



(J. Kalisch)

Figure 5-1. "I admit I seen a few waterbugs, but I got no cockroach problems."

Chapter 5

Primary Control Strategies: Modify Resources

Rhonda, The Roach

Cockroach infestations do not appear out of thin air, even though it may seem that way. German and brownbanded cockroaches are nearly always imported into the structure by human activities. What happens when a cockroach is introduced into a new building? By way of illustrating our discussion, let us look at this situation from a cockroach's viewpoint. We will call our roach *Rhonda*.

Rhonda, a female German cockroach bearing a fertile egg case, has been living for the past two weeks in the produce section of a supermarket. After a night of foraging, she crawled into a five-pound bag of potatoes. Her bag of potatoes was carefully selected this morning by Mrs. Porter who bought the potatoes to make German potato salad for the Ladies Aid Society pot-luck luncheon on Saturday. After a bumpy ride in the back of the car, Mrs. Porter carried the sack of potatoes into the house and set it on the pantry floor. Rhonda isn't comfortable in the sack of potatoes, so when the activity quiets down, she starts looking for a hiding place. Because Mrs. Porter has a neat pantry area, Rhonda cannot find a very good hiding place. She finally settles behind a box of laundry detergent. Tonight she must search out a more permanent place to live. If she finds a better place, she will mark the newly-found shelter with an aggregation pheromone before she leaves to look for food or water. Marking this place will help her find it again.

If Rhonda cannot find a suitable shelter, she will travel from place to place finding temporary places to hide. She will be stressed and have to deposit her egg case in an unsuitable place. Few of her 30+ offspring will survive and an infestation cannot get started. If Rhonda cannot find a food and water source, she will also die after a week or two.

The lesson in the story is this: every habitat, whether it is a house or apartment kitchen,

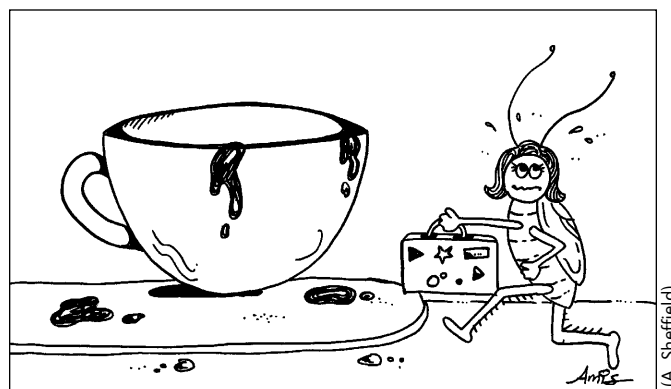


Figure 5-2. Rhonda the roach, visibly stressed, is looking for a place to hide.

bathroom, basement or commercial kitchen has a capacity to support a certain number of cockroaches. This is called the *carrying capacity* for the specific cockroach species living there (Figure 5-3). Biological forces always aim to maintain the population at this level, regardless of measures taken to reduce the population, like pesticide applications. After an insecticide application, the remaining

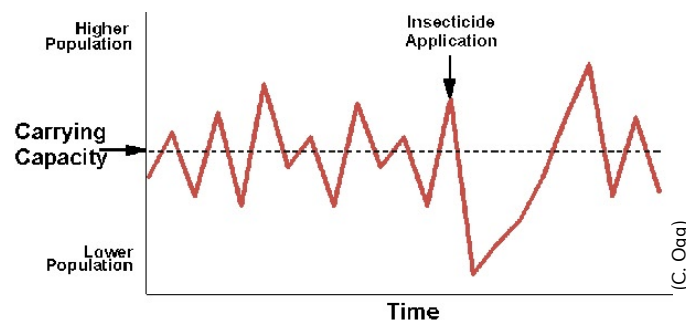


Figure 5-3. The carrying capacity of the environment is based on resources provided by the environment and required by the animal. Every kitchen has the capacity to harbor a cockroach population.

roaches will have less competition for food and hiding places (resources). Their reproductive rate will increase and, in no time, the roach population will rebound.

The key to effective control is to lower the carrying capacity of the environment by eliminating the resources needed by cockroaches. These needed resources are water, food and shelter.

Like any animal, cockroaches need these resources to thrive and reproduce. Only small amounts of water and food may be required. The resources in every habitat determine whether or not an infestation can be established and the potential infestation level. Let's discuss each of these required resources individually.

Essential Resources: Water, Food and Shelter

Water. Cockroaches have a waxy coating on their body to prevent moisture loss, but they still need water. One drop of water per day is all a cockroach needs. Any water or moisture will do; they can get water from condensation on pipes, small leaks, moist sponges, soaked wood and moistened food. Different cockroaches have different water requirements. Of those roach species we are discussing, the German and oriental cockroaches need moisture most frequently.

Food. Cockroaches eat almost anything: crumbs, hair, fingernail clippings, spots of grease, soiled clothes, pet fur and dead insects (even dead cockroaches). Very small, immature cockroaches stay in hiding places and eat droppings of older cockroaches. If food becomes scarce, cockroaches will cannibalize their own young and eat egg cases. Studies have shown cockroaches eat a balanced diet whenever they can. Food high in protein or is moist, is very attractive to cockroaches. If you are leaving pet food in the dish overnight, you are feeding your cockroaches. And, feeding them well.

Shelter. Cockroaches live in cracks and crevices during the day. They prefer wood and paper in their living quarters rather than metal surfaces. Their flat body allows them to squeeze into places where they can touch the surfaces above and below at the same

time (Figure 5-4). Cockroaches can squeeze into cracks 1/16 of an inch or larger. Cockroaches like warmth produced by electric motors, condensers and ovens and may live inside appliances, especially if there is water nearby.

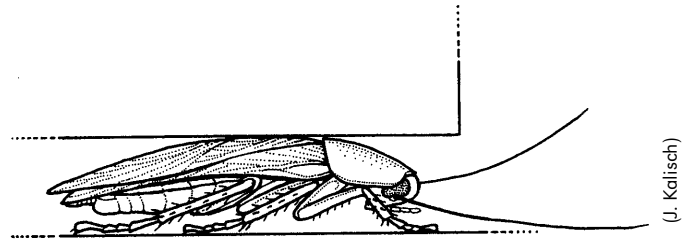


Figure 5-4. Cockroaches live most comfortably in tight places.

Reduce Water Availability

For German and oriental cockroaches, limiting the availability of water will quickly stress them and make control efforts more effective. It is the first step you should take in your control program.

Plumbing Problems. Examine all the sinks in your home. Do your faucets leak? If so, you need to repair them. Inspect the base of the faucet and run the water. Does the base of the faucet leak? Replace the gasket. Then, examine the faucet opening and see if there is a screen present, if not, install one. This screen breaks up the flow of water into a steady stream. But, it also helps to prevent thirsty cockroaches from getting into the faucet to get water.

Make sure there are no leaks in the plumbing underneath the sink especially when the water is off. Repair any leaks, no matter how small. Carefully look for a whitish residue at all connections. This whitish residue is a sign of slow water leakage. Clean the residue, tighten the connection, and check it daily for a week or two to make sure the leak is sealed.

Cold water pipes may sweat from condensation, especially during humid weather in the summer. There is enough moisture on sweating pipes to sustain cockroaches. Pipe insulation will help solve this problem. Make sure you use non-absorbent insulation because if it absorbs water, it may grow mold and attract cockroaches. Be sure to seal the insulation thoroughly. Be careful not to

create hiding places for cockroaches between the insulation materials and the pipes.

All drains should be covered with a fine mesh screen. Cockroaches do not normally enter a structure through a drain but will readily enter drains in search of water. Most kitchen sink strainers will not keep cockroaches from going down the drain. Use a strainer with small round holes, instead of slits. Bathroom sink and tub overflow holes must also be kept clean and washed out occasionally.

Other water sources. Before storing moist sponges or dish rags overnight, rinse them with an ammonia water solution. This prevents cockroaches from using this source of moisture. You may want to seal sponges in a sandwich bag overnight.

Check plant pot dishes, and make sure there is no standing water in the dishes. Also, place a layer of gravel over the soil in plant pots to cover exposed moist soil.

Petroleum jelly and mineral oil mixed together and applied to the inside rim of the bowl and around the tank of all toilet bowls will prevent cockroaches from using them as a source of water. This mixture should be reapplied weekly.

Always clean and dry dishes, pots and pans immediately after each use. Never leave dishes in the sink with water in them.

Remove pet water dishes overnight and replace each morning.

If your dwelling has excessive humidity, consider purchasing and using a dehumidifier to reduce the humidity. Empty the tank frequently to prevent its use as a water source by cockroaches.

At least once a month, check the drip pan under the refrigerator (Figure 5-5). Clean and dry the pan before replacing it.

Remove Their Food Supply

Stored Food. Cockroaches eat just about anything. All food items must be kept in a sealed container. Once a package of food is opened, make sure it is tightly resealed. If the original package doesn't reseal tightly enough, place the food product in a tightly-sealed container. Cockroaches can easily chew through paper, cardboard or thin plastic containers, so food items packaged in these materials should be transferred to cockroach-proof



(V. Jedlicka)

Figure 5-5. The drip pan of a frost-free refrigerator is attractive to German cockroaches. There is warmth from the compressor and plenty of food and moisture nearby.

containers before being stored in the home. No open food should be left out overnight. Candy, popcorn, fruit and pet foods must be placed in containers for overnight storage. It is hard to completely deprive cockroaches of food, but limiting food makes it easier for other control methods to work effectively.

Food Waste Management. While food products are an important source for cockroaches, food waste (garbage) is readily consumed by cockroaches. A garbage disposal is very helpful in reducing waste in the home. However, the garbage disposal must be used daily or whenever waste is



Figure 5-6. If you are leaving pet food out overnight, you are feeding your cockroaches, too.

deposited, and it should be flushed with a cleaning solution after each use.

If a garbage disposal is not available, remove garbage to an outdoor, sealed container before evening. If this is not possible, waste food can be placed in cockroach-proof containers like glass jars with air-tight lids.

Clean all surfaces in food preparation or eating areas, including counters, tables and floors with a cleaning solution after each use. Dishes, bowls, utensils and glasses should be immediately cleaned.

Grease is a special problem and can be hard to clean. Cockroaches feed on the film of grease on oven hoods and walls next to where frying pans have been used.

Clean all spills. Spilled food residue will attract cockroaches. Sponges, cleaning pads and brushes must be thoroughly cleaned after use. Soiled clothing should be placed in an area not readily accessible to cockroaches, such as a sealed plastic bag or a tight fitting hamper (without ventilation holes).

Initial Cleaning Efforts. Most of us tend to put off *deep cleaning* jobs (like ovens, behind stoves and refrigerators) until we have a good reason to do them. If you have cockroaches, there should be an incentive to make this extra effort. In fact, there is a good possibility those difficult cleaning areas are contributing to your cockroach infestation. When you clean, you may see cockroaches. Have the vacuum cleaner handy and vac 'em up.



(V. Jeddick)

Figure 5-7 Clean thoroughly to remove food particles, cockroaches and cockroach specs.

Before you begin any control efforts, pull out refrigerators, stoves, freezers and clean behind and beside them. Wash the outside of the appliance. Remove the back of appliances and vacuum dusty areas around motors. (Be sure to unplug appliances when doing this.) Remove items from cupboards, vacuum and clean thoroughly (Figure 5-7). Wash floors. Clean under burners and the stove top. Be sure not to forget the inside and outside the oven and the broiler area, if you have a gas stove. It is important to remove grease. (Cockroaches eat grease with gusto!)

Cockroaches and Rodents

Cockroaches and mice often coexist in the same dwelling. Both cockroaches and mice are nocturnal and live in dark, hidden locations. Cockroaches eat mouse feces and mice, in turn, may eat cockroaches. Cockroaches eat mouse baits (pellets, blocks) without adverse results. If you are using bait to control mice, you may be feeding cockroaches.

Eliminate Hiding Places

Remove Clutter. Remember, cockroaches prefer to be in tight, small places. These areas are where they feel secure, rest, mate and breed. Most cockroaches only need a 1/16" space, so even small cracks and crevices provide ample harborage. Also, cockroaches prefer porous surfaces like wood, paper, cardboard, insulation, and cloth. Stainless steel, aluminum, plastic laminates, ceramic tiles or baked enamel surfaces are less preferred. If you change the habitat, try to use materials cockroaches dislike. When soft, porous materials are layered (such as corrugated cardboard), it forms a cockroach breeding area. Do not keep stacks of paper bags, sacks, cardboard boxes, rags or pieces of wood in locations where cockroaches may be present. One of the biggest mistakes is the practice of storing paper bags between an appliance and the wall because it establishes a layering effect next to a warm area. This paper bag storage practice is an excellent cockroach breeding site.

Examine all areas, in the kitchen, bathrooms, laundries, basement and storage closets, especially near where cockroaches were found in your traps.



(B. Ogg)

Figure 5-8. A German cockroach and fecal specks near a stack of papers in a heavily infested, very cluttered apartment.

Re-organize and eliminate any clutter. Any portable items providing harborage should be sealed in cockroach-proof containers or heavy plastic bags.

Seal Them Out! After you eliminate clutter, search the entire room, and find all cracks, seams and crevices larger than 1/16". Do not overlook cabinets and furniture. These areas need to be sealed so the cockroaches have no places to hide. Commonly neglected areas are behind molding, small holes in cabinet doors, around rubber gaskets, around water pipes, in hollow tube legs of kitchen tables, where cabinets or walls meet each other, or around built-in appliances.

Caulking is an easy, economical way to seal most of these cockroach hiding places. There are three types of caulk:

1. *Latex* caulk is usually cheap, but latex eventually will crack and shrink.
2. *Acrylic* caulks are better than latex, but they still shrink over time. In addition, cockroaches may chew into latex or acrylic caulks.
3. *Silicone* caulks are the best! They are more flexible, waterproof and can't be chewed through.

Before you caulk those crevices, make sure the edges of the space being sealed are clean and dry. Smooth the caulk so it forms a tight seal. Also, use enough caulk to fill the width of the space and about 1/4-inch deep. You will need to use enough caulk so it will last. The disadvantage of silicone caulk is paint will not adhere to the surface like the other

caulks. For spaces greater than 1/2", consider using foam fillers and caulk over the foam. If caulking all the cracks or seams in your home seems to be a major undertaking, use monitoring sticky traps to determine locations where cockroach infestations are established and focus caulking and sealing efforts in those areas.

If cockroaches are infesting the cracks or seams, apply a cleaning solution and desiccation dust (discussed in Chapter 6) to these areas before caulking. Insecticide dusts can be used in void areas, but make sure you read the section about application of dusts before you do this. After you completely seal this area, cockroaches can no longer use it as a hiding place.

Even high-grade silicone seals need to be checked and cleaned regularly. If the edge of the seal begins to flake or peel, clean out the caulk with a knife, and remove the entire section of caulk. Then, clean and smooth the section with abrasive material, like sandpaper, and reapply the caulk.

Don't Overlook These Places

There are some important areas in a kitchen which are often overlooked as a source of water, food or shelter. Ignoring these "secret" places can counteract the effectiveness of other management tactics.



(C. Ogg)

Figure 5-9. Use caulk to seal cracks and crevices and void areas to eliminate these cockroach hiding places.

Refrigerators:

- Door gaskets should be checked and replaced if hard, stiff or cracked. (Yes, roaches can live under refrigerator gaskets.)
- Vacuum the coil and compressor; wash and dry the bottom drip tray.
- Check insulation around motors and clean or replace as needed.

Dishwashers:

- Check and repair all leaks.
- Remove bottom panel and clean regularly.
- Check insulation for cleanliness and replace if needed.
- Check door gaskets and seals; replace them if they leak.
- Make sure food residue is removed from inside the dishwasher daily.

Stoves:

- Clean the stove regularly and thoroughly. Don't forget to clean under the burners.
- Use heatproof sealants to caulk cracks.
- Check insulation for possible infestations. You may need to replace it. (Cockroaches can live and breed in the insulation if they can gain access inside the walls of the stove).

Electrical Locations:

- Examine and caulk around electrical fixtures, outlets and switches. For your safety, turn off the electricity.
- Use a foam sealant if an infestation exists inside the electrical conduit.

Metal Cabinets: Even though cockroaches do not prefer metal, they will live in metal cabinets, if they have no other options. Metal cabinets are usually constructed with small openings which allow cockroaches to get inside the doors. Examine cabinets carefully. Seal hinges, latches, seams and holes in the bottom and/or top of the doors. (C. Ogg)

Drawers: Pull out each kitchen drawer and examine the cavity. When the drawer is closed, small void areas are created which provide cockroach harborage (Figure 5-10)

Small Appliances: Cockroaches can enter small appliances through small holes and cracks. The most likely infested appliances is the microwave oven, since it may not be cleaned regularly after use and food particles may build up. It should not be necessary to throw appliances away. Instead, take the appliance apart or use a cold treatment, discussed in Chapter 6.



Figure 5-10. A kitchen drawer has been removed to expose a cluster of cockroaches hiding in the void area created when the drawer is closed. Vacuum these cockroaches.