



Cockroaches

Cockroaches are one of the most common household insect pests. A major concern with cockroaches is that they are repulsive and objectionable to people simply by their presence. They are also capable of transmitting bacterial pathogens (*Salmonella* spp., *Shigella* spp., *Staphylococcus* spp., *Streptococcus* spp.) that cause food poisoning, diarrhea, or typhoid. Recently, cockroaches have been recognized as being an important source of indoor allergens found in their body, saliva, and fecal matter. Cockroaches also can damage household items, by eating glue in wallpaper, books, and furniture.

Habitat

The place where cockroaches live and eat is called their habitat. Cockroaches may become established in dwellings from passive introduction, such as cartons, boxes, and grocery bags, or by actively flying or crawling in from the outdoors. In apartment complexes, cockroaches may move via common plumbing fixtures connecting individual units.

Cockroaches prefer warm, undisturbed areas with high humidity and a nearby source of food. In general, cockroaches are most active at night. By day, they hide in dark areas such as under refrigerators and stoves, in kitchen cabinets, and in cracks and crevices in walls. Their oval, flattened body shape allows them to easily enter cracks and crevices. They are extremely hardy and can survive long periods without food or water.

Life cycle

Cockroaches undergo incomplete metamorphosis that consists of three stages: egg, nymph (immature), and adult. Depending on the species, 12 to 40 eggs are contained in an ootheca (egg case) that protrudes from the tip of the female abdomen. Egg cases are deposited on or under suitable substrates before hatching. The egg stage lasts from a few weeks to a few months.

The active nymphs hatch from the eggs and are much smaller than adults, wingless, and usually lighter in color. Nymphs periodically shed their skin as they develop to the adult stage. They appear white for several hours, until their new "skin" darkens and hardens. Each nymphal stage is

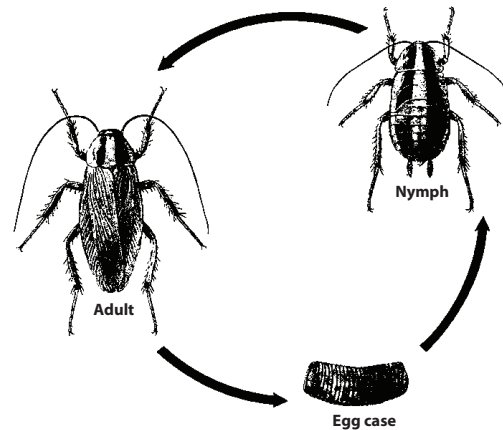


Figure 1. Life cycle of a cockroach (Courtesy of WHO)

larger than the previous one. Although only one nymphal stage is shown in Figure 1, the number of nymphal stages may range from two to 18 depending on the cockroach species. Nymph and adult cockroaches live in the same habitat and have similar feeding habits. The life cycle from egg to adult may take from a month or so up to 12 months. Some species may live for several years.

Quick facts about roaches

- **Obnoxious:** Roaches are among the most intolerable insects due to their repulsive and annoying characteristics.
- **Disease carrier:** Roaches contaminate food and eating utensils and spread bacterial pathogens.
- **Asthmatic:** Roach allergens (saliva and fecal material) are strong asthma triggers.
- **Incomplete metamorphosis:** Roaches have three stages in their life cycle: egg, nymph, and adult. All stages may be found any time of year.
- **Omnivorous:** Roaches can eat any organic matter.
- **Nocturnal:** Roaches hide in dark, sheltered places during the day and come out to feed at night.
- **Rapid breeding cycle:** Roaches can rapidly expand their numbers in a few weeks or months.
- **Hitchhiker:** Roaches hitchhike in appliances, in boxes, or on furniture that is brought into the dwelling.

Identification

There are more than 3,500 different species of cockroaches in the world, but only five (Figures 2a, 2b and 3) that homeowners may come in contact within Kansas. These species are distinct both in their appearance and in where they may be found. Of these, German and brown-banded cockroaches prefer indoor locations. Oriental, American, and wood cockroaches usually live outdoors but occasionally become an indoor problem. One of the important considerations of a good cockroach management program is to correctly identify the species involved in a cockroach infestation.

German cockroach (*Blattella germanica*)

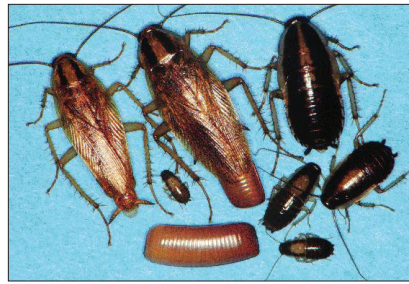
The German cockroach prefers sites close to a food and water source and are the most common indoor pest species, especially in multiple family dwellings in Kansas. They are often found in kitchens, bathrooms, and food storage areas. Adults are ½- to ⅝-inch long, and are light tan to light brown in color. They can be distinguished from other adult cockroach species by two dark stripes that run lengthwise on the pronotum (just behind the head). This species usually gathers or aggregates in cracks and crevices around cabinets, wall and ceiling voids, and in and around refrigerators, dishwashers, stoves, washers and dryers, and water heaters. One of the most distinguishable characteristics of this species: females carry their ootheca (egg case) protruding from the tip of the abdomen until almost ready to hatch.

Brown-banded cockroach (*Supella longipalpa*)

While the brown-banded cockroach is often found with the German cockroach, it prefers starchy foods and a drier habitat. This species is usually located throughout homes — high on walls, behind wallpaper, pictures, bookcases, or near warm electrical components such as radios, televisions, and refrigerators. Adults are ½-inch long and light tan in color. This species can be separated from the German cockroach by the absence of the two dark longitudinal strips on pronotum and the presence of two light transverse bands across the body at the base of the wings and on the abdomen. The bands are much darker during immature stages. Males are winged and narrow. Females are broader and wingless.

American cockroach (*Periplaneta americana*)

The American cockroach is the largest of the common roaches and prefers dark, warm, moist areas where it feeds on decaying organic matter. They readily live outdoors but occasionally may be found in bathroom plumbing, sewers, steam tunnels, and masonry storm drains. They are common pests in animal rearing facilities. Adults are reddish brown and reach 2 inches in length. Both sexes have wings, and the edges of the pronotum are light colored.



German cockroach

Egg case:
Light tan; ¼-inch long; dropped shortly before hatching; 30 to 40 eggs.

Nymphs:

Wingless; two lengthwise stripes behind the head; molts six to seven times.

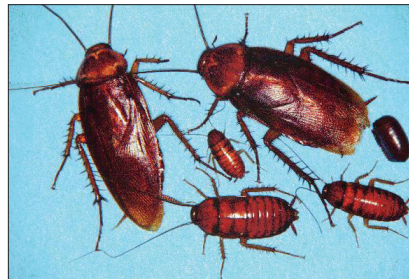


Brown-banded cockroach

Egg case:
Light brown; ¼-inch long; glued to a protected surface; 13 to 18 eggs.

Nymphs:

Wingless; two dark transverse bands across the body; molts seven to nine times.

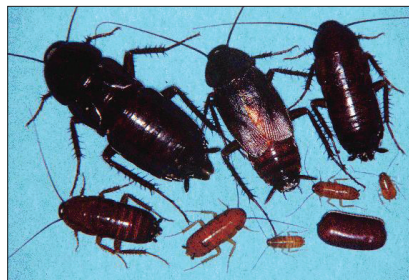


American cockroach

Egg case:
Brown when laid but turn black; ⅜-inch long; glued to a protected surface 24 hours after it is formed; 12 eggs.

Nymphs:

Wingless; shiny, reddish-brown nymphs; molts 13 to 18 times.



Oriental cockroach

Egg case:
Dark reddish brown; ⅜-inch long; glued to a protected surface 24 hours after it is formed; 16 eggs.

Nymphs:

Wingless; two dark transverse bands across the body; molts seven to 10 times.

Figure 2a. Identifying features of cockroach species

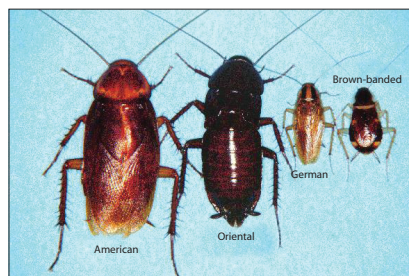


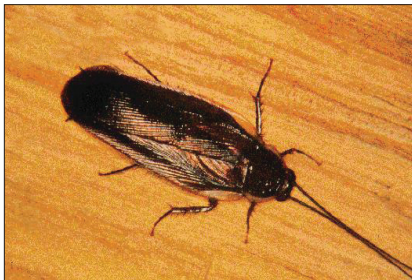
Figure 2b. Comparison of American, Oriental, German and Brown-banded adult cockroaches. Photos courtesy of the University of Nebraska.

Oriental cockroach (*Blatta orientalis*)

The Oriental cockroach prefers damp, dark, cool areas and is often found in basements, garages, trash cans, wood piles, and indoor/outdoor drains. Adults are 1¼ inch long and black to dark brown. Females of this species are wingless, and the wings of the male only cover three-quarters of the insect body.

Wood cockroach (*Parcoblatta spp.*)

Wood roaches, (Figure 3) are a group of outdoor cockroaches that don't breed inside and do not become established in the home. They live in rotted logs, tree stumps, hollow trees, stopped-up rain gutters, and in piles of firewood. They may wander into homes built in wooded areas or be carried in on firewood. They may be noticed at the time when the males are active and attracted to lights. Adults are about ½- to ¾-inch long, brown in color with clear edges along the thorax and front portion of the wings. The wings of the males extend slightly beyond the tip of the abdomen. The female's wings cover only one-third to two-thirds of the abdomen.



Wood Cockroach

Egg case:

Yellowish brown; curved on both sides like a half moon; deposited behind the loose bark of dead trees, fallen logs; 32 eggs.

Nymphs:

Wingless; dark brown; molts six to seven times.

Figure 3. Wood cockroach adult male

Control measures

Controlling a cockroach infestation is difficult. An integrated pest management (IPM) approach that combines different control strategies is required for effective cockroach management. The IPM approach strives to manage pest populations using techniques that reduce the amount of insecticides required to accomplish that goal. Homeowners may undertake their own IPM plan for controlling cockroach infestations with good success.

Correct identification

Correct identification of infesting cockroach species is essential in locating their hiding places and directing control efforts to those areas. Looking at the egg cases in Figure 4 helps to distinguish the egg cases in the different species.

Monitoring/trapping

Regular monitoring and inspection helps to detect cockroaches before they become established. Sticky traps provide the best method to monitor cockroach populations, reveal hiding places, and assess the effectiveness of control measures. These traps are inexpensive, convenient to use, disposable and contain no toxic chemical. The number and

placement of traps are critical. Place traps along the edges of floors and walls and close to sites where cockroaches are likely to encounter them when foraging. Intensive trapping with sex or aggregation pheromones has been shown to be effective in controlling German cockroach populations.

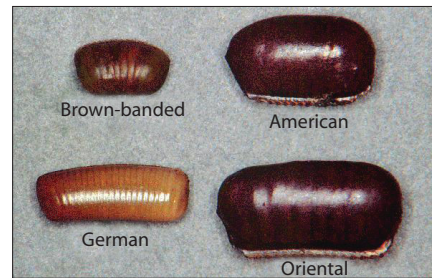


Figure 4. Cockroaches egg cases (clockwise from top left) brown-banded, American, German, and Oriental. Photo courtesy of the University of Nebraska.

Prevention/sanitation

It is difficult to remove all the food, water, and hiding places available to cockroaches within a home. Good housekeeping can minimize food and water sources as well as eliminate favorable breeding sites, reducing the possibility of cockroach infestations and the need to use insecticides.

- Do not leave uncovered food and dirty dishes out overnight, store all food, including pet food in insect-proof containers such as plastic, metal, or glass with proper lids; clean stove and cabinets to avoid any accumulation of grease and food scraps.
- Keep garbage and trash in closed plastic containers and frequently dispose; keep waste containers washed and clean; remove paper, cardboard, lumber, firewood, and other debris to eliminate hiding places and harborage.
- Prevent cockroaches from entering the home by sealing or caulking around air conditioning units, windows, doors, pipes, or other openings; eliminate all possible indoor hiding and breeding areas by repairing plumbing leaks, cracks, and crevices; insulate pipes to prevent condensation.
- Regularly vacuum behind appliances, in cupboards, in cracks and crevices to eliminate food scraps, hiding cockroaches, shed skins, and egg capsules.

Chemical control

Insecticides are most effective in controlling cockroaches when integrated with sanitation and other nonchemical efforts. If used, insecticides must always be used in such a way as to prevent contamination of food, water, dishes, and utensils. The user must read the entire label and apply insecticides according to label instructions. Insecticides registered for cockroach control are generally available as sprays (in liquid or wettable powder form), dusts, baits, and aerosol (pressurized) sprayers. The type of product

selected and the application method used depend on the location and nature of the infestation. The effectiveness of an insecticide depends on the thoroughness of the application. It is important to treat all areas where cockroaches hide. This may include beneath and around objects (cabinet, sinks, and appliances), cracks, crevices, corners, frames, baseboards, etc. Because initial treatments do not kill eggs, reapplication may be necessary after a few weeks to kill recently emerged nymphs. Use different insecticides periodically to avoid insect resistance.

Sprays available as ready-to-use formulations provide fast, easy, and immediate relief from cockroach infestations. Note: some oil-based sprays may damage some types of surfaces. Wettable powder formulations are generally less repellent and more effective on a wide range of surfaces. Common home use insecticides include the active ingredients cyfluthrin, cypermethrin, and permethrin. Insect growth regulators (IGRs), like methoprene, are also effective by inhibiting the growth or maturity of cockroaches. All active ingredients listed have very low mammalian toxicities.

Dusts generally have longer residual action than sprays but become ineffective if they get wet. Dusts can be used in puff applicators and delivered into cracks, crevices, and wall voids, under refrigerators and furniture; around pipes, tunnels, and conduits; and in other places that are inaccessible to sprays. Boric acid mainly provides effective control of cockroaches as a stomach poison, but also abrades the insect's body. Unlike other insecticides, boric acid powder does not repel cockroaches because it is nonvolatile and odorless. Insecticidal dusts such as diatomaceous earth and silica gel also may be used for cockroach control. Both erode the waxy coating on the insect's body, causing dehydration and death. Boric acid, diatomaceous earth and silica gel dusts are low

in toxicity to humans and pets and provide good residual control.

Baits are relatively easy to use and have become popular in the last few years. Available in ready-to-use formulations containing a food attractant and a toxicant, baits are usually long lasting and often work well in areas that cannot be effectively sprayed or dusted. Baits are ideal in conjunction with a residual spray or dust. For baits to be effective, they must be placed in areas of known cockroach activity. Bait stations are the most popular application method because they are easy to install, safe to people and pets, and provide long residual control.

Aerosols are ready-to-use pressurized containers (aerosol bombs) containing non-residual insecticides and are only effective when used indoors and in combination with residual insecticides and in airtight locations.

Ultrasonic devices are not recommended for controlling cockroaches because research has not shown them to be effective.

If a severe cockroach infestation occurs, or it is unclear what to do, contact a professional pest control operator.



- Correct identification
- Monitoring/trapping
- Prevention/sanitation
- Chemical control
 - Sprays
 - Baits
 - Dusts

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