

SECTION 1
CHAPTER
3

PEST MANAGEMENT AND CONTROL

LEARNING OBJECTIVES

After completely studying this chapter, you should:

- Understand why certain arthropods and vertebrates are considered pests.
- Understand the concepts of ecosystem, community, and population as they apply to management of structural pests.
- Be able to relate the sequence of methods/activities involved in a pest management situation.
- Be able to relate the sequence of methods/activities involved in a pest management situation.
- Be able to recognize the components of integrated pest management.
- Understand the concept of pest thresholds.
- Understand the concept of resistance, how to recognize it, and possible ways to prevent it.

WHAT ARE PESTS?

Pests are not pests because of what they *are* (bedbug, yellow jacket) but because of what they *do* (suck blood, sting).

According to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), a pest can be any insect, rodent, fungus, or weed as well as other organisms. Most simply defined in *The Dictionary of Pest Control*, a pest is “Any unwanted organism....” Pests of structures can be generally characterized as organisms (excluding parasitic microorganisms) that have human health, economic, or aesthetic implications, or that damage wooden support

structures of buildings (covered under Category 7B—Wood-destroying Pests). Unlike agricultural pests, they are less likely to cause direct economic damage to products. For instance, though roaches or rodents may cause an economic hardship when restaurants or food-packing plants are closed by legal action, the action is taken for reasons of human health. Likewise, carpet beetles in woolens or museum tapestries degrade clothing or works of art, but the reduction of value of the pieces is primarily for aesthetic reasons rather than consumption of woven wool.

Ecosystem

Defined by the way they behave in an environment or *ecosystem*, pests occur as a group or *population* of individuals of a particular kind (e.g., German cockroaches). Different populations that exist together are called a *community*. One such community may be fleas, pets, and people. A community together with its physical and biological supporting factors makes up the ecosystem (e.g., German cockroaches, fleas, people, pets, and their required food, shelter, and water). The technician does not look at the pest infestation alone but must consider all elements in the ecosystem to design the best control and management methods.

METHODS OF PEST CONTROL

Pest management means the reduction of pest populations to tolerable numbers by changing practices, making habitat or structural alterations, and carefully using pesticides to kill pests only when indicated. Many variations and combinations of methods are used to control pests, but the sequence of these methods follows a pattern: inspection, habitat alteration, pesticide application, and follow-up.

Inspection

Pests do not infest uniformly—they focus on specific areas. These pest-preferred sites must be understood and located. Training and experience in conducting inspections are important for successful location of infested areas.

Habitat Alteration

Infested areas provide *harborage*, (i.e., a place that provides an organism's food, water, and shelter requirements) for pests, so changing or eliminating some of these favorable elements will make survival less successful. Such changes commonly include increased sanitation, moisture reduction, and the elimination of clutter.

Pesticide Application

Though successful habitat alteration can reduce or eliminate populations, it will often be less than complete and pesticide application may be necessary. The key to pest control is the successful combination of these methods.

Follow-up

Some pest management programs do not include more than the minimum follow-up, such as legally mandated record keeping. However, follow-up practices such as detailed record keeping, supervisor oversight, and a quality control program can make the difference between the success or failure of a pest management program.



APPROACHES TO PEST CONTROL

There are four approaches to current structural pest management activities: prevention, reaction, extermination, and integrated pest management. Pest management firms may utilize one, a few, or all of these methods depending on company resources and the types of pest management problems encountered.

Preventive Pest Control

In preventive pest control, a technician follows a pre-established schedule or route to:

- Make expected appearances.
- Make inspections
- Apply appropriate controls.
- Talk with the tenant or manager.
- Record information required by law.

Though the inspection can indicate where pests occur, with this approach, pesticides are usually applied regardless of whether pests are observed or not. Those who practice this approach are satisfied that pests will be killed as they contact the pesticide residue.

Advantages

- Contracts can be fulfilled routinely.
- Work can be set up easily.
- The technician can proceed as rapidly as possible.
- Occupants are satisfied if pests do not appear.
- It is the most economical short-term approach.

Disadvantages

- Time alone governs the schedule.
- Inspections are brief.
- Boredom from repetition can affect the technician.
- Pesticides may be used regardless of whether there is an infestation.
- There is no evaluation.
- Records are brief.
- Long-term solutions are not provided.

Discussion

The least technical expertise is needed for preventive pest control, and the brevity of the activity and interaction gives clients the incorrect idea that controlling pests is elementary. This approach can be more efficient with a quality control program.

Reactive Pest Control

In reactive pest control, a technician responds to special, unscheduled calls and:

- Talks with clients.
- Makes an inspection.
- Identifies infested sites.
- Applies pesticides to pests or sites.
- Records necessary information required by law.

Advantages

- Response is relatively quick.
- The occupant is satisfied by the fast response and immediate pest suppression.
- The interaction with technicians is positive.
- Minor recommendations by the technician to clients are often accepted because the client requested them. Such recommendations make pest control more effective.

- Situations are more interesting for technicians, and boredom is reduced.

Disadvantages

- Clients often mistakenly assume complete extermination.
- Clients are quick to anger if the problem recurs.
- Without a detailed inspection, failure is likely.
- Pesticides are often used as barriers if pests are not found.
- This approach is less economical than scheduled, route-type responses.
- Records are brief.

Discussion

A higher level of technical expertise and a better ability to interact with clients are needed for reactive than for preventive pest control. A quality control program will reinforce technician recommendations.

Pest Elimination or Pest Extermination

A senior technician, usually a supervisor, responds to an appointment, and:

- Interacts with clients.
- Makes an *intensive* inspection.
- Recommends methods to reduce pest food, water, and harborage, such as sanitation, maintenance improvements, habitat alteration, etc.
- Applies pesticides in a variety of formulations each time.
- Makes follow-up inspections.
- Records information on past inspection and recommendations as well as information required by law.

Advantages

- Significant interaction with the pest control supervisor gives the client a good understanding of the problem and the changes needed for control.
- The pest control supervisor interacts directly with clients.
- Longer-lasting control results from changes made by the client.
- Thorough pesticide application occurs.
- There is a high level of interest by technicians.

Disadvantages

- Mistakes in inspection and recommendations to clients or subsequent lack of follow-through by clients will result in control failure.
- A maximum amount of pesticides is usually used; chances of potential misuse, misapplication, and pesticide accidents are increased.
- High pesticide and labor costs are sustained.
- Unexpected results are quickly noticed and questioned.
- The energy required to completely eliminate a pest population is much greater than that required to keep a pest population suppressed to a tolerable level.

Discussion

A high level of technical expertise is needed as well as superior ability to get client cooperation.

Integrated Pest Management

Commercial applicators are required, by Regulation 637 to receive training in integrated pest management (see Chapter 1). After a pest management technician makes a thorough inspection, an integrated pest management program is developed that includes a detailed plan and schedule. Elements of the detailed plan and schedule are:

- The designation of zones of probable infestation and sites of pest infestation within the zones.
- Recommendations for sanitation, maintenance improvements, habitat alteration, reduction of moisture, work procedure changes, safe practices, methods of application, etc.

Finally, pest management components are considered and integrated into the pest management plan (see below).

Advantages

- Long-term pest control procedures are used.
- Client management is involved.
- Costs are reduced over time.
- A reduction of pesticide use (e.g., elimination of preventive spraying) is attained.
- A low-toxicity pesticide response is possible.

Disadvantages

- Not every company or agency has the expertise to provide pest management programs.
- There is a labor-intensive start-up period.
- Costs are higher than “low bid.”

Discussion

Integrated pest management was first used in protecting agricultural crops; in recent years, it has proven effective in structural pest management.

INTEGRATED PEST MANAGEMENT COMPONENTS

Pest management components are considered and integrated into an overall pest management plan.

Monitoring and Record Keeping

Inspection, continual sampling, and use of survey devices that result in accurate recorded pest counts are emphasized. Monitoring goes on in identified zones of potential infestation and is intensified in infested target sites. Non-target areas are not monitored.

Record books or logs are placed in central areas or management units. Records contain monitoring counts; sanitation, maintenance and personnel practice problems; pesticide use, formulations, and amounts. Keep the

records accessible to pest management technicians and client supervisors.



Education, Training, and Communication

Communication is an on-going activity. Pests should be reduced to a level acceptable to the client. To achieve these goals, the pest technician interacts actively with the client. On-going informal training or instructive communication between the technician and the client group's designated liaison is important. Pest management supervisors, technical representatives, or consultants provide formal training.

Designated liaisons are clients with whom pest management technicians will review the record, problems, and control program each monitoring or treatment interval. Liaisons should explain the pest management program to other clients, i.e., staff members, tenants, workers, etc. Liaisons coordinate client efforts needed for the success of the program.



Integrated Control Methods

All practical measures to suppress the pest population to a tolerable level must be considered:

- Cultural controls (e.g., regular cleaning schedule, garbage elimination, changes in worker procedures)
- Physical modifications and maintenance changes (e.g., screening, caulking, etc.)
- Pest control devices and pesticides

Thresholds

A *threshold* is the level of pest density that can be tolerated. Integrated pest management is *site-specific*, for example, different numbers of cockroaches may be tolerated at different sites (e.g., hospitals vs. garbage rooms). The number of pests that can be tolerated at each target site is determined (this level may be zero). Setting thresholds eliminates preventive spraying, curtails excessive pesticide application, and encourages good inspection. Some sites tolerate higher pest numbers than others.

Evaluation, Quality Control, and Reporting

No gains in pest management are made without evaluation. Interviews, surveys, and record examinations should be made at scheduled times. Persons other than the pest management technician should conduct the evaluations. Client management should receive formal written and verbal reports made at scheduled intervals by technical representatives or pest management supervisors.

A CASE FOR IPM: RESISTANCE

Some insects become resistant to a pesticide, and the most complete application cannot achieve acceptable control. Of structure-infesting pests, the housefly and the German cockroach demonstrate the most significant resistance to pesticides.

How Pests Become Resistant to Pesticides

Most pesticides are put together by combining chemical elements. Large pest populations have some individuals whose internal systems can reduce (break down) the pesticide compound to harmless elements. When the pesticide is applied, these pests survive. They produce some offspring that can also break down the pesticide. With each generation, more and more offspring inherit resistance. If applicators continue to apply that pesticide, more and more will be able to survive a pesticide application. Once present, genes for resistance will always be carried by some members of the population.

How to Recognize Resistance

First, eliminate reasons that lead to failure to suppress a pest population. If questions such as these can be answered positively and the pest population still exists, the population might be a candidate for resistance testing:

- Are clients doing their job by improving sanitation, reducing clutter, etc.?
- Have inspections been complete?
- Have pests been correctly identified?
- Has habitat alteration been complete?
- Have pesticides been applied accurately?

The Way to Prevent Resistance

Use of a multi-component approach such as integrated pest management prevents or delays resistance, which occurs when a single pesticide is consistently applied. When pesticides alone are used in a routine way for pest control, the pest population rebuilds between treatments. With repeated applications after population recovery, the more susceptible individuals are killed and those that are less susceptible become the parents of the next generation. Alternating pesticides with different modes of action (e.g., organophosphates and pyrethroids) can also help to reduce or delay resistance to pesticides.

SUMMARY

Pests are unwanted organisms—unwanted because their activities run counter to those of the people living in the same ecosystem. This ecosystem is made up of a number of animal populations, two of which are pests and humans. Together, these populations are called a community. The community and the biological (pest food, hosts, prey plants, etc.) and physical (hiding places,

temperature, humidity) supporting factors are the components of an ecosystem—a basic, self-sustaining natural unit. Pest control takes place within this unit. To be effective, pest management acts on the parts of the ecosystem that will bring about the desired results.

Pest control approaches are set up to prevent, react to, eliminate, or manage pests. Each approach has advantages and disadvantages. The most complete (integrated) approach to pest management involves the coordination of many elements, depending on the nature of the infested site.

Pests are not evenly distributed in an ecosystem, so inspections are needed to locate them. To manage pests, the supporting factors of their population need to be identified and altered. When habitat alteration alone is not sufficient, pesticides can be used to reduce the pest population to a tolerable level.

Finally, an evaluation or follow-up assessment makes the control results last longer and provides information to the pest control technician and others concerned on how well the job was done.

SECTION 1 CHAPTER 3

Review Questions

Chapter 3: Pest Management and Control

Write the answers to the following questions and then check your answers with those in Appendix A in the back of this manual.

1. Define a pest in simple terms.
2. Define pest management.
3. Pest populations are part of an ecosystem. What elements make up an ecosystem?
4. In infested apartments, pest infestations are evenly distributed.
 - A. True
 - B. False
5. In a simple sequence of methods, which of the following is the first method or activity a pest control technician should do?
 - A. Pesticide application
 - B. Habitat alteration
 - C. Inspection
 - D. Follow-up

6-9. Match the following to the appropriate description:

- A. Preventive pest control
- B. Reactive pest control
- C. Pest elimination or extermination
- D. Integrated pest management

Select the pest management approach BEST described by the following:

- _____ 6. A technician responds to special, unscheduled calls.
- _____ 7. Detailed plan includes designation of infestation zones and several recommendations.
- _____ 8. Approach most likely to use the maximum amount of pesticides.
- _____ 9. Technician follows a pre-established schedule; pesticides are used regardless of whether or not there is an infestation.

10. The desired level of pest control is determined primarily by:

- A. The client.
- B. The technician.
- C. The pest control supervisor.
- D. The pest.

11. What is a pest threshold? What are the advantages of establishing threshold levels?

12. The integrated pest management approach to pest control, more than the other approaches, emphasizes:

- A. Safe pesticide application.
- B. The reduction of pests to a tolerable number.
- C. Inspection.
- D. Client communication.

13. Which of the following is not a component of integrative pest management?

- A. Monitoring
- B. Pesticide application
- C. Preventive spraying
- D. Record keeping

14. What is the drawback of consistently applying a single pesticide to control a pest population? What is the solution to this problem?