide Fumigation Conversion Chart

<table>
<thead>
<tr>
<th>Gas Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ppm = 0.0005% = 0.02 g/m³</td>
</tr>
<tr>
<td>257 ppm = 0.026% = 1.90 g/m³</td>
</tr>
<tr>
<td>1000 ppm = 0.100% = 3.88 g/m³</td>
</tr>
<tr>
<td>4121 ppm = 0.412% = 16.00 g/m³</td>
</tr>
<tr>
<td>oz/1000 ft³ = gram/m³ = mg/l</td>
</tr>
<tr>
<td>16 oz/1000 ft³ = 1lb/1000 ft³</td>
</tr>
</tbody>
</table>

Source: Great Lakes Chemical Corp.
**MEAN, CLEAN, PHOSPHINE**

Two metal phosphides are available for fumigation: aluminum phosphide (Degesch Phostoxin) and magnesium (Degesch FumiStrips) phosphides. These compounds are solids which, in the presence of atmospheric moisture, liberate the gas called hydrogen phosphide (PH₃), also known as phosphine. The primary use of these products has been and still is in the stored-product fumigation area. There has been an increased use of these products in burrowing rodent and mole fumigations. Magnesium phosphide (Degesch Magtoxin) is also labeled for spot fumigation in grain mills, breweries, and food processing plants.

**Physical Properties**

**Physical Characteristics:** Phostoxin is a colorless inflammable gas with a pronounced “carbide” or “garlic” odor.

**Specific Gravity:** It is a true gas, slightly heavier than air, 1.17 (air=1)

**Solubility:** Slightly soluble in water, 26cc/100ml @ 17°C

**Stability:** May be spontaneously flammable in air with a lower flammable limit of 1.79% by volume or 17,900 ppm. However, these concentrations are not attained if the product is applied in accordance to label instructions.

**Penetration:** Hydrogen phosphide does not enter irreversible chemical reactions with the fumigated commodities. Phostoxin is highly penetrative.

**Reactivity:** It may, however, react with certain metals, particularly gold, silver, copper and copper compounds such as brass, silver, and platinum to cause corrosion, especially at high temperatures and high humidity. Some types of copy paper and undeveloped film may also be affected.

**source:** NPCA Technical Release ESPC 066114

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**Phostoxin® Mode of Action**

The exact mode of action of this popular fumigant is not clearly known; however, there are three theories to explain it:

1. The molecules that gain quick access to the nervous system may act on it to paralyze the insects. (Winks 1973, Nakakita 1974, Kashi, 1981)
2. The paralysis of the spracular muscles prevent active respiration to continue. (Nikakita 1974, Kashi and Bond, 1975)
3. The enzyme cytochrome oxidase is attacked by phosphine to cause toxic action in the insect. (Kashi and Cefurka 1976, Nakakita 1976, Price 1980)

Kashi of Canada proved that the weevil group are the hardest insects to kill with phosphine fumigants. Longer exposure is recommended when these pests are known to exist in the commodity or fumigated product. The time it takes to kill all stages of granary weevi (Sitophilus granarius) at various concentrations follows:

<table>
<thead>
<tr>
<th>Temperature (F)</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>16</td>
</tr>
<tr>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>78</td>
<td>2</td>
</tr>
<tr>
<td>86</td>
<td>2</td>
</tr>
</tbody>
</table>

The cooler the temperature the longer it takes to kill all stages of this stored-product pest.

In comparison to the weevils, the Indianmeal moth (Plodia interpunctella) takes a relatively shorter exposure time to kill all stages with phosphine.

This is also true with carbon dioxide. Collin Smith of Rentokil in the UK recently showed that in the fumigation Bubble, most insects (all stages) are killed after four days exposure at a 60% concentration of carbon dioxide when the temperature was 87 degrees (F). However, the stored-product moths took only one day at 87 degrees (F).

The eggs of the stored product-moths were highly tolerant to phosphine gas, but all other stages (larva, pupa, adult) were much more susceptible to phosphine at various concentrations. The second hardest stage to kill with phosphine gas is the young pupae. (Bell 1975)

Phosphine is effective against Dermestids (carpet beetles and Warehouse beetles). However, the egg stage is the most tolerant stage to kill except for the quarantine pest; Khapra beetle (T. granarium). In this case, the diapausing larvae stage is very tolerant of high levels of phosphine. The larva stage is the easiest stage to kill with phosphine in the Flour beetle group and the eggs are the hardest stage to control. Hole et al (1976)

**MAGNESIUM PHOSPHIDE**

This metal phosphide is a relative newcomer to the fumigation world. It has many of the same characteristics and uses as aluminum phosphide; however, it has found a niche for specific uses where other fumigants are not well suited. It is labeled for use against insects which infest stored commodities and for the control of burrowing pests. The Degesch Magtoxin® formulation contains 66% magnesium phosphide and 34% inert ingredients.

Magnesium phosphide comes in solid plates (Fumi-Cel® and FumiStrips® packaged strips) (Magtoxin®, one gram pellets, and three gram tablets.)

Like all metal phosphides, magnesium phosphide is acted upon by the atmospheric moisture to produce the active gas hydrogen phosphide or phosphine (not phosgene).

The real advantages to this formulation of phosphine are that it reacts at lower temperatures than the aluminum phosphide (Phostoxin®) and the breakdown can be more complete. It is not as dependent on temperature and humidity as aluminum phosphide. This allows the effective fumigation in cooler temperatures to be possible where methyl bromide and aluminum phosphide cannot be used.

Degesch Magtoxin® is a spot fumigant for sealable equipment. (e.g. milling, brewing). Sullivan (1984) showed it to be an alternative to ethylene dibromide (EDB) spot fumigants when repeated applications could be made on a periodic basis and where at least 36 hours of shutdown could be accomplished.
CONTROL VS. MONITORING

Here are four studies that suggest that some stored-product insects can be controlled with the use of pheromone traps. Pheromone trapping has the potential to aid in the control of stored-product insects more than just monitoring. These four referred journal studies point this out.


Emergences were reduced by over 97% when a population density of 0.25 moths/m² surface area was exposed to a dispenser containing moth pheromone.


It was postulated that insectistasis can be achieved in tobacco stores either by mass trapping of tobacco beetles on several pheromone traps or by supervision of the population density of cigarette beetle on a few pheromone traps and a limited number of curative treatments (eg. fumigation or U.L.V. treatments), timed according to the extent of trap catches.


Both studies suggest that mass pheromone trapping may be a useful tool for the long-term suppression of cigarette beetle populations in some of Hawaii’s food processing and storage facilities. This technique may also be able to suppress the population levels to insectistasis in some situations.

4. Control of Ephestia kuehniella by mass-trapping P. Trematerra and F. Battaini Institute of Agricultural Entomology, University of Milan

The continued presence of the traps in the environment resulted in considerable captures (over 94% of all specimens present), stabilizing the infestation to levels as low as those observed during months unfavourable to development. In flour mills the utilization of this methodology could lead to a drastic reduction with consequent economic and qualitative advantages.

Cigarette beetle on a few pheromone traps and a limited number of curative treatments (eg. fumigation or U.L.V. treatments), timed according to the extent of trap catches.


Insect Species

- Cigarette Beetle Kits and Lures... 48.6%
- Red & Confused Flour Beetle Kits and Lures... 8.2%
- Saw-toothed Grain Beetle Kits... 2%
- Lesser Grain Borer Kits and Lures... 2%
- Drugstore Beetle Kits and Lures... 2%
- Angoumois Grain Moth Kits and Lures... 1%
- Warehouse Beetle/Khapa Kits and Lures... 14.3%
- Others and Misc... 4.9%

Individual traps/lures... 29.5%

New Terms

Integrated Resistance Management: Management of a pest population to recognize the potential for resistance and reduce its negative effects.

Insectistasis: "A state wherein the population density of a pest species is diminished to the extent of allowing storage of foodstuffs (or continued plant growth) without significant impairment." The use of pheromone traps to reduce pest insects to a level of acceptance. This definition is now being used with pheromone mass trapping programs.

Cameron Clawson

Cameron Clawson began working for Fumigation Service & Supply, Inc. in the summer of 1987. Since that time, Clawson has helped fumigate over 60 million bushel of grain and over 60 million cubic feet of warehouse space. Needless to say, he has quickly become extremely experienced in all types of fumigations.

Cameron’s duties as fumigation technician for FSS includes spearheading the sealing and prep-work that goes into large scale fumigations. Clawson also adds a personal touch while running the rodent trapping and baiting programs for a few local companies.

Cam’s hobbies include bow and shotgun hunting, along with weightlifting (it helps to be strong when you’re walking through grain in a flat storage fumigation).

"Cameron is an “ever-ready” employee who is glad to help the customer anyway it can.”

Earth Day

April 22, 1990, marks the 20th anniversary of Earth Day. The original challenge was to awaken the nation, and the world, to environmental problems — and to prevent further destruction. Earth Day will bring people together to discuss environmental problems and to work toward solutions.

NEW TERMS

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Insectistasis: “A state wherein the population density of a pest species is diminished to the extent of allowing storage of foodstuffs (or continued plant growth) without significant impairment.” The use of pheromone traps to reduce pest insects to a level of acceptance. This definition is now being used with pheromone mass trapping programs.
## INTERPRETING PHEROMONE TRAP CATCH

By David K. Mueller, RPE

There has been much discussion among those who recommend the use of pheromone traps and those who use pheromone traps for stored-product insects as to the level at which action should be taken to correct a pest insect problem. Everyone is looking for that ‘magical number’ or threshold level where they can start to justify the expense of manpower, shutdown time, materials, and liability for a corrective action. This may be a ULV fogging, a heat treatment, or maybe even a general fumigation.

"There is no magical number or formula to determine this level of action."

Each stored-product insect species reacts differently to each type of pheromone attractant. In general, lepidoptera (moths) are more attracted than coleoptera (beetles) to pheromones. Some short lived adult beetles are more attracted than long lived adult beetles. In some cases it is the scientists’ inability to match the precise molecular structure of the natural pheromone compound that causes the pheromone lures to work poorly.

After a pheromone trapping program has been installed and data has been collected from the traps, what do we now do with these numbers and what do they mean?

The data should be carefully charted and saved for future reference. It can be valuable in solving customer complaints that may not arise for several months. This data can be used in future years to help plan a pest management strategy that may determine when a control procedure is scheduled. With more information available, it makes pest management easier to achieve.

When insects are captured in a pheromone trap, a determination needs to be made as to what action should be taken. No magical numbers are available to you to make that determination. The emphasis that one company’s management may place on insect control may be quite different than that by another. The insect defect standards of the grain elevator operator are different from that of the flour miller. A grocery store’s standards may be somewhat different than the natural food store. Typically, the closer that you get to the end consumer, the greater the emphasis in achieving ‘zero tolerance’.

Instead of setting action levels like “10 insects per week per warehouse” or “5 Indianmeal moths per trap” means it’s time to do something, I propose that the data is collected and evaluated on a trap by trap basis rather than an accumulation of all the traps combined.

### The key to determining when action should be taken as insects are captured in pheromone traps should not necessarily be a total ‘body count’, but rather when population growth in one or more areas is observed.

Finding a consistent increase in captured insects throughout the warehouse (ie. 1 - 5 - 10 - 15) may not be as important as if you find population growth in one trap or one particular area (5 - 20 - 50). Then, closer visual determination of a control strategy is implemented. Something as simple as discarding a pallet of old coded product may solve the problem instead of making a general assessment that the entire facility is becoming infested.

### Conclusion

The use of pheromone traps to determine the presence or absence of a pest population is an exciting new step toward a total pest management program. The interest in pheromones in recent years has been fueled by their potential to modify the behavior of pests and help control them with significantly reduced levels of insecticides. Action levels can be decided and the judicious use of control methods can be prescribed when population growth is observed in one or more areas of a facility.

The practical application of pheromones to misdirect insect behavior and prevent the reproduction of pest species is helping to provide the food and tobacco industry with the option of a total pest management strategy.

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### HAPPY ANNIVERSARY ESA

San Antonio, Texas was the site of the 100th anniversary celebration of the Entomological Society of America (ESA). Over 3500 scientists converged on this historic city in December to disseminate and gather knowledge in their chosen niche of entomology.

Over 1900 presentations were given in a four day period. This means that from 8 a.m. till 10 p.m., papers were being presented in a dozen different places at the same time. Some of the presentations represented years of patient investigation in a particular facet of this science.

At the conclusion of this centennial celebration, a special international symposia was conducted on Trapping Stored-Product Insects. This was the second of a series of three symposia (Vancouver, B.C., San Antonio, Bordeaux, France) that brings the researchers together to discuss a common field; pheromones, attractants, and trapping for stored product insects.

Scientists from Australia, Berlin, Canada, England, Indonesia, India, Mexico, United States, and Wales representing government agencies, universities, manufacturers, and end-users attended this two-day confer-

### The objectives of this workshop were:

1. Identify workers in key areas
2. Discuss techniques
3. Standardize terminology
4. Standardize techniques
5. Encourage co-operation
6. Seek support/funding
7. Identify needs of users

The information exchanged was extremely valuable to all who participated.

(continued on next page)
HAPPY ANNIVERSARY
(continued)

The proceedings will be published this summer in the Journal of Kansas Entomology.

Insects Limited, Inc. was asked to give a paper on: "The Practical Application of Pheromone Traps in the Food and Tobacco Industry." In cooperation with Herman Benezet, Ph.D., R.J. Reynolds Tobacco Co., Larry Pierce, Food Protection Services, and Vera Krischik, Ph.D., USDA, FGIS, David Mueller of Insects Limited, Inc. presented a paper that discussed:

1. Who is Using Stored-Product Insect Fumigants?
2. What type of Pheromone Traps/Lures are Being Used?
3. Control vs. Monitoring; Effects of Long-Term Pheromone Trapping on Cigarette Beetles, Lastiderma sericorne in Laboratory and Field Studies.
4. The U.S. Government’s Perspective on Insect Traps: Inspection for Insects by FGIS; Future Roles for Insect Traps.
5. Interpreting Pheromone Trap Catch.

INSECT I.D.

Where can I get this insect identified? Insects Limited, Inc. offers a free service to its customers.

Guidelines to follow:

Obviously, smashed insects with missing legs or heads are difficult or impossible to identify. You can help ensure accurate identification by doing the following:

1. Collect fresh, live specimens.
2. Collect several specimens and different stages (such as adult and larva) if possible.
3. Don’t pack insects in plastic bags or tin foil; they’ll rot. Kill and preserve small, soft-bodied, or delicate specimens in a bottle containing rubbing alcohol (or Jack Daniels). Large, dead, hard-bodied insects, and butterflies and moths, can be packed in a small box with layers of cotton or tissue.
5. Give as much information as you can about where the insect was found and what it was infesting. If possible, include a small sample of material it damaged.

It is important to include a self-addressed stamped envelope with your specimen. We will identify the insect and make copies of pertinent information about this pest and mail it back to you. But don’t forget the self-addressed envelope. Insects Limited, Inc. identifies hundreds of specimens for our customers each year and believes that this is an important service. "Knowing the pest is half the battle in controlling it.”

FUMIGANTS & PHEROMONES TECHNICAL SEMINAR

It’s time again to mark your calendar for the 1990 Fumigants & Pheromones Technical Seminar to be held in Indianapolis on December 11 & 12. This is the seventh in a series of biannual advanced training programs designed to give our customers in the pest management profession a look at new techniques and methods of controlling pests.

The speakers being gathered for this two-day seminar will be a consortium of international and domestic experts. The 1988 meetings drew over 210 delegates from 27 states in the United States and from Canada and Great Britain.

If you are interested in receiving a program, when they become available, check #2 on the Bingo Card and mail it in to Fumigation Service & Supply, Inc.

"In order to stay professional, we must stay current”

Population Growth on Earth

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>First billion people</td>
</tr>
<tr>
<td>1960</td>
<td>3 billion</td>
</tr>
<tr>
<td>1975</td>
<td>4 billion</td>
</tr>
<tr>
<td>1986</td>
<td>5 billion</td>
</tr>
<tr>
<td>1999</td>
<td>6 billion</td>
</tr>
</tbody>
</table>

Bio-Rational Tip:

"A simple solution to a complex problem.”

How can you extract an unwanted pest (spider, boxelder bug, roach, mouse, or even a bird) from someone’s living or working area?

Answer: A Dustbuster or Shop Vac. You don’t touch the pest, the immediate problem is removed without applying unwanted residual pesticides and if you want to be humane, you can take the critters outside and release them.

Agri-Network Recruiters
Duaine Nault
P.O. Box 78126
Indianapolis, IN 46268
(317) 251-4299

A recruiting and placement firm specializing in obtaining and positioning management personnel for the milling, baking, food, and agricultural industries has been formed by Dwaine O. Nault. A graduate of Kansas State University, Mr. Nault has had extensive experience in flour, corn, pet food, and feed milling as well as food manufacturing and packaging. He is a past president of the A.O.M. Prior to organizing Agri-Network Recruiters, Mr. Nault was Vice-President of Production for Acme Evans Milling Company.

PHEROMONE TRAPS/LURES

Send For Free Catalog

Insects Limited
10540 Jessup Boulevard
Indianapolis, IN 46280-1451
1-800-992-1991
CIGARETTE BEETLE

The most popular pheromone trap that Insects Limited, Inc. distributes is for the Cigarette Beetle, this sex attractant, (2,6-diethyl-3,5-dimethyl-3,4-dihydro-2H-pyra) has shown amazing results for the baking, tobacco, spice, botanical, coffee, and food processing industries. The cigarette beetle is one of the top five stored-product insects found in processed food in the United States.

There are three different traps and two different pheromone lures available from Insects Limited, Inc.

Why three different traps?
The Lasiotrap works best in a non-dusty situation while the Sanitrap and the Serrico traps work best in dusty areas (ie. production locations). The Tobacco Monopoly of Japan and the multi-national cigarette manufacturer B.A.T. have worked to produce a trapping system that works best for their particular situation.

MALLIS Handbook Available in 1990

The Seventh Edition of the *Handbook of Pest Control*, the most comprehensive reference book ever published in the pest control industry, will be available this summer. More than 1,000 pages of up-to-date information on the behavior, life history, and control of household pests will be included in this most recent edition of what has been called “the Bible of the pest control industry.” Originally authored by renowned entomologist Arnold Mallis in 1945, the *Handbook of Pest Control* has undergone six revisions. Authors contributing to the Seventh Edition include John Craft, Roger Gold, Stoy Hedges, Dr. William Jackson, Harry Katz, Dr. Douglass Mampe, Keith Story, Dr. Philip Koehler, Robert Russell, Dr. Rex Marsh, and David Mueller. In all, 30 consultants, and hundreds of photographs and illustrations, some in full color, will fill this book.

The *Handbook of Pest Control - 7th Edition* is aimed at pest control professionals. The cost is $95.00. Chapter 23; *Fumigation*, was written by David Mueller of Fumigation Service & Supply, Inc. This five-part fumigation chapter contains extensive reference information about all types of fumigants and ways to use modern fumigants. Anyone who has used Mallis in the past will want to update this “encyclopedia” of urban and industrial pest control.

Circle #3 for more information when it becomes available.

OKUMURA UNIVERSITY

George Okumura (Okumura Biological Institute) is a master at identifying insects and teaching people how to identify insects. After twenty-eight years working at the California Dept. of Agriculture in Sacramento, there isn't much he hasn't seen when it comes to stored-product pests.

George offers several seminars each year on Pests Associated with Food Industry and Environmental Sanitation, an Advanced Course on Pest Recognition and Food Industry Problems, and Insect Fragments Identification. They are designed for those involved in quality control, sanitation, and production.

These seminars are held in Chicago and Sacramento and even in Honolulu.

BINGOCARD

I am interested in receiving information on:

1. Cigarette Beetle Pheromone
2. 1990 Fumigants & Pheromones Technical Seminar
3. Seventh Edition of The Mallis Handbook of Pest Control
4. Okumura’s Seminars

Name:
Company:
Address:
City/State:
Zip: Phone: ( )
AN OPEN LETTER TO THE EDITOR

dear sirs,

we got bugs, we got bigguns and littluns.
some got hare, some aint. somes a stayin
fer brakfast an thats pissin me off. they
thunk i took em to raze. if you saw how
meny they was, yewd thunk it to.

anyhow, i been a reedin yore newspaper
and you got sum goot stuff in that. i
recognize mse al thee stuf in yore a ritin
bout. facks is, i was a cortin a lass lookd
like miss autumn. leese i was till she
runned off with that harvey hollowell an

anywaz, i was a wantin to rite cuz i had a
ider fer ye. i been thinkin bout them bugs i
got. i tride lots of kyeres. thee wun thet
was werked bess is strate from my farm
her in cedar crossing. wat i dun wuz fil my
matris on my bed with cow pattys. then,
to kep thee criters off un me i dont tak
baths no mor. after 3 days, they dont cum
rond no mor.

ifin you evr nede mor ideers, cum on don
har to my farm in gods countr, ile put ye
up fer a nite, fede ya an weel talk bugs.

yores in bugs,
homer gevers, rt 3, cedar crossing, ga.

QUOTABLE QUOTES

Spiders and webs were the first sticky
traps for insects.” Ken Vick, Ph.D.,
USDA, Gainesville, FL.

“Will DDVP be used in the food indus­
try? It depends on your level of con­
scious.” Mike Glazier, Fairfield America.

“Farmers are more and more being
viewed by the general public as a source
of environmental contamination rather
than stewards of the land.” G. Georghious,
San Antonio, TX, December, 1989.

“At the end of 1988, 504 species showed
resistance to one or more insecticides.” G.
Georghious, San Antonio TX, December,
1989.

“There were 14 cases of low level
resistance to phosphine on Lesser grain
borer in Oklahoma in 1988 and over 40
cases in 1989.” Garrett Cooper, Ph.D.
University of Oklahoma.

Fumigation Service & Supply, Inc.
10540 Jessup Blvd.
Indianapolis, IN 46280-1451
317/846-5444
FAX 317-846-9799

SEMINAR
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