

Managing Pests Around the Home

Suggestions for the General Public

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.

When should I contact a professional pest control company? 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 or work under the direct supervision of a licensed operator. 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:

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 (weekly, biweekly, monthly) 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.

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 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.

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.

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 alternative controls - traps and vacuums.
5. Reduce exposure to people and pets from pesticides by using baits, insect growth regulators, dusts in voids and sprays in cracks and crevices.

Sanitation is a key factor in controlling pests.

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.

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.

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.

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, a 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 10 feet of corners of buildings usually give the best cross ventilation. Suggestions for the number of vents in a crawl space are 1 sq. ft. of vent space per 300 - 600 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. 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. See FHA Minimum Property Standards for the current year. Ventilation of attic spaces and roof areas is important in minimizing water vapor build up. 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. Place ventilators to assure air movement through a stack effect. It is important to place screening behind vents to exclude pests.

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

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 have a dramatic effect on millipede, cricket, sowbug, pillbug and clover mite populations is to keep 12-to 18-inches 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. 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 buildings' susceptibility to termites. 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. Support wood posts on a concrete base. Moisture attracts termites to the home. Repair plumbing leaks and leaks in roofs and around windows as quickly as possible. Clean leaves and debris from gutters. Down spouts 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.

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.

Vacuumping. 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. 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).

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. It is important to wear proper safety equipment when applying dusts. Always follow the label instructions for safety.

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.

Read the pesticide label carefully and always follow all label directions.

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 (Hinkle, N.C., P.G. Koehler, and R.S. Patterson. 1990. Egg production, larval development, and adult longevity of cat fleas (Siphonaptera: Pulicidae) exposed to ultrasound. J. Econ. Entomol. 83: 2306-2309.)

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. Additional publications are listed under PESTS as a PB or SP and many are now located on our web site at <http://www.utextension.utk.edu/publications/pests/default.asp#home>

SEE THE LABEL FOR MIXING, USE AND DISPOSAL DIRECTIONS!

RTU= ready-to-use.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>ANTS See PB1629</p>	<p>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. Workers 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.</p>	<p>Do not spray near baits!! Baits should contain slow-acting ingredients such as abamectin, hydramethylnon, dinotefuran, fipronil, indoxacarb, disodium octaborate tetrahydrate, boric acids, and borax so they are distributed well throughout the colony.</p> <p>Indoors: <u>Baits:</u> Most ants feed on sweets, but Odorous house ants and Argentine ants don't feed on oils very often, so try Terro Ant Killer II (odorous, Argentine), Combat Ant Killing Gel (Argentine ants), Spectracide Bug Stop Liquid Ant Bait (odorous, Argentine), Hot Shot Ultra Liquid Ant Bait (odorous, Argentine), as well as other sweet and protein baits for these ants.</p> <p>Myrmicine ants, such as Pharaoh ants, big-headed, little black ants and pavement ants feed on sweet liquid and gel baits listed above and other baits such as Hot Shot Maxattract Ant Bait₂ or Raid Ant Baits.</p> <p>Outdoors: <u>Baits:</u> Combat Outdoor Ant Killing Stakes Combat Outdoor Ant Killing Granules Grants Kills Ants Killer Ant Bait</p> <p><u>Barrier Sprays:</u> bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>Professionals have access to more baits and sprays than homeowners and professionals are trained to use them. Call a pest management professional if an ant problem persists.</p> <p>Follow good sanitary and exclusion practices. Exploit the worker caste by using baits. Find foragers and place bait near the foraging trails. Workers then bring the 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.</p> <p>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, bait outdoors, exclude ants by sealing entry points such as window sills and door steps, and/or spray entry points (barrier spray) into the structure.</p>

ANTS-FIRE

(see Redbook recommendations for Home Lawn Insects) See web sites <http://www.extension.org/fire+ants> for publications (Managing Fire Ants in Urban Areas, Two-step...) and other information about fire ants and "Imported Fire Ants In Tennessee" at <http://fireants.utk.edu> for extensive list of TN fire ant management products under "Updates". For a list of "homeowner" products by price and application type (broadcast vs. individual mound treatment) see <http://www.aces.edu/pubs/docs/A/ANR-0175-A/ANR-0175-A.pdf>.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
ANTS - CARPENTER See PB1599	<p>Large, black, red, or red-and-black ants that nest in damp wood. Wingless workers 1/4 to 3/8 inch long. Winged male and female reproductives swarm from a colony. These ants 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.</p>	<p><u>Dusts:</u> boric acid dusts permethrin 0.25% deltamethrin 0.05%</p> <p><u>Sprays:</u> beta-cyfluthrin RTU 0.05% bifenthrin 0.05%</p> <p><u>Baits:</u> Apply indoors or outdoors, according to label, where ants are seen.</p> <p>Combat Ant Killing Gel Combat Outdoor Ant Killing Granules Terro Ant Killer II Grant's Kills Ants Ant Killer Bait</p>	<p>Because carpenter ants can cause structural damage, infestations are best treated by a professional. Professionals have access to more products, such as baits (Maxforce Carpenter Ant Bait Gel) and nonrepellent liquids (Termdor, Premise, etc.), than homeowners. 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.</p> <p>Some success has been found using ant baits for carpenter ant control, but it is not always a successful technique at this time. Place baits where ants are actively foraging. Do not spray ants or baits with fast-acting sprays because it will repel ants from baits and prevent the bait from being brought back to the nest.</p>
BATS PB 1624	<p>Night-flying creatures invade attics and similar areas.</p>	<p>Treat area with insecticides to control external parasites including fleas, mites and lice after bats are excluded. See fleas and mites section.</p>	<p>Close entrance holes with wire screening to exclude bats after they have left the resting area. Seal opening with expandable foam.</p>
BEAN WEEVILS	<p>Small, gray beetles and white worms cut round holes in dried beans and peas. May attack in field or in storage.</p>		<p>Non-chemical control: Either destroy the infested products or salvage them by super heating to 140 degrees F for ½ hour, or super cooling in a deep freeze at 0 degree F for 4 days. Store insect-free beans in containers with tight lids.</p>
BOOK LICE	<p>Small, soft-bodied, cream-colored to grayish or light brown, wingless, fast-moving. Feed on molds, fungi. Found in books, cereals, wallpaper, boxes. May damage starched things.</p>		<p>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.</p>
BED BUGS PB 1763	<p>Flat, oval, reddish-brown, wingless insects. Bloodsucking. Night feeders.</p>		<p>Very difficult to control. Often a professional needed.</p>
BOXELDER BUGS See SP341-H	<p>Flat, ½ 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.</p>	<p>bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>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 (seed-pod-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.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>CARPENTER BEES See SP341-P</p>	<p>½ to 4/5 inch long with a blue-black, green or purple metallic sheen. Color and size resembles a bumble bee, but the top of the abdomen is hairless.</p> <p>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.</p> <p>Carpenter bees overwinter in previously used galleries, so the structure should also be inspected in the fall. Repaint sealed area to prevent woodpecker damage.</p>	<p>Apply <u>Dusts</u> into the gallery openings: Apicide (carbaryl 5%) deltamethrin 0.05%</p> <p><u>Sprays</u>: Bee/Wasp Killer Aerosols beta-cyfluthrin RTU 0.05% Ortho Home Defense Max Termite and Destructive Bug Killer Concentrate (bifenthrin)</p> <p><u>Foam</u>: Spectracide Termite Killing Foam₂</p>	<p>Nonchemical or preventive controls include painting or varnishing wood surfaces. Use a straight wire to break up cells in tunnels. Individual bees can be caught with a net and killed.</p> <p>In the spring, puff insecticidal dust 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.</p>
<p>CARPET BEETLES</p> <p>Black Carpet Beetle</p> <p>See SP341-I</p> <p>Common; or Furniture; or Varied carpet Beetles</p>	<p>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 has long terminal bristles.</p> <p>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.</p>	<p>Apply spot treatments of insecticides to infested or suspect areas, but not to clothing. See precautionary statements about pesticides staining carpets.</p> <p>beta-cyfluthrin RTU 0.05%, bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>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.</p>
<p>CENTIPEDES</p>	<p>Have long feelers and many long, slim legs. Fast moving. Long antennae.</p>	<p>Indoors: beta-cyfluthrin RTU 0.05%, lambda-cyhalothrin RTU 0.03%</p> <p>Outside: Sevin spray beta-cyfluthrin RTU 0.05% bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>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.</p>
<p>CHIGGERS</p>	<p>Very tiny mites which get on the person and cause blotches and itching. Don't invade homes, but get in yards and wooded areas.</p>	<p>If needed, treat yard with a labeled insecticide every 4-6 weeks, or according to label.</p> <p>cyfluthrin Ready-to-spray 0.75% beta-cyfluthrin 0.05% G</p>	<p>Mow lawn regularly. Remove weeds and brambles from fence rows. 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.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
CLOTHES MOTHS See SP341-J	Buff-colored 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. Any ready-to-use or concentrated liquid spray labeled for this pest.	Adults are not attracted to light and will fly to 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 and insecticides 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: bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03% Outdoors use: bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	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.
COCKROACHES PB1024 German Cockroach Brown Banded or Furniture Cockroach Oriental Cockroach American Cockroach Smokybrown 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 2 pale bands traversing wings. Widely distributed throughout the house in walls, closets, furnishing, in 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. 1 to 1 1/2 inches, uniform, very dark brown to black; head shield is a solid, dark color. Takes harborage in moist, warm and dark places like treeholes, mulches, soffits in attics with poor ventilation.	<u>Baits in cracks and crevices:</u> Combat Roach Killing Gel, Hot Shot Ultra Clear Roach Gel, Bayer Dual Action Roach Killer Power Pen <u>Baits for small roaches:</u> Combat bait stations for small roaches, Raid Double Control Small Roach Baits with Egg Stopper, HotShot Ultra Liquid Roach Bait, others. <u>Baits for large roaches</u> Combat bait stations for large roaches, HotShot MaxAttrax Nest Destroyer Roach Bait, others. Do not spray near baits because cockroaches could be repelled. <u>Lightly dust voids with insecticidal dusts containing boric acids</u> <u>Sprays:</u> beta-cyfluthrin RTU 0.05% bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	Prevent access to food, water and shelter. Practice good sanitation in food handling, storage and eating areas. Control moisture, 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, pipes opening into walls, joints of furniture and cabinets, pipe conduits, and elsewhere as indicated by glue board catches. If you chose 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 food handling areas.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
CRICKETS	Black, jumping insects with long antennae. Cave or camel crickets are humped and brown.	Sprays beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	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.	Spray trees: Sevin Spray spinosad	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.
EARWIGS	Easily identified by pair of "pinchers" at end of abdomen.	Indoors: bifenthrin RTU 0.05% Outdoors: bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	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.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>FLEAS PB 1596</p>	<p>Small, 1/16" long, reddish-brown, wingless insect. Body compressed laterally, legs long and adapted for jumping.</p> <p>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.</p>	<p>On pet: CATS, KITTENS, & PUPPIES ARE MORE SENSITIVE TO INSECTICIDES!!!!!!</p> <p>Consult a veterinarian and always read the label prior to treating a pet. Beware of imitation products.</p> <p>Veterinarian supplied products - usually kill fleas within 12 - 36 h or sooner and provides 90 - 95% control for about 30 days: see pesticide recommendation at http://www.ent.uga.edu/pmh/</p> <p>under <i>Homeowner</i>, and <i>Pets & Honey Bees</i>, for a thorough listing of veterinarian supplied on-pet products.</p> <p>Spot-treat infested areas and pet resting areas inside <u>Insect Growth Regulators [and adulticides]:</u> pyriproxyfen [and pyrethroid] Bengal Full Season Flea Killer Plus 2 Enforcer Flea Spray for Home</p> <p>methoprene [and pyrethroid]</p> <p><u>Adulticides:</u> pyrethrins bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p> <p>Outdoor Premise Treatment (when specified on label): pyriproxyfen (Archer and others) lambda-cyhalothrin RTU 0.03%</p>	<p>Step 1. With veterinarian supplied products that are currently available, control of fleas in small- to moderate-sized infestations is likely to occur by using those pet treatment products alone. May take 2 months to completely break flea life cycle.</p> <p>If pet treatment alone does not provide sufficient control, initiate a complete control program by April.</p> <p>Step 2. 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.</p> <p>Step 3. Treat pet resting areas indoors 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.</p> <p>Step 4. 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. If fleas are surviving outdoors, apply insecticide to labeled areas.</p> <p>Keep pets and people out of treated area (indoors and outdoors) until surface sprays dry.</p>
<p>FLIES Face flies, small cluster flies, and blue bottle flies</p>	<p>Adult flies of these three species hibernate in attics and wall voids. Cluster flies about 1/3" 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.</p>	<p>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.</p>	<p>Cluster fly larvae are parasites of earthworms.</p> <p>Face fly larvae develop in cow patties. Adults hibernate in attics and wall voids.</p> <p>Blue bottle fly larvae develop in garbage, decaying meat, dead animals, fish and excrement.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
House flies	About 1/4" in length, dull gray color with 4 longitudinal dark stripes on the thorax.	Victor Fly Catcher Sticky Tape Various light traps Use pyrethrin aerosol for temporary relief inside home. Apply residual sprays on outside locations where flies rest. beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	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.
Bottle Flies 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" long, red eyes, tan head and thorax, abdomen gray-black.	Sanitation. Remove food source. Traps may aid control. Various flying insect killers for temporary relief of 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. For temporary relief of adults, spray adults with flying insect killers.	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 SP341-C	Adults 1/8 to 1/4 inch long. Slender, gray larvae have shiny black head and white thread-like body.	For temporary relief of adults, spray adults with flying insect killers.	Larvae feed on decaying plant roots. Avoid over-watering plants, let soil dry out somewhat between waterings. Adults are attracted to light and run rapidly over soil surface.
HEAD LICE See SP341-S	Tiny, flat insects which infest people and clothing.	Premise sprays are not recommended for head lice control. Several louse shampoos and other hair products are available for homeowner use.	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 of head lice shampoo or other hair product may be needed at this time. Follow label directions.
MICE See PB1624	Adults weigh about ½ ounce. Dusky gray color, slender body, prominent ears, tail about as long as head and body. EPA's final risk mitigation decision requires that all rodenticide bait products for sale to consumers be in tamper-resistant bait stations. Loose bait such as pellets will be prohibited as a bait form. http://www.epa.gov/oppsrrd1/reregistration/rodenticides/finalriskdecision.htm	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. Place trap at right angles to rodent pathway with trigger part of trap against the run.	Mice move in from outdoors in fall as temperatures decline. Exclusion practices needed, mice can fit through an opening 1/4" 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.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
MILLIPEDES	Slender, brownish, multi-legged, hard-shelled, 1-2" long. Two pair of legs per body segment. Invade home from outdoors. Harmless.	Outdoors: bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%	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. Vacuum millipedes found indoors. Millipedes are not insects, so insecticides not always effective. Best control obtained when pest comes in direct contact with the insecticide.
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. Residuals such as those listed for fleas may also work. Mites are not listed on homeowner labels. Only apply products to areas listed on label as for other pests. beta-cyfluthrin RTU 0.05% bifenthrin RTU 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. See chiggers for repellents. If mites entering from outside, place double-sided sticky tape around windows and other similar entry points.
MOLES 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 mole, 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: a 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.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>MOSQUITOES See SP503-B</p>	<p>Delicate insects that bite humans and animals. Larvae and pupae found in water. Adults stay in shrubbery, crawl spaces, etc.</p> <p>See Entomology and Plant Pathology mosquito web page for a list of web sites pertaining to mosquito control and West Nile virus http://eppserver.ag.utk.edu/mosquitoes.htm</p>	<p><u>Treat standing water such as rain pools, intermittently flooded areas, stagnant water, etc. with:</u> Bacillus thuringiensis israeliensis (Bti): Summit <i>B.t.i.</i> briquets (briquets may need to be anchored) Mosquito Bits Mosquito Dunks</p> <p>methoprene Pre-strike granules Pre-Strike Mosquito Torpedo</p> <p><u>Outside of buildings:</u> use pyrethrin spray for temporary relief as aerosol or fogger; resmethrin 0.2% in outdoor fogger</p> <p>Residual barrier (malathion, permethrin, and other pyrethroids) can be applied to vegetation on perimeter of property that is prone to rapid infestation of mosquitoes. This kills adults feeding on nectar in day and some may act as a repellent. Spray other shady damp areas where mosquitoes rest.</p> <p><u>If needed indoors</u> use flying insect killers for temporary relief.</p>	<p>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.</p> <p>Easiest to control mosquitoes in immature stage because confined to water. Treat standing water with labeled insecticide. Repair screens.</p> <p>Reduce the number of areas where adult mosquitoes can find shelter by cutting down weeds adjacent to the foundation and in yards, and mowing the lawn regularly.</p> <p>People should wear repellents when potentially exposed to mosquitoes. Apply N,N-diethyl-m-toluamide or N,N-diethyl-3-methylbenamide called DEET to skin. American Academy of Pediatrics (2003): concentration of 10% DEET appears to be as safe as products with a conc. of 30% when used according to label. Children and adults can wear clothing with long pants and long sleeves while outdoors. Most guidelines cite that it is acceptable to use repellents containing DEET on children over 2 years of age. DEET or other repellents such as permethrin can also be applied to clothing (don't use permethrin on skin), as mosquitoes may bite through thin fabric. Mosquito netting can be used over infant carriers.</p> <p>More information on repellents and their safe use can be found on the web located at: http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm</p>
<p>MULTICOLORED ASIAN LADY BEETLE SP503-C</p>	<p>Multicolored Asian Lady Beetles (MALB) start searching for overwintering sites, your home, on the first or second day when temperatures are greater the 65°F after a dramatic drop in temperature, usually to near freezing. This usually occurs about the third week in October.</p>	<p>bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03% other pyrethroids</p>	<ol style="list-style-type: none"> 1. Pest-Proof: seal entry points before beetles arrive. 2. Treat roof lines or soffits, vertical contrast areas, and entry points (around the following outdoor items: windows, doors, vents, pipe penetrations) with pesticides before the beetles arrive. 3. Remove dead beetles as they pile up because they may cause other MALB to aggregate. 4. If the beetles make their way into the home, vacuum or try a light trap.

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>PANTRY PESTS</p> <p>Saw-Toothed Grain Beetle</p> <p>Cigarette Beetle</p> <p>Indianmeal Moth</p> <p>Rice Weevil</p> <p>Confused Flour Beetle</p> <p>Red Flour Beetle</p>	<p>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.</p> <p>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.</p> <p>3/8" wing span, inner 2/3 of wing grayish, outer 1/3 of wing copper in color. Feeds in coarse grain products, chocolate, nuts, dried fruit.</p> <p>1/8" long. Long snout on head, dark brown with 4 bright spots on wing cover. Feeds on grains.</p> <p>1/8" long, reddish-brown convex, oval shape, antennae gradually enlarged to end in a club. Cannot fly. Feeds in flour and cereal products.</p> <p>1/8" long, reddish-brown convex oval shape, antennae has a distinct 3-segmented club. Feeds in flour and cereal products.</p>	<p>Locate food source and discard. Place grains, flours, nuts and other stored products in insect proof containers when they are brought home from store.</p> <p>Pheromone traps can indicate the presence of pests and may provide control without insecticides when populations are low and pests confined.</p> <p>Vacuum cracks and crevices and wipe down pantry to remove pests and food source.</p> <p>Often insecticide applications are NOT necessary.</p>	<p>To prevent infestations:</p> <ol style="list-style-type: none"> 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 insect-proof 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. <p>See Bean Weevil for non-chemical control.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>POWDER POST AND OTHER WOOD-BORING BEETLES See E&PP #391</p> <p>Powder Post Beetles</p> <p>Lyctid powder post beetle</p> <p>Anobiid powder post beetle</p> <p>Roundheaded borers</p> <p>Old house borers</p> <p>Others</p>	<p>Shot-sized holes along with flour-like powder indicate these beetles.</p> <p>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.</p> <p>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.</p> <p>Presence indicated by large hard-shelled beetles with long feelers.</p> <p>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, dark brown/black with "V" or "W"-shaped markings on wing covers; 2 bumps on thorax. Reinfests seasoned softwoods (pine).</p> <p>Neat 1/2" holes may appear in walls where beetles emerge. Don't usually reinfest seasoned softwoods (pine).</p>	<p>See POWDER POST AND OTHER WOOD-BORING BEETLES in the Household and Structural Pest Management for Professionals Section for pesticide suggestions</p> <p>Any wood-destroying beetle that has pupated prior to insecticide application may be unaffected and may continue to emerge. Insecticide applications should prevent reinfestation.</p> <p>If an anobiid infestation spread into walls or between floors fumigation may be needed. Fumigation is costly and should only be considered as a last resort. If only small articles 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.</p> <p>If all evidence indicates the infestation is localized, wood could be replaced. This often the option used for lyctids. Watch for new holes in adjacent areas.</p> <p>If crawlspace wood infested with anobiids, 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. Professionals have moisture meter.</p>	<p>Determine extent of infestation. Signs for powder post beetles are: flour-like "frass" dropping from pinhead-sized or slight larger holes, Anobiids' frass are more gritty than Lyctids; 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. Stethoscope can be used to hear large old house borer larvae chewing in spring and summer.</p> <p>Prevention:</p> <ol style="list-style-type: none"> 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. <p>New houses usually infested by use of infested lumber. May also come from firewood.</p> <p>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.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
RATS PB1624	<p>Norway rat: 12-18 inches, tail shorter than head and body, body heavy and thick, ears small</p> <p>Roof rat: 12-17 inches, tail longer than head and body, body light and slender, ears larger.</p> <p>Young rat : 6-7 inches feet large, head large</p> <p>House mouse: 6-7 inches feet small, head small</p> <p>Droppings identification:</p> <p>Roof rat: pointed, about ½ inch</p> <p>Norway rat: blunt, about 3/4 inch</p> <p>House mouse: pointed, about 1/8 inch</p>	<p>When rats are plentiful or where unsanitary conditions exist with shelter, poisoned baits are the best control method. Often community- wide control needed.</p> <p>EPA's final risk mitigation decision requires that all rodenticide bait products for sale to consumers be in tamper-resistant bait stations. Loose bait such as pellets will be prohibited as a bait form. http://www.epa.gov/oppsrrd1/registration/rodenticides/finalriskdecision.htm</p>	<p>Exclusion practices needed. Rats can fit through an opening ½ 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 expandible 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.</p> <p>Often area-wide effort needed.</p>
SILVERFISH AND FIREBRATS See SP341-O	<p>Grayish, wingless, rapid-moving insects with 3 long tails. Feed on starchy materials such as bookbinding, wallpaper, cardboard, etc.</p>	<p>bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>Treat crack and crevice where silverfish and firebrats may dwell. Attics often the source of infestation.</p>
SKUNKS PB1624	<p>These animals many times live in the ground around or under homes.</p>	<p>Bac-Azap biological odor control or others can be sprayed to eliminate odors.</p>	<p>Trap and remove skunks from property. Seal the foundation to prevent entry under building.</p>
SNAILS AND SLUGS	<p>Long, grayish, shiny, soft-bodied creatures. Will attack various plants. Leave slime trails on walks and walls.</p>	<p>Snail and slug killer baits containing metaldehyde or iron phosphate. Do not contact with plant material.</p>	<p>Remove boards and plastic or plant debris and dry damp areas adjacent to foundation.</p>
SNAKES PB1624	<p>Snakes of various kinds, den around or invade homes and other buildings.</p>	<p>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.</p>	<p>Mouse-proof building. Mow lawns and field to control grass, weeds and brush. Remove boards, flat rocks, trash piles and other debris.</p>
SOWBUGS OR PILLBUGS	<p>Grayish, hard-shelled, many-legged creatures appear on walks and patios. Roll up in ball when disturbed. Occasional invaders</p>	<p>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.</p> <p>bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>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.</p> <p>Use exclusion practices: caulk cracks around foundation and screen vents in foundation. Drain and dry area around house.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>SPIDERS or SCORPIONS</p> <p>See PB 1193</p> <p>See PB 1191</p>	<p>Many kinds invade homes, basements and roof overhangs from outdoors.</p> <p>Two species most dangerous in Tennessee:</p> <p>Black Widow: dark 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.</p> <p>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 pose a serious threat. Quite often a professional pest management company should be used.</p>	<p><u>Residuals:</u> bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.05%</p>	<p>Most species are beneficial organisms because they feed on pest insects. They are 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 cracks and crevices in 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.</p> <p>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.</p> <p>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.</p>
<p>SPRINGTAILS</p>	<p>Tiny, jumping insects with a forked spring mechanism</p>	<p>Treat entry areas, sills, foundations, soil, and cracks where insects are found (according to label for other perimeter pests): bifenthrin RTU 0.05% beta-cyfluthrin RTU 0.05% lambda-cyhalothrin RTU 0.03%</p>	<p>Usually found in moist decaying vegetation and are incidental invaders into houses. There are a few reports of large populations entering homes. Pest-proof - seal entry point into the structure. Dry out surrounding landscape, water only in morning, etc.</p>

PESTS	DESCRIPTION	CONTROL MATERIALS AND METHODS	REMARKS
<p>TERMITES See PB 1344</p>	<p>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.</p> <p>Workers and soldiers: soft-bodied insects 1/8 to 3/16 inch long. Swarms are honey-brown, dark brown or black with four nearly equal sized and shaped wings. Swarms are easily distinguished from winged ants by termites straight antennae, broadly attached thorax to waist and four nearly equal wings.</p> <p>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.</p> <p>Some termiticide labels list variable rates depending on soil type. To ensure your home is treated as directed by the label, ask 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.</p> <p>Occasionally, moisture damaged wood in roofs can support an aerial infestation. No mud tubes will reach to ground. Attic inspection is important, too.</p>	<p>SEE TERMITES in the Household and Structural Pest Management for Professionals Section for pesticide suggestions</p> <p>Soil treatment: Do not apply near (within 100 ft.) any body of water, cistern, or well.</p> <p>Nonrepellents: Termites do not detect these insecticides and hence walk over the treated soil. Termiticide may be transferred back to colony.</p> <p>Pyrethroids: In general, this groups tends to be repellent, thus treatments must be applied to create a continuous barrier.</p> <p>Wood treatment: Termite galleries and wall voids can be treated. May be used to supplement a soil treatment.</p> <p>Disodium octaborate tetrahydrate (DOT) can be applied by a professional as pretreatment barrier or as a second barrier (see labels for more details).</p> <p>Baits: Termites feed on bait and spread bait to rest of colony to eliminate or suppress it. Some baits are used as stand alone systems or with a termiticide spray application.</p> <p>We do not recommend that homeowners attempt termite control themselves. Seek a professional!</p>	<p>Follow correct construction practices. This is the best 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.</p> <p>Find a reputable professional to treat. Collect some swarms with wings for identification and vacuum the rest. Leave mud tubes in place until a professional pest control person arrives.</p> <p>Effective control measures for a soil treatment should include:</p> <ol style="list-style-type: none"> 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, spaces 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
<p>TICKS See PB 726</p>	<p>Grayish or brown, round, hard-shelled, 8-legged creatures which invade homes, yards and get on pets and people.</p>	<p>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, house and dog house. Allow surface to dry before people or pets have access.</p> <p>Sevin 5D, granular or spray bifenthrin RTU 0.05% beta-cyfluthrin 0.05% G, permethrin 0.25%G lambda-cyhalothrin RTU 0.03% and other synthetic pyrethroid insecticides.</p> <p><u>Indoors for brown dog tick:</u> bifenthrin RTU 0.05% lambda-cyhalothrin RTU 0.03% other pyrethroids</p> <p><u>Dogs:</u> BioSpot and other permethrin containing spot-ons</p> <p>fipronil (Front Line) spot-ons available from veterinarians</p> <p>collars containing amitraz (don't use around small children or dogs that may chew collar)</p> <p>see pesticide recommendations at http://www.ent.uga.edu/pmh/</p> <p>under <i>Homeowner</i>, and <i>Pets & Honey Bees</i>, for a thorough listing of veterinarian supplied on-pet products.</p>	<p>Nonchemical methods for reducing tick problems include mowing the lawn and controlling weeds.</p> <p>This has three advantages: 1) it lowers the moisture in the grass microclimate and allows sunlight to penetrate, which tends to cause ticks to dry out; 2) 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; 3), removing debris, weeds or clutter from around the house discourages rodents from nesting.</p> <p>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.</p> <p>In the home, ticks stay around baseboards and walls. Use insecticides in cracks and crevice in the home for brown dog tick.</p> <p>Repellents: Apply deet to skin; and Permanone 0.5% spray to shoes, cuffs and socks 2 hours before wearing. See MOSQUITOES for more information regarding repellents.</p>
<p>WASPS, HORNETS, YELLOW-JACKETS See SP290-A, SP341-M</p>	<p>Many types build paper and mud nests around homes, in ground or in shrubs.</p>	<p>Bee and wasp killer aerosols tetramethrin aerosols beta-cyfluthrin RTU 0.05%</p> <p>Dusts deltamethrin 0.05% Apicide (carbaryl 5% D)</p> <p>Victor Yellow Jacket Trap</p>	<p>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.</p> <p>Traps can used to reduce foraging yellow jacket populations.</p>

Chemical Name	Trade Name	Website
abamectin (in bait) and hydroprone	Raid Double Control Small Roach Bait Plus Egg Stopper	S.C. Johnson http://www.killsbugsdead.com
Abamectin	Raid Ant Baits _{III}	S.C. Johnson http://www.killsbugsdead.com
<i>Bacillus thuringiensis israelensis</i>	Summit <i>B.t.i.</i> briquets. Mosquito Bits, Mosquito Dunks	Summit Chemical http://www.summitchemical.com
bifenthrin RTU 0.05%	Ortho Home Defense Max Perimeter & Indoor Insect Killer - RTU	The Scotts Company http://www.ortho.com
borax	Terro Ant Killer II	Senoret http://www.terro.com/
carbaryl 5% D	Apicide	Mystic Chemical Company http://www.apicide.com/
cyfluthrin Ready-to-Spray 0.75%	Bayer Advanced™ PowerForce Multi-Insect Killer Ready-to-Spray	Bayer http://www.bayeradvanced.com/
beta-cyfluthrin RTU 0.05%	Bayer Advanced™ Home Pest Control, Indoor & Outdoor Insect Killer RTU	Bayer http://www.bayeradvanced.com
beta-cyfluthrin 0.05% G	Bayer Advanced™ PowerForce Multi-Insect Killer Ready-to-Spread Granules	Bayer http://www.bayeradvanced.com/
deltamethrin 0.05%	Bonide Termite & Carpenter Ant Dust	Bonide http://www.bonideproducts.com/
dinotefuran 0.05%	Hot Shot Ultra Clear Roach Gel	Hot Shot http://www.hotshotbrand.com.
dinotefuran 0.05%	Hot Shot Ultra Liquid Ant Bait	Hot Shot http://www.hotshotbrand.com.
dinotefuran 0.05%	Spectracide Bug Stop Liquid Ant Bait	Spectracide http://www.spectracide.com/
fipronil	Combat bait stations (Quick Kill Formula for Small Roaches, Quick Kill Formula for Large Roaches)	Combat Insect Control Systems http://www.dialcorp.com/index.cfm?page_id=6
fipronil	Combat Ant Killing Gel	Combat Insect Control Systems http://www.dialcorp.com/index.cfm?page_id=6
fipronil	Combat Outdoor Ant Killing Stakes	Combat Insect Control Systems http://www.dialcorp.com/index.cfm?page_id=6
hydramethylnon	Combat bait stations (Source Kill)	Combat Insect Control Systems http://www.dialcorp.com/index.cfm?page_id=6
hydramethylnon	Combat Roach Killing Gel	Combat Insect Control Systems http://www.dialcorp.com/index.cfm?page_id=6

hydramethylnon	Grant's Kills Ants Ant Killer Bait	Grant Laboratories http://www.grantsproducts.com/ant_control.html
imidacloprid	Bayer Dual Action Roach Killer Power Pen	Bayer http://www.bayeradvanced.com
indoxacarb	HotShot MaxAttrax Nest Destroyer Roach Bait	Hot Shot http://www.hotshotbrand.com/
indoxacarb	HotShot MaxAttrax Ant Bait ₂	Hot Shot http://www.hotshotbrand.com/
lambda-cyhalothrin RTU 0.03%	Spectracide Bug Stop Indoor Plus Outdoor Insect Killer	Spectrum Group, United Industries http://www.spectracide.com/
methoprene	Pre-Strike Mosquito Torpedo	Wellmark International http://www.mosquitocontrolproducts.com/
permethrin	Ortho Ant-B-Gon Dust	The Scotts Company http://www.ortho.com/
0.025% Prallethrin 0.010% Lambda-Cyhalothrin	Spectracide Termite Killing Foam ₂	Spectrum Group, United Industries http://www.spectracide.com/
0.01% pyriproxyfen (Nylar) 0.25% permethrin	Enforcer Flea Spray for Homes	Enforcer http://www.enforcer.com/
0.015% pyriproxyfen 0.4% tetramethrin 0.3% sumithrin	Bengal Full Season Flea Killer Plus 2	Bengal Products http://www.bengal.com/
spinosad	Fertilome Borer, Bagworm, Leafminer and Tent Caterpillar Spray	Fertilome http://www.fertilome.com

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

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label takes precedence over the recommendations found in this publication. 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. The author(s), The University of Tennessee Institute of Agriculture and the University of Tennessee Extension assume no liability resulting from the use of these recommendations.

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