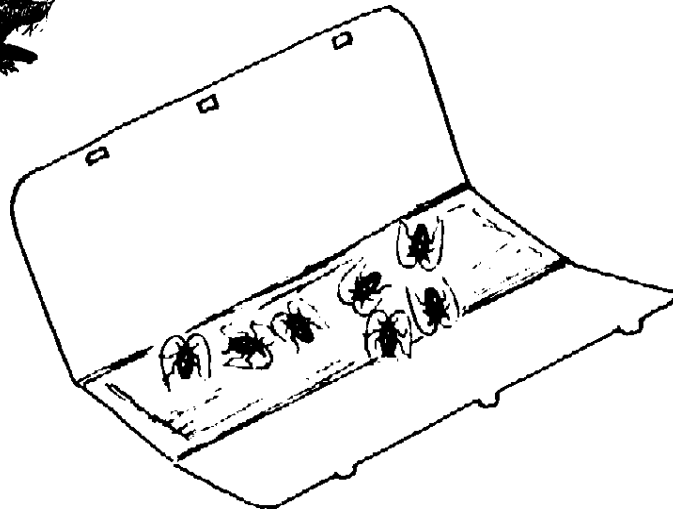


“Action Thresholds in School IPM Programs”

**Supplemental Materials
for
Integrated Pest Management- IPM Training Manual**



**MARYLAND
DEPARTMENT OF AGRICULTURE**

**Parris N. Glendening
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**Maryland Department of Agriculture
Pesticide Regulation Section
50 Harry S. Truman Parkway
Annapolis, Maryland 21401
Telephone: (410)841-5710 FAX: (410)841-2765
Internet: <http://www.mda.state.md.us>**

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Governor**

**Kathleen Kennedy Townsend
Lieutenant Governor**

**Henry A. Virts, D.V.M.
Secretary of Agriculture**

**Hagner R. Mister
Deputy Secretary**

**Dr. Charles W. Puffinberger
Assistant Secretary
Office of Plant Industries and Pest Management**

**Mary Ellen Setting
Chief
Pesticide Regulation Section**

Prepared by
Lawrence J. Pinto & Sandra K. Kraft
Pinto & Associates, Inc.

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Action Thresholds in School IPM Programs

*Maryland Department of Agriculture (MDA) regulations require a school system to have an approved integrated pest management (IPM) plan. The plan must include standards to determine the severity of pest infestation and the need for corrective action. One way to meet this requirement is through action thresholds. This document was developed to help schools develop their own action thresholds. **The specific action thresholds mentioned in the document are offered as examples only.** They are not required by the regulations. Each school using action thresholds should develop thresholds of their own, suited to specific conditions at the school.*

Integrated pest management, or IPM, is a system of controlling pests that does not depend on automatic application of pesticides. A school IPM program consists of a cycle of monitoring, control, and evaluation. Pest levels and other factors are monitored through documented, systematic inspections conducted at regular intervals.



A key difference between IPM and traditional pest control is that IPM often uses “action thresholds.” An action threshold is the point at which an IPM technician takes action to reduce a pest’s numbers. Sometimes an action threshold is a number: five yellowjackets at a trash can, 10 percent feeding damage to a plant, three flies in a classroom. Sometimes it is qualitative: light or no infestation versus heavy infestation. Below the threshold level, the IPM technician does not apply pesticides or set traps or take any other direct control action. (Although the technician should continue to monitor and do sanitation inspections, pestproofing, and take other steps to prevent pest problems.) But if a pest is at or above the action threshold, the technician acts to control the pest.

The idea behind the action threshold is that most pests can be tolerated at some low level. An occasional ground beetle in a school hallway, for example, would bother few people. The costs and risks of taking action because of that one beetle--replacing door sweeps, caulking cracks in walls, or applying pesticide--would far outweigh any benefits. Besides, a lone beetle is likely a temporary guest rather than a serious pest. But thirty ground beetles in a hallway would be a different story, and an IPM technician would need to take some kind of pest management action.

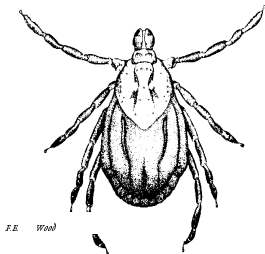
Action thresholds are easy to understand. Establishing them is more difficult. Action thresholds vary by pest (hornet versus ant), by site (storage room versus infirmary), and sometimes by geographic location (western Maryland versus southern Maryland), or by season (fourlined plant bugs stop feeding in June, so the action threshold might be much higher in July than May). For some landscape pests, action thresholds will also vary depending on whether natural enemies are present.

Establishing Thresholds

Five factors should be considered in setting action thresholds: economics, health and safety concerns, aesthetic concerns, public opinion, and legal concerns.

Economics

In high numbers, carpenter bees can seriously damage naturally aged, unfinished wood decking and trim. It can be expensive to protect this wood from carpenter bee attack by treating and sealing it. But it can be far more expensive to have to replace that wood after carpenter bees have damaged it. At some level of carpenter bee activity, the risk of damage justifies action. The action threshold might, for example, be set at an average of one carpenter bee per five linear feet. Then, if eight or more carpenter bees were seen along a forty-foot stretch of building (which equals one bee per five linear feet), the IPM technician would schedule the unfinished wood for treatment or sealing.



American dog tick

Health and Safety Concerns

Action thresholds are set low when health or safety are at stake. The action threshold for ticks by a school athletic field would be set much lower if Lyme disease was common in the area. (Blacklegged ticks transmit Lyme disease.) Bee or wasp action thresholds indoors might be set as low as one (take action if you see a single bee or wasp), if a school child is known to have a severe allergy to stings. The threshold for poisonous black widow spiders would be much lower than for garden spiders.

Aesthetic Concerns

Aesthetic damage occurs when the appearance of something is degraded. Examples include bird droppings on sidewalks, defoliation or flower damage to landscape plants, and disease spots in lawns. People often disagree over what level of aesthetic damage should trigger action. What is acceptable to one person may not be to another. Aesthetic thresholds are fairly consistent, however, for pests that damage landscape plants. The average person begins to feel that some control action is necessary when a pest has damaged roughly ten percent of the plant.



Public Opinion

Certain pests are seen as more disgusting, scarier, or otherwise worse than other pests. The reasons are complex, based on social, cultural, or psychological factors. Most people are less willing to tolerate a cockroach than a cricket, a tick than a beetle, a mouse than a pigeon.

Unfortunately, people often disagree on what level of a particular pest is tolerable. Some people, for example, are frightened of spiders. Seeing a spider is seeing one spider too many. Others view spiders as beneficial, and are willing to tolerate a few spiders, even in an occupied room. Those who equate pests with social status are often unwilling to accept any level of any pest. In contrast, cultural factors or fear of pesticides will often force people to tolerate an unusually high level of pests before they feel pest control action is necessary.



A person's tolerance of a particular pest can sometimes be modified by providing information about pests and beneficial organisms, and the risks and benefits of control.

Legal Concerns

Pests in commercial and institutional kitchens are regulated under state and county health codes. There is little tolerance for cockroaches, ants, mice, and other pests anywhere food is stored, prepared, or served, so action thresholds are typically low. Safety and building standards, rather than IPM considerations, may determine when action is necessary to control termites, rats, flies, and other pests in commercial and public areas, including public buildings such as schools. During public health emergencies, government agencies may legally mandate control of certain pests, such as raccoons or skunks during rabies outbreaks, or mosquitoes during encephalitis outbreaks.

Setting Action Thresholds

Schools need to set action thresholds that are suited for their facilities. The specific action thresholds may be developed by a contractor, school pest control staff, consultants, or by committee. Someone may already have developed action thresholds for some of your key pests. The information may be published in research or extension publications. Schools can sometimes obtain action threshold numbers from other schools that have IPM programs already in operation. Such action thresholds can be used as a reasonable starting point, and then modified to suit the conditions at a particular site.

Most action thresholds will be developed from scratch. The school first determines which pests to include and which locations need separate action thresholds. Then the school decides site by site and pest by pest what pest level is tolerable, and sets an action threshold for each pest at each site. For example, the school might decide that field ant colonies outdoors were of little concern, that an occasional ant or two in a basement storage room was tolerable, but that a single ant in the infirmary would require immediate action. On that basis, the school might set the action levels to be 2 colonies of field ants per square yard outdoors, 5 ants per 100 square feet for storage areas, and 1 ant in the infirmary.

Different levels of a pest may generate different control actions. If an IPM technician found three cockroaches in a storage room, he or she might simply place a couple of cockroach bait stations. But 30 cockroaches might require that the storeroom be extensively cleaned, treated with additional insecticides, and all cracks and crevices carefully caulked.

An Example of Setting Action Thresholds for Yellowjackets

Count the number of yellowjackets foraging at a trash can in a given ten minute period. If that number averages around five, and you are getting no complaints about yellowjackets, and no one is getting stung, then no action is necessary. That particular level of yellowjacket activity is acceptable. You might, therefore, set the action threshold at ten. Any time you counted ten or more yellowjackets at the trash can in a ten minute period, you would take further action, perhaps increasing trash pickups, powerwashing trash cans, setting additional yellowjacket traps, or spending an hour or two searching for nests.

— from *Yellowjackets and IPM*, available from the Maryland Department of Agriculture

The school should review the action thresholds regularly, preferably quarterly. Action thresholds may need to be raised or lowered, particularly in the first year or two of an IPM program. Perhaps the level for house flies needs to be lowered because students are being bothered by flies in classrooms. Or perhaps the action threshold for pests on landscape plants needs to be raised because the plants are being sprayed too often. IPM is a dynamic process.

Examples of Action Thresholds

Listed below are a few examples of action thresholds for pests and sites in a school. Similar information is presented in Tables 1 and 2. The list of action thresholds is not complete, and the thresholds, while reasonable, are offered as examples only. Action thresholds at a particular school could be very different, depending on conditions at the school, pest tolerance levels, and other variable factors.

Please note that when action thresholds are exceeded, some pest management action would be necessary, but not necessarily pesticide application. And even though pests may be below action thresholds, the technician would still be responsible for identifying and reporting or correcting sanitation problems, pest entry points, etc. in order to prevent future pest infestations.

Ants (common house-infesting)

Classrooms and other public areas: 5 ants/room; infirmary: 1 ant/room; kitchen: 3 ant/room; maintenance and storage areas: 5 ants/100 square feet in two successive monitoring periods; outside grounds: 2 field ants mounds/square yard.

Ants (carpenter)

Classrooms, public areas, maintenance areas: 3 ants/room; infirmary: 1 ant/room; kitchen: 2 ant/room; immediate action if ant colony suspected inside or within 25 feet of any building.

Bagworms

Control on conifers when 2 or more large bags/tree or bush. In light infestations, hand pick and destroy; in heavy infestations, spray with *B.t.* between June 15 and July 15, or spray residual insecticides after July 15.

Bees (honey)

Classrooms, infirmary, kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: no action unless children are threatened.

Bees (bumble)

Classrooms, infirmary, kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: action necessary if communal nests are present in student activity area. Also action whenever children are threatened.

Bees (carpenter)

Classrooms, infirmary, kitchen and public areas: 1 bee; maintenance areas: 3 bees; outdoors: 1 carpenter bee/5 linear feet if susceptible, unfinished wood. Also action whenever children are threatened.

Cockroaches

Classrooms and other public areas: 2 cockroaches/room. If 2-10 cockroaches per room, apply cockroach bait. If 10 or more, track down infestations, review sanitation, trash handling, clutter, etc.; open equipment, check inaccessible areas; vacuum and otherwise clean room, and apply baits or other insecticides as necessary. Infirmary: 1 cockroach/room; kitchen: 1 cockroach/room; maintenance areas: 5 cockroaches/room; outside grounds: no action unless noticeable infestation.

Crickets

Classrooms and other public areas: 3 crickets/room; infirmary: 1 cricket/room; kitchen: 2 crickets/room; maintenance areas: 10 crickets/room; outside grounds: no action unless causing problems.

Grain and flour pests

Found in food for human consumption: 1/package or container; pet food: 1 if escaping from packaging; if found in pheromone traps: 2 of any one species (total of all traps)

House flies

Classrooms and other public areas: 3 flies/room; infirmary: 1 fly/room; kitchen: 1 fly/room; maintenance areas: 5 flies/room; outside grounds: 5 flies around any one trash can or 10 flies around a dumpster.

Landscape plants (general)

Whenever pest damage approaches 10 percent/plant.

Lawn pests (insects, nematodes, disease)

Whenever visible damage approaches 10 percent in any 100 square foot area.

Lice (head or body)

Take no action: refer to nurse.

Mice

Indoors: any mouse sighting or evidence of mice (such as new mouse droppings, tracks, etc.) triggers pest management action; outdoors: any noticeable burrows or activity in student areas.

Pigeons

Roof ledges: 10/building for 3 consecutive inspections; public area or roof: whenever droppings accumulate more than 1-inch or nests obstruct gutters or equipment.

Poison ivy

Student activity areas: 1 plant; wooded areas: no control necessary unless near path or student activity area.

Rats

Indoors: any rat sighting or evidence of rats (such as new droppings, tracks, etc.) triggers pest management action; outdoors: any active burrows or activity.

Silverfish

Library and wherever books, paper, files are stored: 1/room; other indoor areas: 2/room

Spiders

Take immediate action if a black widow or brown recluse is suspected in any area; other spiders—classrooms: 1 spider/room; infirmary: 1 spider/room; kitchen/cafeteria: 1 spider/room; hallways: 2 spiders/hallway; maintenance and unoccupied areas: 3 spiders/room; outdoors: only if in large numbers or causing problems.

Tent caterpillars

Desirable ornamental plants: 1 tent or egg mass/tree; woodland trees, nonornamental trees: if potentially damaging or aesthetically intolerable, or after two complaints in two weeks (to prevent repeated infestations, remove wild cherry hosts).

Ticks

Outdoor student activity areas: 3 tick, any species; outdoor wooded and other areas of low student activity: keep grass and weeds trimmed; if any blacklegged ticks found, treat wood edges; for other species, take action if moderate to heavy populations.

Weeds

Lawns: whenever weeds approach 15 percent in any 100 square foot area; ornamental plantings: whenever competing with ornamental plants or whenever aesthetically displeasing.

Yellowjackets/hornets

Classrooms and other public areas: 1 yellowjacket or hornet; outdoors: action necessary if nests are present in or near student activity area; 10/10 minutes at trash can or dumpster; 1 yellowjacket or hornet anywhere if children are threatened.

For More Information...

- BIRC. 1992. *IPM Training Manual for Landscape Gardeners*. The Bio-Integral Resource Center, Berkeley, CA
- Davidson, J.A. and M.J. Raupp. 1997. *Landscape IPM: Guidelines for Integrated Management of Insect and Mite Pests on Landscape Trees and Shrubs*. Maryland Cooperative Extension Service Bulletin 350
- EPA. 1993. *Pest Control in the School Environment: Adopting Integrated Pest Management*. U.S. Environmental Protection Agency. EPA 735-F-93-012
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- Olkowski W., S. Daar, and H. Olkowski. 1991. *Common Sense Pest Control*. Chapter 35, Yellowjackets. Taunton Press, Newtown CT

Sample Action Thresholds* for Maryland Schools: Table 1

| Pest | Classrooms/ public area | Maintenance area | Infirmary | Kitchen | Grounds |
|-----------------------|--------------------------------|---|-----------|---------|--|
| Ants, common house | 5/room | 5/100 ft ² in two successive periods | 1/room | 3/room | 2 mounds/yard |
| Ants, carpenter | 3/room | 3/room | 1/room | 2/room | 1 nest within 25 ft |
| Bees, honey | 1/room | 3/room | 1/room | 1/room | If children threatened |
| Bees, bumble | 1/room | 3/room | 1/room | 1/room | If children threatened |
| Bees, carpenter | 1/room | 3/room | 1/room | 1/room | If children threatened; 1 carpenter bee/5 linear feet |
| Cockroaches | 2/room | 5/room | 1/room | 1/room | If noticeable or invading |
| Crickets | 3/room | 10/room | 1/room | 2/room | If nuisance |
| House flies | 3/room | 5/room | 1/room | 1/room | 5/trash can; 10/dumpster |
| Lice (head or body) | Take no action, refer to nurse | | | | |
| Mice | 1/room | 1/room | 1/room | 1/room | burrows or activity in any student area |
| Rats | 1/room | 1/room | 1/room | 1/room | any burrows/activity |
| Silverfish | 1/room | 2/room | 1/room | 2/room | NA |
| Spiders, poisonous | 1/room | 1/room | 1/room | 1/room | 1/activity area |
| Spiders, others | 1/room | 3/room | 1/room | 1/room | only if nuisance |
| Yellowjackets/hornets | 1/room | 1/room | 1/room | 1/room | 10/10 minutes at trash; 1 if threatening children |

*** The specific action thresholds mentioned in the table are offered as examples only. They are not required by the regulations. Each school using action thresholds should develop thresholds of their own, suited to specific conditions at the school.**

Sample Action Thresholds* for Maryland Schools: Table 2

| Landscape or Grounds Pests | |
|----------------------------|---|
| Bagworms | Control on conifers whenever two or more large bags/tree or bush |
| Landscape plants | When pest damage reaches 10 percent/plant |
| Lawn pests | When pest damage reaches 10 percent/100 ft ² |
| Pigeons | 10/building in 3 successive inspections; droppings 1-inch deep; nests obstructing gutters or equipment |
| Poison ivy | 1 plant in any student area; no action in woods unless near path or student area |
| Tent caterpillars | 1 tent or egg mass/ desirable tree; other trees if aesthetically unacceptable; 2 public complaints within 2 weeks |
| Ticks | 3 of any species in student activity areas; in woods, action if moderate to heavy infestations; treat wood edges if evidence of blacklegged ticks |
| Weeds | 15 percent in 100 ft ² |

**** The specific action thresholds mentioned in the table are offered as examples only. They are not required by the regulations. Each school using action thresholds should develop thresholds of their own, suited to specific conditions at the school.***