

# IPM Tactics For Cockroach Control

There are at least 25 species of cockroaches in Alabama, but only five are serious pests. Cockroaches are also known as palmetto bugs, water bugs, and croton bugs. Most cockroaches are found outdoors. Outdoors, cockroaches are an important source of food for many forms of wildlife. They are also important in nutrient recycling.

An Integrated Pest Management (IPM) approach is the best way to control cockroaches. IPM methods incorporate all available control methods into a pest management program. Control methods include sanitation, exclusion, and chemical techniques. Successful cockroach control depends on proper identification and good knowledge of the cockroach life cycle and habits.

## Importance Of Cockroach Control

Cockroaches can:

- damage property by chewing on or soiling book bindings, fabric, and other materials.
- cause respiratory illness in people who are allergic to the allergens cockroaches produce.
- secrete smelly oils that are offensive and can ruin food.
- impart odors to dishes that look clean.

## Types Of Cockroaches

For pest control purposes, there are two categories of cockroaches—indoor and outdoor. The smaller cockroaches, the German and the brownbanded, are considered “indoor” or domestic species. They are seldom longer

than 5/8 inch. The German cockroach is the most common indoor cockroach and causes the most persistent problem.

The “outdoor” or peridomestic species are American, smoky-brown, brown, Australian, and woods roaches. Most adults are about 1¼ to 2 inches long and are often called palmetto bugs, although some of the woods roaches can be as small as German cockroaches. Outdoor cockroaches can become an indoor problem when they accidentally come in through an open door or are carried in.

## Cockroach Life Cycle

Cockroaches pass through three stages of development: egg, nymph, and adult.

**Egg.** Cockroaches deposit eggs in groups of 20 to 50 in a leathery case or capsule called an ootheca. Usually, the ootheca is dropped or glued to a surface by the female as soon as it is formed. However, the German cockroach carries its egg case. It can be seen protruding from the female’s body until the eggs are ready to hatch.

**Nymph.** When cockroach nymphs hatch from eggs, they resemble the adults in shape, except that they are much smaller and lack wings. Nymphs shed their skin (molt) several times, increasing in size each time before molting into an adult. Depending on the kind of cockroach, the wings vary from being longer than the body to being small pads.

**Adult.** Newly molted cockroaches are soft and white, but

harden and darken in color rapidly. Therefore, there are no “albino” cockroaches. Normally, cockroaches molt in protected areas, but in serious infestations, they may be seen in the open.

Small cockroaches often produce six to eight generations a year with 30 to 48 eggs per case. Larger cockroaches usually produce one to three generations per year with 10 to 28 eggs per case. All cockroaches are most active at night.

## Major Cockroach Pests

### German Cockroaches *Blattella germanica (L.)*

Adults are 1/2 to 5/8 inch long. They are pale brown or tan with two parallel black streaks on the shield or pronotum which covers the head (Figure 1). Unlike most cockroaches, German cockroach females protect their egg cases by carrying them around. The egg case protrudes from her body until the eggs are nearly ready to hatch. Each case can contain 30 to 48 eggs that require about 2 weeks to hatch. A female German



Figure 1. German cockroaches: male (left), nymph (center), and female (right). (Photo by P. A. Zungoli and W. H. Robinson.) Used by permission.



Figure 2. Brownbanded cockroach. (Photo by Jim Castner, used by permission of the University of Florida Entomology and Nematology Department.)

cockroach may produce between one and seven cases during her life. Adults may live 3 to 4 months. German cockroach nymphs are about 1/8 inch long when they hatch. They are uniformly dark, except for a light brownish area in the middle of the body.

### **Brownbanded Cockroaches** *Supella longipalpa (F.)*

Adults are about 5/8 inch long (Figure 2). All stages have two light, yellow-brown bands that run across their backs. The bands on adult males may be hard to see since their light brown wings completely cover their narrow bodies. Males are known to fly in warm homes or apartments while females cannot fly. Brownbanded cockroaches may be found anywhere in the house, especially above the floor around cabinets, in room corners, and underneath drawers. They are also found behind pictures, in furniture and appliances, including TVs, microwaves, computers, and radios. These cockroaches are common in public buildings.

### **American Cockroaches** *Periplaneta americana (L.)*

Adults range in size from 1 1/2 to 2 inches long (Figure 3). Generally, they are red-brown in color, with pale yellow "halo-like" markings on the pronotum above the head. The nymphs are about 3/16 inch long when they hatch from the egg case and are initially



Figure 3. Large outdoor cockroaches: (left to right) American, brown, smokybrown, and Australian. (Photo by Eric Benson.)

gray-brown. American cockroaches are often found in dark, moist, warm areas, especially around sewers, storage rooms, and garbage sites. Along the coast, they may be found in trees, especially palmettos. When inside, they generally stay on the basement and first floor levels. Adults may fly on warm evenings.

### **Smokybrown Cockroaches** *P. fuliginosa (Serville)*

Adults are about 1 to 1 1/2 inches long (Figure 3). As the name implies, they are smoky brown in color. The young nymphs are about 3/8 inch long, with black bodies and white markings on the middle of their bodies and on the tips of their antennae. Smokybrown cockroaches prefer dark, humid environments. They can be very mobile and will use a variety of habitats such as mulch, log piles, thick vegetation, and roofs. In structures, they can be found from the attic to the crawl space. Adults may fly on warm evenings.

### **Oriental Cockroaches** *Blatta orientalis (L.)*

Adults are 1 to 1 1/4 inches long and dark brown to jet black in color (Figure 4). The wings of the males are not quite as long as the body, while the females have only small wing pads. The nymphs are about 1/4 inch long when they hatch and go from red to brown as they develop. These cockroaches prefer dark, damp, relatively cool locations. These



Figure 4. Oriental cockroach. (Photo by Jim Castner, used by permission of the University of Florida Entomology and Nematology Department.)

cockroaches are commonly found in bathtubs because they have difficulty climbing smooth surfaces. They also can be found in water meter boxes, sewer lines, leaf litter, crawl spaces, and basements. In a structure, they rarely go above the basement level.

## **Minor Cockroach Pests**

### **Australian Cockroach** *P. australasiae (F.),* And **Brown Cockroach** *P. brunnea Burmeister.*

Adults of both cockroaches are about 1 1/2 to 2 inches long. The Australian cockroach is about the same size and color as the American cockroach, but it has yellow markings on the front of its wings (Figure 3). The Australian cockroach usually lives only along the coast. Brown cockroaches can occur statewide. Both cockroaches are often found in the same locations as American cockroaches.

### **Surinam Cockroaches** *Pycnoscelus* *surinamensis (L.)*

Adults are about 3/4 to 1 inch long, with a stout body (Figure 5). They are brown to black with a pale band on the front edge of the body. The wings extend beyond the length of the body. Interestingly, only females are found in the United States. Surinam cockroaches are most commonly found along the coast,



Figure 5. Surinam cockroach. (Photo by Jim Castner, used by permission of the University of Florida Entomology and Nematology Department.)



Figure 6. Florida woods cockroach. (Photo by Jim Castner, used by permission of the University of Florida Entomology and Nematology Department.)



Figure 7. Cuban cockroach. (Photo by Jim Castner, used by permission of the University of Florida Entomology and Nematology Department.)

where they can become very numerous in lawns. It is a burrowing species that lives outdoors and often infests potted plants. When plants are brought inside, the cockroach infests premises such as the interiorscapes of shopping malls and houses.

### Florida Woods Cockroaches *Eurycotis floridana*, And Other Woods Cockroaches

The Florida woods cockroach adult is about 1½ to 3 inches long and is found in the coastal counties in Alabama (Figure 6). It is often called the “stinking cockroach” because it produces a foul-smelling fluid to protect it from predation. The Florida woods cockroach and other woods cockroaches live in the bark of dead pine stumps and logs, in tree cavities, and under palmetto leaves on the ground. Occasionally, they enter homes on the ground floor. Since they do not survive well indoors, they do not cause serious problems.

### Cuban Cockroaches *Panchlora nivea* (L.)

Adults are about 1 inch long and distinctively pale green in color (Figure 7). Nymphs are dark brown. The Cuban cockroach is an outdoor tropical species found in the coastal areas of Alabama. Adults live on plant leaves and nymphs live in leaf litter and debris.

## Methods Of Cockroach Control

An IPM approach is the most effective method of cockroach control. The least effective control method is the use of chemicals alone. Using chemicals alone results in insecticide resistance and, ultimately, very poor control.

Homeowners may undertake their own IPM plan for cockroach control with good success, or they may elect to contract the services of a professional pest control operator. Professionals have the equipment and training to do a thorough job and have access to products not available to homeowners. If you decide to contract the services of a professional pest control operator, get estimates from several reputable firms before you decide on one.

### Prevention And Sanitation

Successful cockroach control requires prevention and sanitation. Prevention and sanitation can be divided into four categories: exclusion and elimination of food, water, and harborage. Following the recommendations in the four categories will likely eliminate the most important factors that affect cockroach establishment and survival.

#### Exclusion

- German cockroaches can initially infest a structure when infested grocery bags are brought inside. Inspect groceries for cock-

roaches before storing. Keep grocery bags in outside storage areas.

- Cockroaches breed prolifically in corrugated cardboard boxes. Discard unnecessary boxes immediately.

- Keep doors and windows shut. Keep screens in good repair to prevent cockroaches from entering your home. Check attic vents and make sure that large openings around outside drainage lines and sewer vents are screened or sealed. Use tightly packed steel wool as a temporary filler until openings can be sealed properly.

- Caulk cracks and gaps around doors and windows to help prevent cockroaches from entering your home.

- Children can transport cockroaches from school to home in bookbags and lunch containers. Inspect these items regularly.

- Dwellings, such as apartments, that are separated by a common wall are particularly difficult situations. An infestation can migrate between apartments via the plumbing encased in a common wall. Therefore, cockroaches from one apartment can easily migrate to another apartment, infesting a “clean” dwelling. To help prevent this, caulk holes in common walls and around plumbing.

### Elimination Of Water Sources

Water is the most important factor in cockroach survival. German cockroaches can survive only

12 days with food but no water. However, if only water is present with no food, cockroaches can survive for about 42 days. Cockroaches often come indoors during periods of drought because they are looking for moisture. Eliminate water sources by doing the following:

- Tighten or patch leaky pipes in kitchen and bathroom areas.
- Do not let water stand in sinks for long periods of time.
- Do not overwater indoor plants because accumulated water will be available to cockroaches.
- Empty pans under refrigerators used to catch water from condensation.
- Be aware that pet drinking dishes, aquaria, and pipe condensation (under sinks, in wall voids) can also be sources of moisture.
- Eliminate sources outside where water can collect, such as cans, tires, and tree holes (Figure 8).

## Elimination Of Food Sources

Cockroaches do not need large amounts of food to survive, especially in the presence of water. Furthermore, food sources can compete with cockroach baits, decreasing their effectiveness. Elimination of food sources includes:

- Store and dispose of garbage properly. The highest concentration of cockroaches in a home is usually around the garbage can and around the refrigerator.
- Seal garbage can lids to prevent cockroaches from accessing food sources. Also, keep garbage areas clean by wiping frequently.
- Dump sink strainers frequently to prevent food build up.

- Wash dishes immediately after use. Dishes left unwashed are a major source of food for a kitchen infestation.

- Keep kitchen appliances such as toasters, toaster ovens, microwaves, stoves, ovens, and refrigerators free of crumbs and other food debris. In addition, clean the areas around these appliances.

- Reseal all food after opening or store in the refrigerator.

- Seal pet food tightly. Do not leave food and water out all the time.

- Regularly vacuum or sweep under and around furniture where people eat, such as the dining room table. Vacuuming can also remove cockroach egg cases that will not be killed by insecticides. Remember to promptly dispose of the vacuum cleaner bag in an outdoor container.



Figure 8. Tree hole habitat for outdoor cockroaches. (Photo by Faith Oi.)

## Elimination Of Harborage

In addition to food and moisture, cockroaches require a place to live. The cockroach harborage is critical to its survival. Cockroaches prefer dark places that are warm and moist. Places that provide tight spaces such as stacks of newspaper or cardboard, piles of clothing, or cracks and crevices in structures are ideal. Harborage not only provide a place for cockroaches to live, but

they also can create “pesticide free” zones where cockroaches can hide if insecticides are selected as one tactic in the IPM program. Eliminate harborage by doing the following:

- Seal cracks and crevices. Adult cockroaches can fit into cracks only about  $\frac{1}{16}$  inch and prefer spaces of about  $\frac{3}{8}$  inch.

- Pull mulch away from the house. The large, outdoor cockroaches breed prolifically in pine straw mulch and poorly in gravel or on bare soil.

- Stack firewood off the ground and well away from the house.

- Fill tree holes with cement to remove this prime harborage area.

- Keep shrubbery and ornamentals well trimmed and away from the house. Ivy is a favorite breeding place for outdoor cockroaches.

- Remove all dead palm branches. Palm bracts are prime harborage for outdoor cockroaches.

- Keep clutter such as newspapers, bags, and clothing from accumulating.

## Chemical Control

Use prevention and sanitation methods before and concurrently with chemical control tactics.

Greasy surfaces decrease the effectiveness of insecticide applications. Therefore, before treating surfaces eliminate grease and oil by scrubbing with hot, soapy water. Generally, liquid sprays will not be effective when applied to wood surfaces such as cabinets and shelves.

Vacuuming will eliminate cockroach skins and feces that cause cockroach allergies. Cockroach feces also contains a chemical (aggregation pheromone) that attracts cockroaches to an area. Eliminating

the cockroach feces by scrubbing with hot, soapy water will decrease the amount of aggregation pheromone available to attract cockroaches to the area.

Use chemicals in a judicious manner and only according to label instructions. There are a large number of insecticides for cockroaches. Only a few of the more commonly used chemicals are listed here. The common names are printed in bold letters, and an example trade preparation is listed in all capitals in parentheses. For additional listings, see the *Alabama Pest Management Handbook*, ANR-500B.

The most common formulations for cockroach control are sprays, dusts, and baits.

### Sprays

Insecticides commonly used in indoor sprays include **allethrin**, **chlorpyrifos** (DURSBAN), **diazinon**, **permethrin**, **propoxur** (BAYGON), **pyrethrins**, **resmethrin**, and **insect growth regulators** (IGR) such as hydroprene or pyriproxyfen.

Insect growth regulators will take 4 to 6 weeks for a noticeable decrease in the population. But control is longer lasting because the cockroaches are no longer able to reproduce once exposed. Evidence of insect growth regulator exposure is twisted wings on the adult cockroaches and altered behavior. Expect to see more cockroaches during the day as a result of IGR use. Seeing more cockroaches after IGR use means the treatment is working.

Apply materials to cracks and crevices where cockroaches live. These areas include cracks around pipes under sinks, around toilet bowls, around baseboards, and around appliances. Never spray around

or into electrical outlets. Avoid spraying food preparation surfaces. Do not touch surfaces until dry (at least 4 hours). Some materials may damage carpets, tile, or plastics. Check the label before using any material on these surfaces.

Outdoor homeowner products include carbaryl (SEVIN), chlorpyrifos (DURSBAN), and diazinon. Apply these materials at the label rate to cracks and crevices where cockroaches are suspected of living or entering the home, such as door thresholds and window frames. A perimeter treatment along the base of the foundation wall, in cracks and crevices, and at points of entry into the home can also help control the larger outdoor cockroaches. However, large scale insecticide applications are best done by professional pest control operators.

Research at Auburn University has shown that an IPM approach reduces the amount of insecticide used and can result in better reductions of outdoor cockroach populations for longer periods of time when compared with perimeter spraying alone.

### Dusts

Dusts are slow-acting but can give long lasting control. Boric acid is probably the most commonly used dust labeled for cockroach control. It is most effective indoors in clean, dry areas.

Apply boric acid with a duster that puts out a thin film of dust. Apply dusts in hidden areas such as under refrigerators, stoves, sinks, wall voids, and other cracks and crevices. Do not apply dusts in open areas such as on shelves or counters where food and utensils are kept. Boric acid is highly toxic to plants and will discolor some fabrics. Other effec-

tive dust and borate products are available to pest control operators.

### Baits

Baits usually come in granular formulations, plastic stations, or large syringes for gel applications. Some commonly used insecticides in baits include chlorpyrifos (DURSBAN 0.5% BAIT), hydramethylnon (COMBAT ROACH BAIT STATIONS or GEL BAIT), sulfluramid (RAID MAX), and avermectin (ROACH ENDER).

Apply granular formulations outside in plants and mulched areas. Bait stations are most effective when placed in corners where you suspect cockroaches are hiding or coming into your home. Get small stations for German cockroaches and large stations for the larger outdoor cockroaches.

Place the gel in syringes in cracks and crevices around windows, doors, and any other suspected cockroach harborage, except in food handling areas. Never spray a liquid insecticide where baits have been applied. Liquid insecticides used in the vicinity of baits will repel cockroaches from the bait. Pest control operators have other baits in different forms that also provide long lasting control.

## IPM Approach For Indoor Cockroaches

- Thoroughly vacuum and wipe the premises with hot soapy water.
- Place baits (gel and station type) according to label directions.
- Check baits monthly until populations decrease, then quarterly. Replace empty bait stations because they provide additional harborage for cockroaches when empty.

- If populations are very high, a “clean-out” using a liquid insecticide mixed with an insect growth regulator, such as hydroxyflorfen or pyriproxyfen, in cracks and crevices may be needed to knock down the initial population. Place baits in areas not treated with liquid insecticide or place baits 4 to 6 weeks after spraying.

## An IPM Approach For Outdoor Cockroaches

An 80 percent reduction in cockroach abundance was achieved using the following IPM approach.

- Replace mulch and debris around the home with a band of crushed gravel that extends 1 foot out from the foundation.
- Apply 0.5 percent chlorpyrifos ant and cockroach bait within 3 feet of the home in pine straw, fallen leaves, or ivy, and next to

other cockroach habitats such as garden borders, large rocks, or railroad ties.

- Apply gel bait containing 2 percent hydramethylnon to sheltered cracks and crevices such as porch corners, under ledges, in crawl space gratings, and under garage doors.

This combination of IPM tactics was compared with a perimeter treatment of 8 ounces of chlorpyrifos in 100 gallons of water, sprayed 3 feet up from the base of the house and 10 feet out. The IPM approach outlined above maintained an 80-percent reduction in cockroach populations for up to 40 days, using only 1/4 of the insecticide in the perimeter treatment. In 40 days, the cockroach populations for the perimeter treatment alone had rebounded to cockroach population levels where no treatment was applied.

## References

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Use pesticides only according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

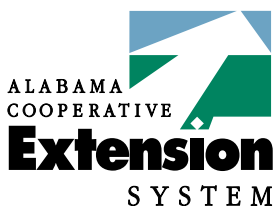
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