



Defense Supply Center Philadelphia  
West Coast Support Office  
Alameda, California

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# Pest Facts

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## Integrated Pest Management

### The Theory of Integrated Pest Management

In the not too distant past, pest management relied upon scheduled pesticide applications to achieve the desired result. Over time, however, the policy of "spray and go" proved to be ineffective and controversial in many situations. Due to the inherent limitations characteristic of many chemical control programs, a new theory (integrated pest management) based on common sense pest management principles was adopted to fill the void. Integrated pest management (IPM) incorporates a variety of techniques (chemical and non-chemical) into a comprehensive, situational program based upon pest prevention/elimination through exploiting pest behavior and biology.

Although all pest problems are unique, developing an IPM program consistently follows a series of pre-established steps. For example, all programs begin with accurate pest identification. From this, a plan is organized which targets the elimination of specific pest requirements (food and harborage). Once a plan (using chemical and non-chemical techniques) is developed, action thresholds are established (to determine when treatment is necessary), populations monitored, and program results documented to determine effectiveness. If it is determined that the program is not meeting expectations or the situation changes, re-evaluation and modification of program components is conducted until the desired effect is achieved.

The following information is provided to assist you in understanding IPM program theory and design.

### Program Development

#### Locating and Monitoring Pests

Program design must be based on pest detection, monitoring and accurate identification. Visually inspecting an area where pests or their damage is observed is the most common method of detection. Inspection involves careful and thorough searching for signs of the pest and conditions which favor pest survival. Monitoring is a systematic method of observing pests or pest signs over a period of time. Monitoring may help you detect pests

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and determine their accesses and harborages. Monitoring is also helpful in evaluating management programs. Once a pest is discovered, accurate identification is essential. For example, managing a roof rat infestation is a bit different than a program designed for a Norway rat. Mistakes in identification could lead to mis-allocation of resources and program failure.

### **Visual Inspection**

The purpose of visual inspection is to actively search for pest evidence. During an inspection, look for: (1) conditions that favor pests (poor sanitation, clutters, access to food and water); (2) signs of pest damage, entry or presence; and (3) the pest itself.

When doing an inspection, it is helpful to prepare sketches of the structure or area. Observe any conditions that may cause problems during pest management operations. Note areas that you were unable to inspect because they were inaccessible. Show locations of landscaping, trash and garbage storage, water sources and other features of the area that may attract or harbor pests or promote pest buildup. Solicit assistance from facility managers and employees. They are your "eyes and ears" and will know when conditions in the facility change. It is important to provide basic pest management training to all involved and encourage communication. Make everyone a part of the solution rather than the problem.

### **Detection and Monitoring Devices**

Different types of simple devices may assist you in detecting and monitoring many pests. Additionally, because these devices are present 24 hours, they will often reveal pest problems that you may have missed during active visual inspections. The following provides information about a few common devices.

#### *Pheromones and Other Attractants*

Pheromones are chemicals produced by insects (and other animals) which affect the behavior of the same species. Pheromones are used for mating, aggregation, feeding, trail following and recruitment. Synthetically produced pheromones mimic the action of naturally produced pheromones or some pest insect species. These are useful for monitoring the adult forms of a variety of pest moths, beetles and certain flies. Other materials may also be used as attractants including foods.

#### *Light Traps*

Traps equipped with ultraviolet lights, or black lights, will attract several species of flying insects. These traps usually have a container with a funnel-shaped entrance that allows insects to enter easily but blocks their escape. Some light traps have an electrically charged grid that kills insects as they approach the light. These traps, however, are not used for insect monitoring and have little value in flying insect control.

#### *Sticky Traps*

For monitoring cockroaches and rodents, glue boards are often used. However, they do have some restrictions including specific environmental requirements.

### Establishing Action Thresholds

Pest management decisions are influenced by health and safety issues created by the pest, legal restrictions and levels of pest tolerance. Occasionally a pest management decision depends on the costs involved to manage a pest weighed against the benefits received. On the basis of any of these factors, an action threshold can usually be established to determine what type of program (management components) is needed and when it should be implemented.

#### *Health and Safety Threshold*

Health or safety threats commonly require fast, extensive and sometimes costly pest management measures. Several pests have the potential for causing injury or vectoring disease. Others damage facilities (rats, termites) or cause product loss (stored product arthropods, rodents).

Decisions to manage pests are based, in part, on knowledge of the potential harm they may cause. If serious injury or damage may result, the management threshold must be very low.

#### *Legal Thresholds*

Public safety codes often require pest management in public buildings, commercial housing, food service facilities and other public structures. Building and safety standards address the management of structural pests as well as the repair of damage. These legal thresholds dictate when pest management must be used, even though in some cases management methods cannot be economically justified or the pests may not be causing a hazard to public health or safety.

For information on laws which regulate pest infestation in certain buildings and on food, contact local health or preventive medicine departments.

#### *Pest Acceptance Thresholds*

People have different degrees of pest acceptance that they are willing to tolerate. pest acceptance thresholds may be high because of social or cultural factors or because of concerns about the costs or hazards of pest management methods. A pest acceptance threshold may be extremely low due to revulsion or fear. Acceptance thresholds may sometimes be modified if you can provide factual information regarding specific pests, the potential for pest damage, and pest management programs.

#### *Economic Threshold*

In certain instances, the cost of management measures may need to be justified. economic thresholds may apply if there are no health and safety, legal or tolerance thresholds that need to be considered. An economic threshold is a level of pest abundance at which the potential loss caused by pest damage is expected to be greater than the cost of managing the pest. Consumer confidence may also be considered an economic cost.

## **Integrated Pest Management in Facilities-An Example**

Pests may be prevented/managed, through sanitation and habitat modification, or they can be managed by trapping, pesticide use and in some instances biological management. Pests in facilities are usually more efficiently managed when a combination of compatible management methods are used. The following is a generic example of a basic pest management program used for facilities.

### *Sanitation/Habitat Modification*

Habitats are areas within a larger environment that are suitable for pest survival. Habitats provide a pest with some or all of the necessary survival resources. A habitat can only accommodate a maximum number of pests due to limitations of one or more of these resources. This maximum number is known as the carrying capacity. Where large quantities of food are available and shelter and other specific requirements are ample, the carrying capacity is high. Such a habitat can support a high number of pests. If the carrying capacity is limited, however, the population/community tends to remain fixed. If you remove individuals from a habitat through pest management measures or if they die off due to natural causes, these individuals will be replaced by others, usually soon, unless the carrying capacity is reduced at the same time. Population/community size is maintained at the carrying capacity by increased reproduction among remaining individuals or by migrating individuals.

Habitat modification usually involves improving sanitation practices. Sanitation includes removing food, water, breeding sites and harborage used by pests. Outdoors, you may need to trim or remove vegetation near buildings, clean up trash, keep garbage in closed containers, provide for drainage of standing water, clean up animal wastes and spilled feed, and eliminate items which attract pests. Inside, sanitation includes storing foods and food wastes in tightly closed containers, cleaning up spills and residues for all areas, removing trash and other materials that can be used for nests, and thorough vacuuming and dusting on a regular basis. The cleaning of surfaces may also improve the effectiveness of pesticides by removing grease, oils, dust, and other contaminants that interfere with their function. Rodent trapping significantly improves with sanitation. To assist in good sanitation, make sure interior areas are well lighted to simplify cleaning and easy detection of pests and pest damage. Train employees concerning the importance of good sanitation practices.

Other sanitation practices include removing dirt mounds, wood pieces and other cellulose debris from areas beneath buildings to keep from promoting termite problems. Provide adequate ventilation to areas beneath buildings to reduce moisture.

Outdoor lights placed near entrances to buildings attract many flying and crawling insects at night. If possible, locate light fixtures away from entrances. Otherwise, modify the type of light being used. Sodium vapor lights are better than mercury vapor lights or standard incandescent lights for outdoor use because they emit a spectrum of light that is less attractive to insects; yellow "bug" bulbs work on the same principle.

A program of sanitation and habitat modification requires cooperation. All people working in a building must keep food, food waste and trash in pest-proof containers and store other items in designated places where they cannot attract pests. Employees should promptly report pest problems. Housekeeping and landscape

maintenance workers can help by keeping interior and exterior areas free of trash, nesting sites and other items that might be attractive to pests; they should provide containers for wastes and specify locations for storage of other materials. Waste containers should be frequently emptied and cleaned as well as the surrounding areas. Buildings must be monitored on a regular basis to ensure that sanitation conditions are maintained and to spot new problem areas as they occur.

### Exclusion

Exclusion is a type of habitat modification useful for keeping pests from entering facilities. The design, construction and maintenance of a building may either promote pests or exclude them. Pest-proof design should be an important consideration when planning new structures and remodeling others.

Check building exteriors for pest accesses. Obvious entrances for many pests are doorways and windows. These must be fitted with tight-fitting screens and doors. Properly installed weather stripping eliminated small cracks that provide access for some pests. Look for foundation or wall cracks, leaking plumbing, gaps in siding or joints and areas where pipes, wires or other objects pass through walls. Fill openings with concrete or another suitable patching material. Check window screening and air curtains for good repair and proper functioning.

### Inspection

Inspect items brought into a building for pest infestation. Also inspect trucks, trailers or railcars for pests. Often, pests are brought into a facility through a method of conveyance.

### Trapping

Besides their benefits as monitoring devices, traps are used to kill pests or to catch pests so they may be removed from an area. Many types of pests can be managed through trapping. Traps do not require the use of chemicals and the user can easily view the success of the trapping program. However, successful trapping programs require skill, time and attention to develop workable techniques. Even so, trapping may not always work well enough under some conditions to satisfactorily manage target pests. Trapping techniques that are successful in one situation may not always work as well under different conditions or at other locations.

### Pesticides

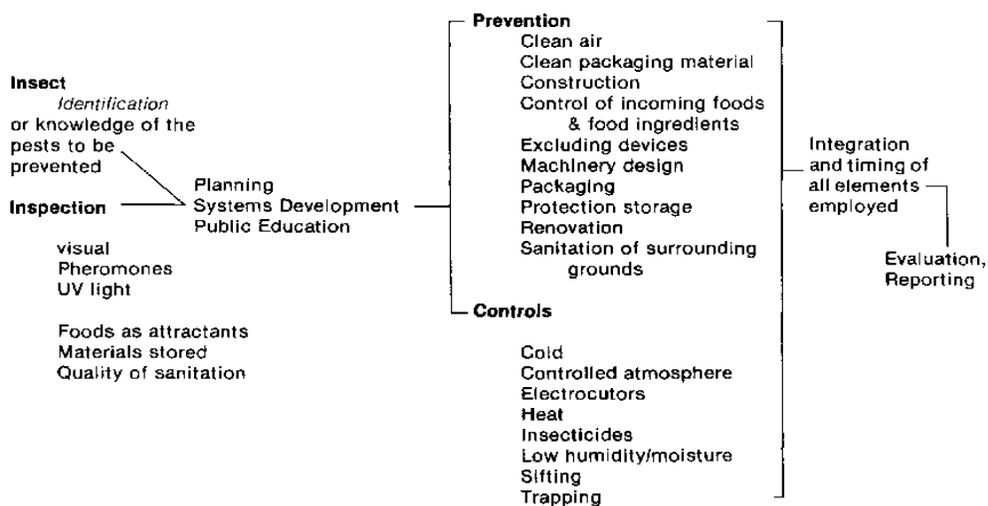
The application of pesticides is often the most common pest management method. To be effective, however, chemicals must be used in conjunction with other techniques. Furthermore, pest specific, low-toxicity compounds should be used when possible. Compounds should never be applied on a schedule and be someone who is not trained and certified.

## **Summary**

A well designed integrated pest management program is an extremely effective in controlling current pest infestations and preventing new populations from becoming established. All programs are developed following a series of steps and utilizing a variety of chemical and non-chemical techniques. Success, however, is dependent

upon proper training, communication and cooperation. For more information concerning IPM, please contact your local pest management professional or DSCP-WCSO at commercial (510) 337-8122, DSN 686-8122 or email paa5245@exmail.dscp.dla.mil.

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Generic IPM Program for Stored Product Arthropods