Fumigants & Pheromones

Issue 32

Fall of 1993

A Newsletter for the Insect Control & Pest Management Industry

Public Enemy #1

The Indianmeal Moth

"Start with the insect..."

One insect is found more often than any other in stored food and grain in the United States and Europe. This is the dreaded Indianmeal moth (a.k.a. Miller moth, Mealy moth, Grain moth). This small moth alone is responsible for most of the insect problems associated with the seed, popcorn, natural health food, pet food, and some stored grain products. Let's afford the time to pay respect to this "dirty rat" that spends your money so freely.

This is one of the easiest stored food insects to identify because the adults have a colorful appearance and the larvae leave a silken webbing trail wherever they crawl.

Why has this insect survived man's arsenal so well?

Believe it or not, man is just a minor player in the battle to control this Public Enemy #1. Predacious and parasitic insects are the true enemy of these gangland rivals. Notice how the larvae feverishly toil to spin a protective cover over its food, one silk strand at a time. Not only does this protect its food and create a warm and secure covering, but it also serves as the oviposition (egg laying) spot where the fertile female may lay some of her 350-500 eggs.

Man has thrown chlorinated hydrocarbon compounds (DDT et. al.), fumigants (ethylene dibromide et.al.), organophosphates (Malathion et. al.), *Bacillus thuringiensis* (Bt) and this Insect Gangster acted as if it had a bullet-proof coating.

Resistance

Dr. Larry Zettler of the USDA in Savannah, recently discovered that IMM have become resistant to malathion at an alarming rate. He showed that one strain of IMM is 90,000 fold resistant to this commonly used grain insecticide. Dr. Richard Beeman of the USDA in Kansas showed as far back as 1983 that this insect's resistance to malathion was almost 'fixed' throughout the United States.

As this insect has been able to genetically alter itself, other competitive insects like the Mediterranean flour moth have fallen in importance. R.T. Cotton expressed that the Mediterranean flour moth and not the Indianmeal moth was the predominant moth pest of the milling industry in the 1930's, prior to the development of synthetic insecticides like malathion.

Liv'n on the Land

The Indianmeal moth was originally a grain and seed feeding insect before man came along. It probably came from the 'Cradle of Civilization' and now has spread throughout the world. Many Europeans crack their windows in their homes and businesses. Most don't have screens over the windows. On a recent trip to Germany, I came back to my hotel to find dozens of Indianmeal moths in my room. They were attracted to my pheromone samples. Indianmeal moths in homes throughout Europe seem to be a serious problem.

Man's sloppy habits offer advantages to this pest to survive and flourish. Imagine that we feed our birds in the winter when we start feeling sorry for them. That bird

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ARTICLES IN THIS ISSUE

seed usually gets put in the basement or in the garage, right? Occasionally a little or a lot may spill. We clean it up, but some gets kicked under the freezer or shelves. That's a feast for a 'poor' outdoor forager who is happy to survive on much lower protein grass seed.

Other areas of overwintering are under poorly constructed grain bins, spilled grain down most railroad tracks, and abandoned bird feeders, half-eatened peanuts, or seasonal foods.

Mice play a big part in the survival of the indoor Indianmeal moth. Mice will discover the bird seed or pet food bag and start hoarding this food in a hidden cache. This cache is many times in the attic, hollow walls or other quiet and secure places. Man will discover the telltale signs of this furry pest and place traps or poison baits. When the rodents have been eradicated, the moths move in to the abandoned seed cache without even a thank-you note to the homeowners.

Then in the spring and the homeowner or business sees a few moths fluttering around. A few tiny moths, no problem, 4-6 weeks later this first generation of moths has layed 350 - 500 eggs and those few tiny moths are now a nuisance and quite often a pain-in-the pocket book.

Now, imagine that we have gone through the summer and it's early fall. We are in the fourth generation of Indianmeal moths in our business or home and these little *#><* are really ticking you off. Right? This... is why we call them Public Enemy #1!

Gangsters of Love

Indianmeal moths have a great reproductive capacity and a relatively short life cycle. They can tolerate and resist some synthetic and biological insecticides. They have a strong drive to reproduce and are extremely attracted to their pheromone. They know that they are only going to live for a short time as an adult, so they have a strong drive to reproduce. Even after they become stuck in a pheromone trap, they move to the lure rather than try an escape to the edge of the trap.

Conclusion

The purpose of this article was not to give you the statistics and characterics of this important stored-product pest however; the purpose was to give you an appreciation of an insect enemy that has battled everything that man has thrown at him and not only has survived, but flourishes.

To the victors go the spoils.

An Economic Assessment of Banning Methyl Bromide

Methyl bromide is a widely used fumigant for controlling soil pests and protecting stored commodities. It has been in use since the 1930's. Methyl bromide recently became a concern of a group of nations whose members signed the Montreal Protocol, a treaty to protect the ozone layer. The parties to the Montreal Protocol recently declared that methyl bromide contributes to the depletion of the stratospheric ozone layer with the resulting adverse environmental consequences. Their decision was primarily based on information from an assessment panel and an international workshop. The Montreal Protocol signatories and Environmental Protection Agency have made recent regulatory oriented decisions to restrict the use of methyl bromide.

Cumulative Effects of Phaseout

Crop	Percent MB Used
Tomatoes	35%
Strawberries	15
Peppers	12
Tobacco	10
Ornamentals	10
Grapes	5
Melons	5
Other crops	8
Total	**100%**

source: Walter L. Ferguson Economic Research Service

Decisions to Restrict Use of Methyl Bromide

1. A freeze of level of use: In November 1992, an international treaty was signed that included an agreement to freeze the production and use of methyl bromide to 1991 levels, with exemptions for quarantine and pre-shipment levels. Further action under the Montreal Protocol will be based on upcoming scientific and technology assessments.

2. A ban: The Environmental Protection Agency has initiated action under the Clean Air Act, which will result in a ban of all uses by the year 2000.

METHYL BROMIDE USES

Methyl Bromide is used on 21 crops as a soil fumigant.

The states affected most would be California, Florida, Georgia, North Carolina, and South Carolina.

In 1990, over 80 percent of the 64 million pounds used was for agricultural-related purposes. Uses of methyl bromide for all purposes included:

44-49 million pounds for soil fumigation;

5 million pounds for post-harvest fumigation treatments;

4-9 million pounds for fumigating structures; and 8 million pounds as a chemical intermediate in manufacturing.

Methyl bromide proposal could be costly

Washington, D.C. — The U.S. Department of Agriculture has estimated that U.S. producers and consumers would lose approximately $1.3 billion-$1.5 billion annually if methyl bromide is banned for agricultural purposes.

Use of the chemical may be banned by the year 2000 if a proposal by the Environmental Protection Agency (EPA) goes into effect.

USDA said approximately 64 million pounds of methyl bromide were used in the U.S. in 1990, mostly for agriculture related purposes.

Soil fumigation is the top use, but the chemical is also used to fumigate structures such as grain bins.

Note: The $1.3 - $1.5 billion annually number was derived from the scenario that all exported products that are fumigated would then not be able to be exported. No alternative methods were considered for this assessment. More accurate assessments are underway at this time.

Dave's Soapbox

for what it's worth...

Start with the insect first.

How many times have you heard someone talk about treating an insect problem or a pest problem and the conversation goes something like this?:

'Joe, the Food Sanitarian': "I found these black bugs in the north tower today, what should I do?"

'Don, the chemical salesman': "Well Joe, I've always had good luck with Vapona. Fog it a lil' heavy in your tower tonight. We need to use it up before they take it away from us. If that doesn't work we've got lots of other chemicals that we can fix you up with."

No mention of what the target pest. No mention of what the insects were feeding on. No mention of conditions that may prevent this problem from occurring. Just the old spray-and-kill attitude.

Sometimes it is a hard habit to break. That is, the habit to reach for an insecticide everytime you notice an insect in your facility or your house. Slowly that spray-and-kill mentality is being replaced with a new generation of problem-solvers in the integrated pest control field. It may take a whole generation to move our paradigm to stop thinking that man's purpose on this planet is to conquer nature to one that asks several important questions about the problems before action is prescribed.

How should that conversation gone?

'Joe, the Food Sanitarian': "I found these black bugs in the tower today, what should I do?"

'Paul, the Pest Managing Problem-solver': "Tell me more about the insects you found. What size are they? Do they fly? What were they feeding on? Did they have hard wing covers or soft? What type of mouthparts do they have? Describe the antennae to me.

Joe, what you have there is a common ground beetle. We've been getting alot of calls on that one lately. The adult ground beetle is a predacious insect which hunts for larvae at night. It is attracted to lights at night. Do you leave your lights on in the tower at night? (Yes) Do you have outside lights that shine on the tower at night? (yes) Joe, if possible, turn out those lights at night or filter them with red or yellow plastic filters. I will call you back in a couple of days to see how this method works. In the meantime you can have the cleaning crew vacuum up those dead beetles. I would like for you to send me one next day air so we can be sure what it is. Joe, since this insect lives in the ground most of the year, you may consider a granular insecticide next spring around the perimeter of your building. I will forward some literature and an MSDS sheet on it. Call me if I can be of any further assistance."

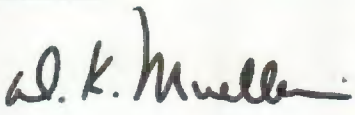
True pest management always starts with identifying the pest(s).

It then proceeds to match the best control methods possible.

The key to effective pest management is to offer conditions that are not favorable for the growth and development of pests.

Examples of this are heat, cold, growth regulators, exclusion, light, darkness, pheromones, enhanced natural predator populations, air movement, color, *and finally the safest and most effective pesticides available...if needed.*

It is important to remember that our job should be to solve pest problems, not just sell chemicals.



Evaluating Multiple Catch Traps

In a recent article in *Pest Control Technology* (August 1993), Bobby Corrigan of Purdue University shared some intriguing and useful results.

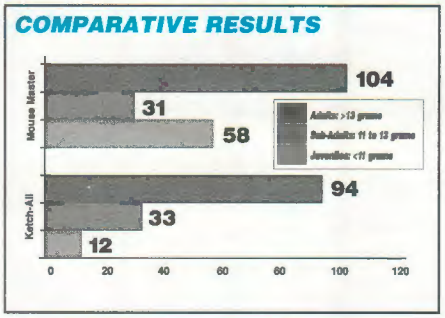
Multiple-catch mouse traps, also called "curiosity traps", are one of the mainstays in the tools used against mice. In fact, in the commercial food and warehousing industry, these traps are the predominant approach to mouse control.

The Mouse Master

The Mouse Master™ Trap (by Micro-Gen of San Antonio) has recently been making significant inroads into the mouse trapping market. The number of traps sold over the past five years has nearly doubled.

Most mice tend to enter these traps as a result of their opportunistic behavior in investigating new harborages.

During 1992, a study was conducted to evaluate the Mouse Master as compared to the industry's standard and most popular wind-up trap, the Ketch-All™. Using Mouse Master as a model, tests were also conducted to determine whether a parallel or perpendicular placement of a wind-up trap has any effect on mouse capture.



Results: Comparative test. The results of the comparative study are presented as totals of the test sites in the above illustration. Overall, the Mouse Master outperformed the Ketch-All in total number of mice captured. The difference is specifically due to the number of juveniles captured by the Mouse Master as compared to the Ketch-All. In fact, of the 193 mice captured by the Mouse Master, the capture rate for juveniles was 30 percent, compared with only 8.3 percent for the Ketch-all.

The difference between the two traps is not related to captures, but rather to

continued on page 4

retention of juvenile mice. It seems the Ketch-All trap allows for just one too many millimeters of space between the catch paddle and the floor of the trap compared to the Mouse Master. The small mice are getting out. The Kness company plans to have this space corrected in 1993 models.

source: Copied in-part from Pest Control Technology, 8/93.

Robert M. Corrigan, Vertebrate Specialist, Purdue.

A Method for Controlling Insect Contamination in a Factory

By Motokazu Hirao
Hirao Biological Institute
1764-147 Kita, Shizuoka 420, JAPAN

This paper was presented at The 1st International Conference on Insect Pests in the Urban Environment, St. John's College, Cambridge, England; June 30 - July 3, 1993.

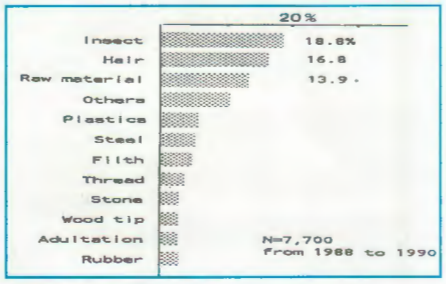


FIGURE 1: Classification if foreign materials contaminated in foods distributed by some supermarket

Abstract- Insects and other arthropods in industrial plants become infested in many kinds of commodities as foreign materials. Some surveys on insect fauna were conducted in 20 factories in Japan's central area from 1988 to 1991 to minimize insect contamination. The data of insect captured by sticky/tape and light traps was used to determine the invasion routes and habitats. 62.8-78.3% of trapped insects by three types of traps were *Psychodidae* (moth flies), *Sciaridae* (fungus gnats), *Chironomidae* (midges) and *Psocoptera* (booklice).

75% of the insects captured were photo-positive insects. They were classified by their invasion routes and habitats to prevent their continuous invasion. In a factory producing sanitary products, only structural improvements have been conducted for seven years. Flying insects have been decreasing and the factory has been operating successfully without any significant problem with insect contamination.

LARGE DEFECT SURVEY

A big supermarket group, which has 2,400 retail stores and produces a business volume of $230 billion, provides a penalty system on manufacturers when supplying unsatisfactory and defective products.

Even with this penalty system, they still received 12,000-15,000 complaints per year from consumers. 63% of it came from foods and 40% of the 63% are food contamination from foreign materials.

Results and Discussion

1.) From 1988 to 1991, 20 factories were investigated with three types of traps. Totally 2,387 sticky traps (roach-type floor traps), 1,015 tape traps (fly ribbon-type) and 100 light traps were used. Totally 12,325 insects and other arthropods were caught by sticky traps; 5,736 by tape traps and 20,440 by light traps.

2.) It is difficult to know quantitatively all of the insects in the plant with three types of traps; however, it is possible to detect an invasion route (determine how the insects come into the plant), habitats and infestation level by relatively simple trapping with three kinds of traps. This data can be applied to develop a control program.

3.) 62.8% to 78.3% of trapped insects are in three families; *Psychodidae, Sciaridae* and *Chironomidae* by sticky traps and tape traps: *Chironomidae, Psocoptera* and *Staphylinidae* by light traps. It can be said that families of invaders and insects in factories are relatively small.

4.) 75% of trapped insects by three types of traps in a factory were photo-positive flying insects, and 17.7% were moth flies from water drainage system.

5.) These insects and other arthropods found in factories can be divided into the following classes according to their mode of infestation.

Class 1 : Insects living and repeating generations in structure

Blattidae (cockroaches), *Pscoptera* (booklice), Collembola (springtails), etc.

Class 2 : Insects crawling through door slit from exterior

Polydesomoidae (millipedes), *Oniscidae* (pill millipedes)

Class 3 : Insects coming from water drainage system

Psychodidae (mothflies)

Class 4 : Insects flying into structure through openings

Sciaridae (dark-winged fungus gnats), *Chironomidae* (midges), Cecidomyiidae (Gall gnats), *Phoridae* (humpbacked flies) etc.

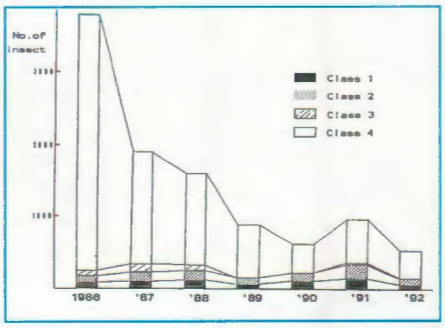


FIGURE 2: Yearly reduction rate of captured Insect in a sanatary product factory

Conclusions:

Since many of the insects captured were photo-positive and captured in a light trap, this shows how important it is to correct structural openings like door and window and window slits, cracks and crevices, air ventilation, and employees entering shipping and receiving areas. To prevent insect invasion, all of the openings should be minimized.

Note: It is important to note, except for the booklice, stored-product insects didn't rank in the top ten most popular insects captured in this study. The saw-toothed grain beetle was thirteenth. Stored-product pheromone traps might have produced different results.

It is also important to note that any insect control program should start with knowing which pests you are dealing with, whether it is in 20 factories and over 2,400 retail stores as in this survey in Japan or one small operation in Indiana. Mr. Hirao shows in this study very clearly that knowing the pest is truly the first step in learning how to control it.

Thank you, Mr. Hirao, for sharing your results.

1st International Conference on Insect Pests in the Urban Environment

St.John's College, Cambridge
30th June - 3rd July 1993

Cambridge - What a setting for an educational conference and even four days of sunshine, too!

When names like Darwin, Pythagoras, Sir Issac Newton, Krick and Watson, Wordsworth, and the great entomologist Wigglesworth are heard in soft spoken conversation while sipping white tea on lawns that look like golf greens you begin to understand the tradition behind this city that is home to over 30 colleges.

The famous St. John's College was the site of this bold attempt at bringing the pest control industry together to share research and ideas. The international organizing committee that included W.H Robinson and Pat Zungoli from the United States were joined by L.F. Baker, C.J. Boase, D.H. DeVries, J.P. Edwards, K.B. Windey,and Secretariat J.C. Wickham of England.

This meeting took over three years to prepare for, but the preparation was obvious down to the last detail. For example, a hardback proceedings from over 40 speakers was provided prior to the meeting!

There were over 340 attendees and 40 spouses for this four day conference. It was heavy on college professors and Dow Elanco representatives but lacked the participation from the many technical directors that were back home in July working hard at their business. There were seventeen countries represented with UK, USA, Germany, The Netherlands, France, Japan, Sweden and Australia making up the majority of attendees.

Proceedings of the 1st International Conference on Insect Pests in the Urban Environment

A limited number of copies of the proceedings are available from THE BOOKSTORE.

This hardback edition has the complete research papers of the speakers and more. Cost $64.00 ea. To order, call 1-317-846-3399.

Population Explosion

15,000 years ago

Man started to live in settlements. He established permanent colonization by planting food and domesticating animals.

9,000-4,000 years ago

The civilizations in Egypt, Mesopotamia, and India flourished.

Great temples were built and grain was grown and stored for future famines.

1801 - 1851 - the population in England/Wales doubles because of the Industrial Revolution. People leave the country to work in the cities. Public transportation allowed people to travel long distances.

Living in an urban area:

Almost two and a half billion people representing 45% of the world's population live in urban areas. One third of the urban population lived in urban slums and shanty towns. Seventy-five percent of all South America's were living in urban areas in 1990. Europe ranked second with a little more than 73% of the population in urban areas.

Largest Urban Cities in the World

Metro./Country	1990 (mill.)	2000 (mill.) (est.)
1. Mexico City, Mexico	20.2	25.6
2. Tokyo, Japan	18.1	19.0
3. Sao Paulo, Brazil	17.4	22.1
4. New York, USA	16.2	16.8
5. Shanghai, China	13.4	17.0
6. Los Angeles, USA	11.9	13.9
7. Calcutta, India	11.8	15.7
8. Buenos Aires, Argentina	11.5	12.9
9. Bombay, India	11.2	15.4
10. Seoul, Korea	11.0	12.7

1990 world population
4.8 billion people

2050 estimated world population
14 billion people

Source: C.J. Watson

The Indianmeal Moth... Fall Alert *(continued from pg 1)*

Fall is the time of the year that the Indianmeal moth knows it is time to prepare for the winter. How does it know...? As the days get shorter, you will see less adult moths. The larvae will start to gorge themselves. Their development will stop at the large (5 - 6 instars) larvae. At this stage they like to wander and spin copious amounts of silk webbing from their lower lip. This is the stage that can tolerate Minnesota and Frankfurt winters. This is the stage that fumigants have such a hard time killing in the fall with summer dosage rates and durations. If you fumigate this overwintering larvae with phosphine and don't extend your duration you can expect survivors. These are the survivors that create resistance for the future (ie. malathion).

Speakers for the Upcoming Conference in Germany

An International Technical Conference and Workshop

Practical Use of Fumigants & Pheromones *December 1-3, 1993*

Prof. Moshe Calderon, Ph.D.
Agriculture Research Organization
Stored Product Insect Research in Israel

Jeffery Brown, Ph.D.
S.C. Johnson & Son, Inc./ USA
Eagles, Otters & Unicorns. Three species of Innovations for the Future of the Pest Control Industry Around the World.

Paul Cogan, Ph.D.
Central Science Laboratory
Slough, UK
Workshop Moderator

Wittko Francke, Ph.D.
University of Hamburg
Principal Aspects in Chemical Communication of Insects

Lothar Benzing, Ph.D.
Detia Freyberg GmbH
Monitoring Phosphine- Fixed Installation/ Portable Instruments

Robert Watson, Ph.D.
NASA, Washington, DC
A Review of the Current Methyl Bromide Issue

Patrick Kelley
Insects Limited, Inc./ USA
Pest Monitoring Software

David K. Mueller, BCE
Program Chairman
Insects Limited, Inc.
USA
A New Method of Using Phosphine in Combination with Heat and CO2

Registration & Reception
June Beasley & Barbara Brookie
Insects Limited, Inc.

John B. Mueller
Fumigation Service & Supply, Inc./ USA
Modified Fumigation Techniques

Jeremiah B. Sullivan, Ph.D.
Sullivan & Associates, Inc./USA
Moderator/ Speaker
Corrosion Management with Phosphine

Savannah Trap

In 1990 Dr. Michael Mullins of the U.S. Department of Agriculture, Stored Product Insect Lab., Savannah, Georgia, unveiled his new insect trap at the Fumigants & Pheromone Technical Seminar in Indianapolis. Mike, a tennis player, developed this trap after examining a can of tennis balls one day. The new Savannah Trap (Flit-Trak M² ™) is now commercially available from Insects Limited, Inc.

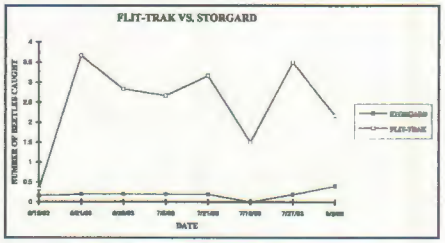
The Trap

The Savannah Trap employs a unique trapping system that takes advantage of the climbing nature of certain stored product beetles (especially flour beetles). The reusable, plastic trap features an inverted, cone-shaped ramp and pitfall reservoir which allows beetles 360 degree access. A sleeve cover resists dust while providing for precise placement of the lure. As beetles move towards the attractant at the top of the plastic ramp, they are attracted to—and eventually drop into—the escape proof pitfall cup. There is no glue used for entrapment. Care should be taken to always look under the cup for beetles. Some find this area ideal for harborage.

The Attractant

There is a synergistic effect to the food oil-based attractant and the pheromone lure. The food attractant also acts as a killing agent by suffocating the insect pests. The food oil will attract other stored-product insects like the saw-toothed grain beetles and various larvae. It has been noticed that female Trogoderma will often lay their eggs on the edge of the trap.

Test Results



Graph by: Angie Richards, Entomologist

The System

The Savannah trap kits includes 2 sets of: five traps, five aggregation pheromones, 10 adsorbent pads and food attractant, for $60.00

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Yellow Jacket Inn

A comparison of three yellow jacket traps and three baits reveals distinct differences among them.

Yellow jackets, which are members of the genus *Vespula*, are a constant problem every summer and fall as a result of their attraction to food, refuse, and water. They frequently appear at picnics, fairs, amusement parks, garbage pails, and swimming areas where they often sting humans. Those who are especially sensitive or allergic to yellow jacket venom may suffer for days or enter into shock and even die.

George O. Poinar Jr., Henry G. Heil, and Thomas A. Hall of California were the investigation research team that evaluated the three different yellow jacket traps and the food attractants.

Day	Sterling Trap	Oak Stump Farm Trap	Yellow Jacket Inn *(Seabright Trap)*
Cost:	$16.-$20.	$13.-$17.	$5.-$9.
1	11	22	24
2	6	17	21
3	4	25	23
4	9	21	28
5*	0	10	8
6*	0	10	9
7	2	13	19
8	6	19	18
9	15	21	
Total	**38**	**152**	**171**
Average per day	4.2	16.9	19.0

* cool and foggy days

FIGURE 1: Yellow jacket caught during trap performance trial

Their story and data was reported in the July, 1993 edition of Pest Management, an excellent publication of the National Pest Control Association.

Day	Liverwurst	Cat Food	Raw Chicken
1	160	55	118
2	110	39	52
3	102	31	81
Total	**372**	**125**	**251**
Average per Day	124	42	84

FIGURE 2: A comparison of food baits that the yellow jacket preferred. (two locations)

New Pheromones Under Development:

Saw-toothed Grain Beetle
Clothes Moth
Tribolium (improved)
Mite traps (storage mites)
Smoky Brown Cockroach

Fall Meeting Calendar:

We hope to see you this fall at one or more of the following educational programs.

Food Safety for Zero Defects
ASI, St. Louis
September 13 & 14

Pests Associated with the Food Industry and Advanced Pest Recognition Course
Mike Holcombe, BCE / 205-355-8104
September 14 - 17, Chicago

Fumigation Update Conference
USDA, Federal Grain Inspection Service
September 16-17, New Orleans

Quebec Pest Control Association
October 15,16, 17
Montreal, Canada

AIB Principles of Food Safety and Hygiene for Food Processors
October 18-20
Engineering for Food Safety
October 21-22
Leatherhead, Surrey, England

60th National Pest Control Conference
Convention & Exhibition
October 24-29. Washington, DC

Association of Operative Millers
October 22-23, District Meeting,
Frankenmuth, MI

Pest Control Technology
Mike Holcombe, BCE
November 16-17, Chicago

****Practical Use of Fumigants & Pheromones***
An International Conference & Workshop
December 1-3, 1993, Lubeck, Germany

Entomological Society of America
National Conference & Exhibition
December 12-16, Indianapolis

Purdue Pest Control Conference
January 4th-8th, 1994 West Lafayette, IN

1994 B&G Pest Control Conferences IPM...Looking Back Into the Future
January 7, San Antonio
January 21, Houston
January 25, Dallas

**we have been invited to be a speaker*

*** we are exhibiting*

If you are looking for a speaker for your conference or training program, contact us for details...*"Have slides–Will travel."*

QUOTABLE QUOTES

"More children die from diarrhea caused by flies each year than through malaria carried by mosquitoes." Dr. Richard Russel, Australia, at Cambridge Conference.

"When we have to be scientists to be businessmen, it becomes harder to believe some of the hokus-pokus methods and ideas in our industry." Don Shaheen, Vice-President, Degesch America, Inc. 1992 Fumigants & Pheromones Technical Conference, Indianapolis.

"For this year's NCAA Final Four men's basketball tournament in Charlotte there were 533,193 applicants for 2,014 general public tickets." NCAA, Shawnee Mission, KS.

Why am I retiring? asked of Dr. Wigglesworth, Professor of Zoology, Cambridge, Applied Entomologist, Author, Age 93; "Because when I get up from my desk to go to the bench, by the time I get to the bench I forget what I went to do."

"Pest management is applied ecology." David Hagstrum Ph.D., USDA Grain Marketing Lab, Manhattan, KS.

NEWSLETTER

Fumigants & Pheromones is published by Fumigation Service & Supply, Inc. and Insects Limited, Inc.for the professional applicator. 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: David K. Mueller, Fumigation Service & Supply, Inc., P.O. Box 40641, Indianapolis, IN 46280.

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