2016 eManual available for download at http://tinyurl.com/q5jxanu (access code:PPMC2016)
Badges
Badges are required for entrance to meeting rooms and the exhibit hall; wear yours at all times.

Local Time
Eastern.

Meeting Space
Anyone wishing to request meeting space can do so at the Conferences Office in Room 116 of Stewart Center.

Exposition
Check out the Memorial Union ballrooms to see what’s new with our pest management industry suppliers.

Cell Phones
Silence phones before entering meeting rooms.

Union Club
Reservations at the Union Club Hotel for the 2017 Pest Management Conference will be accepted when the 2016 conference begins. Reservations are processed on a first-come-first-served basis. The reservations office is open from 8 am to 5 pm Monday through Friday and is located two doors down from the front desk.

Coats
You may want your coat for the Monday group photo which is taken outside (see pg. 14). Stewart Center and the Union are connected by an underground tunnel so you will not need to go outdoors. There are coat racks provided in Loeb and Stewart Center Classrooms.

Parking
Visitor parking is available in the Grant Street Parking Garage ONLY. The maximum daily fee is $10, with hourly rates available. Union Club Hotel guests receive free parking in the Grant Street Garage. For this conference, you will be able to purchase Grant Street parking garage permits for $2/day at registration, while supplies last. Upon entering the parking garage from the Grant Street entrance, pull a ticket to lift the arm and park; the permit you purchase at registration is what you will swipe to exit the garage. Parking overflow will be accommodated in Wood Street Garage (south of the Union on Grant Street). You will need to purchase a permit at the registration desk for $5/day.

Do not park in any other parking garage on campus or in non-metered parking lots. Parking tickets will be issued in these areas.

Welcome to Purdue!
Gary Bennett, Conference Chairman
Progressive Pest Management ~ The Purdue University Pest Management Conference is committed each year to providing the information needed for our industry to move forward. The use of new ideas and technologies promote innovative and environmentally sensitive approaches to pest management. The foundation for progressive pest management is built upon strong programs in continuing education and advanced training. Thus, the Purdue Conference has been designed by an Industry Planning Committee to assist you and your company in meeting these goals.

Thanks and Appreciation for Conference Sponsorship Support

BASF Professional Pest Control
  Monday Evening Reception

Bayer Environmental Science
  Tuesday Exhibit Hall Refreshments

Bell Laboratories
  Speaker: Bobby Corrigan

Cardinal Professional Products
  Speaker: Ed Hosoda

Collins Pest Management
  Speaker: Dan Collins

Copesan
  Speaker: Bennett Jordan

Ensystex
  Tuesday Bed Bug Session

FMC
  Speaker: Jay Bruesch

Indiana Pest Management Association
  Tuesday Afternoon Break

J.T. Eaton Company
  Monday Evening Exhibit Reception
  & Tuesday Evening Alumni Reception

Oldham Chemical Co.
  Tuesday Box Lunches

NPMA
  Speaker: Russ Ives

PCT Magazine/GIE Media
  Conference Advertising

Pest Management Professional/North Coast Media
  Conference Advertising

Plunkett’s Pest Control
  Speaker: Jay Bruesch

Rentokil
  Speaker: Gene White

Residex
  Wednesday Morning Break

Rose Pest Solutions
  Speakers: Dale Hodgson & Mark Sheperdigian

Steritech
  Speaker: Judy Black

Syngenta
  Monday Exhibit Hall ~ Coffee & Refreshments

TruGreen
  Speaker: Bob Avenius

USDA - ARS
  Speaker: Tom “Guy” Shelton

UnivarES
  Conference Messenger Bags

Zoecon
  Tuesday Exhibit Hall Box Lunches

for the Pest Management Industry
Exhibition Schedule

**M O N D A Y**  10am-1pm - Exhibits Open
*Coffee & Refreshments provided by:*

5:00-7:30pm - Exhibit Hall Reception
*Sponsored by:*

**T U E S D A Y**  10:15am-1pm - Exhibits Open
*Complimentary Box Lunches provided by:*

*Refreshments provided by:*

<table>
<thead>
<tr>
<th>Special Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Indiana Pest Management Association Luncheon Meeting</td>
</tr>
<tr>
<td>Pi Chi Omega Dinner Meeting</td>
</tr>
</tbody>
</table>

**Future Conference Dates**

January 9 - 11, 2017
January 8 - 10, 2018
January 7 - 9, 2019

Like us on Facebook!

Check into our event at Purdue Pest Management Conference

Post your conference photos to our page

80 Years of Progressive Education
Purdue Research Poster Display

**Exhibition Schedule**

**Monday**
- 10am-1pm - Exhibits Open
- Coffee & Refreshments provided by:
- 5:00-7:30pm - Exhibit Hall Reception
  Sponsored by:

**Tuesday**
- 10:15am-1pm - Exhibits Open
- Complimentary Box Lunches provided by:
  Refreshments provided by:

---

**Aaron Ashbrook**

**Chlorfenapyr susceptibility monitoring in bed bug (Cimex lectularius L.) Field populations from the United States**

A diagnostic bioassay technique was developed for chlorfenapyr susceptibility monitoring of field collected bed bug populations. Once baseline chlorfenapyr concentrations for a susceptible bed bug strain was determined, 10 field collected bed bug populations were screened for chlorfenapyr susceptibility.

**Dr. Mahsa Fardisi**

**Assessment of insecticide susceptibility levels in field strains of German cockroaches (Blattella germanica L.) collected from public housing**

The main objective of this unique study was using a scientific approach to address the cockroach resistance problem by (1) identifying the most effective insecticides for controlling German cockroach infestation in two low-income multi-housing sites (Danville, IL and Indianapolis, IN), and (2) testing different insecticide deployment strategies at the two housing sites to compare their long term effects on controlling cockroaches and limiting resistance evolution.

**Aaron Myers**

**Silencing and functional characterization of a tergal gland-associated alpha amylase in the German cockroach, Blattella germanica L.**

German cockroach males possess tergal glands that secrete a combination of oligosaccharides, lipids and proteins. Four major proteins occur in the secretion, with one being the 63kDa alpha-amylase “BGTG-1”. Relative expression of BGTG-1 mRNA was determined using quantitative real-time PCR (QRT-PCR). RNA interference (RNAi) was performed to silence BGTG-1 gene expression by injecting BGTG-1 homologous double-stranded RNA (dsRNA) into male cockroaches. Groups injected with BGTG-1 dsRNA showed significantly lower BGTG-1 gene and protein expression compared to controls, which correlated with lower tergal gland amylase activity in BGTG-1 dsRNA treatments. These results connect amylase gene expression and activity in tergal gland tissue.

**Brittany Peterson**

**A metatranscriptomic approach aimed at understanding bacterial roles in the termite holobiont**

Authors: Brittany F. Peterson and Michael E. Scharf

This project is looking at transcriptome level contributions of microbiota in the eastern subterranean termite Reticulitermes flavipes. The broad goal here is to find bacterial genes which are critical for termite biology. These gene products may be stereotypical (cellulases, hemicellulases, etc.) and/or novel contributors to the gut consortium, may help to reveal the roles of the organisms from which they come, and may highlight possible novel targets for pest control.

**Dr. Mike Scharf**

**Termite gut research in the Scharf lab at Purdue**

Research in the Scharf lab focuses on molecular physiology and toxicology of urban pest insects, mainly termites and cockroaches. Our overall goals are to uncover basic information with “real-world” impact to the urban pest management industry. This poster overviews some aspects of our ground-breaking research on the termite gut and what it has taught us about termite biology.

**Dr. Scott Williams**

**Purdue Improved Crop Storage (PICS) bags: Reducing post-harvest losses to improve income and food security on smallholder farms**

Smallholder farmers face considerable challenges in protecting grain from insect pests during storage. The Purdue Improved Crop Storage (PICS) bag is an hermetic storage technology that provides a solution to these challenges. By isolating the grain and its pests in an air-tight container, the bags facilitate an environment that reduces insect damage to grain. The bags are also cheap and flexible, giving farmers equal flexibility on the volumes of grain they store. Now available in over 25 countries throughout Africa and Asia, the PICS program serves as a model for both feasible storage solutions for smallholder farmers and effective supply chain development. Now, PICS looks to expand into new markets that may benefit from this type of storage solution.
Stewart Center

1st Floor

Stewart Newsstand
(mini-mart)
Sun noon-6pm
M-Th 7:30am–7:30pm

2nd Floor

Library Special Collections

Drop Box Locations

Information Room 107

Classrooms

Loeb Playhouse
Fowler Hall
Room 214
Room 218
Room 202
(Tues. Break)

Room 107 - Information
East Foyer - Registration
West Steps - Group Photo
Loeb Foyer - Break Area
Coat Check West Faculty Lounge

Purdue Memorial Union

up 2 flights steps at door entering PMU from Stewart Center or Grant St. Entrance

Sagamore Restaurant
Breakfast
M-F 6:30-10am
Lunch
M-F 11am-1:30pm

Ballrooms - Exhibition Hall & Reception
Boiler Copy Maker
Union Club Hotel

Coat Check
West Faculty Lounge

Women's Rest room
Men's Rest room
Infant Changing Station
ATMs
HC Accessible
Stairs
Telephone

7
Dining at the Union

Ah Z (Sushi & Noodle Soup)  
Flatbreads (sandwiches)  
Freshen's (Healthy Eating)  
LaSalsa Mexican Grill  
Lemongrass (Asian & Sushi)  
Oasis Cafe (coffeehouse/sandwiches)  
Pappy's Sweet Shop (burgers, dogs, ice cream)  
Pick & Mix Salads (Salad Bar)  
Starbucks  
Urban Market/Loops (mini-mart & cereal bar)  
Villa Fresh Italian (pizza, pasta, salad)

- Sun Closed; M-Th 10:30AM-6:30PM
- Sun Closed; M-Th 7:30AM-6:30PM
- Sun 11AM-4PM; M-Th 9AM-7PM
- Sun Closed; M-Th 10:30AM-7PM
- Sun Closed; M-Th 10:30AM-6:30PM
- Sun Closed; M-Th 7:30AM-6PM
- Sun 7:30AM-9PM; M-F 7AM-11PM
- Sun Closed; M-Th 10:30AM-6PM
- Sun 8AM-Midnight; M-Th 7AM-Midnight
- Sun 3-8PM; M-Th 7AM-10PM
- Sun 11AM-10PM; M-Th 10AM-10PM
### Eating Establishments in Close Vicinity

<table>
<thead>
<tr>
<th>Number</th>
<th>Establishment</th>
<th>Food Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mad Mushroom</td>
<td>Pizza *</td>
</tr>
<tr>
<td>2</td>
<td>Harry's Chocolate Shop</td>
<td>Bar - Pub Food</td>
</tr>
<tr>
<td>3</td>
<td>Von's Dough Shack</td>
<td>Calzones *</td>
</tr>
<tr>
<td>4</td>
<td>Jake's Roadhouse</td>
<td>Bar - Pub Food</td>
</tr>
<tr>
<td>5</td>
<td>Hot Box</td>
<td>Pizza *</td>
</tr>
<tr>
<td>6</td>
<td>Discount Den</td>
<td>Mini Mart</td>
</tr>
<tr>
<td>7</td>
<td>Five Guys</td>
<td>Burgers</td>
</tr>
<tr>
<td>8</td>
<td>Where Else?</td>
<td>Nightclub ONLY</td>
</tr>
<tr>
<td>9</td>
<td>Fu Lam</td>
<td>Chinese</td>
</tr>
<tr>
<td>10</td>
<td>Basil Thai &amp; Bubble Tea</td>
<td>Thai</td>
</tr>
<tr>
<td>11</td>
<td>Subway</td>
<td>Sandwiches</td>
</tr>
<tr>
<td>12</td>
<td>Tsunami</td>
<td>Japanese Fusion</td>
</tr>
<tr>
<td>13</td>
<td>Taco Bell</td>
<td>Mexican</td>
</tr>
<tr>
<td>14</td>
<td>Dairy Queen</td>
<td>Sandwiches &amp; Ice Cream</td>
</tr>
<tr>
<td>15</td>
<td>Orange Leaf</td>
<td>Frozen Yogurt</td>
</tr>
<tr>
<td>16</td>
<td>Brother's</td>
<td>Bar ONLY</td>
</tr>
<tr>
<td>17</td>
<td>Fresh Mix</td>
<td>Salads &amp; Smoothies</td>
</tr>
<tr>
<td>18</td>
<td>Potbelly's</td>
<td>Sandwiches</td>
</tr>
<tr>
<td>19</td>
<td>Qdoba</td>
<td>Mexican</td>
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<tr>
<td>20</td>
<td>Einstein Bros.'</td>
<td>Sandwiches</td>
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<tr>
<td>21</td>
<td>Panda Express</td>
<td>Chinese</td>
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<tr>
<td>22</td>
<td>Captain Gyro</td>
<td>Greek</td>
</tr>
<tr>
<td>23</td>
<td>The Egyptian</td>
<td>Middle Eastern &amp; Hooka Bar</td>
</tr>
<tr>
<td>24</td>
<td>Khana Khazana</td>
<td>Indian</td>
</tr>
<tr>
<td>25</td>
<td>Greyhouse Coffee Shop</td>
<td>Cafe</td>
</tr>
<tr>
<td>26</td>
<td>Vienna Espresso Bar</td>
<td>Cafe &amp; Bakery</td>
</tr>
<tr>
<td>27</td>
<td>Food Mart</td>
<td>Mini Mart</td>
</tr>
<tr>
<td>28</td>
<td>Maje Sushi</td>
<td>Sushi</td>
</tr>
<tr>
<td>29</td>
<td>Olive House</td>
<td>Mediterranean Grill</td>
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<tr>
<td>30</td>
<td>Maru Sushi</td>
<td>Sushi</td>
</tr>
<tr>
<td>31</td>
<td>Dawson's House of Chili</td>
<td>Chili</td>
</tr>
<tr>
<td>32</td>
<td>Green Sprout</td>
<td>Sushi &amp; Asian</td>
</tr>
<tr>
<td>33</td>
<td>Fiesta</td>
<td>Mexican</td>
</tr>
<tr>
<td>34</td>
<td>Red Mango</td>
<td>Yogurt &amp; Smoothies</td>
</tr>
<tr>
<td>35</td>
<td>Noodles</td>
<td>Pasta</td>
</tr>
<tr>
<td>36</td>
<td>Chipotle</td>
<td>Mexican</td>
</tr>
<tr>
<td>37</td>
<td>Jimmy John's</td>
<td>Sandwiches *</td>
</tr>
</tbody>
</table>
| 38     | A.J.'s                     | Sandwiches *                   

* DELIVERY AVAILABLE
Tower Center for Urban & Industrial Pest Control

A-Mark Pest Management, Rockville IN; John Abell, Abell Pest Control; Action Pest Control, Evansville IN; Absolute Pest Control, NC; Bayer Environmental Science, Kansas City MO; Clark Pest Control, Covina CA; Kevin Connelly, Chicago IL; Pest Solutions; Dow AgroSciences, Indianapolis IN; ENSystex, Jacksonville NC; Tom Evans, Southern Mill Creek Hall, Circle City Pest Control; Mr. & Mrs. Frank Harder; Mr. & Mrs. Charles Hromada, Germantown TN; Indiana OH; Killroy Pest Control; Gerald Leeb, Chicago IL; Greg Long, Syracuse IN; David Mueller, Insects Limited; National Pest Management Magazine, Cleveland OH; POW Pest Control, Farmersburg IN; Roland Rhodes, Rhodes Chemical Co.; R.S. Steritech, Ontario Canada; Syngenta Professional Products, Wilmington DE; Terminix, Memphis TN; Alfred H. Industries-Div. of Orkin, Parsippany NJ; Rich Williams, Bell Laboratories; Zoeken Professional Products, Schaumburg IL

Benefactor

Greg Augustine, Harbor Pest Control; Jim & Helen Benschoter, Ben-E-Lene Pest Control; Todd Brown, BASF; G.P. Pest Control, Decatur AL; Bobby Corrigan, RMC Pest Management Consulting; Dr. & Mrs. Michael Culy, Dow Hanstra, Lafayette IN; George L. Hutton, Indianapolis IN; Isotech Pest Management, Covina CA; Bob Jackson, Pest Control Association; Dr. & Mrs. Harry B. Moore, Jr., Raleigh NC; Dan Moreland, Strongsville OH; Truly John & Jan Owens, Racine WI; Larry P. Pedigo, Iowa City IA; PicSmart, Phoenix AZ; Pi Chi Omega; Punktets, Fraternity; Chris Turpin, Purdue University; W. B. McCloud & Co., Hoffman Estates IL; John Walton, Arab - Evansville IN

Fellow

Tim Baietto, Quik-Kill Pest Eliminators; Batzner Pest Management, New Berlin WI; Milta Bennett, Purdue University; Forshaw Distribution, Cincinnati OH; Danny Glaze, Arab - Kokomo IN; Ed Hosoda, Cardinal Professional Products; Michael D. Hiesch; O'Donnell's Termite & Pest Control, Quincy IL; Vince Parman Memorial Gift by Julia Parma; Des Moines IA; Varment Guard Environmental Services, Columbus OH; Wil-Kil Pest Control, Menomonee Falls WI

Friend

Ted Bruesch, LiphaTech; Mike & Helen Corbitt, UnivarUSA; Don & Jane Green, Arrow Services; Kathy Heinsohn; Joe Popham, ACCA Exterminating; Kevin Puets, Fowler Pest Control; Janet Shah, Indianapolis IN; Mark Swihart, Pest Control; Jeff Zeigler, Orkin Pest Control

Supporter

Mark Ameling, Professional Pest Management; Richard Belka, PureTech Pest Control; Ronald Bledsoe, Hoosier Inc.; Robert Clemens, Baxter Pest Control; Brian Combs, Combs Pest Control; Pete Daniello, Clean Brands; Dennis Danville; Scott Glaze, Arab - Kokomo IN; David Hall, Indianapolis IN; Bob Hanstra, Reliable Exterminators; Linda Hoemig, Charlie's Spider Fighter; Dana Holman, Pioneer Pest Control; Rob Jackson, Jackson Pest Management; Pest Control; Earl MacLean, American Pest Professionals; Todd Marcum, BBuggs Inc.; Dan McGhiery, Orkin Pest Control; Myers, Forshaw Distributing; Brad Pollert, Service Termite & Pest Control; Arnold Ramsey, FMC; Scott Robb; Orkin; Ray Siegel, POW Pest; David Stewart, Green Lawn Plus; Rob Sutherland, Orkin Pest Control; Terry Taylor; Windler, Windler Pest Control; Kevin Witt, Field Pest Control; Jeremy Word, Arrow Termite & Pest Control
Pest Management - Wall of Honor

1. Arrow Termite & Pest Control; B&G Equipment Co.; BASF Professional Pest Control, Research Triangle Park NC; Corky's Pest Control, Inc.; Ray Crim, Arrow Exterminators; Dewey Pest Control; Judy & Robert Dold, Rose Products; FMC Corporation, Philadelphia PA; Dr. & Mrs. Austin Frishman, AMF Pest Management; Marion County Pest Management Association, West Lafayette IN; H. Russell Ives, Rose Pest Solutions; J.T. Eaton, Twinsburg National Pest Management Association, Fairfax VA; Orkin, Atlanta GA; PCT Magazine/GIE Media, Richfield OH; Rose Pest Solutions, Troy MI; S.C. Johnson & Sons Inc., Racine WI; Harold Stein, Jr., Crane Pest Management; H. Treleven, Sprague Pest Solutions; UnivarUSA, Dallas TX; Western Exterminator Company, California; Western Exterminating Company, IL.

2. Reg & Carrie Campbell, LaPorte IN; J. R. Campbell, Kokomo IN; Dan Collins, Collins Pest Management; Cook's AgroSciences; Mr. & Mrs. David Fincannon, Dallas TX; Griffin Pest Control, Kalamazoo MI; Bob & Phyllis Jackson Pest Management; Dr. & Mrs. Kenneth W. Kirby; Judy & Larry Logan, Indianapolis IN; Minnesota Nolen, Truly Nolen of America Inc.; Okolona Pest Control, Louisville KY; Oldham Chemical Co., Memphis TN; Ridley MN; Syed Shah, Arab Termite & Pest Control; Steritech, Broomfield CO; Steritech, North Carolina; Tom & Jeff; Mark B. Weisburger, White Plains NY; Michael A. Weisburger, White Plains NY.

3. University; Norman O. Besheer, Kansas City MO; Doug Foster, Burt's Pest Control; David Edwards, Noblesville IN; Products; Insect Technologies, Lexington KY; Sandy Lindsey, Lafayette IN; McCloud Services, Chicago, IL; Plan; Residex, Hobart IN; SWAT Pest Management, Evansville IN; Smithereen, Chicago IL; Springer Pest Solutions, Milwaukee WI; Steve & Janet Yaninek, Purdue University.

4. American Pest Management; Gene & Betty Hilger, Orkin Pest Control; Jack Lucas, Fortner Pest Control; Kent, Syracuse IN; John Vermillion, The Bug Man; Scott Wright, Arab - Evansville IN; Joe Zagorski, Affordable

5. Lake Pest Control; Scott Broaddus, Bayer; Harry Bryan, Nisus; Jeff Burkett, Orkin; Kathy Callahan, BBugs;annis Felix, Premier Pest Control; Sarah & Jeff Florey, Arab Termite & Pest Control; Bill Fulton, Terminix of Marian Herndon, K-9 Bed Bug Busters; Laura Hickman, UnivarUSA; David Hilger, Hilger Enterprises; Kent; Wally Jessup, Guaranteed Pest Control; Dave Johnson, AP&G; Tim Kaforke, UnivarUSA; Joe Long, Ace Pest Control; Jeff & Kate McGovern, Palatka FL; Sharon Molter, Protech; Jim Moore, Lake Pest Control; Mark O., Action Pest Control; Tim Runyon, SWAT Pest Control; Ron Scheufler, Bay Exterminating; Ron Schmitt, Mr. Pest Control; Chuck Trowbridge, Ensystex; Scott Underwood, Oldham; Carl Wallin, UnivarUSA; Bob
80th Annual Purdue Pest Management Conference

January 11 - 13, 2016 • West Lafayette, Indiana

2015 Attendance Anniversaries

56 Robert Windler
52 Chuck Haggerty
   Jim Haggerty
51 Robert Dold (Sr.)
46 Gary Bennett
42 Greg Long
41 Marion Hall
   Carl Hinderer
40 Dave Mueller
38 Bobby Corrigan
37 Robert Hanstra
36 Russ Ives
   John Patton
   John Walton
35 Mike Corbitt
   Terry Rosenthal
   Richard Whitman
   John Vermillion
34 Dale Fietzek
   Ralph Hall
   Lizbe Knote
   Kim Mountain
33 Eric Smith
32 Robert Golden
   Joe Popham
31 Tim Kaforke
30 Bill Achramowicz
   Pat Hottel
   Steve Warren
29 Kevin Puetz
   Mark “Shep” Sheperdigian
28 Tim Biatto
   Lynn Frank
   David Lisanby
   Dave Scott
27 Tim Gibb
   Jim Sargent
   Gene White
26 George Saxton
   Gerry Wegner

Greater Than 25 Years

50 Laurin Athey
   Kevin Behrens
   Grzesiek Buczkowski
   Scott Farris
   Brad Harbison
   Dale Hodgson
   Tom Karsies
   Mahmoud Nour
   Scott Robbins
   Darren VanSteenwyk

10 Years

Paul Petri
25 Years

80 Years of Progressive Education
A-MARK PEST MANAGEMENT/ELI LILLY
Kirsten Brichler & Sarah Dietrich

AUSTIN FRISHMAN
Emily Justus & Zachary Webster

BASF PROFESSIONAL PEST CONTROL
Garrett Price

BOB OAKES MEMORIAL/WEISBURGER FAMILY
Heidi Jones

C.C. ALEXANDER MEMORIAL
Mary Rushton

DUANE EDWARDS/ARAB TERMITE & PEST CONTROL
Aaron Myers

GEORGE E. GOULD
Tim Anderson, Ashlyn Burns, Julius Eason, Cecilia Foley, Emma Huffman, Aaron Myers, Lauren Quatroche, Julia Snyder, Sara Stack & Catherine Terrell

GERALD LEEB
Briget Blood

INDIANA PEST MANAGEMENT ASSOCIATION
Kabita Kharel

J. EDWIN SAMETH MEMORIAL
Aaron Ashbrook & Adam Salyer

J.J. DAVIS MEMORIAL
Hannah Quellhorst, Stephanie Russell, Ben Savage, Becca Thomson & Sean Tormoehlen

J.T. EATON & COMPANY
Mathew Dittman

NORM EHLMANN/UNIVAR USA
Zach Goldman, Taylor Nelson

OHER FAMILY
Mathew Dittman

PMP MAGAZINE
Megan McCarty

RHODES FAMILY
Tim Luttermoser

WILLIAM L. BREHM MEMORIAL
Alex Duffy & Brittany Peterson

2015 - 2016

Student Scholarships

for the Pest Management Industry
Monday

EXHIBITS OPEN
BALLROOMS • PURDUE MEMORIAL UNION
10:00 a.m. – 1:00 p.m.  Coffee & Beverages Courtesy of: syngenta

Value Added Session (Optional)
STEW 214

11:30 a.m. – 12:30 p.m.
Live Insect ID + Food Pests
Bennett Jordan, Copesan & Adam Salyer, Purdue University
Techniques and tips for pest ID using live insect specimens, and how to successfully manage these pests.
Indiana CCH credits: 1 each in 3a, 3b, 7a, 7b, 7d, 8, 12 & RT

General Session 1:15-5pm
Loeb Playhouse • Moderator: Gary Bennett

1:00 - 1:15 p.m.
Opening Ceremonies
Gary Bennett, Coordinator and Conference Chair, Purdue University

1:15 - 2:45 p.m.
Managing Problem Pollinating Insects and Odorous House Ant Update
Dale Hodgson, Rose Pest Solutions
Bees, wasps, and other pollinators can be dangerous pests, in addition to their usefulness as pollinators. Managing them will be discussed. An update on odorous house ants will also be given.
Indiana CCH credits: 1.5 each in 7a & RT

2:45 - 3:45 p.m.
Pest Vulnerability Points – Use in Prevention
Jay Bruesch, Plunkett’s Pest Control
Sponsored by FMC
Know your target pest, what its weaknesses are, how to use these weaknesses, and how to quickly and easily spot them.
Indiana CCH credits: 1 each in 7a & RT

3:45 - 4:00 p.m.
Break – Loeb Foyer

4:00 - 5:00 p.m.
New Technologies in IPM FlyBy
Jeff McGovern, The Resource Shop
New technologies available to PMPs, including chemicals, formulations, equipment, non-chemicals, etc., will be presented by representatives of exhibitor companies.
Indiana CCH credits: 1 each in 3a, 3b, 7a, 7b, 8 & RT

5:00 PM  GROUP PHOTO • WEST STEPS – STEWART CENTER
General Evening Session 7:30-9pm
Loeb Playhouse • Moderator: Aaron Ashbrook

7:30 - 9:00 p.m.  Spiders – An Update on Their Importance and Management
Mark Sheperdigian, Rose Pest Control
They are remarkable creatures, but can have serious public health implications, and they can be a real nuisance in and around buildings. Shep will update on spiders and their importance.
Indiana CCH credits: 1.5 each in 7a & RT

Hard Copy Prints of the Group Photo Will No Longer Be Provided
All attendees who registered with an email address for this conference will be sent an email with the group photo attached as a JPEG. If you would like to receive a copy but did not provide an email address with registration, please come by Room 107.
Value Added Session (Optional)
STEW 214 • Moderator: Carrie Campbell

12 noon - 1:00 p.m.

Techniques for Bed Bug and Cockroach Treatments
Dini Miller, Virginia Tech

Bed bugs and German cockroaches continue to be difficult to control. Use of insecticides, application procedures and strategies for conducting treatments continue to need updating.

Indiana CCH credits: 1 each in 7a & RT
**Technical Session**

STEW 214 • Moderator: Phil Nixon

**1:30 to 2:30**

**How Well Do Termiticides Work? – Reach for the 21st Century**
Tom Shelton, USDA ARS
Termiticide testing continues. What are the results of recent evaluations and what does the future hold for different chemistries, formulations, and strategies.

*Indiana CCH credits: 1 each in 7b, 12 & RT*

**Carpenter Ants – A Continuing Structural Pest Problem**
Gene White, Rentokil
Why carpenter ants continue to be a major problem and new strategies for managing this pest.

*Indiana CCH credits: 1 each in 7a, 7b, 7d & RT*

**BREAK 3:30-3:45pm**

STEW 202

**3:45 to 4:45**

**Carpenter Bees – A Pest Problem on the Rise**
Dale Hodgson, Rose Pest Solutions
They are back as a major wood-destroying pest. This topic will address why they are back, and approaches to management.

*Indiana CCH credits: 1 each in 3a, 7a, 7b & RT*

**Sponsored by:**

**Indiana Pest Management Association**

**Concurrent Evening Sessions**

**Speciality Session**

STEW 214 • Moderator: Lee Humberg

**7 to 8**

**Trains, Planes & Fast Food Restaurants**
Jeff McGovern, The Resource Shop
These are difficult places in which to conduct pest management. Tools and techniques will be discussed using case studies.

*Indiana CCH credits: 1 each in 7a & RT*

**Wildlife Update – Pest Problems and Solutions**
Dan Young, USDA Apis Wildlife Services
As urban expansion continues, more and more wildlife is wanting to share space with us. This will be an update on pest problems and solutions.

*Indiana CCH credits: 1 each in 3a, 3b, 7a, 7b & RT*

**Fumigation Session**

STEW 218 • Moderator: Carl Wallin

**7 to 9**

**Fumigation Update**
Ed Hosoda, Cardinal Professional Products
New technologies, chemistries, equipment, and strategies will be covered.

*Indiana CCH credits: 2 each in 7d & RT*
**Wednesday**

General Morning Session 8-11:15am
Loeb Playhouse • Moderator: J.R. Campbell

- **8:00 - 9:00 a.m.**
  **Tick Management Update**
  Mike Dryden, Kansas State University
  Research that is going on in this area will be discussed, and factors affecting IPM programs will be included.
  *Indiana CCH credits: 1 each in 7a & RT*

- **9:00 - 9:30 a.m.**
  **NPMA Update**
  Russ Ives, Rose Pest Solutions
  New technical and training programs, and their use in developing quality IPM programs will be discussed.
  *Indiana CCH credits: .5 each in 7a & RT*

- **9:30 - 9:45 a.m.**
  **Break – Loeb Foyer Sponsored by Residex**

- **9:45 - 11:15 a.m.**
  **Developing a Safety Program for Equipment and Pesticides**
  Fred Whitford, Purdue University & Bob Avenius, Trugreen
  Equipment, as well as pesticides, require special attention so that they can be stored, maintained, and used. Updates on these subjects will be included.
  *Indiana CCH credits: 1.5 each in 3a, 3b, 5, 6, 7a, 7b, 7d, 8 & RT*

**AWARDS & RECOGNITION LUNCHEON**

**Ballrooms • Purdue Memorial Union**

11:30 - 1:00 p.m.  Master of Ceremonies – Tom Turpin

General Afternoon Session 1-3pm
Loeb Playhouse • Moderator: Rich Williams

- **1:00 - 2:00 p.m.**
  **Flea Problems are on the Rise**
  Mike Dryden, Kansas State University
  Problem flea control situations, and their solutions, will be discussed.
  *Indiana CCH credits: 1 each in 7a & RT*

- **2:00 - 3:00 p.m.**
  **Rodent Management Update**
  Bobby Corrigan, RMC Consulting
  Sponsored by Bell Laboratories
  Bobby will discuss health problems in schools associated with rat infestations, and talk about how our extreme weather events have influenced rodents and their management.
  *Indiana CCH credits: 1 each in 7a, 7d & RT*
Information Center
Stewart Center Room 107

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<td>(closed for Awards Luncheon)</td>
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CCH/CEUs

Attendance Forms can be picked up across from the registration windows on Monday from 8:00am - 1:00pm. Forms will be available in Room 107 thereafter.

The CCH/CEU Guide contains all important information about each state’s approval details and submission instructions.

State-specific sign-in rosters or additional paperwork will be available in Room 107; see the CCH/CEU Guide for states requiring additional steps.

Bar Code Scanning will be used to verify attendance for sessions in addition to paperwork. Please complete your attendance forms as instructed. If you want CCH credits for your attendance be sure to scan your bar coded badge at the beginning and end of each session you attend AND turn in your completed paper forms.

Completed paperwork can be turned in at Room 107 or in either of the two drop boxes provided (located outside Room 107 & outside Loeb Theater - see page 6).

Keep the yellow copies for your records and staple any additional forms together before placing them in a dropbox.

Evaluation Forms

Complete an Evaluation Form for a Chance to Win a Prize!
Please complete the Evaluation Form you received at registration and return it to a member of our staff in Room 107.

You could win a copy of Truman’s Scientific Guide valued at $119! The winner will be announced at the Wednesday Awards Luncheon. (You do not need to be present to win).

Attendance Anniversity Sign-In

If you received a letter prior to the conference informing you of an upcoming anniversay for 10 or 25 years of attendance - Please check in at Room 107 so we may have your awards ready at the time of the Luncheon on Wednesday.
The Center for Urban & Industrial Pest Management

is proud to recognize their

Industrial Affiliates

Dow AgroSciences

MGK Insect Control Solutions

syngenta

BASF The Chemical Company

Bayer Environmental Science
Monday

**Live Insect ID (Value Added)** ................................................................. 22
Bennett Jordan, Copesan & Adam Salyer, Purdue University
Indiana CCH credits: 1 each in 3A, 3B, 7A, 7B, 7D, 8, 12 & RT

**Managing Problem Pollinators & Odorous House Ants** ............................ 23
Dale Hodgson, Rose Pest Solutions
Indiana CCH credits: 1.5 each in 7A & RT

**Pest Vulnerability Points – Use in Prevention** ............................................ 27
Jay Bruesch, Plunkett’s Pest Control
Indiana CCH credits: 1 each in 7A & RT

**New Technologies in IPM FlyBy** .............................................................. 32
Jeff McGovern, The Resource Shop
Indiana CCH credits: 1 each in 3A, 3B, 7A, 7B, 8 & RT

**Spiders – An Update on Their Importance and Management** ....................... 33
Mark Sheperdigian, Rose Pest Solutions
Indiana CCH credits: 1.5 each in 7A & RT
Live Insect ID + Food Pests
(Value Added)
Bennett Jordan, Copesan Services, Inc.
Adam Salyer, Purdue University

1. Introduction
   A. Scope and importance stored product pests
   B. Overview of insect orders containing stored product pests
   C. Insect morphology overview with a focus on traits used to separate stored product insects
      i. Antennal types, segments, and terminal features
      ii. Pronotum
      iii. Elytra shape and features
      iv. Tarsal arrangements
      v. Mouthparts
      vi. Wing features

2. Working through pests
   - Each pest will begin with a quiz question based on a scenario in which they might be found
   - 5 minutes will be spent on each of the pests below and will include tips for ID and information on biology, behavior, where they are likely to be found, and management tips.
     Maize weevil
     Rice weevil
     Indian meal moth
     Cigarette beetle
     Drugstore beetle
     Angoumois grain moth
     Red flour beetle
     Confused flour beetle
     Saw-tooth grain beetle
     Warehouse beetle
     Rusty grain beetle

3. Summary of information covered and final quiz questions
Odorous House Ant Update/
Managing Problem Pollinating Insects
Dale Hodgson, BCE
Regional Technical Manager
Rose Pest Solutions

Odorous House Ant (*Tapinoma sessile*)

**OHA Appearance**
- Brown to black in color
- Monomorphic (same size) workers 1/16 - 1/8”
- Antenna 12 segments; no club
- No spine on thorax
- Profile unevenly rounded
- One segmented pedicel
- Pedicel hidden by gaster

**OHA Characteristics**
- Odor when crushed
  - “rotten coconut”
  - “rancid butter”
  - “old vegetable oil”
  - “Murphy’s Oil Soap”
  - And the winner is….. Bleu Cheese!

**OHA Geography**
- Found throughout the US and Southern Canada
  - “Widest geographic range and greatest eco- tolerance of any ant species in North America”
  - *Mallis 10th Edition*

**OHA Characteristics**
- Multiple Queens
- Colonies up to as many as 100,000 usually 2,000- 10,000

**OHA Life Cycle**
- Stage Duration (depending upon environment)
  - Eggs 11-26 days
  - Larvae 13-29 days
  - Pre-pupae 2-3 days
  - Pupae 8-25 days
  - Adults 2-3 years
OHA Behaviors
Colonies are submissive to other species—unless they are the most numerous
Workers will distribute food only to nests in the same trail—will not distribute to nests in other trails—important to consider when baiting
Feed predominately on honeydew but will feed on other insects
Switch between foods fairly often—honeydew is preferred; will tend aphids/scale insects
Known to switch to proteins when opportunity presents itself or if necessary

OHA Behaviors
Reproduce by budding (predominant)
Can also reproduce by male/female mating either in the nest or after a nuptial flight—mating within the nest is more common

OHA Behaviors
Dominate the areas invaded (eventually)
Have shown submissive behavior when numbers are lower to other species—baiting scenarios have an effect; OHA’s “let” the other species have at the bait first until numbers dropped below those of the OHA’s

OHA Behaviors
NPMA Field Guide states that colonies are non-aggressive
Mallis states that colonies are aggressive but nests within the same colony are not aggressive
Workers are a little “oddball” when alarmed:
run around with abdomens up—like an acrobat ant
run in an erratic pattern—like a crazy ant

OHA Nesting
Nests are moved frequently
adverse conditions (chemical/mechanical)
reoccupy previous site if conditions improve

Usually relatively close to moisture/food—not always the case
Numbers of nests fluctuate during the season
Number of nests are dictated by trail length (long trail—more nests; trail use changes during season
Known to live in compound nests—cohabitate with other species

Nest Sites
Leaf litter, logs, boards, landscape timbers
Nests are usually shallow, outdoors—indoor nests have been found often
Nests are interconnected; colony food distribution and worker movement is not distributed only to nests within the same trail—
*important strategy in baiting—bait ‘em all
OHA Management/Control

Use behaviors and characteristics against them
Combination of baiting and use of non-repellants seem to work the best in the field
Critical to have multiple placements and enough bait present to get distributed throughout
Some “tricks of the trade”:
- use baits in combination
- keep baits in constant supply
- use many bait placements
- use non-repellants in combination with baits
- perform several inspections; attempt to locate nests

And now for something completely different……

Pollinators- They’re Everywhere
- The Good- Honey Bees, Bumble Bees, Butterflies, Moths
- The Bad- Carpenter Bees, Wasps, Hornets
- The Ugly- Flies (Midges*, Mosquitoes), Beetles

Honey Bee Issues
- Nest Sites
- Feral Colonies
- Africanized Bees

Bumble Bee Issues

Moths/Butterflies?

Carpenter Bee Issues

Stinging Insects in General

The Ugly-
- Flies (Diptera), Beetles

Honey Bee Issues?

Honey Bee Issues

Honey Bee (Africanized)

Bumble Bee Issues- nest location

Carpenter Bee Issues
Wasp/Hornet Issues

Dipteran Issues
   Not quite a typical scenario

Treatment Options
   Exclusion
      sealing gaps- caulk
      weather stripping
      flashing
      mesh
   Access points- they are everywhere!

Perimeter Treatments
   Do’s and Don’ts…..
Pest Vulnerability: Use in Prevention
Jay Bruesch
Technical Director
Plunkett's Pest Control, Inc.

True or false?
Our clients need us because we have access to stronger pesticides than they do.

Remember your training experience?
ID
Life cycles
  Life stage duration
  Type of metamorphosis
Anatomy
  Mouthparts and digestion
  Antennae and sensory
  Reproduction
Feeding preferences
Pest behavior

Are pests "clever?"
The "wily" roof rat
The "cunning" Norway rat
The "wary" cockroach

Pests choose.
  Harborages
  Food
  Nest locations
  Escape routes

Pests learn.
  Trap shyness
  Bait aversion
  Escape routes
  Feeding trails
  Conditioned behavior

Pests do not think.
  Evaluate
  Consider options outside of current situation
  Plan
  Arrive at decisions affecting later actions
Pests’ choices are conditioned.
  Reward
  Punishment

We can think.
  Plan ahead
  Anticipate problems
  Use knowledge to guide decisions
  Evaluate and adapt
  See the world through the perspective of another

We are not slaves to our conditioning and instincts.
  Pest change from one generation to another, slowly
  We can turn on a dime.

Or are we?
  One pesticide fits all
  Scorch-and-burn mentality
  The baseboard jockey
  The I PM jockey

Back to the basics ... 
  Metamorphosis
  Life cycle
  Life stage duration
  Identification
  Anatomy
  Behavior
  Survival needs (% RH; temperature; food; water; harborage)

Get:
  Truman’s Scientific Guide
  Smith and Whitman NPMA Field Guide

Pests’ abilities are their vulnerabilities ...

Pest vulnerabilities
  Better chance of success
  Less work for us
  Less interruption of our clients’ operations
  Every pest has at least one Achilles’ heel
Your toolkit
- Inspection tools
- Monitoring tools
- PPE
- The label
- Pesticides
- Communication
- Skills And Knowledge

Requirements for survival
- Remove competing food and harborage
- Stress population
- Where to inspect
- Limit the area requiring inspection

Lifecycle
- Time in egg stage?
- Time from egg to adult?
- Type of metamorphosis

Duration of life stages
- Timing of inspections
- Timing of sanitation (maximize benefits of this while minimizing client suffering)
- Timing of treatment
- Timing of follow-up

Behavior
- Placement of baits
- Inspection
- Composition of baits
- Pest as delivery method

Feeding and damage
- Where is the life stage we're after?
- Larvae = found hot spot

Example: German cockroach vulnerabilities
- Nymphs molt 7 times ➔
- Thigmotaxis ➔
- Follow structural guides ➔
- Tropical ➔
- Cannot "smell" food from long distances ➔
- Egg to adult in 2 months ➔
Aggregation pheromones →
It IGR to encourage feeding?
Vertical cracks
Placement of sticky traps
Warmth, water; wood
Place baits in/near daytime harborage
Timing of follow-up; aggressive approach
Inspection

Case study No. 1
Client is producer of dry milk by-products for food processing
Product in bags
Bags on pallets
Pallets stabilized using shrink wrap
Load rejected in Singapore because of SPP infestation

Case study No. 1
1/10" long, brown, 3-segmented antennal club, "nodes" at corners of prothorax
Fungus feeders
Good fliers
Attracted to light
Not usually a stored-product pest

Case study No. 2
Client is large cereal manufacturing facility
Indian-meal moths through WIP warehouse

Case study No. 2
Larva does all the damage
Egg to adult in 2 weeks to 40 weeks, depending on temperature, food availability, etc.
Feeds on grain, milled grain, nuts, candy, etc.
Adults do not eat

Case study No. 3
Client is fluid milk processing plant
Milk in receiving end; fluid milk, cream, butter out in shipping
Separating
Pasteurizing
Bottling
Packaging
New account: Ants are main concern
Case study No. 3
ID
Require warmth
Require moisture
Follow structural lines
Polygynous
Budding
Trophallaxis

Case study No. 4
Client is a dairy drying plant (fluid milk in; powdered cheese and powdered whey out)
Past 15 years: Cigarette beetles in the dryer area an adjacent warehouse
Drying tower was removed 7 years ago; cigarette beetles persist
Numbers peak in June, August; low activity between the two peaks; no activity in winter
Rochester, MN

Case study No. 4
Cigarette beetles fly
Attracted to light
Strong sex pheromone response
Adult in 3 months; longer if cold
Big variety of dietary choices
Live about a month as adults

Conclusion
ID, Bio, Behavior facts are important
Always start with the pest (D. Mueller)
Use your training!
Pest ID skills need constant sharpening
You need an ID backup (staff entomologist. Extension agent)

Jay Bruesch, BCE
Plunkett's Pest Control, Inc.
40 52nd Way NE
Fridley, MN 55421
(877) 571 -7100
jay@plunketts.net
New Technologies in IPM - FlyBy
Officiated by Jeff McGovern, The Resource Shop

New technologies available to PMPs, including chemicals, formulations, equipment, non-chemicals, etc., will be presented by representatives of exhibitor companies.
Spiders
Mark D. Sheperdigian, BCE

Introduction
• Spiders and other arachnids
  o Amazing creatures
  o All about silk
  o Poisonous vs. venomous

• Dangerous or not?
  o Brown Recluse
  o Black widows
  o The hobo spider
  o Yellow sac spider

Spiders as Urban Pests
• Achieving pest status
  o In the home
  o In the work place
  o On buildings

• Common pest spiders
  o Cellar spiders
  o North American house spider
  o Yellow sac spider
  o Orb weavers
  o Funnel web spiders

Managing Spiders
• Hunting spiders
  o Reservoir reduction
  o Exclusion
  o Contact insecticides

• Web building spiders
  o Interior
    ▪ Physical removal
    ▪ Contact insecticides
  o Exterior
    ▪ Physical removal
    ▪ Exterior perimeter treatments
Tuesday

Concurrent Morning Session: Management Session

Sure Fire Training Training ................................................................. 37
Jay Bruesch, Plunkett’s
Indiana CCH credits: 1 each in 7A & RT

Regulatory Update – State & National Activities ................................. 44
Jay Kelley, Office of the Indiana State Chemist
Indiana CCH credits: 1 each in 7A & RT

Concurrent Morning Session: Bed Bug Session

The Science & Practical Importance of Bed Bug Movement .................. 45
Mark Sheperdigian, Rose Pest Solutions
Indiana CCH credits: 1 each in 7A, 7D & RT

Bed Bugs IPM Over the Next 10 Years ............................................. 46
Dini Miller, Virginia Tech
Indiana CCH credits: 1 each in 7A, 7D & RT

Value Added Session

Techniques for Bed Bug and Cockroach Treatments............................... 49
Dini Miller, Virginia Tech
Indiana CCH credits: 1 each in 7A & RT
**Concurrent Afternoon Session:**

**Technical Session**

**How Well Do Termiticides Work? Reach for the 21st Century** .......................... 53
Tom Shelton, USDA ARS
Indiana CCH credits: 1 each in 7B, 12 & RT

**Carpenter Ants** ................................................................................ 56
Gene White, Rentokil
Indiana CCH credits: 1 each in 7A, 7B, 7D & RT

**Carpenter Bees** ................................................................................ 63
Dale Hodgson, Rose Pest Solutions
Indiana CCH credits: 1 each in 7A, 7B & RT

**Concurrent Session:**
Food Pest Management Session

**Latest Research & IPM Strategies in Food Pest Management** ........................ 66
Linda Mason, Purdue University
Indiana CCH credits: 1 each in 7A, 7D & RT

**Impact & Implications of Global Food Safety** ................................. 68
Judy Black, Steritech
Indiana CCH credits: 1 each in 7A, 7D & RT

**Food Pest Management in Unusual Situations** ................................. 69
Dan Collins, Collins Pest Management
Indiana CCH credits: 1 each in 7A, 7D & RT

**Concurrent Evening Session:**
Specialty Session

**Trains, Planes & Fast Food Restaurants** ................................. 70
Jeff McGovern, The Resource Shop
Indiana CCH credits: 1 each in 7A & RT

**Wildlife Update – Pest Problems & Solutions** ................................. 72
Dan Young, USDA Aphis Wildlife Services
Indiana CCH credits: 1 each in 3A, 3B, 7A, 7B & RT
Concurrent Evening Session:
Fumigation Session

Fumigation Update ................................................................. 74

Ed Hosoda, Cardinal Professional Products
Indiana CCH credits: 2 each in 7D & RT
Sure-Fire Training
For An Hour, A Day, A Career
Jay Bruesch, BCE
Plunkett’s Pest Control, Inc.
A Copesan Pest Solutions Partner

Training or Education?
- Education: Facts and values
- May be prerequisite for training
- Training = behavior is changed
- Training requires interaction, doing, using senses
- You need both training and education

The Road Map
- Define business need
- Performance objectives
- Preparation
- Training/content
- Interaction
- Assessment

Business Need
- Situation: Where we are now
- Desired outcome: Where we wish we were
- Rationale: Training will get us there
- Training is not always the answer
  - Lack of tools
  - Poor program
  - Discipline problem

Business Need (Rationale)
- The foundation
- Do this first

Performance Objectives
- What learner will DO or SAY as a result of training
- State criterion for mastery
- Describe conditions
- Verbs- avoid vague statements
- Limited number
- Large number? Break it up
Verbs for Performance Objectives
   ➢ THIS:
      • State...
      • List...
      • Describe...
      • Perform...
      • Explain...

   ➢ NOT THIS:
      • Know
      • Be able to
      • Understand

Conditions for Performance Objectives
   ➢ THIS:
      • A reference resource
      • A situation description
      • A real-world problem
      • A tool or piece of equipment
      • A problem or mishap
      • A question or other cue

Criteria for Mastery
   ➢ "...successfully..."
   ➢ "...to the satisfaction of the instructor..."
   ➢ “… according to (reference standard)..."
   ➢ "...correctly..."

Rationale and Objectives
   ➢ Impossible to screw this up!
   ➢ Most important: Do it.

How Long?
   ➢ 10 minutes
   ➢ 15 minutes
   ➢ 20 minutes
   ➢ 45 minutes
➢ Preparation
➢ Prerequisites
   • OK to assign advance study
   • Reading selections
   • Equipment manual
   • Labels
   • Standards

Content Need to Know? Nice to Know?
➢ Pest ID
➢ Pest bio and behavior
➢ Control tools and techniques
➢ Pesticides
➢ Safety
➢ Regulations
➢ Client relations
➢ Administrative
➢ Selling

Back to your Performance Objectives!

Content Sources
➢ Subject-matter expert
➢ Books
➢ Practical manuals
➢ Industry standards
➢ Regulations
➢ Protocols
➢ Supplied by participants

Presentation
➢ Demonstration
➢ PowerPoint-Lecture
➢ Online
➢ CD-DVD-Video
➢ Reading study/quiz
➢ Roundtable
➢ Peer-to-peer
Presentation
➤ Single-topic event
➤ Training day
  • Training meeting
  • Specialized seminar
➤ Multiple-day
➤ Initial training
➤ Continuing education/training

Assessment
➤ Quiz
➤ License or certification exam
➤ Performance
➤ Contest
➤ Post-training metrics
➤ ➔ Adjust and improve

Back to the Basics
➤ Business need
➤ Performance objectives
➤ Content
➤ Practice
➤ Assessment related to performance objectives

Single Topic
➤ Rationale
➤ Performance objectives
➤ Content: What format?
➤ Practice: How?
➤ Feedback: The sooner, the better
➤ Assessment: Refer back to performance objectives

Training Day: Training Meeting
➤ Multiple short topics
➤ Frequent breaks
➤ Mixed content types
  • Technical
  • Administrative
  • Safety
  • "People" skills
  • Regulatory
  • Selling
  • Pep talk, award achievements
➤ Each topic designed separately
Training Day
  ➢ Lesson plan
  ➢ Checklist:
    • What need
    • Handouts
    • Demonstrations
    • Quizzes
    • Props
    • Prizes
  ➢ What to say
  ➢ What do do and when
  ➢ Why?

Training Day: Keep in Mind:
  ➢ Cell phones/texting
  ➢ Food and beverages
  ➢ The room
  ➢ Adult learner: WIIFM?
  ➢ Cover the route?
  ➢ Notify CSRs
  ➢ Notify clients

Training Day: Specialized Seminar
  ➢ Theory
  ➢ Nuts & Bolts
  ➢ Practice
  ➢ A night and a day?
  ➢ Adequate meeting facilities
  ➢ Good night's rest

Multiple Days
  ➢ Consider stress
  ➢ Keep sessions short
  ➢ Breaks to check on kids, etc.
  ➢ Mix it up
  ➢ Opportunity to foster company cohesiveness
  ➢ Competition
  ➢ Plan for alcohol
  ➢ Socialize
  ➢ End on an upswing
  ➢ End early
Initial Training

- Start with objectives (hard, hard work!)
- List your resources
  - State-sponsored manuals (break it up)
  - Study materials
  - DVDs
  - CD-ROM
  - Demonstrations
  - Pest specimens (your collection, or buy them)
  - Manufacturer-supplied
  - Instructor-led topics and "chalk talks"
  - Quizzes
- Cover all topics
- Plug resources into training needs
- Create a checklist

Initial Training

- Classroom
- Hands-on (OTJ)
- The "teachable moment"
- Checklist
- To employee file

Initial Training: The Classroom

- Quiet
- Lighting
- A/V resources
- Study aids
- Seating
- Desks
- Privacy

Certification Preparation

- ACE
- BCE
- License certification categories
- Master exam
- ServSafe
- Same model: business need/rationale; performance objectives; choose and assemble content; practice; evaluation.
Interaction is the Key
- Lecture plus discussion
- Reading plus worksheet
- Video/DVD plus quiz
- Equipment diagnostics
- Structured roundtable
- Demonstration plus practice
- Study plus game
- Sports metaphor
- "Olympics" or timed competition
- Group vs. group competition
- Case study analysis
- Peer-to-peer

Recognition
Regulatory Update
Jay Kelley
Office of the Indiana State Chemist

1. 2015 enforcement trends
2. 2016 Pest Control Priorities
3. Indiana Pollinator Protection Plan
4. 2015 case review – “The Interesting Stuff”
Bed Bug Movement
Mark D. Sheperdigian, BCE
Rose Pest Solutions

Introduction
- The basics of bed bugs
  - They’re everywhere, they’re everywhere!
  - Development: egg to adult
  - Food sources
- Mechanisms of Dispersal
  - Why go anywhere?
  - Musical chairs
  - Greener pastures
  - Tainted Love

Hitchhiking
- The accidental traveler
  - Hi ho, Hi ho…
  - Homeward bound
- The long ride to nowhere
  - Dead ends
  - On the road again

Curb Your Bed Bug
- Human behavior
  - Just throw out the bed and be done with it
  - Unintended consequences
- Trading Up
  - …a perfectly good couch!

March of the Bed Bugs
- Exploded populations
  - Bed bugs everywhere
- Off to seek their fortune
  - Long range vs short range attractants
- Last chance for gas
  - How far can they go?
What is Realistic in Bed Bug Control for the Next 10 Years?

D. M. Miller, Ph.D.
Virginia Tech

A. Introduction:

Predictions:

We will be able to eliminate bed bugs from single family homes using heat; chemical/non-chemical combination treatment; or fumigation. This is because for single family homes we will very likely have the $$$$$ and client cooperation.

However bed bugs will continue to thrive in multi-unit housing where construction of the facilities allow for bed bug movement; we have no control over resident behavior; and the labor required to inspect and treat leads to costs that are unsustainable.

Our expectations of treatment are complete eradication in an entire building. These expectations are quickly proving to be unrealistic. What we are seeing across the United States is not only an increasing number of infestations, but also the infestations are becoming larger as people cannot afford repeated treatments.

B. Realistic Bed Bug Control in 2016?

We have to decrease the annual costs of bed bug control in multi-unit housing. How do we do this:

- Less unit preparation and more inspection!
- Training of facilities personnel
- Facilities staff inspects and monitors
- Prevent bed bug spread between units.
- Applications of desiccant dusts
- Use of vacuums
- Heat chambers
- Liquid chemical applications
- Bed encasements

C. Training Facilities Personnel (charge by the hour for the training)

1. Bed bug identification
2. How to recognize signs of infestation
3. Hands-on training on how to conduct a quarterly inspection of the top 5 locations:
   - Bed (headboard, mattress seams mattress tag)
   - Whatever seat has the best view of the TV
   - Any wheelchair or scooter chair
o All ceiling-wall junctions
  o All baseboards and faceplates

D. Long Term Prevention (of bed bug spread between units)
  • Desiccant dusts have residual longevity
  • Place around perimeter
  • Resistant strain died in ~36 hours
  • Lasts unchanged in wall voids for years in low humidity

Your company can do the application or your company can teach the facilities personnel how to do it.
If they are HUD they must have applicator certification.
You must know the building construction

E. Bed Bug Monitoring:
  • Sticky traps do not work. Bed bugs are too smart!
  • Pitfall traps are the least expensive (do not give them away!)
  • Do not have to put them under furniture legs
  • Put near the head of the bed
  • Place in each unit and staff inspects previously infested units once a month.
  • Monitors do not work if they are not put out or checked. You put them out and charge by the hour!

F. What we MUST Vacuum!
  • Bed bugs have reduced cuticular penetration type resistance (among other types)
  • Shed skins are thick and protective
  • Small instars hide in the Shed skins of older nymphs
  • Nymphs inside shed skins are protected from chemical treatment

G. Heat Treatment Methods
  • Clothes Dryer
    o No more washing on treatment prep instructions please!!!!!!!!!
    o Dryer only-saves $$$
  • Treat belongings with In a heat chamber
    o Books, shoes, toys, electronics Etc.
  • Whole Home Heat ($800-$1200)
    o Propane or electric.
    o Temperature ~55.5°C, fans turned on to heat items in the room to 50° C.
    o Must Provide this Record

H. Many Good Chemical Products
  • Novel pesticide formulations
    o Temprid (B-cyfluthrin & imidacloprid
    o Transport (Bifenthrin & acetamiprid)
    o Tandam (λ-cyhalothrin & thiomethoxam)
• Bedlam Plus
• Phantom Aerosol
• Others???

I. Consider the future…
What other tools do we have available?
• Heat chambers for furniture and personal items
• Vehicle fumigation with Vikane
• What else?

J. Fumigation for Vehicles
• A market we cannot ignore
• Apartment residents have bed bugs in their cars
• Shelters asking residents to store belongings in their cars
• Residents have homeless relatives that they drive around

K. Resident Training (charge by the hour)
• Must be taught what bed bugs look like
• Imperative for early detection
• Realistic expectations of treatment
• No freaking out!!!

L. Imagine the future where ….
• All of your multi-unit accounts have bed bug issues. No two units are the same.
• Could you see servicing them once a month? Once a quarter? For one or two bugs?
• Does your company have the man-power?
• Are you prepared to provide training?
• How much can you charge per unit over the next 10 years?
• Should you charge by the hour?

Always remember….Free has no value!!! Do not ever give your services away.
Cockroaches: We Have the Tools but They are Still Ahead of Us, Why?

(Value Added)
D. M. Miller, Ph.D.
Professor of Urban Pest Management
Virginia Tech

A. German Cockroach Management: How Your Application Methods Can Improve Your Speed and Efficacy

1. Not all Infestations are the same
   - Today I am speaking specifically about HEAVY, HEAVY infestations.
   - “Multiple Small Placements” Theory does not work in this environment. Takes too long
   - Too much time
   - Contamination
   - Not enough volume

   If you are talking this theory up…You need to get out more!

B. How Do I Support My Lab?

   - The urban program is funded through sponsored research that we do for manufacturers, basically testing products in the laboratory and in the field.
   - Many bait efficacy tests: Advion, Vendetta, MaxForce Magnum, Alpine.
   - Pre-treatment populations are quantified.
   - Baits will be applied and populations will monitored at days 3, 7, 14, 30, 60, to 90 days.

C. Richmond Rehabilitation Housing Authority Established in 1940

   - Gilpin Court Built 1942
   - 11 family housing developments
   - 8 elderly housing developments
   - Now houses 10,000 people
   - 4000 units
   - Mosby Court average resident income $11,000
   - Average length of occupancy 9.4 years
   - Test Site in Richmond (458 units)
     Built 1962
Four and Eight-Plexes: 1-4 Bed Rooms

Conditions of Sanitation
Sanitation at the Site

Lots of treatment over the years…

D. Current Pest Control Contract

- Richmond pays $2478 for quarterly treatment
- Treating 458 units working 8 hours a day for one week
- They are using 1 technician only
- 92 per day
- 12 units every hour
- 5 minutes per unit (including walking between units, opening doors, breaks etc.)
- Technician does not have the time to put out enough bait at $6.00/door
- All but two of our 36 original test units are reported as not having cockroaches

E. Pre-Trapping Apartments

- Placed three sticky traps in each unit for 24 hours
- Above the sink
- Below the sink
- Behind the toilet
- Returned the next day to pick up the traps and count the cockroaches

F. Apartment Selection

- We trapped 8,186 (April 29th) cockroaches in 83 units
- We selected 40 units for tests
- Each formulation (and controls) would be tested in 6 units
- For statistical replication each formulation must be used in two different buildings
- No building could have more than one bait

Average 24 hour trap catch per selected unit was 200 (greatest average of my career)

G. Pre-test Trapping: Petersburg

- Truly a career high
- Average 463 cockroaches per unit
- Pre-trapping took place in August
Back in Richmond…

- We pre-trap again the same units and some additional
- Our original trap counts have now doubled. Our average unit now produces 464 cockroaches in 24 h.
- What did they get for $2,478???
- Double their number of cockroaches!!!

H. Test Products:

- Advion (indoxacarb 0.6%)
- MaxForce Magnum (Fipronil 0.05%)
- 3 Experimental formulations of indoxacarb (0.6%)
- Alpine (Dinotefuran 0.5%)
- Controls

I. Treatment Begins

- All units receive an initial application of 30 grams. Additional bait at 14 days.
- Our problem is finding places to apply all of this bait in crowded units
- How do we get all of this bait out?

J. Applying Tubes of Bait Quickly

- The Bait Burrito
- Cockroaches like the Burritos
- Cockroach Cannoli

K. No More Whining About Competing Food Sources!

L. Baiting Protocol

- All units received 30 g of bait on Day 1
- On Day 14 units trap catch was evaluated for each unit and bait was applied according to infestation level
- Trap catch >500 received 60 g
- Trap catch >100 received 30 g
- Trap catch 50-100 received 15 g
- Trap catch < 50 received 7 g
- Trap catch <10 receive 0 g
M. Results and Impact of Trapping

- In Richmond- trapping in April removed 8,186 cockroaches. Trapping for test in July over 60 days (6 times) removed >37,000 cockroaches from 36 units (1032/unit) over 60 days. Total of 47,608 cockroaches.
- In Petersburg (August) we have trapped out 45,739 (1270/unit) in 30 days. Why the difference?

N. Costs: How Fast Can You Get in the Door?

- Time Spent (1.00/Min)
- Impact of Trapping
- In Richmond- trapping in April removed 8,186 cockroaches. Trapping for test in July over 60 days (6 times) removed >37,000 cockroaches from 36 units (1032/unit) over 60 days. Total of 47,608 cockroaches.
- In Petersburg (August) we have trapped out 45,739 (1270/unit) in 30 days. Why the difference?

O. Conclusions

- All baits worked very well.
- Previous failures to reduce the population were not due to bait failure but lack of quantity.
- Needed to use burritos and canollis to get enough bait out.
- Conclusions (but not done yet)
- Required an average of 50 g per unit (2 applications) to get the reductions we observed
- Average application rate was 10 minutes to apply 20 g in a unit.
- Average PCO cost would $15-18 per unit to get bad units under control
- January start would reduce cost
How Well Do Termiticides Work? – Reach for the 21st Century

Thomas Guy Shelton
USDA Forest Service – Forest Products Laboratory
Starkville, MS

Abstract:

The USDA Forest Service has had an interest in termite and other wood destroying organism biology and control research since the early 1930’s. Beginning just prior to U.S. involvement in the Second World War, the FS termite project has investigated the efficacy of termiticidal compounds for the protection of wooden structures and shipping materials. These efforts have continued, and at present provide the efficacy data required by EPA for the federal registration of candidate termiticides. While it is obvious why this data is needed, it isn’t always obvious how it is done, or the eventual outcomes. The new termiticide products may require more customer education about their use compared with the previous generations of termiticides.

Body:

I. History

   a. Origins

   b. Termiticide testing and the military

   c. Methods development (fast, consistent and credible)

      1. Ground board

      2. Stake

      3. Concrete slab

      4. The Gulfport Scale

   d. Moving to Starkville and starting over

   e. Becoming part of the Forest Products Laboratory

      1. Additional science and technical staff

   f. Testing locations, historically and currently
II. Methods
   a. Ground board
   b. Concrete slab
   c. Other testing methods

III. Regulation of termiticides
   a. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
   b. Environmental Protection Agency
      1. Office of Prevention, Pesticides and Toxic Substances (OPPTS) 810.3600
   c. State Lead Agencies and Association of Structural Pest Control Regulatory Officials (ASPCRO).
   d. Understanding standards
      1. EPA vs. State-level termiticide standards

IV. Termiticide transfer
   a. Alteration of plot layouts

V. The annual termiticide report
   a. Examples from current dataset

VI. Do termiticides work?
   a. While correct application is key to success with these product, education is equally important
      b. Customer education on expectations of control and the importance of inspections should be part of every conversation with new clients

Conclusions:

I. The process of registering termiticides is a long process and can be difficult for companies seeking to enter the market immediately. Most of the products entering the testing program never come to market. Once registered and available for use, the efficacy data used to register these products are available in an annual report from the FS in a pest management trade journal.
II. The bottom line is that there are products that can meet the five years of 100% control EPA standard. Soil-applied termiticides are not the only tools available for termite control. All control methods have benefits and risks associated with them, it is important to understand these characteristics to aid customers in choosing appropriate control or prevention methods.

III. The need for customer education never goes away. The importance of inspections and the expectations of control (nothing lasts forever) are important discussions to have with new clients. Customers must understand their role in a successful control program.
Carpenter Ants: Let’s Nail Them!
Gene White, BCE

Taxonomy and Natural History of Hymenoptera

Order *Hymenoptera:

** Hymenoptera: hymeno, god of marriage (referring to the union of front and hind wings)

♀ Number of Hymenopteran species of the world: ______________
  o Coleoptera (beetles) @ 300,000
  o Diptera (flies) @ 120,000
  o Lepidoptera (butterflies and moths) @ 112,000
♀ Number of known Hymenoptera species north of Mexico: _________
  o Coleoptera @ 23,701
  o Diptera @ 18,200

Basic Taxonomy

♀ Suborder Symphyta
  o Sawflies, Horntails and other Wood wasps
♀ Suborder Apocrita
  o Solitary and social wasps
  o Solitary and social bees
  o _________

General Characteristics of Hymenoptera

♀ Less than .5 mm to greater than 40 mm in length
♀ 2 pair of wings with few veins
♀ Hindwing _____________ than the forewing
♀ Hindwing has a row of tiny hooks on the anterior margin which attach to a fold on the posterior margin of the forewing called hamuli
♀ Mouthparts mandibulate (_______________)
♀ Labium and maxillae in some (especially bees) form a tongue like structure through which liquid food is taken
♀ Antennae usually 10 or more segments and mostly filiform (straight) or geniculate (elbowed)
♀ Tarsi usually 5 segmented
Well developed ovipositor sometimes modified into a **sting** (females only) and functions as a weapon of offense and defense.

**Larva Characteristics**

- White legless, nearly featureless and grublike or maggotlike, except for the Symphyta;
- Symphyta larvae resemble Lepidopteran caterpillars, but have more than five pairs of prolegs lacking crotchets.

---

**Identification and Biology of Carpenter Ants**

**Identification of Carpenter Ants**

- Pedicel 1-segmented
- Profile of the thorax is evenly rounded and lacking spines
- 12 segmented antennae (no club)
- Gaster with anal opening surrounded by circle of hairs
- Color: black, red, black & red, brown

---

**Specimen # 2**

*Carpenter Ant Camponotus spp.*

- Evenly rounded thorax
- Circle of hairs

**Size:** 1/8-1/2 in.  
3.5-13 mm
Life Cycle of Hymenoptera

- Holometabola (complete)
- Egg
- Larva
- __________
- Adult

Social Behavior

- Cooperative brood care
- Reproductive division of labor
- Overlap of generations

Castes

- Basically two castes:
  - Reproductives
    - __________
    - Males
  - Workers (Major & Minor):
    - Monomorphic - one size
    - Dimorphic - two sizes
    - ___________________ - more than two sizes (carpenter ants)

Stages of Colony Growth

- Founding stage
- Ergonomic stage
- ________________ stage

Founding Stage

- Begins with Nuptial flight
  - Mating in C-ants occurs on the wing... Yeeee Haaaaa!!!
    - Foundation by multiple queens: pleometrosis (not in carpenter ants)
    - Foundation by a single queen: haplometrosis (carpenter ants)
- Nest formation in C-ants is ____________:
  - ____________ seals herself into a chamber until the first brood is mature
- Nest in wood with a moisture content of a minimum _____ %
**Ergonomic Stage**

- Activities are exclusively concerned with work devoted to colony **growth**
- Colony dispersal and reproduction does not occur at this stage
- Colony size
  - Colony members are usually over ______________________________
  - May have as many as __________ to __________ workers

**Reproductive Stage**

- Period ranges from 1 to 5 years, usually 3-5 in C-Ants
- Sexual forms start new colonies

**Independent Colony Formation by Winged Reproductives**

- Swarming at various times of year by winged reproductive males and females:
  - “Swarmers”
  - Reproductives
  - ____________________

**Food Gathering**

- Predators (carnivores)
- Harvesters and Fungus Growers (herbivores)
- Omnivores (______________________________)

**Food Preferences**

- Liquid and semi-liquid foods are ingested by mature ants then fed to larvae and sister workers
- Solid foods are taken to the nest site and fed to ant larvae which masticate and return feed worker adults
  - ____________________

**Food Preferences**

- Common foods for adult carpenter ants:
  - Sweets
  - Meats
  - Plant juices
  - Grease
  - Insects
  - Honeydew

* Individuals may forage up to _______ yards from the nest.
Pheromones & Social Behavior
- Alarm signals
- Recruitment
- Caste functions
- Slavery
- Altruism
- Communication

Communication
- Chemical (pheromones)
- Tactile
- Visual
- Sound (vibration & mandible clicking)

Defense
- Weaponry (formic acid in carpenter ants)
- Crypsis (camouflage; none in C-ants)
- Mimicry (none in C-ants)
- Mullerian (warning coloration; possibly in C-ants)
- Batesian (scare tactics; making one’s self look larger in C-ants)

Inspection / Identification / Monitoring

Inspection / Monitoring
- Inspection is the catalyst or driving force behind everything we do as professionals!

Why Focus on Inspection?
- Ultimately saves time / money
- Offers a clearer solution to the problem
- Establishes a ______________ between company and client
- Allows for Assessment of:
  - Pest ID / Biology
  - ______________________
  - Choice of PM Methods and Techniques
  - Choice of Pesticides
  - Client Tolerance
Where to Look for C-Ants?

szedł Away from the structure
szed ——
szedł Inside the structure
szed All three!!

Specifically Where to Look for C-ants

せず A place where moisture is, or has been a problem as far back as the home is old...
せず Places where moisture is easily accessible to a queen C-ant
せず ———
せず Usually in wood, but not always...

Even More Specific Places to Look for C-ants

せず Outside
せず Trees
せず Railroad or landscape timbers
せず Out buildings
せず Inside siding, ———, insulation and wood frames of walls
せず Roof edges, gutter board, rafters and panels
せず Window framing, especially door-wall construction
せず Behind shutters
せず In columns or porch posts
せず Sill, header board, joists, flooring
せず Voids behind ———, cabinetry, fireplaces, false beams, etc.

Carpenter Ant Behavior

せず Usually nest in wood that is in decay
せず Workers will forage up to ——— ft. Away from the main colony
せず Peak activity is from 10pm to 2am, but begin activities at dusk
せず C-ants will establish satellite colonies
せず Workers typically follow natural or man made construction lines
せず Cooperative Brood Care
せず Reproductive Division of Labor
せず ——— Pheromones
せず Foraging workers feed the entire colony
Questions we should ask ourselves during C-ant evaluation

1. How long has the problem occurred?
2. What has the client observed in regards to ant activity?
3. What can the client tell me about the history of the structure? Water problems... etc.
4. Is the nest located on the clients’ property?
5. In locating the nest, is it away from, on or inside the structure?
6. Are swarmer (winged reproductives) present?
7. What time of year is it? January, March, June, etc.
8. Can I reach the colony with conventional insecticides or can I use baits or both?
9. What can the client do to help eliminate the problem?
10. Has the client used a service before us, or have they made attempts to treat the problem themselves?

Treatment Strategies

- Exterior treatments
  - ____________ or ____________ immigrating colonies
- Interior treatment of baits
  - Baits in general will consistently eliminate colonies
  - Difficult or large colonies may take a lot of bait and time
  - ALWAYS identify the ant, some require more care than others (Pharaoh ant, Argentine ants)

How Ant Behavior Relates to Control

- Cooperative Brood Care
  - Most of the ants are in the nest
- Reproductive Division of Labor
  - Only queens reproduce, little chance of genetic resistance
- Trail Pheromones
  - Ants give you direct information as to proper bait placement
- Communal Food Gathering
  - Foraging workers feed the entire colony
Carpenter Bees
Dale Hodgson, BCE
Regional Technical Manager
Rose Pest Solutions

Carpenter Bee
The Main Players

Eastern *(Xylocopa virginica)*
Eastern Distribution

Western or California *(Xylocopa californica)*
Western Distribution

Southern *(Xylocopa micans)*- This one not really considered a structural pest
Southern Distribution

Valley *(Xylocopa varipuncta)*
Valley Distribution

Mountain *(Xylocopa tabaniformis)*
Mountain Distribution- Foothills and mountains of Arizona, California, Nevada, and Oregon

General Characteristics

Telling the boys apart from the girls-

<table>
<thead>
<tr>
<th>Body Part</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antennae Segments</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Spines on tip of tibia</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Exposed abdominal segments</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

And one more important boy/girl thing
Males do not have stingers – they will hover and go into “attack mode”; but, they are faking…..

Females do have a stinger but sting very rarely

General Characteristics
½”- 1” long
Thick body
  Resembles a bumble bee but abdomen is smooth and shiny

Socialization
  Not a social insect– do not live in nests or colonies
    *some galleries may be close together

Biology/Behavior
  Adults overwinter in abandoned gallery tunnels (Eastern)
  In Spring adults emerge and begin feeding on nectar as well as pollinating

Nest construction
  Bore 3/8” hole into wood; makes a 90 degree turn and runs with the wood grain about 4-6”
  Galleries used by several bees may be 10 feet long
  Galleries are reused or new gallery branches off single entrance hole
  Additional galleries excavated above and below
  Prefers weathered, unpainted wood
    Eastern- Hardwoods, Cedars, Structural Pines– the most damaging carpenter bee in NA
    Western (California)- Incense Cedar, Redwoods
    Mountain– Structural timbers

Gallery Layout
  Each cell provisioned with one egg, bee bread
  Cell closed off with wood plug
  1 cell is produced per day totaling 5-6 cells

Developmental time is around 36 days except for the Mountain CB; developmental time is 84-99 days

While the female is doing all of this the males are out chest thumping…

Damage

Damage and a Bonus

Control
  Treatment Do’s and Don’ts
    Direct Contact
    Residual (borates, other materials)
Trapping?

Damage Control
  Paint
  Repair
  Replace
Latest Research and IPM Strategies in Food Pest Management
Linda Mason
Associate Dean Graduate School and Professor of Entomology
Purdue University

Summary: Although techniques to store food from the farm gate through to the completed product, free from pesticides residues and pests. The federal government is reviewing all pesticides and demands data to justify keeping certain pests or sites on the label. If conditions are not met, then a site or pest is removed, for management options. Research labs, whether private or public, are aggressively looking for ways to merge these two demands, especially with arising issues of global food security. New technologies that are being advanced are targeting control strategies that will meet that demand. These include such things as temperature modification, residual and fumigant designs and packaging, which are attempting to address the risk of emerging pests, pesticide resistance and consumer demands.

Research Updates
Farm Gate through Consumption – Basic Biology to Applied Controls
Research at the outer limits

Biological Controls

Bacterial pathogens

Fungal pathogens

Botanicals and natural products

Rapid Molecular Diagnosis
Threats to successful control

Pest Resistance

Registration and compound compatibility

Invasion and Establishment of Pests

Population shifts due to climate change

Biodegradable packaging and changes in sensitivity to infestation

Importance of Sanitation

Pull it all together to get IPM
Impacts and Implications of Global Food Safety

Judy Black
Steritech, A Rentokil Company

ABSTRACT
Food is exported and imported today in many countries at never before seen levels. Food safety incidents caused by these imported/exported products have caused some international agreements to be created to help limit them. Several years ago the Global Food Safety Initiative (GFSI) gave the pest management industry a hint of what was to come in the future. However, initial slow adoption of these auditing schemes in the food processing industry allowed for the pest management industry to somewhat ignore these schemes. Today, GFSI-style schemes are the norm. While regulations and trends in other countries are not rules we have to follow in the United States, they can be an important predictor of future realities.

I. Food Safety Around the World
a. Incidents
b. Government actions

II. Global Food Safety Initiative (GFSI) Audit Schemes
a. Structure of the initiative
b. Various audit schemes

III. Pest Management Trends in Other Countries
a. Rodenticides
b. Glue boards
c. Other

IV. By the end of this training you will be able to:
   a. Name some of the international agreements that impact food processors who export/import
   b. Articulate your understanding of GFSI audit schemes to food processing clients
   c. Describe some of the pest management trends in other parts of the world
Food Pest Management in Unusual Situations
Dan Collins
Collins Pest Management, Inc.

Summary

Food grade pest management programs must be pro-active to protect end consumers and our client’s brands. Moreover, pro-active pest management programs should be designed to meet regulatory standards such as the Food Safety and Modernization Act (FSMA). Ongoing risk assessments, corrective action/preventive action (CAPA) and root cause analysis are critical components of a pro-active pest management system.

With this said, food pest management oftentimes requires “outside-the-box” thinking when it comes to solving tough, engrained pest populations. Every food plant has its own unique challenges and, for the most part, these challenges can be overcome through non-chemical measures such as sanitation, exclusion, habitat modification and employee-behavior modifications.

This presentation will provide a science-based approach to developing an inspection-based, pro-active pest management program and examine real-world case studies that solved or significantly reduced difficult pest issues in the food manufacturing environment.

Inspections

1) Inspections should be a systematic process

2) Risk assessments and their implementation

3) Corrective Action/Preventive Action

Case Studies

- Rodents
- Stored Product Insects
- Small Flies
- Cockroaches
Assess and Evaluate

For many years the pest control industry has offered “free” inspections. These take time and money to perform and frankly devalue an important part of the pest control process. What we need is thorough investigation.

The terms “assess” and “evaluate” more accurately convey the purpose of the initial onsite visit. Our efforts need to be focused and documentation accurate in order for the client and PMP to make informed decisions about pest control services. Technology has given us new tools to assist us in serving our clients and proving our value and benefit to them.

Assess

Let’s take a look at the word—ASSESS and see how it can help us remember the elements critical to the success of our work. Those elements are represented by the letter S used four times in the word itself. When interviewing a client, investigating, and then mapping the site, the four “S”s keep us on track.

S – Sightings of the pests themselves.
S – Signs of the presence of pests.
S - Sounds caused by pests moving around or the sounds they make themselves.
S – Smells caused by the pest or their preferred harborage.

Identifying the locations of these four elements and notating them onto a site map will help resolve the problems faster.

The Five Primary Processes

Heat
Cold
Fumigation or “Fume”
Chemical
Mechanical

It is important to remember that management is not achieved through reliance on a single method. Proper management is achieved by creating a process of layers using combinations of these 5 methods.
The 12 Key Factors of Pest Control

The resources anything needs to be a pest.

- Access – A way in
- Food – Something to eat
- Water – Something to drink
- Harborage - A place to live

Where to find the pests and their resources

- Underneath - Look under
- Around – Look around both sides
- Behind – Look behind
- On top of – Look on top

How to get rid of pests and prevent them from becoming an infestation

- Cleaning – Remove the visible dirt
- Sanitation – Remove the dirt you can’t see
- Maintenance – Keep facility and equipment repaired and running properly
- Product Rotation – First in first out

The twelve key factors represent the baseline of any pest control process as well as the keys to your success.

Jeff McGovern
The Pest Coach
Jeff McGovern Pest Management Consulting
(770) 331-4348
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Abstract
As human populations continue to expand, so do human-wildlife conflicts. Maintaining a balance between wildlife populations and the ever changing human environment is essential to ensuring human health and safety as well as minimizing future conflict. Across the U.S., migratory birds often present unique challenges to the wildlife management professional (WMP). The management of migratory birds requires additional steps associated with federal and state permitting, that if overlooked, could present the WMP with legal consequences. Having the ability to incorporate a number of techniques to resolve the issue will not only increase your success rate, it can aid in obtaining permits. This presentation will cover the USFWS permit process as well as general management decisions to consider when dealing with migratory birds.

I. Migratory Bird Treaty Act
   A. History
   B. Why Important
   C. Restrictions
   D. Exemptions

II. USFWS Permit Process and WMP Role
   A. Property owner responsibilities
      1. Actions required prior to permit issued
      2. Things to know before applying
   B. Costs and timelines
   C. State specific permits

III. So, Someone has a Migratory Bird Issue
   A. Determine if this is something you are capable of resolving
      1. Experience in dealing with birds
      2. Techniques you are comfortable utilizing
      3. Knowing your limitations
   B. Assess Situation: Determine the Species and Associated Damages
      1. Discussion with the property owner
      2. Site inspection
   C. Determine Management Strategy
      1. Biological, environmental, social, cultural factors
      2. Available expertise, legality, cost, effectiveness
   D. Provide Service
      1. Technical assistance
      2. Direct management
IV. Examples and Emerging Issues
   A. Woodpeckers
   B. Red-tailed Hawks
   C. Black Vultures
Abstract

For many years the fumigation industry has remained status quo, but since the phaseout of methyl bromide began in the year 2000, we have seen many significant changes. In 2001, cylinderized phosphine fumigants (ECO\textsubscript{2}FUME\textsuperscript{®} and VAPORPH\textsubscript{3}OS\textsuperscript{®}) were registered in the US, followed by the registration of ProFume\textsuperscript{®} in 2004. As we progressed through the reregistration of methyl bromide, EPA indicated that there will be many changes in the label instructions with the rest of the fumigants as well, meaning that all fumigants will likely require intense worker safety monitoring and buffer zone restrictions during the fumigation process. Other industry challenges include finding quarantine treatment schedules for the available fumigants that offer similar control (Probit 9) to methyl bromide; finding ways to overcome phosphine resistance to several stored product insects in the US; registering and effectively using some of the new potential fumigants being researched; and properly stewarding all fumigant products, to make sure we minimize the risks associated with these important products. Sulfuryl fluoride for residential fumigation will be going through some additional regulatory changes in 2016 especially after two serious misapplications that were highly publicized in 2015.

1. Fumigants currently registered
   a. Methyl bromide
   b. Sulfuryl fluoride
   c. Metal phosphides, aluminum and magnesium
   d. Cylinderized phosphine, ECO\textsubscript{2}FUME\textsuperscript{®} and VAPORPH\textsubscript{3}OS\textsuperscript{®}
   e. Propylene oxide
   f. Carbon dioxide

2. Use patterns for each fumigant
   a. The new methyl bromide label and requirements
      i. Critical Use Exemptions (CUE)
      ii. Quarantine and Pre-Shipmen t Uses (QPS)
      iii. Replacing methyl bromide for quarantine treatments, both export and import
   b. Post-harvest and residential uses of sulfuryl fluoride, how they are used
c. Metal phosphide fumigants, choosing the right product, whether it’s aluminum or magnesium phosphide or pre-packaged fumigants.
   i. Introducing the Degesch SpeedBox™

d. How cylinderized phosphine fumigants are used in the US and worldwide

e. Propylene oxide as a sterilant, and the recent insecticide use label

f. Using carbon dioxide for organic treatments…a growing market

3. Pros and cons of each fumigant
   a. Pros and cons of sulfuryl fluoride
   b. Pros and cons of metal phosphide fumigants
   c. Pros and cons of cylinderized phosphine
   d. Pros and cons of propylene oxide
   e. Pros and cons of carbon dioxide
   f. Using this information to choose the right fumigant for a specific job

4. Phosphine resistance
   a. History of phosphine resistance in the US and worldwide
   b. Recent publications on phosphine resistance, Opit et al
   c. How to manage phosphine resistance
      i. Finding the “sweetspot”
   d. The future and what the industry needs to focus on

5. New technologies and application techniques for existing fumigants
   a. Using alternative fumigants to manage phosphine resistance
   b. Importance of monitoring gas concentrations and how to do it
   c. Recirculation of fumigants when necessary
   d. Gas distribution within fumigation enclosures
   e. Minimizing gas leakage and techniques
   f. The growing use of sulfuryl fluoride for bed bug and brown recluse spider control
   g. Degesch SpeedBox™

6. Effects of temperature, dose, exposure periods, HLT’s and target pests
7. Regulatory changes and what’s in the future
   a. Label changes and requirements
   b. Department of Transportation (DOT)
   c. What’s going on in Canada?
   d. Fumigation Management Plan (FMP)
   e. Worker and public safety
   f. Efficacy monitoring
   g. California restrictions for residential use of sulfuryl fluoride and how it may affect the rest of the US
   h. Fumigant monitoring equipment
   i. MRL’s, CODEX and country requirements
   j. USDA PCIT database and finding the export fumigation protocols/fumigation schedules

8. Fumigant research trials
   a. Industry scrutiny on fumigants since the phaseout of methyl bromide
   b. USDA-ARS, Dr. Spencer Walse
   c. Export protocols
   d. Example, Brown marmorated stink bug, Bean thrip on Citrus

9. Potential new fumigants

10. Recent highly publicized fumigant misapplications and the impact on the industry
    a. Review of the issues
    b. Investigations
    c. Industry cooperation and participation
    d. Minimizing risk in the future

11. DDVP update
    a. New label in 2016
    b. Restrictions on the label
    c. Effectiveness of DDVP

12. Using carbon dioxide for organic treatments

13. The future…
Wednesday

Tick Management Update ................................................................. 78
   Mike Dryden, Kansas State University
   Indiana CCH credits: 1 each in 7A & RT

NPMA Update ................................................................................... 81
   TBD
   Indiana CCH credits: .5 each in 7A & RT

Developing a Safety Program for Equipment and Pesticides ............... 82
   Fred Whitford, Purdue University
   Bob Avenius, Trugreen
   Indiana CCH credits: 1.5 each in 3A, 3B, 5, 6, 7A, 7b, 7d, 8 & RT

Flea Problems are on the Rise .......................................................... 83
   Mike Dryden, Kansas State University
   Indiana CCH credits: 1 each in 7A & RT

Rodent Management Update .......................................................... 86
   Bobby Corrigan, RMC Consulting
   Indiana CCH credits: 1 each in 7A, 7D & RT
Tick Management Update
Michael W. Dryden DVM, MS, PhD, DACVM (parasitology)
University Distinguished Professor of Veterinary Parasitology
College of Veterinary Medicine
Kansas State University

Abstract

At least 15 different infectious agents and diseases are transmitted or produced by ticks parasitizing dogs, cats and humans in North America. Most of these species are hard ticks with a three-host development cycle in which each motile stage (larva, nymph, and adult) feeds on a different host after molting. Tick species, disease occurrence, and peak activity of each tick life stage can vary dramatically depending on geographic and climatic conditions. Gaining an understanding of tick distribution, tick ecology, and seasonal occurrence of different tick life stages can help with the management of tick infestations and reduce the incidence of tick-transmitted diseases. Control should be based on an understanding and management of ecologic factors responsible for tick infestations and selection of appropriate acaricides.

I. Hard ticks (Ixodidae) Identification, Host acquisition & Life Cycles
a. Species of interest U.S.
   i. Amblyomma americanum - Lone Star Tick
   ii. Amblyomma maculatum - Gulf Coast Tick
   iii. Dermacentor albipictus – Winter Tick
   iv. Dermacentor andersoni - Rocky Mountain Wood Tick
   v. Dermacentor occidentalis - Pacific Coast Tick
   vi. Dermacentor variabilis - American Dog Tick
   vii. Ixodes pacificus – Western Black-legged Tick
   viii. Ixodes scapularis - Black Legged Tick
   ix. Otobius megnini - Spinose Ear Tick
   x. Rhipicephalus sanguineus - Brown Dog Tick

b. Life Cycles
   i. Each life stage feeds 3 – 14 days (rarely longer)
   ii. Each life stage must feed to molt to next stage.
   iii. Mating generally occurs on host with most species (exception Ixodes spp.).
   iv. Females consume large quantities of blood (engorge) over several days.
   v. Males of most species feed sparingly, but do not engorge.
c. Acquisition of ticks
   i. Questing
      1. Once a tick has settled into a waiting posture on a stem or leaf, any indication of a host’s approach (such as vibration, CO2 or a shadow) may cause the tick to assume a characteristic questing posture, oriented toward the stimulus with the front legs raised and often waving.

II. Changing/expansion of tick ranges and densities & increased tick encounters
   a. Tick ranges and density have expanded greatly in North America over the past 30 years.
      i. Reforestation
      ii. Wildlife conservation, relocation and restocking
      iii. Climate changes
      iv. Migratory birds
      v. Decreased environmental pesticide application
      vi. Increased human contact with natural areas
      vii. Recreation, occupation, housing developments in forested areas.
      viii. Other
   b. The distribution and abundance of Black legged tick (*Ixodes scapularis*) and Lone star tick (*Amblyomma americanum*) are linked to the distribution and abundance of their primary reproductive host, the White-Tailed deer (*O. virginianus*) and a deciduous forest canopy.
      i. White-tailed Deer repopulation
      ii. By 1890 the deer population in North America was approximately 300,000
      iii. Game conservation, repopulation/relocation, federal law (the Lacey Act of 1900) banned interstate shipment of wild game meat - ending market hunting
      iv. 2012 Quality Deer Management Association estimated there are approximately 30 million whitetails in the U.S.

III. Tick Control
   a. Education
   b. For pets use safe & effective topical or systemic tick control products
   c. For humans personal protection, clothing and repellents
   d. Tick habitat alteration
      i. Altering the landscape to increase penetration of sunlight and lower the humidity.
      ii. Prune trees, mow the lawn, remove leaf litter accumulations, clear underbrush in woodlots, and cut grass, weeds, and brush along edges of the lawn, stone walls, and driveways.
      iii. Mowing and removing vegetative cover will also discourage rodents which serve as hosts
e. Perimeter yard treatment
   i. Insecticide application – sprays or granules
   ii. Cyfluthrin, bifenthrin, carbaryl, permethrin
f. *Rhipicephalus sanguineus* “Brown Dog Tick”
   i. Only tick in North America that will inhabit buildings (homes and kennels)
   ii. Indoor treatment necessary
   iii. Acaracide resistance established in this tick species

Conclusions
Tick species occurring in locations where they previously did not exist. Tick-transmitted diseases are diagnosed in locations they previously did not exist. Ticks are active throughout the year in many locations. Due to natural climate fluctuations and introduction of different tick species. Tick densities are significantly higher in many locations. Ticks are now common in many of our suburban areas.

Suggested References


NPMA Update
Russ Ives
Rose Pest Solutions

New technical and training programs, and their use in developing quality IPM programs will be discussed.
Developing a Safety Program for Equipment and Pesticides
Fred Whitford, Purdue University
& Bob Avenius, Trugreen

Equipment, as well as pesticides, require special attention so that they can be stored, maintained, and used. Updates on these subjects will be included.
Flea Problems on the Rise

Michael W. Dryden DVM, MS, PhD, DACVM (parasitology)
University Distinguished Professor of Veterinary Parasitology
College of Veterinary Medicine
Kansas State University

Abstract

Fleas are clinically important parasites of domestic pets being responsible for the production of allergic dermatitis, serving as vectors of various bacterial pathogens and are the intermediate hosts for filarid and cestode parasites and occasionally cause anemia and death. The goals of flea control must include elimination of existing flea populations on pets and in the premises and prevention of future flea infestations.

I. Fleas
   a. Over 2200 species and subspecies
      i. 95% on mammals / 5% on birds
      ii. Fleas from Antarctica to the Arctic
   b. Ctenocephalides felis - (cat flea) most prevalent species on dogs and cats
   c. Other Species -
      i. Pulex simulans (flea of small & medium sized mammals)
      ii. Ctenocephalides canis (dog flea)
      iii. Echidnophaga gallinacea (poultry sticktight flea)

II. Infestations – Reservoirs
   a. Fleas outdoors come from eggs deposited from flea infested feral dogs and cats and urban wildlife.
      i. Eggs deposited in protected areas may develop
      ii. Eggs-larvae-pupae-adult fleas
      iii. As pets are let outdoors newly emerging fleas (C. felis) jump on our pets.
      iv. Or fleas may jump on people and be transported back into the home
      v. Flea source points in the outdoor environment are limited
   b. Host Associations
      i. In North America Ctenocephalides felis infests wide diversity of mammalian and avian hosts
      ii. bobcats, cats, cattle, chickens, coyotes, dogs, ferrets, Florida panthers, grey foxes, hedgehogs, opossums, raccoons, red foxes, skunks, rarely rodents etc.
III. Life cycle
   a. *C. felis* begin feeding almost immediately once they acquire a host & then mate.1,2
   b. Begin egg production within 20 – 24 hours3
      i. Produce 40 – 50 eggs/day during peak reproduction3
      ii. Average 27 eggs/day for the first 50 days of life and continue production for over 100 days.3
   c. Larvae
      i. Larvae (1mm) hatch within 2 - 10 days.
      ii. Larval development in protected microhabitats
      iii. Moderate temperatures, high relative humidity and a source of adult flea fecal blood.
      iv. Blood (adult flea feces) is an essential component in the diet. Larvae will feed on a variety of organic debris including flea egg shells & other flea larvae.
      v. Negative phototaxis & positive geotaxis
      vi. <15% of larvae placed in carpet move more than 20 cm (8 inches) before they pupate.
      vii. Susceptible to heat and desiccation
      viii. 8 - 34 days to pupation
   d. Pupae
      i. The larva spins a silk-like cocoon
      ii. Undergoes metamorphosis from larva-pupa-adult flea.
      iii. Development over 5 days – 4 weeks
      iv. Cocoons are ovoid, 0.5 cm long, whitish, and loosely spun. The silk fibers are sticky and debris from the environment usually coats the cocoon.
      v. Under chair and sofa cushions
   e. Pre-emerged and emerged adults; delayed emergence
   f. Flea Development
      i. Temperature and Humidity Dependent
      ii. Typically 85 to 95% of fleas emerge within 3 to 8 weeks, with scattered emergence of a few fleas for 60 to 90 days depending upon temperature & humidity. But can be extended for >300 days.

IV. Host Seeking by Adults
   a. Positive phototaxis & negative geotaxis
   b. Newly emerged fleas, which are, located in carpets or outdoors, may bite humans before finding their preferred hosts.
   c. In most homes newly emerged fleas die within 1 to 2 weeks if they do not find a host.

V. Concepts of Control
   a. By the time a pet owner notices fleas, there has been development of immature stages within the home for 1 to 2 months.1,2
   b. Immature flea stage biomass has already accumulated.
c. Consequences of a flea infestation

d. Must stop flea reproduction & development
   i. Eliminate infestation in the premises.
   ii. Provide for long term control.

e. Chemical Premises Treatments
   i. Indoors
      • Adulticide (pyrethroids) & IGRs (methoprene or pyriproxyfen) to kill eggs and larvae
   ii. Outdoors
      • Cyfluthrin, imidacloprid, permethrin, etc..
      • Try to direct chemical control to “source point” areas outdoors.

f. Resistance
   i. Resistance has been detected to a variety of insecticides
   ii. Combined with natural climatic fluctuations, resistance likely contributes to the increasing numbers of flea control failures

g. Mechanical control
   i. By reducing the number of eggs, larvae & adults you reduce the number of emerging fleas.
   ii. Wash pet bedding
   iii. Vacuum under chair and sofa cushions
   iv. Vacuum carpet
   v. Steam clean carpet
   vi. Wash area/throw rugs
   vii. Use of flea traps

Conclusions:

Flea infestations can be frustrating for pet owners and can be extremely deleterious to the dogs and cats living in the infested homes. While pet owners will treat their pets, it is the environmental biomass that contribute to the prolongation of the infestation and is often unknown to many pet owners. It is in the management of this biomass that the professional pest management specialist can have the greatest impact on these infestations and alleviate pet and human suffering.

Suggested References


Rodent Control Updates
Spot-On!
An OTJ Analysis of Equipment Placement For Rodent Control
Bobby Corrigan, Ph.D. Urban Rodentologist
RMC Pest Management Consulting,
Richmond, IN.

I. For your company over the past 3 years, has rodent business
Increased
Remained the same
Decreased

Global Rodent Population Fluctuations and Increases?

1. Winter Kills
2. Regional areas and weather stability, water resources, etc.
3. City areas vs. Suburban and Rural: increased human population of an area; the rodents will associate with the humans moving in
4. Are control programs designed and implemented to eliminate a population or suppress an on-going population?
5. Are urban infrastructural budgets keeping up with repairs and sanitation programs?

II. Spot-On!
An OTJ Analysis of Equipment Placement For Rodent Control

Spot: A particular place or point.
Station: The place where something stands or is located

A. Overview
The laying down of rodent control equipment should not simply be only along walls and building perimeters, because of the premise that “rodents follow walls”. Yet, a large percentage of the times, this is how it is done by both the lay person and the professional.

Gut Check Each Time: Why. This. Spot.? 
B. The Science of Rodent Equipment Location: Considerations of Rodent Behaviors In and Around Buildings

1. Shadows: Prey Species
2. Overhangs and Head Vibrissae
3. Warmth: Rodent Weakness
4. Lines: Travel Efficiency
5. Pheromone lay downs
6. Holes Used Once: Entry Begets Entry
7. Corners Nearby any Food
8. Volatizing Foods (Garbage, Exhaust directions,
9. Quite Areas within home ranges.

C. Equipment-Specific Tips For OTJ Placement Spots

1. Bait Stations
2. Snap Traps
3. Glue Traps
4. Multiple Catch Traps

Food Plant Audited Spots: Those Spots Plus Scientific Spots.

For Audits; Pick the rodent behavioral spots ;install first and then supplement with the yardstick placements if it is mandatory for the auditing firm.
### 2015 Purdue Pest Conference Attendees

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<tr>
<th>Name</th>
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<td>Megan Abraham</td>
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<td>Indiana Dept. of Natural Resources - Indianapolis, IN</td>
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<td>Bill Achramowicz</td>
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<td>Pursuit Pest Control - North Barrington, IL</td>
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<td>Steve Akers</td>
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<td>Indiana University - Bloomington, IN</td>
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<td>Qurban Ali</td>
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<td>James Allen</td>
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<td>Orkin Pest Control - Indianapolis, IN</td>
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<td>Cody Allen</td>
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<td>Enviromental Pest Control - Grayling, MI</td>
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<td>Brian Allman</td>
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<td>Allman Brothers Termite &amp; Pest Control - Bloomington, IN</td>
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<td>Barry Alpha</td>
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<td>Alpha's Dependable Exterminators - Monticello, IN</td>
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<td>Peterson Farms Inc. - Hart, MI</td>
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<td>Mark Ameling</td>
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<td>CleanBrands LLC - Warwick, RI</td>
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<td>Bob Andrews</td>
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<td>Andy Architect</td>
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<td>National Pest Management Association - Fairfax, VA</td>
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<td>Terminix Services, Inc. - Danville, IL</td>
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<td>Tim Baietto</td>
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If you feel our records are in error, contact Holly Fletcher-Timmons (765) 494-5856 or htimmons@purdue.edu to correct our database.
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<td>Chris Daugherty</td>
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If you feel our records are in error, contact Holly Fletcher-Timmons (765) 494-5856 or htimmons@purdue.edu to correct our database.
# 2015 Purdue Pest Conference Attendees

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<td>Keyontay Earl</td>
<td>Batzner Bed Bug Services - New Berlin, WI</td>
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<td>MGK - Golden Valley, MN</td>
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<td>Ken Frost</td>
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<td>Travis Funkhouser</td>
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<td>Peter Giananakas</td>
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<td>Timothy Gibb</td>
<td>Purdue University - West Lafayette, IN</td>
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<tr>
<td>Kevin Gibson</td>
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<tr>
<th>Name</th>
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<tr>
<td>John Giemzik</td>
<td>Platinum Pest Solutions - Lansing, IL</td>
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<td>McCloud Services - Alsip, IL</td>
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<td>Brad Jones</td>
<td>Monroe County Community School Corp. - Bloomington, IL</td>
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<td>Robert Jordan</td>
<td>Burt's Termite &amp; Pest Control Inc. - Columbus, IN</td>
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<td>Bennett Jordan</td>
<td>National Pest Management Association - Fairfax, VA</td>
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<td>Mike Joyce</td>
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<td>David Jozwiak</td>
<td>Bugsy's Elkhart Ext. Co. - Elkhart, IN</td>
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<td>Wayne Kankovsky</td>
<td>US Inspect, LLC - Lombard, IL</td>
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<td>Patrick Kelley</td>
<td>Insects Limited Inc. - westfield, IN</td>
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<td>Kelley's Termite &amp; Pest Control - Bloomington, IN</td>
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<td>Jay Kelley</td>
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<td>Iare Pest Control - Schererville, IN</td>
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<tr>
<td>Tajalli Kelley-Graves</td>
<td>Michigan Department of Agriculture - Belleville, MI</td>
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## 2015 Purdue Pest Conference Attendees

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<td>Joe Norman</td>
<td>Earlywine Pest Control - Richmond, IN</td>
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<td>Carl Rust</td>
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<td>Jim Sargent</td>
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<td>Tomohiko Sato</td>
<td>Yutaka Make Co., Ltd. - Osaka,</td>
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<tr>
<td>Dominique Sauvage</td>
<td>Clark Pest Control - Lodi, CA</td>
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<td>Randy Schaap</td>
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<td>Darren Van Steenwyk</td>
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<td>Miguel Vargas</td>
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<td>Batzner Pest Management, Inc. - New Berlin, WI</td>
</tr>
<tr>
<td>Thomas Velasquez</td>
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<td>Tom Vel Exterminating Inc. - Wilmette, IL</td>
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<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Company/Position</th>
</tr>
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<tbody>
<tr>
<td>John Vermillion</td>
<td>35</td>
<td>The Bug Man - West Terre Haute, IN</td>
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<tr>
<td>Alejandro Vogel</td>
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<td>Rodex - Managua,</td>
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<td>Carl Vogelewede</td>
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<tr>
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<td>Taylor Pest Management - Hillsdale, IN</td>
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<td>Scot Wakefield</td>
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<td>Dean Walendzak</td>
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<td>Monroe County Community School Corp. - Bloomington, IN</td>
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<td>Cargill Inc. - Indianapolis, IN</td>
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<td>Gerry Wegner</td>
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<td>- Vero Beach, FL</td>
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