

# COCKROACHES . . . RECOGNITION AND CONTROL

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Cockroaches are some of the oldest of insects, as indicated by fossil remains dating to 200,000,000 years ago. Their ability to survive the many changing environments through time illustrates their capability to adapt to wide ranges of habitats and living conditions.

Although cockroaches have not been incriminated as direct carriers of diseases, they do contaminate food and kitchen utensils with excrement and salivary secretions and leave an unpleasant odor.

## Biology and Behavior

Cockroaches develop by gradual metamorphosis through three life stages: egg, nymph and adult. Adult females produce small, bean-like capsules or oothecae which contain the eggs. The female usually drops or glues capsules to some surface soon after they are formed. (The female German cockroach carries the capsule protruding from her body until the eggs are ready to hatch.) Nymphs which hatch from the eggs and emerge from the oothecae resemble adult cockroaches, except that they are smaller and do not have fully-developed wings. Their flattened bodies and long, spiny legs enable them to run rapidly and to squeeze into crevices and other hiding places.

Nymphs molt several times until finally mature males and females appear. As indicated in Table 1, the time they require to complete their life cycle varies from about 2 months to nearly 3 years, depending on the species and environmental conditions.

Most cockroaches are tropical or sub-tropical in origin and generally live outdoors. However, some species have adapted well to living with man. Though

it is true that they prosper in dirt, filth and grime, cockroaches at times infest even the most sanitary and well-organized homes and buildings.

Cockroaches enter buildings in infested boxes, grocery bags, beverage cartons, furniture and dried pet foods. They also enter around loose-fitting doors and windows, where electrical lines or water and steam pipes pass through walls, in seasoned firewood and through sewer lines.

Most cockroaches are nocturnal and appear during daylight only when disturbed or where there is a heavy infestation. They prefer warm, dark, humid shelters and often move around the kitchen sink or drainboard; in cracks around, under or inside cupboards and cabinets; where pipes or electrical wiring pass along or through a wall; behind window or door frames, loose baseboards or molding strips; on undersides of tables and chairs; in upholstered furniture; in bathrooms; in radio and TV cabinets; and in motor compartments of refrigerators, washing machines and other appliances. It is important to know where cockroaches are hiding in your home because these are the locations you must treat.

Cockroaches feed on a variety of plant and animal products, including meat and grease, starchy foods, sweets, baked goods and other unprotected kitchen goods. They also feed on materials such as leather, wallpaper paste and book binding and sizing.

## Common Species

Approximately 3,500 species of cockroaches exist in the world today, with 55 species known to live in the U.S. In Texas, only five species are really troublesome in homes and other buildings. The other cockroach species are not found in Texas or they breed and live outdoors. They may on occasion come in-

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approach of cold weather, they move in masses into homes and other buildings. In buildings, these cockroaches inhabit high moisture areas such as sewers, drains and dark, damp basements. They somewhat restrict their activities to the ground or below-ground levels in buildings.

**Smokybrown Cockroach (*Periplaneta fuliginosa*)**

The adult is slightly more than 1-inch long and is a uniform very dark brown to black. Unlike the American cockroach, the head shield is a solid dark color. Both males and females have wings longer than their bodies and are capable of flying. Nymphal cockroaches are smaller than adults and have only partially developed wings.

Adults females usually carry their egg capsules for 1 to 2 days before attaching them to the outside surfaces of buildings and other protected sites. Sometimes they drop the capsules on the ground.

These cockroaches live primarily outdoors and prefer wooded areas near houses, leaf litter, trash piles and other sites with high humidity and organic matter. They also hide under rocks and building materials. They may enter homes with infested firewood or during seasonal migrations.

**Control**

The control of cockroaches requires care and planning. Taking precautions to prevent a cockroach invasion into a home or building works better than applying insecticides to control an established population. Cleanliness in the home and elimination of favorable breeding sites lessens greatly the possibility of cockroach infestation, but these practices will not always prevent infestation from outside. Cockroaches can survive in even the most sanitary environment once they establish an infestation.

Because various cockroach species may live in the same building, it is essential to identify the species accurately and use control measures that take advantage of behavioral patterns and life requirements of the particular species. For instance, to control the widely spread brown-banded cockroach, chemicals must be applied over greater areas of a home or building than to control the more restricted German or American cockroaches.

*Non-chemical control.* Non-chemical measures include:

1. Keeping tight-fitting windows and doors; caulking cracks in outside walls, sills and foundations.

Table 1. Life-history data of common cockroaches in Texas.

	Average number eggs per capsule	Average number capsules per female	Number of molts	Nymphal stage (days)	Life cycle (days)	Average longevity of adults (days)	Approximate number of offspring per year from one female under favorable conditions
German	37	7	5 to 7	103	40 to 251	140	35,000
American	15	58	10 to 13	468	320 to 1071	441	812
Brown-Banded	16	10	7 to 9	161	143 to 379	115	677
Oriental	14	14	7 to 10	542	215 to 991	96	196
Smokybrown	24	17	9	344	311 to 513	247	306



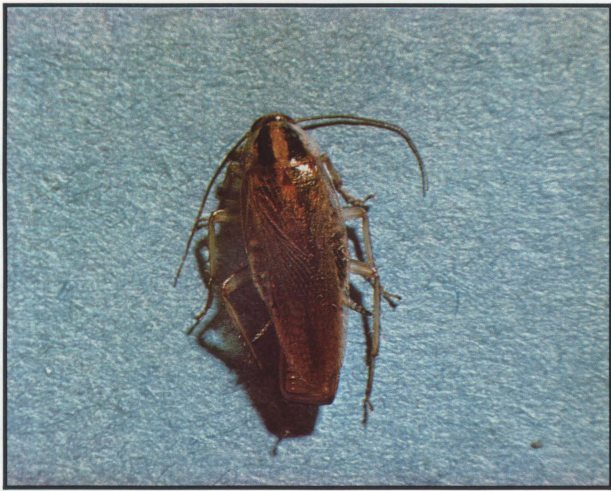


Figure 1. German Cockroach, **Blatella germanica** (actual length) \_\_\_\_\_

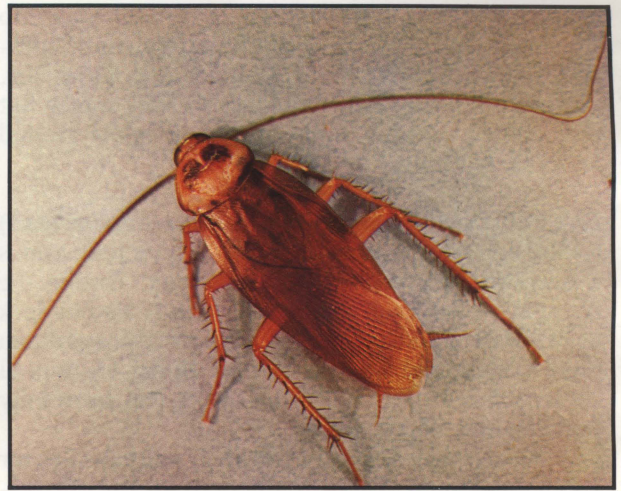


Figure 2. American Cockroach, **Periplaneta americana** (actual length) \_\_\_\_\_



Figure 3. Brown-banded Cockroach, **Supella longipalpa** (actual length) \_\_\_\_\_

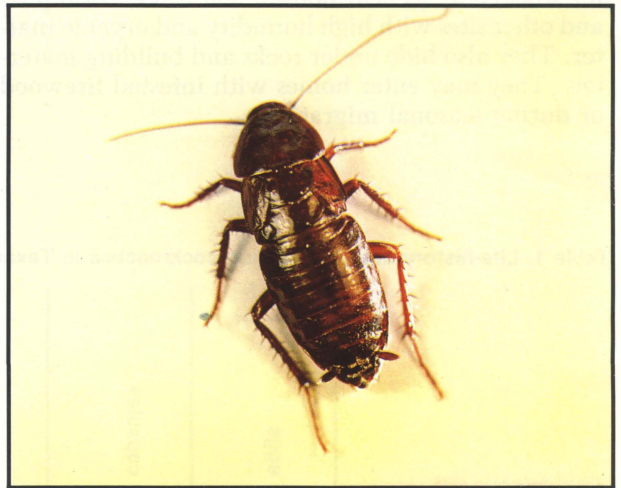
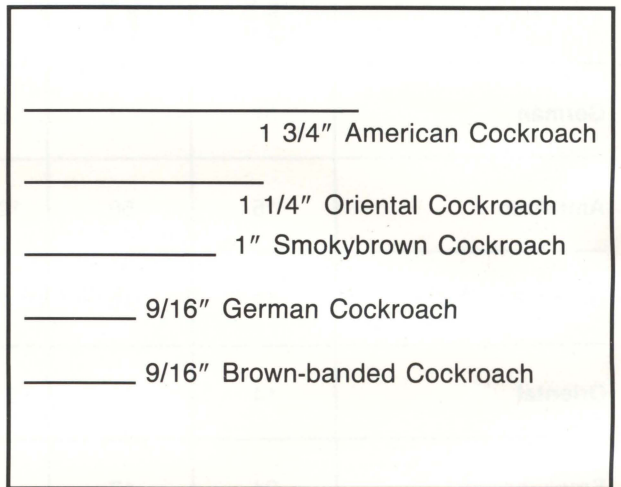


Figure 4. Oriental Cockroach, **Blatta orientalis** (actual length) \_\_\_\_\_



Figure 5. Smokybrown Cockroach, **Periplaneta fuliginosa** (actual length) \_\_\_\_\_



Relative lengths of Common House-Occurring Roaches in Texas

2. Sealing all openings where electrical lines or water, steam and cooling pipes pass through walls and floors to slow the movement of cockroaches into a home or building.

3. Inspecting beverage cartons, boxes, dried pet foods, potatoes, onions and firewood to avoid bringing cockroaches into the home.

4. Repairing plumbing leaks and sealing other moisture sources.

5. Keeping the premises clean by removing all food crumbs, garbage, etc. to containers with tightly fitting lids.

*Traps.* Traps are inexpensive, convenient to use, disposable and contain no toxic insecticide. Trapping is effective but only when used in conjunction with preventive and insecticidal measures. Trapping alone will not eliminate cockroach populations. There are any number of commercially available traps. All are more or less box-shaped and have the inside surface covered with a very sticky adhesive and slow-release food attractant. Cockroaches enter the trap when detecting the food odor and become immobilized by the adhesive.

Traps should be placed where cockroaches are likely to travel to and from feeding and hiding areas. Reposition the traps if no cockroaches are caught after 2 to 3 nights. The number of traps required for a home or building will vary with the kind of cockroach present and the severity and location of the infestation.

*Chemical control.* To effectively control cockroaches with insecticides, inspect closely for their daytime shelters and thoroughly treat these locations. Regardless of the insecticide or formulation chosen, chemicals placed in or near regular hiding places provide much better control than those placed where cockroaches move only occasionally.

Present methods of insecticide control generally provide only temporary control within treated structures. Since some cockroach species invade homes and buildings from outside, they may reinfest dwellings once the insecticide dissipates. To solve this problem, outdoor populations also must be controlled. For example, when smokybrown cockroaches become numerous in the home, use of chemicals inside provides short-term control. Locating, treating or removing outside shelters provides effective long-term control.

To eliminate an established infestation from a home or building, first remove all routes of reinfestation, then thoroughly clean the home and apply an approved chemical. The type of chemical selected and the application method used depends on the location and the nature of the infestation. No one chemical handles all cockroach problems, but the various types available present a combination that is effective.

Study each cockroach problem and use control measures in accordance with the location, extent and nature of the infestation. With a range of chemicals,

formulations and application techniques available, be sure to select the appropriate combination to provide the desired control.

*Residual sprays.* Residual sprays are formulated as oil-base or water-base emulsions, water-base suspensions (wetable powders) or as aerosols. Oil-base sprays may stain floor tiles and painted surfaces, deform carpet and other rubber pads and are fire hazards when used near open flames. Water-base emulsions are easy to mix, but may stain wallpaper, light-colored carpets and certain other surfaces; can short out electrical circuits; and are inferior to oil-base sprays on impervious surfaces such as glass and metal. Wettable powders need near-constant agitation in the spray tank, but they leave the most active residues, especially on porous surfaces such as unpainted wood or concrete block.

Residual sprays are easy and fast to apply. When spraying cockroach shelters, pay attention to cracks and crevices. Usually, exposed surfaces are not treated with sprays, although it may be necessary to treat surfaces over which cockroaches crawl. Apply sprays just to the point of runoff to minimize chances of staining and reduce pesticide waste.

*Dusts.* Using dusts sometimes suffices as the total treatment for cockroaches but is most often a supplemental treatment. Dusts generally have longer residual action than sprays but are ineffective if they become damp.

Dusts are useful in cockroach control because they can be placed deep into cracks, crevices and wall voids; under refrigerators and furniture; around pipes, tunnels and conduits; on very smooth or very rough surfaces; and in other places not treatable with other formulations. Do not use dusts for treating large surfaces because they leave unsightly deposits. Also, cockroaches avoid heavy deposits and they will not walk through thick layers of the material. Use light pressure on the application device to minimize the dust particles in living areas. Apply dusts as light, even residues that are barely visible to the naked eye.

*Baits.* The least important part of a bait is the insecticide. If cockroaches will not feed on the bait, the insecticide has no effect. Thus, it is important not to contaminate stored bait with organic solvents, other insecticides, fungicides and fertilizers.

Baits are usually long lasting and often work well in areas that cannot be effectively sprayed or dusted. In many situations, baits seem to be most useful when used in conjunction with a residual spray or dust. Baits provide best results in buildings where there is no other food supply.

*Aerosols.* Aerosols are most useful for identifying the location and extent of cockroach infestations. Squirting small amounts of aerosols into hidden areas and shelters forces cockroaches to evacuate and to move across previously treated surfaces. Aerosols have no residual effect, so must be used in conjunction with residual sprays or dusts. Some residual insecticides are



available as aerosols. Use them as directed on the label.

Following are some insecticides suggested for control of cockroaches:

Inside the Home	Baits for Roaches	Outside Areas
propoxur (Baygon®), S,AE	propoxur (Baygon®) B boric acid B	propoxur (Baygon®) S
diazinon S,AE	chlorpyrifos (Dursban®) B	diazinon S
chlorpyrifos (Dursban®) S,AE		chlorpyrifos (Dursban®) S
boric acid D (see TAEX publication L-1373)		
synergized pyrethrins S,AE		
resmethrin (or SBP-1382®) S,AE		

S = spray; AE = aerosol, D = dust, B = bait

## Cockroach Control in Apartment Housing

German cockroaches are the most common insect pest for apartment dwellers in Texas. While people in single family dwellings can usually control these cockroaches for long periods on their first attempt, apartment dwellers usually find cockroach control to be a constant battle. Many urban Texans even feel they must live with "a few roaches" most of the time. This does not have to be the case.

Cockroach control in multi-family housing requires that residents understand certain key factors in cockroach behavior. Effective control procedures then require that residents in most (or all) units of any one structure increase their general sanitation and control efforts. Alternatively, if the apartment management or landlord takes responsibility for cockroach control, he should require *all* residents to participate in the program.

German cockroaches frequently move around within infested apartments, and they even move between apartments where construction features permit. Significant cockroach movement between apartments occurs where individual units share common plumbing connections or possibly other utility connections. Insecticide application causes increased cockroach numbers to move out of treated apartments into adjacent units. This is why apartment dwellers may continue to have cockroach problems despite their sanitation efforts and normally effective insecticide applications. Your neighbors, the apartment management or the pest control service personnel should understand that German cockroaches are mobile within structures. Coordinated control efforts which take this movement into account should then be conducted. Rather than individuals treating their

own apartments or the pest control service treating only separate complaint apartments, exterminators should inspect and treat with insecticides apartments adjacent to those known to be infested. Residents in apartments which have professional pest control service should insist that the apartment management and the pest control technician work together (and with your neighbors) to design and conduct an effective program to control these mobile pests.

Apartment dwellers can caulk cracks and crevices which allow cockroaches access to wall voids. Wall voids which house plumbing systems may harbor many cockroaches but can be treated with insecticide dusts for long-term control. Also, openings where plumbing and electrical connections enter walls can be caulked or plugged with steel wool to prevent cockroach access and movement. Along with these extra steps to prevent cockroach movement between apartments, thorough sanitation and careful insecticide applications into the areas where cockroaches are hiding (during the day time) should give effective control within any one unit. Careful, thorough insecticide applications cannot be made in only 2 to 3 minutes within any one apartment. If this is all the time a pest control service is spending, then their efforts will fail. Residents should question their apartment management about the quality of the pest control work and encourage them to place greater emphasis on this effort.

German cockroach problems may persist despite careful pest control efforts. In some areas cockroaches have adapted to the particular insecticides by developing resistance to one or more insecticides. They usually develop this resistance in apartments or commercial establishments since these dwellings often receive routine insecticide treatments over extended periods. If you have difficulties controlling German cockroaches, consider changing insecticide products in order to use a different active ingredient. See the insecticide recommendations listed above for further information. In recent years, evidence indicates that German cockroaches in some areas may have become resistant to nearly all of the insecticides listed earlier in this publication. Resistance to boric acid has not been noted to date.

*New Developments in Control.* Traditional cockroach control in outdoor urban environments of Texas depends upon applications of insecticides around outdoor structures such as window and door frames and garbage containers. However, once insecticides dissipate (dissipation may occur within 2 weeks under hot, humid summer conditions), the premises are subject to reinvasion, which in turn requires additional chemical treatment.

Entomologists at Texas A&M University have been seeking solutions to this endless pattern of reapplication by learning more about cockroaches in urban areas. Entomologists with the Texas Agricultural Experiment Station are presently conducting research

on roach habits, preferred habitats, population dynamics and interactions with natural enemies. Control techniques such as habitat modification, trapping, use of natural biological control agents and selective insecticidal treatments are being developed. These methods will be combined ultimately into environmentally sound roach control programs applicable both indoors and outdoors.

### **Insecticide Safety Precautions**

The Federal Environmental Pesticide Control Act of 1972 in part prohibits the application of any pesticide in a manner inconsistent with its labeling. This means that a pesticide cannot be used unless it is registered for the specific pest. Consequently, some

chemicals formerly used by homeowners and pesticide applicators can no longer be used.

The status of insecticide label clearance is subject to change, and changes may have occurred since this publication was printed. County Extension agents and Extension entomologists are notified as these changes occur.

The pesticide USER is always responsible for the effects of pesticide residues as well as problems caused by residues that drift from his property to other property. Always read and carefully follow instructions on the product label.

Avoid prolonged chemical contact with skin. Wash exposed skin areas with generous amounts of soap and water. Do not contaminate food, dishes, utensils or food preparation areas with insecticide.

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