



## Bug-Wise

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**Control German Cockroaches:** German cockroaches, *Blattella germanica*, are common urban insect pests. They are especially common in multi-family apartment buildings where they can be extremely challenging to control. Heavy German cockroach infestations are not only disgusting and embarrassing, but they can also cause medical problems. German cockroaches are a major cause of asthma attacks in tenants, especially children, living in heavily infested apartments, and they can also carry and spread food borne diseases.

**Biology:** German cockroaches are easily identified by the two parallel dark bars they have on the front portion of their back. Mature adults are only about ½ inch long, but they more than compensate for their small size through numbers and persistence. These roaches are highly adapted to live with man. In fact they can't survive without us. German cockroaches do not live outdoors, but they thrive in our kitchens and bathrooms.

Female German cockroaches deposit their eggs inside a special, purse-like egg case, which they carry partially protruding from the tip of their abdomen until just before time for the eggs to hatch. Each case contains approximately three dozen eggs. The eggs hatch into tiny nymphs, which shed their skins several times as they grow and gradually mature into adults. The nymphs are wingless and have two parallel dark bars that run down their backs. It takes two to six months for newly hatched nymphs to become adults. Adult German cockroaches can live up to nine months and females lay four to five egg cases during their life. Because they occur indoors, where they can breed year round and are relatively protected from the population limiting effects of predators and parasites, German cockroaches that have plenty of food and water can develop huge populations. Heavily infested buildings have a distinctive, 'roachy' odor.

Adults and nymphs have chewing mouthparts and are not particular about their diet. German cockroaches will eat anything we eat, drink, or feed our pets, but they also thrive on things like dried human or animal excrement; mucus secretions, dried blood, sputum, and other bodily discharges on clothing, diapers or tissues; as well as the bodies and excrement of other roaches. While German cockroaches will readily feed on large items of food left sitting where they can get to it, they do most of their feeding on crumbs, spills, splatters, accumulations of grease, soiled clothing, and similar items. This is why good housekeeping is so critical to controlling this pest. German cockroaches also require a ready supply of water, and this is another reason they are most common in kitchens and bathrooms.

German cockroaches shun light and usually hide when people are active in a room. Roaches hide in dark cracks and crevices and feel most secure when resting in a tight crevice that touches both the back and underside of their bodies. Kitchen and bathroom cabinets provide a variety of voids and crevices that provide ideal housing for cockroaches. They also like to live inside electrical appliances, such as TVs, computers, and microwave ovens. Because of their flattened body shape, adult German cockroaches can fit through cracks less than 1/8 inch wide and nymphs can fit through much smaller cracks. Although adults have well-developed wings, German cockroaches rarely fly.

**Keys to Cockroach Control:** The following table lists, in order of importance, the major steps and tools apartment dwellers and homeowners can use to control cockroaches. Note that insecticide sprays are way down the list! Without good sanitation and housekeeping, insecticides are just not that helpful. Getting a place clean and keeping it clean is the key to controlling German cockroaches. They can not live without food and water. This is why a thorough initial cleaning is the first step in any effort to control German cockroaches and continued good housekeeping is the second, and most important, step.

### Key Steps and Tools in German Cockroach Control

1	Thorough Cleaning and De-cluttering
2	Maintain Good Housekeeping
3	Physical Exclusion Important in multi-family apartments
4	Bait Stations or Gel Baits
5	Insecticidal Dusts (Boric Acid) Only Applied to voids, cracks and crevices
6	Insect Growth Regulator Sprays Usually Applied by Pest Control Co.
7	Insecticide sprays

**Sanitation and Good Housekeeping:** It is important to realize that it does not take much food to feed a cockroach. They don't need a whole chicken leg! A few crumbs from a chicken leg, a bit of cheese stuck to an empty pizza box, a few drops of dried spaghetti sauce splattered on the stove, or a few drops in an empty drink can, will provide food for many German cockroaches. The following list shows some of the most common cockroach food sources. Good housekeeping practices that eliminate these, and similar, food sources will help eliminate and prevent German cockroaches.

### Places German Cockroaches go to eat and drink

- food not stored in refrigerator or bug-proof containers
- dirty dishes left sitting overnight
- fast food containers such as empty pizza boxes, burger bags
- crumbs, and accumulations of food resulting from spills and splatters
- crumbs and dried spills inside and under small appliances such as toasters and microwave ovens
- crumbs and spills under and around refrigerator and other large appliances
- crumbs and spills around the sofa, bed or other non-kitchen areas where food is consumed
- grease in and on stove, stove vents, and on wall behind stove.
- crumbs, spilled food, dead roaches, and roach feces inside cabinets
- garbage cans without tight fitting lids
- accumulations of food sticking to the sides and bottom of unlined garbage cans
- dirty diapers
- empty beverage containers,
- recycle bins kept indoors
- spilled pet food or pet food left out overnight
- dirty laundry
- dirty bathroom area
- water leaks under cabinets and elsewhere
- water condensation on pipes, air conditioners, refrigerator drip pans, etc

**Exclusion:** German cockroach control is especially challenging in multi-family apartments because housekeeping standards and tolerance for cockroaches can vary greatly among apartments within a building, and one heavily infested apartment can create problems for every apartment in the building. Because of their small size, German cockroaches move readily between apartments, traveling through cracks and crevices in walls, through attic and ceiling voids, through floor voids, along and through vents and duct work, and through penetrations for plumbing and wiring. Remember, German cockroaches do not live outdoors, which means they rarely crawl into buildings through exterior doors or windows.

Apartment dwellers who are serious about cockroach control can help reduce re-infestation from neighboring apartments by sealing as many potential entry points as possible. Use spackling, caulking, foam sealant, copper

mesh, or other appropriate tools to seal potential entry points. Remember, it is the holes and crevices that allow cockroaches to travel between apartments that are of greatest concern. Keep in mind that adult German cockroaches can easily enter through cracks that are only slightly wider than the thickness of a quarter and nymphs can enter through much smaller cracks. Copper mesh is especially useful to help seal larger openings, such as those that occur around plumbing. Use a screwdriver or other tool to stuff the mesh into the opening and then finish sealing with an appropriate sealant. Take all appropriate precautions when working around electricity.

**Baits:** When it comes to chemical control, baits are by far the best way to control German cockroaches, but they won't work well without good sanitation. Deprive roaches of other food sources through good housekeeping and they will readily feed on baits placed in and near their hiding places. When used properly, insecticide baits are much more effective than insecticidal sprays. Developments and advancements in formulation of cockroach baits over the past few decades have revolutionized German cockroach control.

Baits consist of a food substance that contains only a small amount of insecticide or insect growth disruptor. They are formulated either as bait stations or as gels/pastes. Bait stations contain a small amount of bait in a small protective container that allows roaches to enter but prevents ready access by children or pets. Gels or pastes come in tubes that allow placement of small amounts of bait under edges of counters, inside cabinets, and similar places that are inaccessible to children or pets, but readily accessible to roaches. Roaches eat the bait, return to their hiding places, and die. But the control does not necessarily stop there. Some cockroach baits provide secondary control--roaches that eat the bodies or feces of roaches that died from consuming bait are also controlled.

Keys to success with baits are 1} Establish and maintain good sanitation—to deprive roaches of alternative food sources, 2} Place baits near cockroach hiding places, being sure to follow label directions, 3} Avoid using insecticide sprays around bait placements. This will cause roaches to avoid the baits because many pesticides, especially those used in most roach sprays, are repellent to roaches, 4} Use an adequate number of bait placements, 5} Replace/reapply baits as soon as they are depleted or become too dried out to be attractive to roaches. The following table lists some of the more common cockroach baits available to homeowners.

### Baits for Control of German Cockroaches

<i>Formulation</i>	Active Ingredient	Brand Name (examples)
<b>Gel Bait</b>	Fipronil 0.01% gel bait	Maxforce FC Roach Bait Gel
	Hydramethylnon 2.15.% gel bait	Maxforce Roach Killer Bait Gel
	Hydramethylnon 2.15.% gel bait	Combat Roach Killing Gel
	Orthoboric acid 50% gel bait	MaxAttrax Ultra Roach Killing Gel Bait
<b>Bait Station</b>	Abamectin 0.05% + hydroprene 95% bait station	Raid Double Control Small Roach Baits + Egg Stoppers
	Fipronil 0.03% bait station	Combat Quick Kill Formula (small roaches)
	Hydramethylnon 2% bait station	Maxforce Roach Killer Small Bait Stations
	Hydramethylnon 2% bait station	Combat Source Kill Formula (small roaches)
	Indoxacarb 0.1% bait station	Hot Shot MaxAttrax Ultra Nest Destroyer Roach Bait

**Boric Acid Dusts:** Insecticide dusts containing boric acid are very useful cockroach management tools. Boric acid dust last indefinitely as long as it remains dry and roaches are not repelled by boric acid. This makes it an ideal treatment to use in combination with baits. Roach Prufe, BoRid, and Enforcer Roach Ridd are just a few examples of the many boric acid dusts sold for roach control. Apply dusts by injecting small amounts into cracks, crevices, and voids where cockroaches hide. This is best done when cabinets and other areas to be treated are empty and clean, as in just before moving into a new apartment or just before replacing items back in cabinets following a thorough cleaning.

Although many dusts come in ‘squeeze application’ bottles, a special tool known as a bulb duster makes the job of applying dust much easier. Bulb dusters are rarely available at local stores, but several models are available through internet suppliers. When applying dust the objective is to apply a very thin layer of dust that will stick to the cockroaches as they walk through it. The cockroaches then ingest the dust when they groom themselves. Boric acid dust should only be applied to cracks, crevices, and voids, and under large appliances where it will not be exposed and where it will not later fall onto counter tops, dishes, or food. Do not place dust in large piles and do not apply dust to places where it will be visible or exposed. It is sometimes helpful to use an electric drill to drill small access holes to allow dust to be injected into voids where roaches are known to hide.

**Insect Growth Regulator Sprays:** Insect growth regulators work by disrupting the development of eggs or preventing immature cockroaches from being able to molt properly, resulting in death. Growth regulators are very useful cockroach management tools and are one of the key tools used by professional pest control companies. Advantages of insect growth regulators are that they are not repellent and provide long lasting residual control.

The two active ingredients in the insect growth regulator sprays used for cockroach control are hydroxyfluthrin (Gentrol) and pyriproxyfen, also known as nylar (Archer). Homeowners can purchase small quantities of pyriproxyfen (Martins IGR is one brand name) for do-it-yourself application. One of the best ways to incorporate these IGR products into a roach control program is to have them applied by a professional pest control company. The best times to have this done are before moving into an empty apartment or when cabinets are being emptied and cleaned.

**Insecticide Sprays:** Although a large number of insecticide sprays are marketed and sold to homeowners for cockroach control, these are not discussed in detail in this publication because they are generally not the best tools for achieving and maintaining safe, effective, lasting control of German cockroaches. Insecticides containing pyrethroid insecticides, such as: cyfluthrin, cyhalothrin, deltamethrin, cypermethrin, or permethrin, will usually provide quick kill of any roaches they contact, but pyrethroid insecticides are repellent to German cockroaches and can interfere with the use of baits. Pyrethroid insecticide sprays can be useful as initial ‘clean out treatments’ when first attempting to control exceptionally heavy cockroach infestations, where the goal is to quickly reduce the cockroach population and then shift to the control methods discussed previously.

Total release aerosol sprays, or ‘bug bombs’ are not recommended for German cockroach control. Although they release an impressive fog of insecticide, most of this insecticide settles on exposed surfaces where people and pets are more likely to come in contact with the residue. The insecticide fog released by total release aerosol sprays does not penetrate well into the cracks, crevices, and voids where cockroaches hide.

**Chemical Free Clean-out Method:** A chemical free method of doing an initial ‘clean out’ of a heavy German cockroach infestation is to use a strong vacuum to physically remove as many roaches and egg cases as possible. Of course this is also a good time to vacuum up dead roaches, droppings, crumbs, spilled food, and other debris. This vacuum clean out approach is especially effective when one person uses an electric hair dryer to flush roaches from their hiding place so that they can be captured by the person using the vacuum. Roaches that are captured in this manner will usually die due to desiccation and physical injury, but be sure to empty and properly dispose of the contents of the vacuum bag when finished.

**Professional Pest Control Service:** Pest control companies have trained technicians who know how to control German cockroaches and have the tools to do a safe, effective job. Arranging for regular monthly or quarterly pest control service is a great way to supplement your German cockroach management program, but do not count on a professional pest control service to be your German cockroach management program. The pest control company still has to rely on you to provide the sanitation and good housekeeping that is so critical to German cockroach management, and they can only treat areas they can readily and safely access. This means it is important to avoid excessive clutter that prevents the pest control technician from being able to do their job. Communicate with your pest control technician and be prepared to empty and clean cabinets, closets, and other areas when necessary to allow proper treatment.

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This information is for educational and preliminary planning purposes only. Brand names mentioned in this publication are used as examples only. No endorsement of these products is intended. Other appropriately labeled products containing similar active ingredients should provide similar levels of control. Always read and follow the insecticide label.