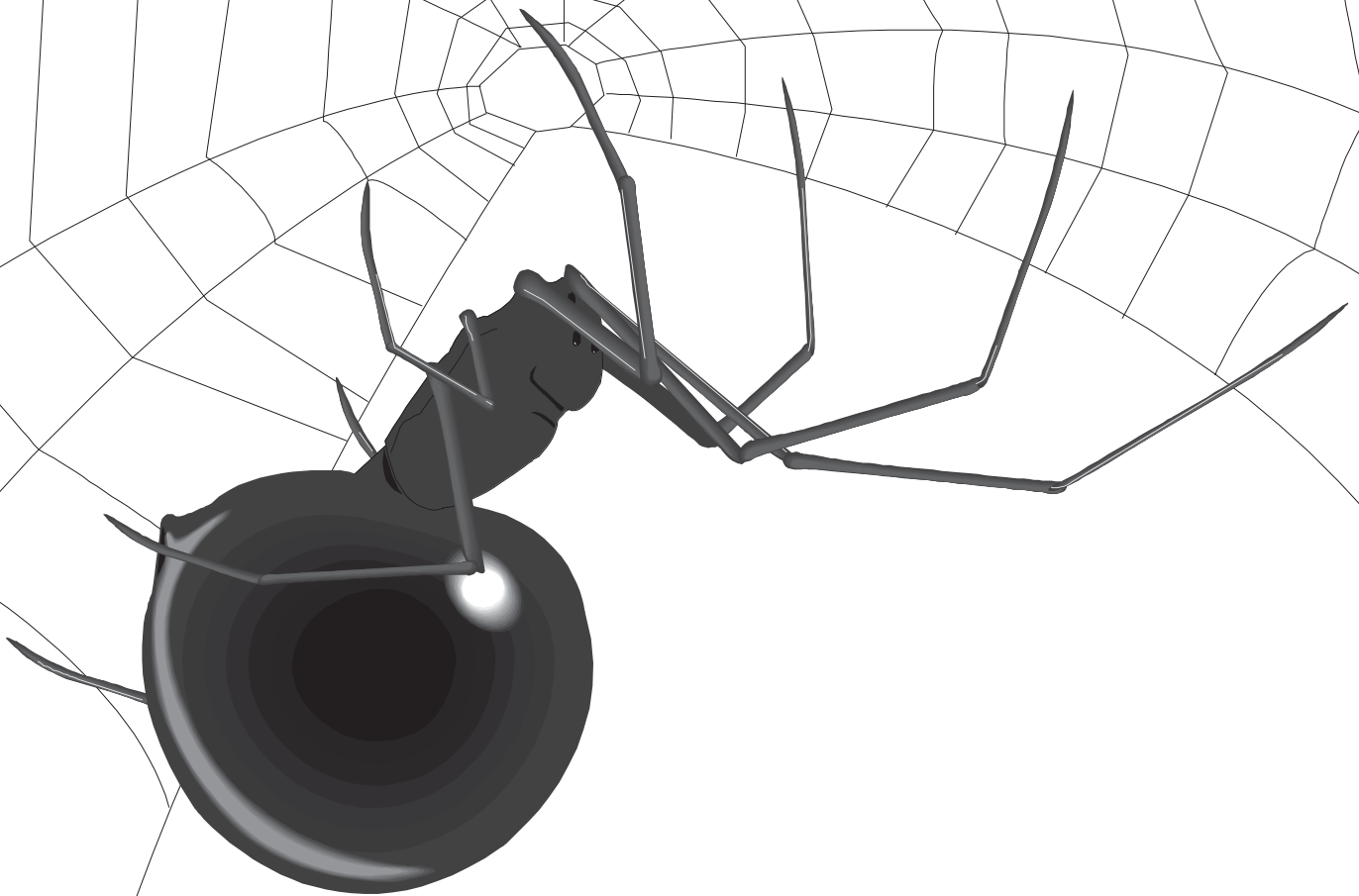


Managing Pests Around the Home

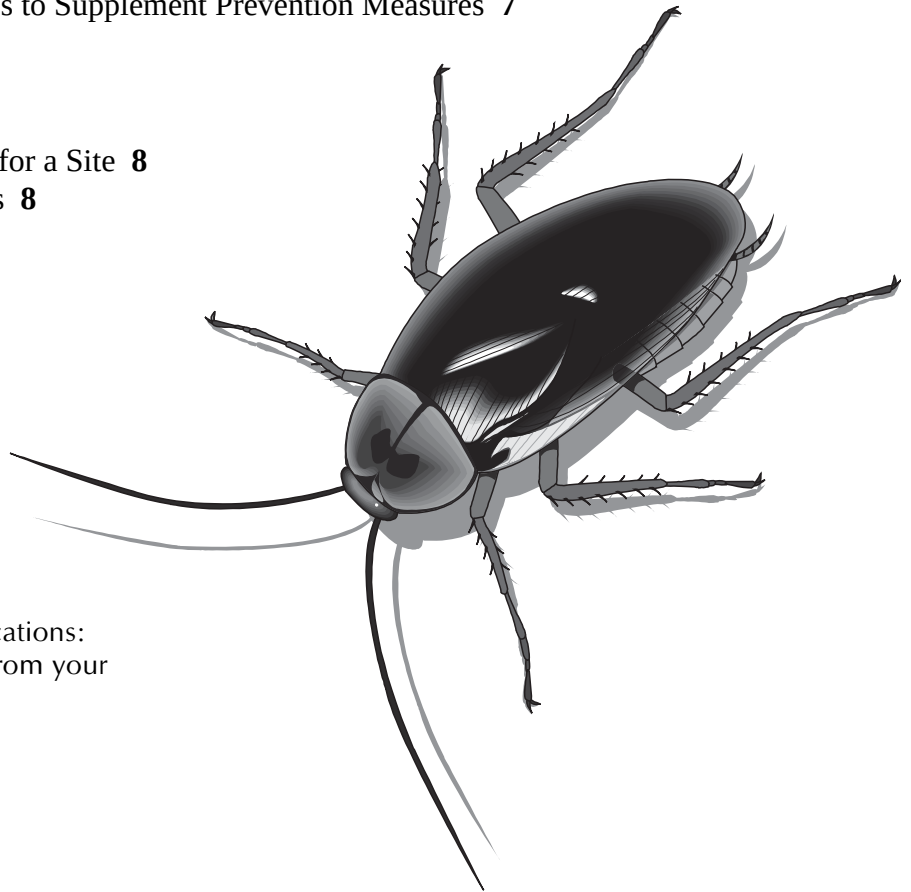


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Reference to other related UT publications:
Additional information is available from your
Extension agent when indicated by
SP or PB numbered series.

Managing Pests Around the Home

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What are household pests?

Most household pests are insects and are commonly called “bugs.” Other organisms such as spiders, scorpions, centipedes, millipedes, ticks, sowbugs, pillbugs, mites, rats, mice, snakes, bats, squirrels, birds, molds and fungi may enter homes. In Tennessee, one or more of about 40 common pests are found in every home at one time or another. Even the most conscientious person cannot always avoid an occasional pest infestation.

Where are these pests found?

Under optimal conditions, large populations of an insect, rodent or other pest can occur in your yard, home, farm or neighborhood. Large numbers of a pest species can develop in trees, stumps, flower beds, mulch, leaf litter, garbage, wood piles, ditch banks, animal carcasses, stored products, spilled materials, sewer lines and other sites. Pests enter homes through openings in the walls, floors, around pipes or cracks, under doors or windows. Pests seeking shelter build nests or hibernate within the walls, attic or in living quarters.

What attracts them to your home?

Pests are attracted by light, warm air, moisture and food. Odors from a dead bird, rodent, dead insects or nest in a wall, soured mop or spilled materials can also be attractive. They seek protection and shelter in dark cavities in walls or crawl spaces.

What can I do to prevent pest problems in my home?

Luckily, many pests are easily controlled. This publication will explain how to manage the most common household pests found in Tennessee. We have placed

special importance on controlling pests by limiting their access to food, water and shelter. Control devices such as vacuums and traps are emphasized. Pesticides are used in a manner to reduce exposure to you, your property and the environment. Always read the entire pesticide label for directions on mixing, applying, safety precautions, storing and disposing of the product before using it. If you are unsure about how to control a household pest after reading this publication, ask your county Extension agent for additional assistance.

Some pests, such as termites, require the use of special equipment and knowledge to apply large volumes of insecticides to all possible entry points into the structure. Professionals have the proper equipment and the training, including safety training, to apply the large volumes of pesticides needed to rid your home of termites. Termites can also be managed with baits, but professional training in understanding the biology of the termite is essential to obtain control.

Quite often, professional pest control technicians have access to more effective active ingredients and formulations than the homeowner. The professional is trained in the life cycle, habits and preferences of the pest, as well as the safest and best techniques to control them. In Tennessee, pest control technicians are required to pass a test before they can apply pesticides in your home. (They may work 90 days under the direct supervision of a licensed operator before taking the test.) Technicians should carry a commercial pesticide applicator certification card verifying they are approved by the Tennessee Department of Agriculture. They need to attend training sessions to obtain points to keep that card. If they do not get enough points within three years, they have to take another test. Also, they must work for a licensed operator if they are charging you a fee. The charter number of their employer's business must appear on their truck.

When should you ask for professional help?

Of course that is a decision you as a homeowner must make for yourself. You may want to use a professional:

- 1) when treating for termites because special equipment and training are needed,
- 2) when treating for other wood-destroying insects and organisms (especially if you are concerned about reselling the home),
- 3) if the pest is found in difficult-to-reach locations and requires treatment with special equipment,
- 4) if you are concerned about pesticide exposure during mixing and applying,
- 5) if there is not enough time to do it yourself, or
- 6) if several attempts have failed to control the pest.

Professionals need your help to manage pests too. Please perform all the sanitation and exclusion practices they recommend.

Managing Pests and Reducing the Risk of Pesticide Exposure:

1. Inspecting and Monitoring

Household pests can be managed with a minimal amount of pesticides by using an integrated pest management (IPM) approach. In an IPM program, regularly scheduled (monthly, quarterly, etc) inspections are encouraged instead of regularly scheduled pesticide applications. If pests are not present, in most cases, pesticide applications may not be necessary. A flashlight and screwdriver are usually sufficient to inspect a structure. Look for insect pests, signs of insect activity, possible food and water sources, as well as pest nesting or resting sites. Inspect for conditions favorable to insects and rodents: warm temperatures (75 - 85 degrees F), condensation, moist wood, humid atmosphere, cracks or crevices where insects can hide, plumbing leaks, spilled materials and food left overnight in pet feeding dishes. Pest feces and webbing are often found in infested areas. Inspect for signs of rodent activity: rodent hair, fecal pellets, tracks, rub marks, and signs of gnawing and digging. Rodent urine will fluoresce under a black light. Monitoring devices such as glue boards and pheromone traps can be useful to detect insects that may have been previously overlooked. Glue boards are very effective in detecting the presence of cockroaches. These should be placed near edges of walls or cabinets near possible shelter, food, or water. Glue boards can also be used for detection and control of rodents. Pheromone traps are available for most pantry or stored products insects.

2. Identification

After the pest is caught, it must be identified. Drawings of many pest species and a list of sources of information on pest identification are in the back of this publication. If you cannot identify the specimen yourself, bring it to your local county Extension agent. After the pest has been identified, you can determine where it lives, what it prefers to feed on, if it can cause structural damage or is

Managing Pests and Reducing the Risk of Pesticide Exposure

1. Scheduled monitoring and inspecting - not scheduled sprays.
2. Identification of pest and damage.
3. Removing pests' access to food, water and shelter through sanitation and exclusion.
4. Use controls such as traps and vacuums. Reduce pesticide exposure to people and pets by using baits, insect growth regulators, dusts in voids and sprays in cracks and crevices.

a health threat, or if it is just a nuisance. If it is determined that control is necessary, several approaches may be used, including sanitation and exclusion practices, vacuuming, trapping and the judicious use of pesticides.

3. Modifying the Environment

All pests need access to food, water, shelter and most often a warm environment. By removing their access to these necessities, you can prevent or decrease pest populations dramatically. This can be achieved through sanitation and exclusion practices, as well as other modifications of the environment.

Remove Access to Food

Keep a building clean. Sweep or mop to remove spilled food and beverages. Clean soiled wool fabrics, furs and feathers before storing. Storage of items can also affect their vulnerability to pest attack. Date food packages being placed in storage. Use older food items first. Remove broken packages and sweep up spills as soon as possible. In storage areas, allow 18 inches of clearance between stacks (or the wall) and elevate items off the floor to permit inspection for pests, feces, broken packages, etc.

Sanitation is a key factor in controlling pests.



Pet food provides food for many pests. Train pets to eat food within 10 minutes of placement.

Proper garbage disposal is also important to reduce pest populations. Use garbage cans with tight-fitting lids. Dispose of contents often, at least twice a week, to prevent fly larvae from crawling out of the can. Daily disposal of garbage would reduce the food available to many pests. Clean garbage containers to remove food materials. Although it is more convenient to place the dumpster or garbage can just outside the kitchen door, dumpsters and garbage cans should be placed away from the structure.

Water and Moisture

Most pests can survive a long time without food, but most need to drink water within a few days or they will die (some exceptions include stored products insects and wood-boring insects). Access to water can be limited by fixing leaking plumbing or dripping faucets, sealing pipe penetrations or ventilating wet areas. Screen floor drains to prevent entry into a structure and to prevent insects from having access to this water source.

Drainage

Foundation drains should move water away from foundations. Drains should be perforated, plastic pipe embedded in coarse gravel at the footing level around the outside perimeter. Drains should empty into a solid pipe to carry water away from the structure. French drains should be used under concrete slabs.

Crawl Space Ventilation

Dry wood (10-12 percent moisture) is less susceptible to fungus infection, termites, powder post beetle and carpenter ant infestation. When floor joists, sub-flooring and insulation are wet with condensate, an attic fan can be installed in a crawl space access opening as a temporary relief measure. Ventilation openings in foundation walls, beneath buildings with crawl spaces, should be large enough and equally distributed to prevent dead air pockets from forming. Such pockets can give rise to humid conditions conducive to termite activity, powderpost beetles, carpenter ants and wood decay. Openings placed within 3 to 10 feet of corners of buildings usually give the best cross ventilation. Depending on the building code, suggestions for the number of vents in a crawl space are 1 sq. ft. of vent space per 300 - 1,500 sq. ft. of crawl space if a polyethylene vapor barrier is used. Vents are approximately 60 square inches, so approximately 2.5 vents equals 1 square foot of vent space. Cover 80 percent of the soil surface in the crawl space area with a 4-6 mil polyethylene (plastic) layer. One way to do this is to cover all of the center of the crawl space area, leaving a 1-foot wide strip of bare soil around the foundation. (A 100 percent crawl space cover could dry hardwood flooring too much and lead to warping.) Moisture rising from the soil around the perimeter will be exhausted through the foundation vents. The plastic cover will prevent moisture rising from the soil from being absorbed by the floor joists, insulation and subfloor. The cross ventilation will lower the moisture content in the wood. Dry wood (10-12 percent moisture) is less susceptible to fungus infection, termites, powder post beetle and carpenter ant infestation. If a plastic barrier is not used, it is suggested that 1 sq. ft. of vent space be placed for every 150 sq. ft. of crawl space. Because the plastic moisture barrier is inexpensive, it is more economical to use the plastic barrier than to install more vents for a crawl space without a plastic barrier.

Attic Ventilation

Ventilation of attic spaces and roof areas is important in minimizing water vapor build up. Even with good ventilation, there is still a need for vapor barriers in ceiling areas. This is especially true of a flat or low slope roof where only a 1- to 3-inch space above the insulation might be available for ventilation. In houses with attic spaces, the use of both inlet and outlet ventilation is recommended. Place inlet ventilators in soffit or friezeboard areas of the cornice. Outlet ventilators should be placed as near as possible or on the ridgeline. This placement of ventilators will assure air movement through a stack effect. A combination of attic ventilators may be installed in the gables, soffits, roof or roof ridge line to maintain a flow of air through an attic. Manufacturers' markings or literature tell the number of square inches of attic vents needed per square foot of attic space. It is important to place corrosion-resistant wire mesh with openings not less than $\frac{1}{4}$ inch in any direction behind all vents to exclude pests.

Exclusion

Exclusion is another way to prevent pest populations with minimal pesticide use. Insect, rodent, bird and reptile



Gaps around doors should be sealed.



Repair plumbing leaks as quickly as possible. Moisture attracts termites to the structure.

pests may walk, crawl or fly into your home. Pests are also carried in bags, boxes or on clothing, so examine these items before bringing them into the structure. To prevent occasional invaders (ladybird beetles, boxelder bugs, elm leaf beetles, centipedes, crickets, millipedes, sowbugs, pillbugs, mites, rats, mice, snakes, bats, squirrels, birds) from entering homes, use exclusion practices. Walk around the perimeter of your structure to determine possible pest entry points. Exclude pests with tight-fitting doors, windows and sealed walls. This may involve adding door sweeps, adding weather stripping to sliding glass doors and windows, caulking openings in window frames, repairing holes in screens, adding screens, etc. If you are unsure whether a door fits tightly, observe the door from outside when it is dark and an interior light is on. If light is seen around the edges of the door, then you don't have a good seal. Mice can enter openings about 1/4 inch, while rats need a 1/2-inch hole. Seal cracks, crevices and holes in the foundation. Screen vent openings in foundation walls and



Leave a 12-18 inch bare zone next to the foundation.

attic. Caulk or seal holes in outside walls, eaves and other external surfaces. Many pests use wires, pipes, tree limbs and other guidelines to help them move from one area to another. Voids around pipes can be sealed with steel wool or copper gauze (which won't rust) and expandable foam. Rodents will not chew the steel wool or mesh. If rats are entering the structure through the commode, install a "Rat Guard[®]" (J.T. Eaton) on sewer lines.

Landscaping Practices

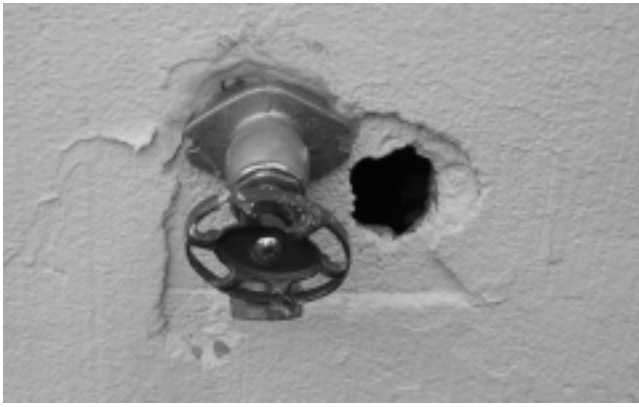
Landscaping practices also influence pest populations. Trim branches away from buildings to prevent carpenter ants, roof rats and squirrels from gaining access. One landscaping practice that can dramatically reduce millipede, cricket, sowbug, pillbug and clover mite populations is a 12-to 18-inch bare zone around the base of the structure.

Termites need cellulose materials to feed on. Mulches placed over the termiticide-treated soil next to the foundation can give termites access to the structure without contacting the termiticide. This is another reason to keep a 12-to 18-inch bare zone next to the foundation. Landscape timbers will often provide food for termites or shelter for carpenter ants. Other landscaping materials for borders, such as concrete or vinyl, are available that will not degrade as quickly as wood and will not provide food for termites and shelter for other critters.

Construction and maintenance practices also affect building's susceptibility to termites. In the final grading, allow at least 6 inches of clearance between the top of the soil and the top of the foundation. Foam board insulation and stucco that extend below grade are especially troublesome. When stucco separates from the foundation wall, termites can tube between the wall and stucco and enter the home undetected. If foam insulation is present below grade also, the termites chew through the insulation. Although the foam board does not provide nutrition, it does provide optimal nesting and tunneling conditions. Even if the termites are detected, liquid termiticides are difficult to apply in this situation because the foam insulation resists wetting.

No wood from the structure should contact the soil. In fact, soil should not be within 6 to 12 inches (or preferably 18 inches) of wood. Remove form boards, construction stakes and scrap lumber from construction sites. Porch supports should be separated from the building by at least 2 inches. Wooden steps should rest upon a concrete base that extends 6 inches above grade. Do not place basement partitions, posts and stair stringers until the concrete floor has been poured. They should never extend into or through the concrete.

Moisture attracts termites to the home. The finished grade outside the building should slope away from the foundation so water will not collect under the house. Repair plumbing leaks and leaks in roofs and around



Holes in the foundation and around plumbing, conduit and wires should be sealed to prevent pest entry.

windows as quickly as possible. Clean leaves and debris from gutters. Downspouts should empty into drain pipes to conduct water away from structure.

Remove debris (firewood, boards and other clutter) from the base of buildings to discourage rodents from nesting; this in turn could reduce snake and tick problems. Firewood can also harbor large cockroaches, carpenter ants, wood-boring beetles, termites and others. Reducing insect populations around or under structures should decrease their predators such as centipedes and scorpions.

Lighting

Many insects are active at night and are attracted to lights. Sodium vapor lights are much less attractive to insects. Use yellow bug lights or sodium vapor lights near doorways, driveways and sidewalks. Use mercury vapor or incandescent lights around the perimeter of the property to lure insects away from buildings.

Exclusion practices are also important indoors. Caulk or seal the edges of wall outlets, fuse boxes, light switches, cabinet edges along walls, any gaps between cabinets, voids below cabinets, the linoleum/bathtub interface and plumbing penetrations to prevent pests from moving along guidelines (wires, pipes, edges of walls) from one area to another. Cockroaches prefer to feel a surface above and below them (space about 3/8 " high or smaller), so areas where floor tile is loose, wallpaper or other surface is peeling, or Formica® is loose on counterparts, all need to be resealed to reduce cockroach harborage.

4. Household Pest Control Measures to Supplement Prevention Measures

Sanitation and exclusion measures can be thought of as prevention. Even though diligent efforts have been applied to reducing pests' access to food, water and shelter, some pests may still occur.

Vacuuming

There are alternative control measures to pesticides. A vacuum can be used to remove occasional invaders. If

a pesticide were sprayed, the dead pests would still need to be removed. A wet/dry vac with a soapy water solution may be more useful when pests are very abundant. Vacuuming can also be used for initial control (cleanout) of cockroach infestations and is especially useful in sensitive environments such as schools and health care facilities. A HEPA or other filter that screens allergens should be used on the vacuum to prevent the allergens from becoming air-borne. Vacuuming can also supplement other pest control efforts. Vacuuming areas frequented by pests prior to flea pesticide treatments can remove 60 percent of the flea eggs and about 27 percent of the larvae. It also removes organic matter and fecal blood the larvae need to feed on to mature. Stimulus provided by the vacuum causes the adult to emerge from the cocoon, and, if not vacuumed, the adult which was protected in the cocoon will now be exposed to insecticide applications. It is important to dispose of the vacuum cleaner bag immediately after use in an outside garbage can with a tight-fitting lid.

Traps

Many different types of traps are available to control vertebrate pests ranging from snap traps to multiple catch traps to other live traps (See Extension SP 293-C). Mice and rats typically use the edges of the wall as guidelines. The trigger of the snap traps should be placed near the wall. Mouse traps should be placed 10-12 feet apart. Glue boards can also be used to trap and control rodent populations. Fly light traps with sticky boards placed 3-4 feet above corners or along walls where they will not compete with natural lighting are excellent monitoring tools and may also provide control.

Pesticides

Pesticides are often needed to supplement the above procedures. To reduce the risk of exposure from pesticides use: baits, insect growth regulators, dusts in voids and formulations such as microencapsulated (ME) and wettable powders (WP) in crack and crevices. Spot treatments should be used on a discretionary basis. The use of "foggers" or space sprays should be discouraged. Baits are available in tamper-resistant bait stations, gels, pastes and granular formulations. These are very effective in reducing risk of exposure to pesticides for several reasons:

- (1) they are premixed or packaged, reducing the threat of exposure during mixing;
- (2) they are usually formulated at low concentrations;
- (3) typically they contain slow-acting toxicants with caution signal words;
- (4) they are placed in cracks and crevices or other protected areas, and
- (5) the toxicant is placed in a carrier that attracts the pest and often the pest transfers this bait to other members of a colony or crowded location that would not be visible.

Examples of baits available to homeowners include Terro® Ant Killer II, Combat® Superbait Ant Baits, Combat® bait stations, Amdro® Insecticidal Bait and Combat® Outdoor Ant Killing Granules.

Insect growth regulators (IGRs) are chemicals that either mimic the hormones that occur in insects or prevent the formation of chitin used in the insect's exoskeleton (outer shell). Examples of IGRs are hydroprene (Gentrol®, Gentrol® Point Source™), fenoxycarb (Award®, Logic®), methoprene (Petcor®, Precor®) and pyriproxyfen (Archer™, Nylar® and many other trade names). Recently, many products containing pyriproxyfen or methoprene have become available to consumers for flea control.

Dusts can be injected into walls and other closed spaces. It is important to apply only a light dusting. Too many puffs can result in a thick layer which could be repellent. Boric acid, silica and diatomaceous earth are examples of inorganic dusts. Other dusts include Sevin®, Tempo®, Ficom®, etc. It is important to wear proper safety equipment when applying dusts. Always follow the label instructions for safety.

Safety Precautions

Pesticides are poisons, but they are safe to use when properly handled and applied.

Protect yourself when applying and mixing pesticides.

Wear:

- A hat.
- Long-sleeved shirt.
- Long pants or coveralls.
- Unlined neoprene or rubber gloves (leather or cloth [including linings] absorb pesticides).
- Socks and boots, especially in wet grass, because of increased chance the pesticide will contaminate footwear.
- Read label carefully to determine steps for mixing, applying and storing pesticides and to determine if other protective equipment such as goggles, rubber apron or a respirator is needed.
- Take extra precautions when mixing because the pesticide is more concentrated.
- Mix outdoors in good lighting and fresh air.
- Wash off at once any pesticide spilled on skin.
- Do not touch surfaces that have been sprayed with insecticides until they are dry.
- Pesticide label will recommend time to re-enter the treated site.
- To determine if carpets are dry before entering, place a paper towel on the carpet. With shoes on, step on the paper towel. If a wet spot appears, carpet is not dry. Repeat procedure a few hours later.
- Keep emergency response numbers, such as poison control centers and medical emergency (911), nearby.
- Use protective gear when cleaning equipment.
- Store all pesticides in a safe place out of reach of children, or irresponsible persons.

Microencapsulated or wettable powder formulations can be used in cracks and crevices. Crack-and-crevice applications can be performed by using a compressed air sprayer (hand-held sprayer) with a plastic tip (available from distributors) that fits on the end of the nozzle. Exposure can be further minimized if the crack and crevice is sealed after the pesticide application. Many of the wettable powders, and microencapsulated and newer formulations are available to professionals.

Insecticides for homeowners' use are often available in other ready-to-use formulations such as aerosols and pumps.

Why Isn't More Better?

Over-applying pesticides can:

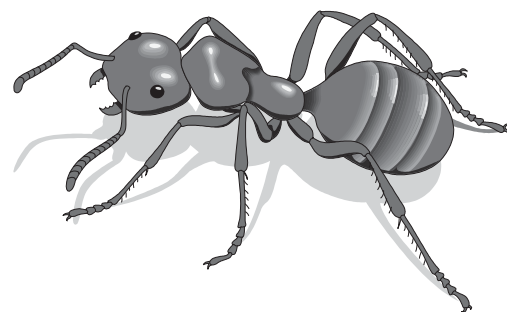
- damage the plants in the lawn, garden or the treatment site
- increase the possibility of exposure
- waste money
- hurt the environment

Selecting the Best Formulation for a Site

Select pest control products that have detailed label directions and **always follow label directions**. Select recommended pesticide formulations and equipment to apply pesticide to the infested area. Select products and methods that are most closely tailored for the particular type of environment. For example, for long residual activity in a dry situation, use a dust or bait; for residual treatments on a porous surface, spray a microencapsulated or wettable powder. Use emulsifiable concentrates where appearance is important. Emulsifiable concentrates tend to penetrate porous surfaces and therefore do not leave much pesticide at the surface. Spot test a small area before applying a pesticide to determine any adverse effects. For a surface application of a residual insecticide where appearance is not too important, use a wettable powder or microencapsulated spray. Wettable powders may leave a white residue on surfaces. Keep solutions and mists away from open flames or sparks. Around electrical installation, use a dust or bait station. On or around plants, use a wettable powder or emulsion.

Ultrasonic Pest Control Devices

Ultrasonic sound waves have been tested extensively for pest control in the laboratory and field; most research results indicate these devices are not effective.



The following pages list recommended procedures and, if necessary, pesticides to use to control specific pests. Remember to reduce the pest's access to food, water and shelter. This may provide control by itself. If pesticides are needed, they are more likely to provide control if access to these necessities are limited.

Pesticides to be used by professionals are printed in bold in this publication. They are not suggested for homeowner use, but are to act as a guide when receiving professional services. Color images for many household and structural pests can be found under Color Image References at <http://eppserver.ag.utk.edu/pat/PATinfo/WDO/WDOindex.htm> and <http://eppserver.ag.utk.edu/pat/PATinfo/GRC/GRCindex.htm>. Additional images can be found at Distance Diagnostic Pest Profiles at <http://web.utk.edu/~extepp/profiles/ddpp.htm>.

Click on insect name for recommended procedures.

Ants	Chiggers	Mice	Snails and Slugs
Fire Ants	Clothes Moths	Millipedes	Snakes
Carpenter Ants	Clover Mites	Mites, Bird or Rodent	Sowbugs or Pillbugs
Bats	Cockroaches	Moles	Spiders or Scorpions
Bean Weevils	Crickets	Mosquitos	Springtails
Book Lice	Elm Leaf Beetles	Pantry Pests	Termites
Bed Bugs	Earwigs	Powder Post and other	Ticks
Boxelder Bugs	Fleas	Wood-Booring Beetles	Wasps, Hornets,
Carpenter Bees	Flies	Rats	Yellowjackets
Carpet Beetles	Fungus Gnats	Silverfish and Firebrats	
Centipedes	Head Lice	Skunks	

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
ANTS See PB1629	Ants have elbowed antennae, a thread-like waist with one or two bumps. Unmated reproductives have wings; the front wings are larger than the hind wings. Worker ants are wingless. Ants are social insects. Colonies are usually established by a queen. Workers feed the queen, care for the brood and defend the nest. Workers travel along well-marked trails between the nest and food.	Do not spray near baits!! Baits containing slow-acting ingredients such as abamectin, hydramethylnon, sulfluramid, fipronil, disodium octaborate tetrahydrate, boric acids and borax are effective. Indoors: <u>Baits:</u> Odorous house ants prefer sweet baits such as Terro Ant Killer II, as well as others. Other ants are more omnivorous: Combat Superbait Ant Baits, Raid Max with sulfluramid, Hot Shot Maxattrax, Raid Ant Baits with abamectin Outdoors: <u>Baits:</u> Combat Ant Killing System <u>Sprays:</u> bifenthrin 0.05% cyfluthrin RTU 0.1% tralomethrin 0.03%	Follow good sanitary and exclusion practices. Exploit worker caste by using baits. Find foragers and place bait near foraging trail. Workers then bring the poisoned bait back to the nest where it is distributed among all members of the colony. You must kill queen(s) (and all the immatures for Pharaoh ants) to eliminate a colony. Spraying for ants indoors often worsens the problem by causing the colony to split into many smaller colonies. Do NOT spray for Pharaoh ants. If ants are foraging indoors from an outdoor nest, exclude ants by sealing entry points such as windowsills and door steps, or spray entry points into the structure. If nests can be located outdoors, treat the nest directly. Professionals have access to liquid baiting systems.
ANTS-FIRE See B-6076, B-6043, SP419, E&PP Info #638			

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
ANTS - CARPENTER See PB1599	Large, black, red or red-and-black ants that usually nest in damp wood. Wingless workers 1/4 to 3/8 inch long. Winged male and female reproductives swarm from a colony. Carpenter ant workers (wingless ants in the colony) do not eat wood, but excavate smooth galleries in the wood to raise their young. Piles of coarse sawdust or splintered wood indicate a carpenter ant nest nearby. Dead insects falling from a wooden porch may indicate a carpenter ant nest above. Most often carpenter ants are located outdoors and foragers are entering the home in search of water or food. Trim branches away from structure. Seal possible entry points such as doors, windows and areas where pipes and wires enter the structure. If ants are nesting outdoors and foraging indoors, potential entry points can be sprayed.	<u>Indoors:</u> boric acid Victor Roach Killing Powder deltamethrin Zep Pest Termite and Ant Killer <u>Sprays:</u> bifenthrin Ortho Home Defense Perimeter and Indoor insect Killer Ortho Termite and Carpenter Ant Killer cyfluthrin Bayer Advanced Home 0.1% <u>Baits</u> See PB1599 for homeowner bait recipe.	Because carpenter ants can cause structural damage, infestations are best treated by a professional. Professionals have the knowledge, other pesticides and special equipment needed to treat carpenter ant infestations. Correct moisture problems, repair leaks and ventilate. Find and treat nests in wood parts. Drilling into the wood may be necessary. Dust nests in wall voids. Do not apply sprays near electricity. Some success has been found using ant baits for carpenter ant control, but it is not always a successful technique at this time. Professionals can place baits where ants are actively foraging. Do not spray ants or trails if baiting because it will repel ants from baits.
BATS See SP293B, PB1624	Night-flying creatures invade attics and similar areas.	Treat area with insecticides to control external parasites, including fleas, mites and lice after bats excluded. See fleas and mites section.	Close entrance holes with wire screening to exclude bats after they have left the resting area. Seal opening with expandable foam.
BEAN WEEVILS	Small, gray beetles and white worms cut round holes in dried beans and peas. May attack in field or in storage.		Non-chemical control: Either destroy the infested products or salvage them by super heating to 140 degrees F for 1/2 hour, or super cooling in a deep freeze at 0 degree F for 4 days. Store insect-free beans in containers with tight lids.
BOOK LICE	Small, soft-bodied, cream-colored to grayish or light brown, wingless, fastmoving. Feed on molds, fungi. Found in books, cereals, wallpaper, boxes. May damage starched things.	Pyrethrins (various aerosols)	Large numbers of book lice develop under excessive humid conditions, moldy books, papers, bags or cereals. Dry out infested areas. Destroy infested material of little value.
BED BUGS	Flat, oval, reddish, wingless insects. Bloodsucking. Night feeders.	resmethrin pyrethrins	Airing mattress in full sunlight aids control and reduces odor. Treat bedframe and cracks in bedroom. Do not spray sheets or blankets. Professionals have access to insecticides with longer residuals.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
BOXELDER BUGS See SP341H	Flat, 1/2-inch long, 1/3-inch wide, dark brownish-black, with 3 lengthwise red stripes behind the head. Wings leathery at base. Membranous at tip with red veins; abdomen is red. Nymphs are smaller, wingless and bright red.	bifenthrin RTU 0.05% cyfluthrin RTU 0.1%	These insects are attracted to buildings in the spring and fall. Large numbers collect on siding, around doors, sunny walls and attics. Use exclusion practices before pests become apparent. Inside, vacuum into a dry vac. Avoid use of space sprays if bugs found in wall voids. Dead bugs in wall voids could serve as carpet beetle food. Eliminate female (seedpod-bearing) boxelder and golden rain trees. Outside: vacuum the bugs into water mixed with 1 teaspoon of a liquid detergent per gallon of water in wet/dry vacuum cleaner tank. Treat listed sites on label when bugs are first seen. Professionals have access to insecticides with longer residuals.
CARPENTER BEES See SP341P	1/2- to 4/5-inch long with a blue-black, green or purple metallic sheen. Color and size resemble a bumble bee, but the top of the abdomen is hairless. These bees chew a circular, 3/8-inch entrance hole into wood and nesting gallery 4-6 inches long at a right angle to the entrance hole. Galleries used for several years may extend 10 feet.	Apply dusts into the gallery openings: Zep Pest Termite and Ant Killer <u>Sprays:</u> Bee/Wasp Killer Aerosols cyfluthrin RTU 0.1% Ortho Termite and Carpenter Ant Killer (bifenthrin)	Nonchemical or preventive controls include painting or varnishing wood surfaces. Use a straight wire to break up cells in tunnels. Individual bees can be killed with a badminton or similar racquet. In the spring, puff insecticidal dusts into nest holes in the evening when the carpenter bees are at rest. Allow bees access to the nest for 24 hours. Seal the hole with putty, 3/8 inch diameter dowel or cork to prevent reinfestation. Carpenter bees overwinter in previously used galleries, so the structure should also be inspected in the fall. Repaint sealed area to prevent woodpecker damage.
CARPET BEETLES See SP341I Black Carpet Beetle Common Furniture Varied Carpet Beetle	Adult 1/8 inch to 1/4 inch in length; black; brown legs. Larva 3/8 inch in length; carrot-shaped; covered with short hair and with long terminal bristles. Adults 1/8 inch long with white and orange; or yellow, white and black; or white, brown and yellow spots; larva with long black to brown hairs.	Apply spot treatments of insecticides to infested or suspect areas, but not to clothing. See precautionary statements about pesticides staining carpets. Pyrethrin 0.10% and permethrin 0.20% aerosol pyrethrins tralomethrin 0.03% cyfluthrin RTU 0.1% bifenthrin 0.05	Carpet beetles infest carpeting, clothing, fur, upholstered furniture, books, bird nests, milk powders, articles of animal products, feathers, wool, silk and other materials of animal origin. Locate food source and remove, if possible. Use good housekeeping, such as cleaning floor and carpets regularly. Dry clean clothes regularly. Stored materials subject to damage should be thoroughly cleaned and stored in tight container with moth crystals. Treat cracks, crevices and hidden area of walls, closets or stored materials, under carpets, etc.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
CENTIPEDES	Grayish creature with long feelers and many long, slim legs. Fast-moving. Long antennae.	Indoors: cyfluthrin RTU 0.1%, bifenthrin 0.05% Outside: Sevin spray cyfluthrin RTU 0.1% bifenthrin 0.05%	Feed on insects. Can bite. Usually not numerous. Active at night. Non-chemical control: leave a 12-18 inch bare zone next to foundation base. Move wood piles and other clutter away from structure. Spot-treat cracks and crevices, door thresholds and moldings where pest may crawl or as directed by label. Residuals may not provide total control. Treatments may need to come into direct contact with pest.
CHIGGERS	Very tiny mites that get on people and cause blotches and itching. Don't invade homes, but get in yards and wooded areas.	Use commercial repellents around ankles and waist for personal protection. Apply deet repellent to skin, and Permanone 0.5% spray to shoes, cuffs and socks 2 hours before wearing. Spray yard with a labeled insecticide every 4-6 weeks, if needed.	Mow lawn regularly. Remove weeds and brambles from fence rows.
CLOTHES MOTHS See SP341J	Brownish moths, wingspread 1/2" long. Larvae are 1/16-1/3" long. Gray silken cases or webbing over surface of fabric.	Brush and clean susceptible items periodically. Sweep or vacuum to remove dust or lint to prevent pests. Also vacuum prior to treatment. Dry clean and moth-proof clothing with moth crystals in tight-sealing container. Do not spray clothes. Pyrethrins, cyfluthrin RTU 0.1%, tralomethrin 0.03%	Adults are not attracted to light and will fly to a dark corner when disturbed. Usually found on infested materials, wool, fur, feathers, hair, upholstered furniture, nonsynthetic carpets, dust and lint. Apply sprays to cracks and crevices in closets and spot-treat other infested areas. See precautions on moth crystals about staining clothing.
CLOVER MITES	Tiny (1/30 inch) mites, brown to olive green with pair of long front legs.	Household sprays control by contact in home: Pyrethrins, tralomethrin 0.03% bifenthrin 0.05% Outdoors use: bifenthrin 0.05%	Invade homes from the yard in great numbers in fall and spring. Stain walls or fabrics reddish-brown when crushed. Keep grass and shrubs from direct contact with house. Good weed control in turf and a vegetation-free border of 12 18 inches around home will help. Apply sprays to points of entry such as foundations, windows and doors. Outdoors, apply a 2-3 foot band to outside foundation walls of house.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
COCKROACHES PB1024 German Cockroach Brown Banded or Furniture Cockroach Oriental Cockroach American Cockroach	About 5/8" in length, pale brown or tan with 2 parallel dark streaks on pronotum. Usually most abundant in the kitchen and bathrooms. 1/2" to 5/8" in length, dark brown with 1 1/2" to 5/8" in length, dark brown with 2 pale bands traversing wings. Widely distributed throughout the house in walls, closets, furnishings and appliances, but abundant in kitchens. 1 1/4" in length, dark reddish-brown to black; wings do not surpass end of abdomen. Usually found in lower floors, outdoors or in crawl space. Frequents water meters, floor drains or moist, dark areas. 1 1/2" in length, reddish-brown with pale yellow band around pronotum. May be found throughout house, outdoors, in crawl spaces, sewers, water meters and garbage cans.	<u>Baits:</u> Combat Roach Killing Gel, Combat bait stations, Roach Ender baits, Raid Max Roach Bait V and Egg Stopper in cracks and crevices. <u>Baits for large roaches:</u> Combat roach bait stations, Combat gel baits, others. Do not spray near baits because cockroaches will be repelled. Insect Growth Regulators containing hydroprene, pyriproxyfen or others. IGRs are slower acting but longer lasting - sterilizes adults and prevents immatures from completing development. Lightly dust voids with <u>boric acids</u>: Orthoboric Acid, Boracic, RoachPrufe 80% Plus <u>Sprays:</u> cyfluthrin RTU 0.1%, bifenthrin 0.05% tralomethrin 0.03%, Black Flag Gold (permethrin 3.5%), Hot Shot (pyrethrins 0.25%), Raid Ant and Roach (0.2% permethrin, 0.13% pyrethrins)	Prevent access to food, water and shelter. Practice good sanitation in food handling, storage and eating areas. Control moisture and prevent leaks or condensation. Seal off harborage sites such as cracks and crevices with caulk, etc. Also use exclusion practices to prevent cockroach movement. Use glue boards or sticky traps placed along edges in dark places to locate and monitor cockroach populations. Baiting is the preferred method for cockroach control. Apply baits to cracks, crevices, pipe openings into walls, joints of furniture and cabinets, pipe conduits and elsewhere as indicated by glue board catches. If you choose to spray, use precautions to keep chemicals out of food, spices and off dishes or eating utensils. Do not apply sprays where electrical shorts may occur; use baits or dusts in these areas. Do not use sprays when baiting because cockroaches will be repelled from the baits. Read label carefully; some products may not be labeled for foodhandling areas.
CRICKETS	Black, jumping insects with long antennae. Cave or camel crickets are humped and brown.	<u>Sprays and dusts:</u> cyfluthrin RTU 0.1% bifenthrin 0.05% Black Flag Gold (permethrin 3.5%) Hot Shot (pyrethrins 0.25%) Raid Ant and Roach (0.2% permethrin, 0.13% pyrethrins)	Black cricket may damage clothing. Repeat treatment as needed. Spray entry points into structure. Dust crawl space. Camel crickets infest damp basements, under slabs and crawl spaces. Ventilate or dry these areas. Active at night. Apply sprays into cracks and crevices where crickets dwell. Use exclusion practices. Glue boards can be used indoors around entry points and other places in basements, etc.
ELM LEAF BEETLES	Oblong, blackish-and-yellow beetle. Comes into homes from outdoors.	<u>Spray trees:</u> Malathion 1% Spray, Sevin Spray Fertilome Borer, Bagworm, Leafminer and Tent Caterpillar Spray	Use exclusion practices to prevent beetle entry into home. Maintain good, tight window and door screens. Screen crawl space vents. Spray infested elm trees. Use vacuum cleaner for beetles in houses.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
EARWIGS	Easily identified by pair of "pinchers" at end of abdomen.	Indoors: bifenthrin 0.05% resmethrin 0.25% Outdoors: bifenthrin 0.05% tralomethrin 0.03% sevin spray or dust	Earwigs are incidental invaders into houses. They usually dwell in leaf litter, mulch and woodpiles and are common "hitchhikers" on vegetables harvested from the garden. Moving compost piles away from the house will aid pest control. Insecticidal control is usually unnecessary for this insect. If needed, spray possible entry points and mulched area around the house.
FLEAS PB 1596	Small, 1/16" long, reddish-brown, wingless insect. Body compressed laterally, legs long and adapted for jumping.	On pet: <u>Insect Growth Regulators [and adulticide]:</u> lufenuron (Program) an insect growth regulator given in a monthly pill/feed additive that is circulated through the dog or cat's blood. Adult fleas feed on treated blood and subsequent generations are unable to develop properly. Available by prescription from veterinarians. methoprene [and pyrethrin or tetrachlorvinphos]:on animal sprays, mousses, and flea collars pyriproxyfen [and permethrin or pyrethrin]:on-animal sprays and spot-ons <u>Adulticides:</u> imidacloprid (Advantage) oil spot-on available from veterinarians permethrin, pyrethrin and other adulticides available. Spot-treat infested areas and pet resting areas inside with following: <u>Insect Growth Regulators [and adulticides]:</u> pyriproxyfen pyriproxyfen [and permethrin or pyrethrin] ready-to-use products methoprene methoprene [and pyrethrins or permethrin] ready-to-use products <u>Adulticides:</u> pyrethrins permethrin ready-to-use 0.2% tralomethrin 0.025% Outdoors (when specified on label): pyriproxyfen tralomethrin 0.03%	Adult fleas prefer to feed on dogs, cats, opossums, foxes and sometimes rats and other urban animals. When pets are not available, humans are attacked. Larvae feed on blood and organic matter in house or yard. Initiate a flea control program no later than April. Vacuum infested areas twice a week and prior to treatment to remove eggs, larvae, adults and organic matter. Steam-cleaning carpet may also reduce populations. Eliminate fleas from pets, bedding and premises before departing on vacation. Treat pets and concentrate on pet resting areas and clean or remove pet bedding on the same day. Insect growth regulators important to break flea life cycle. A combination of an insect growth regulator and an adulticide may be the most efficient formulation to use. Keep pets and people out of treated area (indoors and outdoors) until spray dries. See precautionary statements about pesticides staining carpets at the end of this publication. Repeat treatments, if needed, after about 2 weeks. Read the label carefully; cats may be excluded from treatment. Mow grass, keep weeds down and trim shrubs to expose flea eggs and larvae to lethal dessication. Irrigating areas surrounding buildings, but not against building, may kill fleas by drowning.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
FLIES Face flies, small cluster flies and blue bottle flies	Adult flies of these three species hibernate in attics and wall voids. Cluster flies about 1/3-inch long, dark gray, with checkered black and silver abdomen, with gold hairs on thorax of newly emerged adults. Face fly similar in appearance to the house fly. Adult blue bottle flies have a dull gray thorax and a shiny blue abdomen.	Exclude flies in the fall by sealing entry points, screening behind all vents, sealing holes in walls and attics prior to pest entry in fall. Vacuum or use pyrethrin sprays to kill exposed flies. Use black light trap with sticky surface. Professionals can apply dusts to voids where flies may be overwintering. If necessary, can use residual sprays on outside walls. cyfluthrin 0.1%	Cluster fly larvae are parasites of earth worms. Face fly larvae develop in cow patties. Adults hibernate in attics and wall voids. Blue bottle fly larvae develop in garbage, decaying meat, dead animals, fish and excrement.
House Flies	About 1/4" in length, dull gray color with 4 longitudinal dark stripes on the thorax.	Use pyrethrin aerosol for temporary relief inside home. If necessary, can use residual sprays on outside walls. cyfluthrin 0.1%	Larvae develop in warm organic matter of animal or vegetable origin. Remove trash at least twice a week to reduce fly populations in homes. Screen windows and doors. Garbage cans should have tight-fitting lids. Use insect light traps indoors. Sanitation is very important.
<u>Bottle Flies</u> Green Bottle Fly Blue Bottle Fly Bronze Bottle Fly Black Bottle Fly	1/2" in length; green metallic color 1/2" in length; blue metallic color 1/2" in length; bronze metallic color 1/3" in length; shiny grey thorax and dull blue metallic abdomen.	see House Fly	Bottle flies indoors often indicate a dead mouse or other animal in wall voids, attic, basement, etc. Dispose of dead animal carcasses, animal excrement, etc. Garbage cans should have tight-fitting lids.
Fruit Fly or Vinegar Fly	1/8 inch long, red eyes, tan head and thorax, abdomen gray-black.	Sanitation. Remove food source. Traps may aid control. Pyrethrin aerosols for adults.	Egg to adult in 8-11 days. Larvae in decaying fruit, vegetables and garbage cans. Adults around larvae.
Moth Fly Sewer Fly	Small, scaly or hairy, long-legged moth-like flies.	Sanitation. Remove moist organic materials, clean drains with wire brush; spray adults and resting surfaces with pyrethrins.	Adults rest on walls or foliage. 3-4 weeks from egg to adult. Breed in drain pipes, sinks and very moist organic solids.
FUNGUS GNATS See SP341C	Adults 1/8 to 1/4 inch long. Slender, gray larvae have shiny black head and white thread-like body.	Pyrethrin aerosol for adults	Avoid over-watering plants; let soil dry out somewhat between waterings. Attracted to light. Collect in windows and soil in potted plants. Run rapidly over surface.
HEAD LICE See SP341S	Tiny, flat insects that infest people and clothing.	Permethrin (Nix); Pyrethrins 0.3% and piperonyl butoxide 3% (Rid, A200, R & C, etc.)	Wash infested clothing and bedding with strong soap and very hot water; tumble dry on high heat. Dry clean woolens. Do not share hair brushes, caps, etc. Use special combs to remove nits (eggs). Nits hatch by 10 days, so another application may be needed at this time. Follow label directions.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
MICE See PB1624	Adults weigh about 1/2 ounce. Dusky gray color, slender body, prominent ears, tail about as long as head and body.	Place snap traps, multiple catch traps and glue boards along paths traveled by mice. Traps or glue boards should be placed every 8-12 ft. Traps can be baited with: whole nuts, peanuts or peanut butter, dry rolled oatmeal, bacon squares, small wads of cotton or gumdrops. Baited traps should be set at right angles to rodent runs. Place trap at right angles to rodent pathway with trigger part of trap against the run. <u>Poisoned baits:</u> <u>New acute toxin</u> – bromethalin; <u>Calcium releaser</u> – secondary poisoning of pets not a problem (kills warfarin-resistant rodents): cholecalciferol <u>Older, multiple dose anticoagulants:</u> chlorophacinone, diphacinone <u>Second generation anticoagulants</u> (single-dose, generally effective against rodents resistant to older multiple dose) brodifacoum, bromadiolone, difethialone, others	Mice move in from outdoors in fall as temperatures decline. Exclusion practices needed – mice can fit through an opening 1/4 inch in diameter. Sanitation: remove access to food, water and shelter. Rodents use edges of walls, studs and pipes as guidelines. Remember to set traps where children and pets will not be hurt. Mice are curious and will normally approach traps the first night. If you don't catch a mouse in the first few nights, the trap is in the wrong location.
MILLIPEDES	Slender, brownish, multi-legged, hardshelled, 1-2 inches long. Two pair of legs per body segment. Invade home from outdoors. Harmless.	Indoors: bifenthrin 0.05% cyfluthrin RTU 0.1% tetramethrin 0.25% aerosol Outdoors: bifenthrin 0.05% cyfluthrin RTU 0.1% Sevin spray or dust	Millipedes are not insects, so insecticides not always effective. Best control obtained when pest comes in direct contact with the insecticide. Usually occasional invaders, but may invade in large numbers. Under these circumstances, non-chemical control may be more effective: remove mulch and other clutter from near the foundation, dethatch lawns and water in the morning. Prune tree limbs to dry their habitat. Use exclusion practices. Treat entry points into structure, shady areas, ivy beds, flower beds and rock walls, leaf-litter or as directed by label. Millipedes will die within 2-3 days after entering a dry structure.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
MITES, BIRD OR RODENT	Mites occasionally found indoors because of rodent or bird nest in, on or near structures. Some of these mites may bite people. They are small (about the size of a period), but can usually be seen with the naked eye.	If widespread, space sprays of pyrethrins may be necessary. Residual such as those listed for fleas may also work. cyfluthrin 0.1% bifenthrin 0.05%	The first step in controlling bird or rodent mites is to eliminate the host animals and remove their nesting sites. Often, the nests will be found in the attic, around the eaves and rafters or in the gutters or chimney. Gloves should be used when handling dead animals. A respirator should also be worn when removing nest materials to avoid inhaling fungal spores and other potential disease-producing organisms associated with the droppings. Spray crack and crevice around infested area
MOLES SP293A, PB1624	Small, furry animals that burrow and tunnel in soil, causing raised ridges in yards.	Use mole traps of choker or harpoon type. Grubs only make up a small amount of the mole's diet. Treating lawn for insects would reduce food available to moles, but probably would not lead to control.	Place trap in main runway. Tramp down runs in several spots. Spots re-raised are in main run. Other ways to identify main runway are to look for straight course for some distance; a runway connecting two mounds or other runways; one following a fence row, concrete path or other border; one that follows an edge of field or yard.
MOSQUITOES See SP503C	Delicate insects that bite humans and animals. Breed in water. Adults stay in shrubbery, crawl spaces, etc.	<u>Treat standing water such as rain pools, intermittently flooded areas, stagnant water, etc. with:</u> Bacillus thuringiensis israeliensis (Bti): Summit B.t.i. briquets (briquets may need to be anchored) Vectobac and other granules methoprene (Altosid) liquid, pellet or briquets <u>Outside of buildings:</u> use pyrethrin spray for temporary relief as aerosol or fogger; resmethrin 0.2% in outdoor fogger Residual barrier (permethrin, malathion and others) can be applied to vegetation on perimeter of property that is prone to rapid infestation of mosquitoes. This kills adults feeding on nectar during the day and some may act as a repellent. Spray other shady, damp areas where mosquitoes rest. <u>Indoors</u> use sprays containing pyrethrins or Bioganic Flying Insect Killer in closets, stairwells, behind and beneath furniture for temporary relief.	Eliminate larval sites (standing water) around structure by unclogging gutters, emptying bird baths, children's pools, pet bowls, flower pot saucers, old tires and other containers around home twice a week. Drain or fill low areas where water collects. Easiest to control mosquitoes in immature stage because they are confined to water. Treat standing water with labeled insecticide. Use insect repellents on skin. Repair screens.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
PANTRY PESTS			
Saw-toothed Grain Beetle	Brownish black, 1/8" long, flattened with 6 saw-tooth like projections on thorax. Feeds in a wide variety of stored products, cereals, nuts, dried fruit, cookies, candy, etc.	Locate food source and discard. Place grains, flours, nuts and other stored products in insect-proof containers when they are brought home from store. Pheromone traps can indicate the presence of pests and may provide control without insecticides when populations are low and pests confined. Vacuum cracks and crevices and wipe down pantry to remove pests and food source. Do this before insecticidal application, also. Do not contaminate food, dishes, shelves or utensils with pesticides. If insecticide application desired, direct spray into cracks and crevices of storage cabinet shelves when shelves are clean and all food and utensils, etc. removed. Treat only cracks and crevices in the pantry; overall treatment of storage shelves is not effective. Do not wash off insecticide residue. Cover with paper if desired. cyfluthrin RTU 0.1%, resmethrin, pyrethrins	To prevent infestations: 1) Inspect stored products periodically, 2) Practice good sanitation, 3) Rotate stored product use so older stores are used first and none remain in storage indefinitely, 4) Have adequate ventilation to prevent moisture buildup in storage areas. 5) Insect proofing; use insectproof package or storage procedures wherever possible. 6) Pheromone traps can indicate the presence of pests and are available for Indian meal moth, saw-toothed grain beetle, confused and red flour beetle, cigarette beetle, drugstore beetle, clothes moths and others.
Cigarette Beetle	1/8" long, oval, reddish brown, head not visible from above, antennae saw-like. General feeder in tobacco, seasonings especially paprika, cereal, dried flowers and a wide variety of stored foods.		
Indianmeal Moth	3/8" wing span, inner 2/3 of wing grayish, outer 1/3 of wing copper-colored. Feeds in coarse grain products, chocolate, nuts, dried fruit.		
Rice Weevil	1/8" long. Long snout on head, dark brown with 4 bright spots on wing cover. Feeds on grains.		
Confused Flour Beetle	1/8" long, reddish-brown, convex, oval shape, antennae gradually enlarged to end in a club. Cannot fly. Feeds in flour and cereal products.		See Bean Weevil for nonchemical control.
Red Flour Beetle	1/8" long, reddish-brown convex, oval shape, antennae has a distinct 3-segmented club. Feeds in flour and cereal products.		

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
POWDER POST AND OTHER WOOD-BORING BEETLES See E&PP #391 Powder Post Beetles Lyctid powder post beetle Anobiid powder post beetle Roundheaded borers Old house borers Others	Shot-sized holes along with flour-like powder indicate these beetles. Attacks hardwoods such as oak, ash and hickory found in wood paneling, molding, window and door frames, plywood, hardwood floors and furniture. Antennae with 2-segmented club. Head protrudes forward. Reinfests seasoned wood. Attack hardwoods and softwoods. In addition to above, they also attack beams, rafters, joists, studs and other structural framing. Infestations found in moist, poorly ventilated areas such as crawl spaces, basements, etc. Head hidden by pronotum. Reinfest seasoned wood. Presence indicated by large hardshelled beetles with long feelers. Broadly-oval, 1/4" emergence hole made by old house borer. Larvae in tunnels packed with frass; 3 eye spots to left and right of mandibles. Beetle 3/4 inch long, grey-brown with 2 patches on wing covers; 2 bumps on thorax. Reinfests seasoned softwoods (pine). Neat 1/2" holes may appear in walls where beetles emerge. Don't usually reinfest seasoned softwoods (pine).	Products listed in this column refer to treatment for all reinfesting woodboring beetles listed. Beetles that have pupated prior to insecticide application may be unaffected and may continue to emerge. Insecticide applications should prevent reinfestation. Products containing disodium octaborate tetrahydrate (DOT) and glycols (Bora-care, Shell-Guard) may penetrate wood further than other residuals, but penetration is variable and depends on moisture content of the wood and other factors. Other DOT products include Timbor, Armor-Guard and others. DOT treatments must be made to unfinished surface as they will not penetrate paint or varnish; sand hardwood floors prior to treatment or power-wash logs prior to treatment. Paint, spray, inject or brush on. <u>Other residual insecticides</u> that are injected, sprayed or brushed on to coat the surface of the wood. Spray or brush on until wet, but NOT to runoff: Talstar TC 0.06% Tempo 20 WP 0.1% Tempo SC Ultra 0.05% PT Optem CS (injection) Demon TC 0.25% Prevail 0.3% Suspend SC 0.06% Dragnet SFR If infestation spreads into walls or between floors, some of the above products can be foamed. If foaming is not feasible because of electrical sources, fumigation may be needed. Fumigation is costly and should only be considered as a last resort. If only small articles are infested, such as furniture, antiques, etc., they can be fumigated at a lower cost. Only professional pest control operators licensed to fumigate can perform this operation.	Determine extent of infestation. Signs for powder post beetles are flour-like "frass" dropping from pinhead-sized or slightly larger holes (Anobiid frass is more gritty than Lyctid); adult beetles attracted to light may be found on window sills or foundation vents. Important to determine if infestation active or not. Mark or seal existing holes, vacuum existing sawdust, recheck wood for new holes in spring or early summer. These beetles damage wood slowly. If "frass" is yellow, caked or covered with dust or debris, that damage is old. Old house borers can be detected by hollow sound when wood tapped. Prevention: 1) don't use old lumber from a barn or wood pile unless it has been treated (2) don't use improperly dried or stored lumber (3) inspect firewood prior to bringing into structure (4) paint, varnish or otherwise seal wood to prevent exposed edges (5) seal previous emergence holes to prevent egg-laying sites. New houses usually infested by use of infested lumber. May also come from firewood. Alternative controls for powder post beetles: small items, such as picture frames can be heated at 120 to 140 F for six hours to kill existing life stages. Freezing (0 F) infested wood for 72 hours will also kill all life stages. If all evidence indicates the infestation is localized, wood could be replaced. Watch for new holes in adjacent areas. Decrease moisture in wood through ventilation and moisture barriers. Central heat and air may reduce wood moisture so there is insufficient moisture to support large infestations in living areas. Wood kept below 14 percent moisture would be unsuitable to Anobiid powder post beetle reinfestation or development. Professionals have a moisture meter.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
RATS See SP293B, PB1624	Norway rat: 12-18 inches, tail shorter than head and body, body heavy and thick, ears small Roof rat: 12-17 inches, tail longer than head and body, body light and slender, ears larger. Young rat : 6-7 inches, feet large, head large House mouse: 6-7 inches, feet small, head small Droppings: Roof rat: pointed, about 1/2 inch Norway rat: blunt, about 3/4 inch House mouse: pointed, about 1/8 inch	When rats are plentiful or where unsanitary conditions exist with shelter, poisoned baits are the best control method. Often community-wide control needed. Poison baits are available as ready-to-use, premixed baits. They come in many forms: parafinized blocks for outdoor use and high-humidity areas; treated meal; seeds; or parafinized pellets in bulk or in "place packs" for indoor use. Water baits are sold as packets of concentrate that are mixed with water. They are administered with a chick waterer and are useful in areas where rodent food is abundant. Poison baits should be placed where they are inaccessible to children and pets. Where rodent runs are exposed and in most outdoor situations, tamper-proof bait boxes should be used. Vitamin K is the antidote for anti-coagulants. Poison baits: <u>Newer acute toxin</u> - Bromethalin <u>Calcium releaser</u> - secondary poisoning of pets usually not a problem (kills warfarin-resistant rodents): cholecalciferol <u>Older, multiple-dose anticoagulants</u>: diphacinone <u>Second-generation anticoagulants</u> (single-dose, generally effective against rodents resistant to older multiple-dose) brodifacoum, bromadiolone, difethialone Others	Exclusion practices needed. Rats can fit through an opening 1/2 inch in diameter. Locate entrance into structure and exclude. Use materials such as galvanized, stainless or other non-rusting metal such as 24-gauge sheet metal or 19-gauge hardware cloth with 1/4 inch or smaller opening; brick, concrete block, tile or glass; steel wool with expandable foam; and others. Remove debris such as piles of waste lumber or trash, used feed sacks, abandoned large appliances and wood piles from next to structure. Store pet foods and seed in rodent-proof glass or metal containers. Place snap traps, multiple catch traps and glue boards along paths traveled by rats. Of the snap traps, the expanded trigger trap is the most versatile, since it can be baited. Rats are bait shy. Leave baits in place for at least a week before moving. Place trap 90 degrees to rodent pathway with trigger part of trap against the run. Rodents use edges of walls, studs and pipes as guidelines. Snap traps can be baited with whole nuts; raisins or grapes for roof rats; sardines packed in oil for Norway rats; peanuts or peanut butter; bacon squares; or small wads of cotton. Often area-wide effort needed.
SILVERFISH AND FIREBRATS See SP341O	Grayish, wingless, rapid-moving insects with 3 long tails. Feed on starchy materials such as bookbinding, wallpaper, cardboard, etc.	Raid Ant & Roach (0.2% permethrin, 0.13% pyrethrin) Resmethrin 0.25% bifenthrin 0.05% cyfluthrin 0.1% tralomethrin 0.03%	Treat cracks and crevices where silverfish and firebrats may dwell. Attics many times source of infestation; treatment in attic often necessary.
SKUNKS See SP293B, PB1624	These animals many times live in the ground around or under homes.	Bac-Azap biological odor control or others can be sprayed to eliminate odors.	Trap and remove skunks from property. Seal the foundation to prevent entry under building.
SNAILS AND SLUGS	Long, grayish, shiny, soft-bodied creatures. Will attack various plants. Leave slime trails on walks and walls.	Snail and slug killer baits containing metaldehyde.	Remove boards and plastic or plant debris and dry damp areas adjacent to foundation.
SNAKES See SP293E, PB1624	Snakes of various kinds, den around or invade homes and other buildings.	Place a pile of cool, damp rags in building where snake was last seen. Snake will be attracted and can be removed. Large glue boards can trap snakes.	Mouse-proof building. Mow lawns and field to control grass, weeds and brush. Remove boards, flat rocks, trash piles and other debris.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
SOWBUGS OR PILLBUGS	Grayish, hard-shelled, many-legged creatures appear on walks and patios. Roll up in ball when disturbed. Occasional invaders.	Chemical control usually not necessary for this pest. If needed, apply to infested areas outdoors around perimeter of structure. This stops any invasion into the house. Sevin spray, bifenthrin 0.05%	Remove leaf piles, grass clippings, old boards, wood piles and other debris from around foundation. Leave a 12-18 inch plant/mulch-free zone next to foundation base. Use exclusion practices: caulk cracks around foundation and screen vents in foundation. Drain and dry area around house.
SPIDERS or SCORPIONS See PB 1193 Vanderbilt University brown recluse spider bite information line: (615) 322-2483 See PB 1191	Many kinds invade homes, basements and roof overhangs from outdoors. Two species most dangerous in Tennessee: Black Widow: black spider with red hour- glass shape on bottom of abdomen. More of an outdoor pest along perimeter of buildings. Use outside perimeter treatment with residuals. Brown Recluse, light brown spider, with legs reaching to the size of a quarter or half dollar, dark violin shape on back of front portion of head, 3 pairs of eyes arranged in a semi-circle. Brown recluse poses a serious threat. Quite often a professional pest control company should be used. Remove unnecessary clutter and webs from indoors and outdoors and vacuum, especially under furniture. Use residual sprays around exterior foundation, eaves, closets, storage areas and rugs. Dusts can be applied to wall voids, attics and inaccessible crawl spaces. ULV or aerosol treatment with pyrethrins to kill exposed spiders and flush others onto surfaces treated with residuals.	Dusts: DeltaDust Zep Pest Termite and Ant Killer Tempo 1D Residuals: Demand CS Tempo 20 WP Demon WP Suspend 0.03 - 0.06% Talstar 0.03 - 0.06% bifenthrin 0.05% cyfluthrin 0.1% <u>Space or aerosol:</u> pyrethrins	Beneficial organisms because they feed on pest insects. Occasional invaders that can be vacuumed or swept out the door. Remove wood or mulch piles away from house to lower abundance of their insect food source. Apply insecticides to crawl spaces, basements, attic, eaves and outdoor areas of home. Clean up debris where scorpions and spiders hide. Replace outdoor lights with yellow bug lights. Scorpions will fluoresce under a black light, so they and their breeding areas can easily be seen at night. Use glue boards to trap spiders and locate infested areas. Glue boards should be placed against walls and other guidelines where spiders are suspected. Efforts to control brown recluse will cause spiders to become more active. Prevent bites by checking shoes and clothing before wearing, by pulling beds away from walls, and preventing bed skirting and bedspreads from touching the floor.
SPRINGTAILS	Small, jumping insects with a forked spring mechanism	Treat entry areas, sills, foundations, soil and cracks where insects are found: bifenthrin 0.05% cyfluthrin 0.1%	Usually found in moist, decaying vegetation and are incidental invaders into houses. There are a few reports of large populations entering homes. Dry out surrounding landscape, water only in morning, etc.

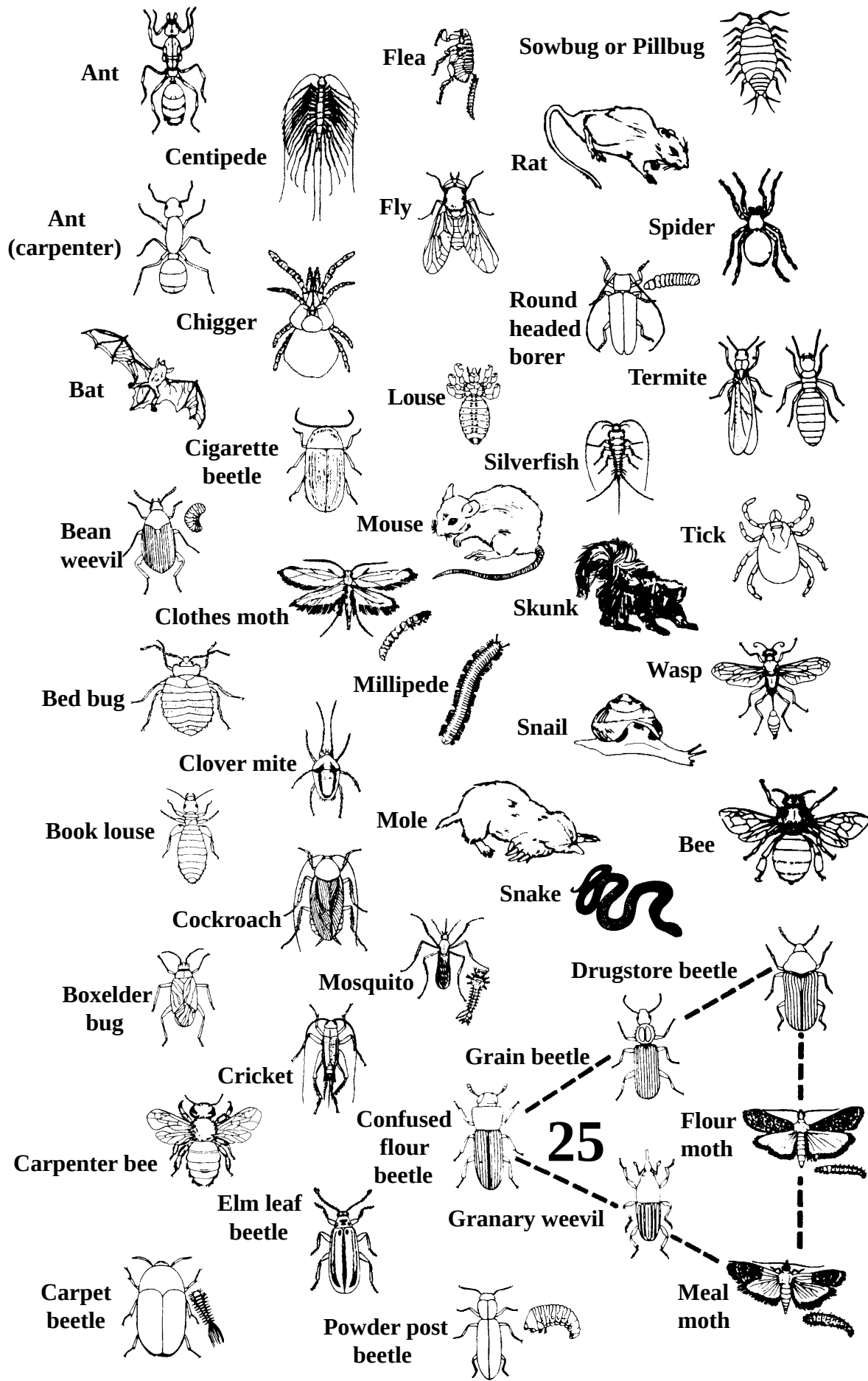
PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
TERMITES See PB 1344	Termites invade and eat wood and other cellulose material, causing extensive damage in structural parts of a building. Their presence may not be discovered until they swarm, years after infesting a structure. Workers and soldiers: soft-bodied insects 1/8 to 3/16 inch long. Swarmers are black to brown with pearly wings. Swarmers are easily distinguished from winged ants by termites' straight antennae, broadly attached thorax to waist and four nearly equal wings. Inspect for signs of termite infestation: irregular earthen tubes constructed across walls, floors and foundation. Hammer or probe timbers with a sharp instrument. Damaged wood will be soft, channeled, unsound and may possibly reveal the termite infestation itself. Use a moisture meter. Active termites will increase moisture reading relative to uninfested areas. Termites commonly enter homes around doors, wooden steps and porches and unexcavated portions of structures. The easiest access points are where wood is in direct contact with the soil. Recently, some termiticide labels have listed variable rates, depending on soil type. To ensure your home is treated as directed by the label, ask the professional to provide a copy of the label. Suggested volumes listed below are usually for the lowest rate. In general, horizontal barriers (under slab) should receive 1 gallon of diluted termiticide per 10 square feet or 1.5 gallons if coarse fill. Vertical barriers (along both sides of foundation wall, around plumbing, piers and conduits) should receive 4 gallons of dilution per 10 linear feet per foot of depth (into a trench 6 inches wide and 1 foot deep) or to the top of the footing. Voids in hollow masonry foundation walls should be treated at a rate of 2 gallons per 10 linear foot so the dilution will reach the top of the footing. Occasionally, moisture-damaged wood in roofs can support an aerial infestation. No mud tubes will reach to ground. Attic inspection is important, too.	Listed below are products available to professionals (Manufacturer): <u>Wood treatment:</u> treat galleries and wall voids; spray or brush on until wet, but NOT to runoff. Used to supplement a soil treatment. Bifenthrin Talstar TC cyfluthrin Tempo 20WP 0.1% Tempo SC Ultra 0.05% cypermethrin Demon TC 0.1% permethrin Dragnet FT 0.5% <u>disodium octaborate tetrahydrate:</u> apply to wood as pretreatment barrier or as a second barrier to prevent tubing (see labels for more details). Paint, spray, inject or brush. Bora-Care Tim-bor Armor-Guard Shell-Guard <u>Soil treatment:</u> Do not apply near (within 100 ft.) any body of water, cistern, or well. + F = may also be foamed <u>Nonrepellents</u> chlorfenapyr Phantom 0.125, 0.05%(BASF) + F fipronil Termidor 80WG, 0.06%, 0.125% (Aventis)+F Termidor SC, 0.06%, 0.125% (Aventis) +F imidacloprid Premise 75 0.05, 0.1% (Bayer)+F Premise 2 (small jobs and foaming) + F (Bayer) Premise 0.5 SC (in-line injector) 0.05, 0.1% (Bayer) <u>Pyrethroids</u> bifenthrin Talstar 0.06, 0.12% (FMC) + F cypermethrin Demon TC 0.25, 0.5% (Syngenta)+F Prevail FT 0.25, 0.5, 1% (FMC) +F permethrin Dragnet SFR 0.5, 1, 2% (FMC) +F Prelude 0.5, 1, 2% (Syngenta) +F	Follow correct construction practices. For added protection against a termite infestation: (1) Remove all wood materials from around and under the house; (2) Remove all form boards and construction stakes; (3) Construct a termite-proof foundation; (4) Have at least 30 in. of clearance under buildings; (5) Have proper ventilation and light under all parts of the building; (6) Use a moisture barrier in crawl spaces; (7) Drain water away from building; (8) Have no wood in contact with the ground, or treat those timbers that require ground contact with approved preservatives/borates (9) Make periodic inspection of buildings. Find a reputable professional to treat (See PB1344). Collect some swarmers for identification and vacuum rest. Leave mud tubes in place until professional arrives. Effective control measures for a soil treatment should include: 1) Inspect basement and underside of house thoroughly to determine the area and extent of infestation. 2) Inspect attic for termite tubes and damage to joists, rafters, flooring and stored materials. 3) Disrupt and block all termite tubes (unless baiting) 4) Ditch the entire foundation inside and out and treat the soil replaced in the trenches with chemicals. 5) Repair all foundation and basement floor and wall breaks with rich concrete. 6) Break all wood-soil contacts; treat such areas with chemicals. 7) Treat infested timbers and replace those which are badly infested. 8) Treat hollow spaces in the foundation—concrete blocks, piers, chimney bases, space behind brick veneer. Ditch and treat inside of porch foundations, under patios, under concrete slabs and the surface of ground under porches and similar dead places. 9) Provide ventilation and drainage beneath house and porches. 10) Remove all scrap wood from beneath house.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
TERMITES Cont'd		<u>Baits</u> Termites feed on bait and spread bait to rest of colony to eliminate or suppress it. Sentricon Colony Elimination System (DowAgrosciences): Bait (Recruit II and Recruit II AG) contains an insect growth regulator (hexaflumuron). First Line Termite Bait, GT and GTX Plus(FMC). This bait contains the active ingredient sulfluramid. Exterra Termite Interception and Baiting System contains the insect growth regulator diflubenzuron. Outpost TBR Termite Bait Response (Bayer) contains the insect growth regulator diflubenzuron. Subterfuge (BASF) contains the active ingredient hydramethylnon. We do not recommend homeowner-installed termite baits.	
TICKS See PB 726	Grayish or brown, round, hard-shelled, 8-legged creatures that invade homes, yards and get on pets and people.	Insecticide applications are most effective when directed into areas where ticks and their animal hosts are likely to frequent. Pay particular attention to borders and fences between wooded or brushy areas and the lawn, around ornamental plantings, beside foot paths, houses and dog houses. Allow surface to dry before people or pets have access. Sevin 5D, granular or spray tralomethrin 0.03% bifenthrin 0.05% permethrin, cyfluthrin cyfluthrin 0.1%G, permethrin 0.25%G and other synthetic pyrethroid insecticides. Indoors for brown dog tick: tralomethrin 0.03% cyfluthrin 0.1% bifenthrin 0.05% other pyrethroids	Nonchemical methods for reducing tick problems include mowing the lawn and controlling weeds. This has three advantages – it lowers the moisture in the grass microclimate and allows sunlight to penetrate, which tends to cause ticks to dry out; it discourages rodents (which may serve as hosts) from nesting; and lastly, because there is less plant matter, less pesticide may be needed if a treatment is necessary. Also, removing debris, weeds or clutter from around the house discourages rodents from nesting. Repair entry points into the house to discourage possible tick hosts from entering. Cracks and crevices, both indoors and out, can be sealed to reduce hiding places for ticks. Inspect and clean pets and their bedding frequently. If bedding is infested, it can be cleaned or destroyed. In the home, ticks stay around baseboards and walls. Use insecticides in cracks and crevice in the home for brown dog tick.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
TICKS Cont'd		Repellents: Apply deet to skin or clothing; Permanone 0.5% spray to shoes, cuffs and socks 2 hours before wearing. Dogs: BioSpot, Priority Spot and other permethrin-containing spot-ons fipronil (Front Line) spot-ons available from veterinarians collars containing amitraz (don't use around small children or dogs that may chew collar)	
WASPS, HORNETS, YELLOW-JACKETS See SP290A, SP341M	Many types build paper and mud nests around homes, in ground or in shrubs.	Bee and wasp killer aerosols tetramethrin aerosols cyfluthrin 0.1% Eugenol 0.2% Eco PCO Jet Victor Yellow Jacket Trap	Wait until dark when wasps return to nest and are slow due to cooler temperatures. Apply insecticides to nest opening and seal nest opening if possible. Remove mud nests in winter to destroy overwintering forms. Traps can used to reduce foraging yellow jacket populations.

For General Public

Trade Name	Chemical Name	Manufacturer Web site
Bayer Advanced Garden™ Lawn and Garden Multi-Insect Killer Granules	cyfluthrin 0.1% G	Bayer http://www.advancedgarden.com/
Bayer Advanced Home™ Home Pest Control, Indoor & Outdoor Insect Killer RTU pump	cyfluthrin	Bayer http://www.advancedgarden.com/
Bee/Wasp Killer Aerosols	various	
Biogonic Wasp and Hornet Killer	Eugenol	EcoSmart http://www.biogonic.com
Combat Ant Killing System	hydramethylnon	Combat Insect Control Systems
Combat bait stations (Quick Kill Formula for roaches, Quick Kill Formula for Large Roaches)	fipronil	Combat Insect Control Systems
Combat bait stations (Source Kill)	hydramethylnon	Combat Insect Control Systems
Combat Roach Killing Gel	hydramethylnon	Combat Insect Control Systems
Combat Superbait Ant Baits	hydramethylnon	Combat Insect Control Systems
Fertilome Borer, Bagworm, Leafminer and Tent Caterpillar Spray	spinosad	Fertilome
Hot Shot	pyrethrins	Spectrum Group, United Industries
Ortho RTU Home Defense Indoor & Outdoor Insect Killer	bifenthrin	The Scotts Company http://www.ortho.com/
Ortho Termite and Carpenter Ant Killer	bifenthrin	The Scotts Company http://www.ortho.com/
Raid Ant and Roach	permethrin, pyrethrin	S.C. Johnson http://www.ortho.com/
Raid Max Roach Bait V and Egg Stopper	abamectin and hydroprene	S.C. Johnson http://www.ortho.com/
Raid Ant Baits	Avermectin B ₁	S.C. Johnson http://www.ortho.com/
Raid Max Ant Bait Plus	sulfluramid	S.C. Johnson http://www.ortho.com/
Real Kill RTU Home Insect Control 3	tralomethrin 0.03%	United Industries Corp.
Sevin	carbaryl	GardenTech, Gulfstream Home and Garden http://www.gardentech.com
Sevin, Ortho Big-B-Gone Multi-Purpose Insect Killer	carbaryl 6.3%granule	The Scotts Company http://www.ortho.com/
Summit B.t.i. briquets	<i>Bacillus thuringiensis israelensis</i>	Summit Chemical
Terro Ant Killer II	borax	Senoret http://www.terro.com/
Victor Roach Killing Powder	boric acid	Woodstream http://www.woodstreampro.com/victor.htm
Zep Pest Termite and Ant Killer Dust	deltamethrin	Enforcer Products



Further references for household pest identification:

Manuals:

Bennett, G.W., J.M. Owens, and R.M. Corrigan. 1997. **Truman's Scientific Guide to Pest Control Operations**. 5th edition. Edgell Communications, Duluth, MN

Mallis, A. 1997. **Handbook of Pest Control - the Behavior, Life History and Control of Household Pests**. 8th edition. Franzak and Foster Co. Cleveland, Ohio. (216)961-4130

Koehler, P. **Pests In and Around the Home**. IFAS Publications, P.O.Box 110011, University of Florida, Gainesville, FL 32611-0011 or (352)392-1764 or if using the World Wide Web <http://gnv.ifas.ufl.edu/~entweb/publicat.htm>

Handbooks for identification and control of specific pests. These are inexpensive and very useful. Most pesticides mentioned are for professional use.

Hedges, S. **Pest Control Technology Field Guide for the Management of Structure-Infesting Ants**. Franzak and Foster Co., Cleveland, Ohio.

Hedges, S. **Pest Control Technology Field Guide for the Management of Structure-Infesting Flies**. Franzak and Foster Co., Cleveland, Ohio.

Hedges, S. **Pest Control Technology Field Guide for the Management of Urban Spiders**. Franzak and Foster Co., Cleveland, Ohio.

Hedges, S. and M. Lacey. **Structure-Infesting Beetles. Volume 1: Hide and Carpet beetles/Wood- Boring Beetles** .Franzak and Foster Co., Cleveland, Ohio.

Hedges, S. and M. Lacey. **Structure-Infesting Beetles. Volume 2: Stored Product Beetles/Occasional and Overwintering Beetles**. Stoy Franzak and Foster Co., Cleveland, Ohio.

Smith, E and R. Whitman. 1992. **NPCA Field Guide to Structural Pests**. NPCA, Dunn Loring, VA.

PRECAUTIONARY STATEMENT

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store, or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

DISCLAIMER STATEMENT

Pesticides recommended in this publication were registered for the prescribed uses when printed. Pesticide registrations are continuously being reviewed. Should registration of a recommended pesticide be canceled, it would no longer be recommended by The University of Tennessee.

Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others which may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product.

Caution: Carpets can be discolored with insecticides.

Exercise caution to prevent carpet discoloration following the use of an organic phosphate insecticide on carpets. The dyes used in the manufacture of carpets have changed in recent years creating a problem in the use of insecticides on carpets.

Carpets dyed with acid red dyes may change color after being sprayed with an organophosphate insecticide. The phosphoric acid reacts with the acid red dye as the insecticide breaks down into the metabolites.

The relative humidity, excess moisture from sweating of walls, floors or slabs, cleaning fluids or bleaches may also interact with the phosphoric acid in the discoloration of the carpets.

The organophosphate insecticides most frequently used in the household sprays are DDVP, Malathion, Sumithion, Orthene, Diazinon and Dursban.

Before applying any product to a carpet, check carpet manufacturer's warranty and care and maintenance information before using a product on your specific brand. Spot test a small portion of the carpeting before treating.