

Introduction to Integrated Pest Management (IPM) Curriculum

Curriculum Outline

Time Required: 3 hours

Suggested Class size: 10 to 20 participants

Objectives:

1. Understand the IPM decision-making process and how it differs from conventional pest control
2. Learn how to use the IPM decision-making process when delivering professional structural pest control services
3. Understand how pest biology and behavior affects the success of management practices.
4. Develop/increase skills in monitoring, record-keeping, setting treatment thresholds, using non-chemical prevention and treatment methods, using reduced-risk pesticides as a last resort, and developing customer cooperation with the IPM service.
5. Learn how to incorporate IPM concepts and methods into a structural pest control business

Synopsis of Class

Lecture and Discussion

A. Introduction, page 3

Have all participants say their name, company, whether they have any experience with IPM.

B. What Is IPM? page 3

Describe IPM as an ecosystem concept and use the Rat ecosystem chart to explain “Population Forces” that limit pest populations, and the many factors in the pest environment that influence pest presence or absence.

C. Pest Ecosystems and IPM, page 4

Explain how analyzing a pest problem as an ecosystem enables the IPMP to understand and address the underlying sources of the pest problem, rather than focusing only on symptoms (i.e., the pest).

D. Origins of Modern Urban IPM, page 5

Explain the adaptation of agricultural IPM methods to urban structural and landscape pests.

E. Definitions of IPM, page 5

Discuss the two definitions provided as examples and explain the differences between the two.

F. The IPM Decision-making Process, page 6

Present the components of the IPM decision-making process.

G. How to deliver a Structural IPM Service using the IPM Decision-making Process, page 6

Discuss each component of the process and provide real-world examples of how the components are used by IPMPs.

H. Benefits of the IPM decision-making process, page 11

Describe how the IPM decision-making process provides superior, long-term pest management that minimizes hazards to human health and the environment, and lowers liability.

I. Desirable Attributes of IPM Practitioners, page 11

Discuss behavioral traits that are common to successful IPMPs.

J. Finding the IPM Customer, page 12

List the customer markets that are most compatible with IPM services.

K. Making the Transition to IPM, page 12

Discuss issues such as pricing of IPM services, sales and marketing tips, providing training support for IPMPs, and other issues that need to be addressed when transitioning to IPM.

Checklist of Materials for Class

Handouts (starting on page 13)

- **Handout #1:** The Rat Ecosystem (page 13)
- **Handout #2:** Definitions of IPM (page 14)
- **Handout #3:** Differences between IPM & Conventional Pest Control (page 15)
- **Handout # 4:** Components of the IPM Decision-making Process (page 16)
- **Handout # 5:** IPM Tools, Equipment, and Products (page 17)
- **Handout #6:** Structural IPM Resources (page 18-19)
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- Reference books (see page 19)
- Exam for Structural Pest Control Board EDU Credits (see pages 20-21)
- Monitoring tools for display:
 - Flashlight and head lamp
 - Hand lens
 - Plastic Ziploc bag and vial for specimens
 - Tweezers for collecting specimens
 - Pen, pencil, clipboard, notepad, monitoring forms
 - Can of compressed air for flushing out insects
 - Sticky traps, talc powder
 - Non-toxic rodent bait
 - Articulated mirror
- Products and equipment used in management for display:
 - Vacuum with HEPA filter
 - Portable steam cleaner
 - Heat gun
 - Exclusion materials such as sheet metal, hardware cloth, expandable metal net, knitted copper mesh, spackle, various kinds of caulk, various kinds of door stops, door sweeps, drywall corner
 - Exclusion tools such as tape measure, tin snips, hammer, screw drivers, pliers, utility knife, scissors, small pry bar, assorted nails and screws
 - Traps—snap, snap with expanded trigger, live single catch, live multiple catch
 - Tamper-resistant bait stations

Curriculum for *Introduction to Integrated Pest Management* Lesson Plan

Note: Throughout the presentation, it is important to engage the audience with questions that will elicit information about their experiences with IPM, especially about barriers to putting IPM into practices and marketing IPM.

A. Introduction

1. Class participation: Self-introduction of all participants.

- Ask participants to say their name, company, and whether they have any professional experience with IPM (i.e., brief 30 second introduction)
- **Nomenclature Note:** The term IPM practitioner (IPMP) used in the curriculum refers to pest control professions who use IPM methods).

B. What Is IPM?

1. Class participation: Ask class what the term “IPM” means to them.

- Point out that people in the class have many different ways of describing IPM.
- Note that there are many definitions of IPM published in the U.S. and abroad, depending on the perspective of the user of the term
- State that before discussing the definition of IPM used in this training, it is important to understand how modern IPM evolved.

2. IPM is based on “ecosystem” concepts popularized in the 1950s and 1960s.

- Definition of an ecosystem: *The system of interactions between living organisms and their environment.*
- Instead of focusing simply on how to kill pests in a specific location, an ecosystem analysis looks at all the factors in the pest’s environment that enable it to survive (the limiting factors) as well as factors that attack or compete with the pests (natural diseases, predators, etc.)
 - what are the conditions in the immediate environment that support the pest?
 - how can those conditions be reduced or permanently removed?
 - are there factors in the environment that attack or compete with the pest?
 - how can those factors be enhanced?
 - what are the connections between the factors that support or discourage the pest?
- Every component in an ecosystem is connected to everything else.
- If you change one component of an ecosystem (e.g., apply a pesticide, caulk a crack, allow garbage to overflow containers) other parts of the system will be impacted—either positively or negatively.
- In order to achieve long-term pest management results, it is necessary to address the pest itself plus the factors in its “ecosystem” or environment that enable it to survive or threaten its survival).
- IPMPs are most successful at solving a pest problem when they harness all the opportunities to remove the pest’s life support systems and protect and enhance natural controls, augmenting these actions with lethal controls only when necessary

- IPMPs need to understand and apply this ecosystem approach in order to achieve long-term results and avoid unintended negative side effects of pest treatments to humans or environmental resources

3. Describe the Rat Ecosystem Model for IPM

Display a slide of The Rat Ecosystem (Handout # 1, page 13).

- Explain the components of the rat ecosystem listed on the handout and how they interact
 - All pests including rats require food, water, harborage (habitat), and an ability to reproduce in order to survive. These components are known as the rat’s “Life Support System”
 - Most pests also have natural enemies as well as competitors of their own species that prey on and/or compete with them for food and other resources
 - If just one of these components is increased, decreased, or removed, the rat population goes up, down, or disappears. Increases or decreases in rat numbers also raises or lowers the number of natural enemies and rat competitors in the vicinity of the target rats
 - In most cases, virtually 100% of rats must be eliminated from a location in order to achieve long term management
 - Lethal methods alone won’t solve the rat problem. To prevent immigrant rats from moving into the vacated habitat, strategies to reduce or remove food, water, and harborage/habitat must be a central part of the management program

4. Discuss “Population Forces”

- The **Population size** of a pest is determined by **population forces** (reproduction, mortality, and movement into and out of an area) and by **limiting factors** (environment=food, water, harborage/habitat, plus predation, and competition) [from Baefsky and Davidson 2004]

5. Discuss the human component that surrounds the pest ecosystem

- Human behavior and associated social, cultural, economic, and political institutions also impact the pest ecosystem and must be taken into account when solving pest problems
- IPM practitioners (IPMPs) must include education and involvement of customers in efforts to manage pests. This might include managers, custodians, social workers, and purchasing agents when solving difficult problems such as bedbugs in single occupancy hotels.

- 6. Class Participation:** Ask the class to suggest changes that could be made to various components in the rat ecosystem to reduce the rat population (see item 4, above). Explore how each change impacts the other components of the ecosystem. Are the changes positive or negative with regard to reducing the rat population? What is the result of failing to make changes in the life support systems for the rats?

C. Pest Ecosystems and IPM

1. IPM is a decision-making process.

- 2. The pest problem is analyzed as an ecosystem (the big picture) in order to identify and remove or reduce the sources of the pest problem (food, water, harborage, human behavior), as well as the pests themselves (i.e., the symptoms).**

- 3. IPM is knowledge intensive and based on an understanding of the biology and behavior of target pests within their environment.**

D. Origins of Modern Urban IPM for Structural and Landscape Pests

1. Developed in Agriculture then adapted to urban pest problems.

Modern IPM was developed in cotton and alfalfa crops in California in the late 1950s and early 1960s. Overuse of DDT and other broad-spectrum insecticides in the post-WWII era had led to high levels of insect resistance to the materials. Pesticide resistance was so widespread that the cost of spraying the crops was higher than revenue received from sales of the crops. Growers asked University of California entomologists to help solve the insect problems. Researchers in biological control methods for pest insects discovered that an integration of monitoring, protection and enhancement of natural enemies found in the crops, and limited spot treatments with pesticides in insect “hot-spots” could keep the pests at acceptable levels. In 1969, the success of these initial “integrated control” programs led biological control researchers at the University of California, Berkeley (Dr. William and Helga Olkowski and their team) to adapt the agricultural IPM methods to solve structural and landscape pest problems in urban environments.

E. Olkowski/BIRC Definition of IPM

Show a slide of Handout # 2, page 14: Definitions of IPM, which shows the two IPM definitions.

1. For purposes of this training the following definition of IPM will be used:

“IPM is a decision-making process that emphasizes prevention and non-chemical treatment methods. Inspection, monitoring and record-keeping are used to determine if, when, and which treatments are needed.

Site-specific treatments are selected from available biological, cultural, manual, mechanical, physical, educational, and chemical strategies, and are used within an integrated program.

Reduced-risk chemical controls are included in the treatment program when non-chemical methods are insufficient to solve the problem in an effective and affordable manner.”

—W. & H. Olkowski, The Bio-Integral Resource Center (BIRC)

2. In recent years, versions of the Olkowski definition have been adapted by the structural pest control industry, including the National Pest Management Association’s (NPMA) Definition of IPM

“Integrated Pest Management (IPM) is a decision-making process that anticipates and prevents pest activity and infestation by combining several strategies to achieve long-term solutions. Components of an IPM program may include education, proper waste management, structural repair, maintenance, biological and mechanical control techniques, and pesticide application.”

— National Pest Management Association (NPMA)

3. Although the two definitions are similar, there are several key differences

Class Participation: Ask the class what differences they see between the two definitions.

- The Olkowski/BIRC definition includes ongoing monitoring and record-keeping. The NPMA definition does not mention this important IPM activity
- The Olkowski/BIRC definition emphasizes use of effective non-chemical methods as a first resort and pesticides as a last resort. The NPMA definition does not distinguish between chemical and non-chemical methods
- When pesticide use is necessary, the Olkowski/BIRC definition calls for use of effective products that pose the lowest risk and hazard to human and environmental health. The NPMA definition does not provide criteria for selection of pesticides.

4. Discuss the differences between IPM and conventional pest control.

Show a slide of Handout #3, page 15: Differences between IPM & Conventional Pest Control. Point out that the information in the chart was published in 1994.

- **Class Participation:** ask the class if the differences between conventional and IPM services have changed since 1994. If so, how?
- Ask the class to mentally rank themselves on a scale of 1 to 5 on their IPM understanding and skills and write the number down on a piece of paper which they keep. Ask the class to raise their hands if their rank was between 1 and 3, or between 3 and 5.
- After discussing the IPM decision-making process (Section G), ask the class to review the ranking they assigned themselves earlier and make any adjustments. Ask the class to raise their hands if they raised their ranking or lowered their ranking.

F. The IPM Decision-making Process.

Display a slide of Handout #4, page 16: Components of The IPM Decision-making Process: Read each component in the decision-making process aloud, then proceed to a discussion of each of the following program components

1. The IPM decision-making process contains the following components

- Establish a partnership with the customer and begin IPM education
- Gather background data on the pest problem
- Learn the biology and behavior of the pest and its natural enemies
- In discussion with the customer, establish the treatment threshold for each pest
- Establish an inspection and on-going monitoring program and a record-keeping system
- Develop an IPM plan for the target pest(s) and discuss this with the customer
 - select and apply IPM methods
 - monitor, evaluate, and fine-tune methods
 - maintain records of treatments and results
- Identify and respond to customer education and IPMP training needs
- Evaluate overall IPM program
- Provide Quality Assurance

G. How to deliver a Structural IPM Service using the IPM Decision-making Process

Class Participation: Structure the following discussion to illustrate how an IPMP applies the IPM decision-making process when servicing a residential or commercial customer account.

1. Establish a partnership with the customer that facilitates client education, participation in problem solving, and feedback.

- Develop a partnership with the customer and educate him/her about how an IPM service works.
 - Uses inspection and regular monitoring to detect and prevent pest problems
 - Focuses on removing the sources of the pest problem
 - Emphasizes pest prevention and non-chemical methods
 - Integrates reduced-risk chemical methods into the program only when necessary
 - Seeks long-term solutions to pest problems
- Establish pest management objectives with the customer for solving the pest problem
 - pinpoint customer's needs and expectations regarding pest control target and results
 - explain that the IPMP needs cooperation from the customer in order to solve the problem
- Establish an on-going communication system with the customer, both written and verbal
 - Use inspection and monitoring information (discussed below) to keep customer informed about work being done by the IPMP, results, and actions that the customer needs to take to help solve the pest problem (e.g., removing clutter, improving sanitation, etc.)
 - Explain that some methods may take a little longer to work than conventional pesticides, but results last longer
 - Explain that IPM methods are constantly being updated as more scientific information becomes available and new products enter the market
 - Explain that IPM is on the cutting edge, and customers should expect services to change periodically. This does not mean less service—it means smarter service

2. Gather Background Information on the Pest Problem(s)

- **Interview the customer: During the initial contact, record detailed information about the pest problem(s):**
 - Type of problem/pest(s)
 - Evidence of problem/pest(s)
 - Location and numbers of problem/pest(s)
 - History of the problem(s)
 - Actions already taken by the client (or prior PCO) and results
 - Incidents, actions, weather conditions, etc. that occurred around the time the pest problem was first noticed that might be linked to the pest infestation
- **Thoroughly inspect the property:**
 - Accurately identify key pest(s)
 - Prepare a written list/map of:
 - Key pests discovered and locations
 - Estimate of pest numbers and amount of damage or nuisance
 - Sources of pest infestation
 - Conditions conducive to pest infestations (structural, environmental, behavioral)
 - Potential problems associated with the pest(s)
- **Record relevant facts about the customer that impact pest management services. For example, are there persons at the customers residence or business with:**
 - chemical sensitivities?
 - pets or aquariums?
 - locked areas requiring monitoring or treatment? etc.

3. Learn the biology and behavior of the pest(s)—i.e., biological responses to environmental conditions, reproduction cycles, food and water sources, harborage, natural enemies, etc. Discuss how this knowledge is key to designing management strategies and provide examples such as:

- Fleas are attracted to light—especially in the white/yellow range. Thus, electric flea traps with yellow bulbs and yellow glue boards are used to monitor and trap fleas inside buildings.
- German cockroaches are “thigmotactic,” i.e., they prefer to live in tight cracks. Using caulk to seal cracks denies the roaches the harborage they require.

4. Establish a repeated monitoring and record-keeping program.

Discuss the differences between inspection and monitoring. Show examples of monitoring tools, devices, software, etc.

- Inspection is a one-time event. Example: the initial visit to the property where information on the pest is recorded.
- Monitoring is paying close attention on a regular basis. Example: regular visits to the property to track efficacy of treatments, make any needed adjustments, detect any new problems, communicate with the customer, etc.
- Both activities provide critical information needed to solve pest problems.
- Monitoring is an integral part of IPM—a legitimate, necessary activity, not just “doing nothing”
- At minimum, monitoring and record-keeping tools are used to:
 - track pest location and activity
 - record conditions conducive to pests
 - record treatment thresholds
 - record treatment actions and efficacy of treatments
 - record recommendations regarding sanitation or other problems requiring remediation by the customer
 - evaluate the success of actions taken by customer and IPMP
 - evaluate overall IPM program efficacy
- Benefits of written records:
 - tracks management actions and recommendations
 - makes pest problems more predictable and preventable
 - enables evaluation of effectiveness of pest problem analysis and treatments
 - makes history of the pest problem and actions taken available to subs and replacements
 - makes IPM service accountable and reduces liability risks

5. Establish pest management objectives with the Customer

- Pest management objectives differ from site to site
- Discuss with the customer his/her concerns and needs regarding the pest problem
- Use pest information gained from the initial inspection establish pest management objectives with the customer and record the information
- Clear objectives help avoid misunderstandings about IPM services provided
- Clarify customer responsibilities and IPMP’s responsibilities for meeting objectives

(e.g., the IPMP is responsible for finding and removing existing cockroaches from the kitchen, removing harborage, and monitoring; the customer is responsible for improving sanitation, and reducing clutter)

- Examples of objectives for commercial accounts include:
 - Food Processing Facility: Manage pests in a manner that complies with the Baking Institute Standards
 - Child Care Center: Prevent harm or annoyance to children and staff from pest insects or rodents, and minimize use of pesticides
- Examples of objectives for residential accounts
 - Protect the outdoor patio from flies, ants, and yellowjackets during the summer
 - Solve existing rat problem and prevent recurrence

6. Set pest treatment thresholds.

- Using the pest management objectives established with the client, establish treatment thresholds
- Explain the concept of treatment threshold (aka “action levels”):
 - “The point at which pest management measures are applied to avoid economic, medical, structural, and/or aesthetic damage or nuisance due to pests”
- Discuss with the customer the associated with the pest problem
- Discuss the benefits of some tolerance of pests (e.g., ants outdoors help control fleas and termites, so can the customer tolerate some ants so long as they are kept outdoors and are monitored by the IPMP?)
- Assess the severity of the existing pest problem
- Determine if treatment is necessary.
- Record information.

7. Select IPM strategies and equipment to prevent, suppress, or eliminate the pest.

- IPMPs are most successful when they harness all the opportunities to remove the pest’s life support systems and protect and enhance natural controls when available.
- Discuss available IPM strategies
- IPM uses multiple integrated strategies, with emphasis on prevention and non-chemical techniques.
- Strategies are usually categorized as no treatment, exclusion, habitat modification, sanitation, physical/mechanical controls, cultural controls, biological controls, reduced-risk chemical controls, and customer education.
- Strategies are evaluated to fit the pest’s life cycle, the customer’s needs, the site, and the surrounding environment.
- Strategies are chosen to be most effective for solving the pest problem in the long-term, and to be least hazardous to the customer, property, and the environment.
- Pesticides are used only when absolutely needed. Pesticide products and delivery systems that reduce the risks and hazards of unnecessary exposure to people, other non-target organisms, and environmental resources are selected.
- Not all available strategies will work equally well in all locations. Sometimes technicians will have to “think outside the box” and experiment to solve a problem.

- Treatment actions taken are recorded.

6. IPM tools, equipment, and products.

Show a slide of Handout # 5, page 17: IPM Tools, Equipment, and Products.

Class Participation: Announce that the list represents items commonly used by IPMPs. As you discuss each item, ask the class how many have used each item or have tried it, and how effective was it.

- Some items are commonly used in conventional pest control (e.g., glue traps for monitoring pest insects; headlamps for hands-free inspections)
- Some familiar items are being used in new ways (CO2 fumigation of bedbug- infested clothing; compressed air for flushing cockroaches)
- Some items are from other industries (e.g., janitorial, construction, medical,) and have been adapted for IPM programs (e.g., steam cleaning equipment; vacuums; fiberoptic visual probes for wall voids, etc.)
- Promising computer technology currently available and on the horizon (e.g., bar codes for monitoring traps; global positioning systems (GPS) and digital reporting from monitoring stations)

7. Develop and Implement a site-specific IPM Plan

- Educate the customer about the IPM Plan
- Emphasize that it has be customized for the customer's site and conditions
- Discuss the responsibilities of the IPMP and the responsibilities of the customer.
- Discuss the possible outcomes of the treatment methods, how long they might take, what to expect.
- Determine how to prevent future pest infestations.
 - How can the pest habitat be altered to reduce pest presence?
 - How can access to structures be closed?
 - How can access to food and water be reduced or eliminated?
 - How can customer behavior change be achieved if necessary to solve pest problems?
- Monitor and revise the plan as needed until the problem is solved.

8. Evaluate IPM program success

- Have the pest management objectives been met?
- Has the customer cooperated as requested?
- Are adjustments to the IPM plan needed?
- Is the management program cost-effective for the customer and the IPMP?
- Is the customer enthusiastically satisfied and willing to provide referrals to the IPMP?

9. Maintain On-going IPM Education and Training

IPM is knowledge intensive. IPMPs require frequent exposure to new information and skill-building opportunities in order to:

- Increase technical IPM skills
- Increase IPM sales skills
- Increase communication skills with customers
- Expand information and training resources from:

- in-house mentors and peers
- in-house and personal library
- internet – world wide web
- contracted IPM training
- attendance at IPM seminars, conferences

10. Provide quality assurance.

- The IPM company should contact the customer by phone or in writing within a few days following the IPM service call to ask if the customer is satisfied with the service. Any concerns expressed by the customer should be followed up by a service call the same day or within 24 hours until the problem is resolved
- All company staff should receive training on customer relations and retention.

H. Benefits of the IPM decision-making process

- Reducing/removing the life support system of the pest(s) produces long-term results which e builds customer loyalty
- Monitoring data and written records make IPM programs accountable
- Regular communication between the IPMP and customers maximizes cooperation and minimizes misunderstandings
- Emphasis on non-chemical methods and pest prevention reduces liability risk
Use of reduced-risk pesticides when chemical control is needed reduces liability risk
- IPMPs “think outside the box” and experiment to solve difficult pest problems which is a value-added benefit to customers

I. Desirable attributes of IPM Practitioners.

- 1. IPM is knowledge-intensive and requires innovative thinking and persistence. The most successful IPM technicians have some or all of the traits listed below:**
- 2. Class Participation: Display a slide of the following traits and ask the class if they agree these traits are important, and if there are other traits that should be on the list and why?**
 - good communicators
 - problem solvers
 - team players
 - open-minded
 - willing to learn and grow
 - others?

J. Finding the IPM Customer

- 1. Class Participation: Ask what types of customers would respond most positively to IPM services.**
 - Parents of young children
 - Child care centers
 - Schools
 - Hospitals
 - Medical office buildings
 - Nursing homes
 - Chemically sensitive or immune-suppressed residential persons

- Public agencies with IPM policies
- Referrals from environmental activists
- Upscale and organic restaurants and foodstores
- Food processing companies

K. Making the Transition to IPM

- IPM Cost comparisons. Initially, IPM is somewhat more labor intensive than conventional pest control, but results are superior and longer-lasting. Once IPM methods are in place, long-term costs are about the same as or less than conventional services
- Call-backs are not necessarily a bad thing. They provide more opportunities to educate the customer about IPM methods and results, and produce long-term buy-in and satisfaction.
- Think about adding innovative services such as: pest-proofing, cleaning and removal, indoor ornamental plant maintenance, window-washing, holiday light installation/removal, etc.
- Use the model of insurance and preventive health care—charge for regular inspections/monitoring.
- Charge for knowledge, information and education (of client). Reduce driving time by spending more time per client but reducing the number of service calls per client.
- Invest in education for your employees. The entire industry would benefit from upgrading the status of pest control technicians in the eyes of the public from its current position of service technician to that of respected and highly knowledgeable consultant.
- Make problem-solving and communication skills a top priority in hiring and promoting technicians.
- Point out that IPM is a continuum. It requires a commitment to on-going education, training, and innovation to build the skills needed to solve pest problems using the most effective, least-hazardous, long-lasting tools.

Handout #1

Handout #2

IPM Definitions: Similarities and Differences

“IPM is a decision-making process that emphasizes prevention and non-chemical treatment methods. Inspection, monitoring and record-keeping are used to determine if, when, and which treatments are needed.”

Site-specific treatments are selected from available biological, cultural, manual, mechanical, physical, educational, and chemical strategies, and are used within an integrated program.

Reduced-risk chemical controls are included in the treatment program when non-chemical methods are insufficient to solve the problem in an effective and affordable manner.”

—W. & H. Olkowski,
Bio-Integral Resource Center (BIRC)

“Integrated Pest Management (IPM) is a decision-making process that anticipates and prevents pest activity and infestation by combining several strategies to achieve long-term solutions. Components of an IPM program may include education, proper waste management, structural repair, maintenance, biological and mechanical control techniques, and pesticide application.”

— National Pest Management Association (NPMA)

Handout #3

Differences Between IPM & Conventional Pest Control

Element	Conventional Pest Control	Integrated Pest Management
Education, knowledge	Minimal	Extensive
Inspection & monitoring	Minimal	Extensive
Emphasis	Treat <u>symptoms</u> of problem Routine pesticide application	Treat <u>sources</u> of problem Pesticides used only when non-chemical methods insufficient to solve problem
Insecticides in occupied spaces	Sprays and aerosols	Baits, gels, dusts, IGRs, etc.
Application of sprays	Surface treatments	Generally avoided or crack & crevice only
Use of space spraying or fogging	Extensive	Generally avoided or crack & crevice only
Rodent control, sanitation, and exclusion	Minimal	Extensive
Lethal control of rodents	Emphasis on rodenticides	Emphasis on trapping
Bird control	Emphasis on avicides	Emphasis on exclusion
Program strategy	Reactive	Preventive
Potential liability	High	Low

Components of the IPM Decision-making Process

- **Establish a partnership and communication system with the customer**
- **Gather background information on the pest problem**
- **Learn the biology and behavior of the pest**
- **Establish a repeated monitoring and record-keeping program**
- **Establish pest management objectives with the customer**
- **Set pest treatment thresholds with the customer**
- **Select IPM strategies, equipment, and products**
- **Develop an IPM plan and discuss with customer**
- **Monitor and evaluate the IPM program; revise as needed**
- **Maintain on-going education and training**
- **Evaluate the success of the IPM program**
- **Provide quality assurance to the customer**

Handout #5

IPM Equipment and Products For Pest Monitoring and Management

Monitoring tools for display:

- Flashlight and head lamp for inspections
- Articulated mirror for inspections
- Hand lens for pest ID
- Plastic Ziploc bag and vial for specimens
- Tweezers for collecting specimens
- Pen, pencil, clipboard, notepad, monitoring forms
- Can of compressed air for flushing insects
- Sticky traps, talc powder
- Non-toxic rodent bait

Products and equipment used in management for display:

- Vacuum with HEPA filter for capturing insects
- Portable steam cleaner for insect control and sanitation
- Heat gun for insect control
- Exclusion materials such as sheet metal, hardware cloth, expandable metal net, knitted copper mesh, spackle, various kinds of caulk, various kinds of door stops, door sweeps, drywall corner
- Exclusion tools such as tape measure, tin snips, hammer, screw drivers, pliers, utility knife, scissors, small pry bar, assorted nails and screws
- Traps—snap, snap with expanded trigger, live single catch, live multiple catch
- Tamper-resistant bait stations
- Bulb duster for applying boric acid, diatomaceous earth, or silica gel in voids
- Various ant baits and bait stations

Handout #6

Structural IPM Resources

Useful Websites for IPM Information

Oregon State University

<http://www.ippc.orst.edu/cicp/>

This is a web site hosted by Oregon State University Integrated Plant Protection Center. The web site is a list of over 6,500 IPM links, organized by topic and searchable by keyword. You can also click on “Main Index” to find categories of links you might be interested in.

IPM Institute

http://www.ipminstitute.org/school_biblio_buildings.htm

This web page lists useful articles about specific pests, and many of the articles are available online.

California Department of Pesticide Regulation

http://www.cdpr.ca.gov/cfdocs/apps/schoolipm/school_ipm_law/26_exempt_text5.pdf

This page of the DPR school IPM web site will help you decide if a pesticide is exempt from posting under the Healthy Schools Act.

University of California Statewide IPM Project

<http://axp.ipm.ucdavis.edu/PMG/selectnewpest.home.html>

Here you will find U.C. Pest Notes for pests of homes, structures, people and pets.

University of California at Riverside Entomology Department

<http://entmuseum.ucr.edu/bugfaq.html>

On this page you will find short descriptions of lesser-known pests with links to sites with more information.

University of Florida Entomology Department

http://creatures.ifas.ufl.edu/main/search_common.htm

“Featured Creatures” has descriptions, biology and some management information on a large number of problem creatures.

University of Florida School IPM

<http://schoolipm.ifas.ufl.edu/>

Useful information on school IPM.

Marin County Department of Agriculture Model School IPM Program

<http://www.co.marin.ca.us/schoolIPM/>

This site has fact sheets to help educate school staff, teachers and parents.

Correspondence Courses

Purdue University Correspondence Course

http://www.entm.purdue.edu/entomology/urban/Urban_Info/courses.html

Here you will find information on Purdue’s IPM correspondence courses.

Reference Books and Publications

Common Sense Pest Control, W. Olkowski, Sheila Daar, Helga Olkowski. 1991
Newtown, CT: The Taunton Press. 715 pp.

Out of print but available from <http://amazon.com> or <http://www.powells.com> and other internet book sources. Complete IPM programs are described for most common urban pests.

Urban Entomology by Walter Ebeling

This extremely valuable book is no longer in print, but can be read online at <http://www.entomology.ucr.edu/ebeling/>

Truman Scientific Guide to Pest Control published by Purdue University

NPMA Field Guide to Structural Pests by Eric H. Smith and Richard C. Whitman, Published 1992

Handbook of Pest Control by Arnold Mallis, Published by Franzak & Foster Co.

Integrated Pest Management for Schools: A How-To Manual (written by BIRC staff)

Find the full text at <http://www.epa.gov/pesticides/ipm/schoolipm/index.html>. Hard copies are available from BIRC (see below).

BIRC publications

For a list of publications on pest management available from BIRC, go to <http://www.birc.org> or call 510-524-2567.

Reference: Baefsky, M. and N. Davidson. 2004 Curriculum for Burrowing Rodents. California Department of Pesticide Regulation. Sacramento, CA. 21 pp.

**Principles and Practice of IPM Exam
for CA Structural Pest Control Board Edu Credits**

1. IPM is: (circle)
 - a. non-chemical pest control only
 - b. a decision-making process
 - c. pest control that considers all methods as equivalent

2. List one reason why knowing the pest's biology and behavior is important.

3. List 3 components of an IPM Service
 - a. _____
 - b. _____
 - c. _____

4. Treatment thresholds for a particular pest will always be the same at every site.
Circle one: True False

5. Inspection and monitoring are the same thing.
Circle one: True False

6. List 2 benefits of keeping written records of inspection, monitoring and treatment activities.
 - a. _____
 - b. _____

7. Circle the concepts that are key to IPM programs:
 - a. in-out customer service
 - b. monitoring and record-keeping
 - c. calendar pesticide treatments
 - d. pest prevention and long-term solutions
 - e. minimizing pesticide use

8. Ongoing _____ for IPM staff is key to IPM success.

**Answers to
Principles and Practice of IPM
Exam 1/12/04**

Answers:

#1 = b

#2 = Options: find harborage, decide management methods and tools, time treatments, etc.

#3 = Options: Refer to Handout #4

#4 = False

#5 = False

#6 = Options: accountability, institutional memory, educate customers, substitutes and replacements,
program evaluation, etc.

#7 = b,d,e

#8 = Training

