Insect Pest Management on Golf Courses

Eileen A. Buss

Golf is an important recreational activity for many Florida residents and tourists. There are over 1500 golf facilities in Florida to choose from, ranging from private resorts to public driving ranges. Turfgrass managers and golfers alike value such qualities as a uniform playing surface and a nice green color in “good” turfgrass. Both of these qualities can be impaired by insects that feed on grass leaves, sap, or roots.

Several insects and mites feed on or live in grass, but not all of them cause economic or aesthetic damage. Many are harmless, some are beneficial, and some are pests. Only a few cause significant damage and need immediate control. Insects are only one of many potential causes for thin or brown grass. Diseases, nematodes, drought, and nutritional disorders can also be damaging. Correct identification of the problem can save money and prevent unnecessary pesticide applications.

The biology and management of the most important insect pests on golf courses in Florida are described in this publication. Pesticides labeled for insect control in turfgrass are listed in Table 1. Information regarding formulations is described in Table 2. In general, healthy turf is less vulnerable to pests and can recover faster from an infestation. Avoid overusing soluble nitrogen fertilizers, mow at the correct height for the grass species, reduce thatch, and avoid over-watering. Check every 7 to 10 days for pest activity, especially in "hot spots" where damage tends to reoccur.

Armyworms

The fall armyworm, *Spodoptera frugiperda* (Figure 1), is the most common species in Florida. Caterpillars first skeletonize the grass blades and later create bare spots.

The caterpillar is green when small, dark brown when mature, and can reach up to 1 1/2 inches long. It has a light midstripe on its back with darker bands on either side. The midstripe ends in an inverted "Y" on the head. Pupation occurs in the soil. Adult moths are brown with a wing span up to 1 1/2 inches. Eggs are laid on grass or almost any object nearby.

In coastal areas of north Florida, moths mainly occur from April to December. Mature larvae feed continuously during the day and night.
Monitor by mixing 1 TBSP of liquid dishwashing soap in 1 gallon of water; pour the solution onto 2-4 square feet near the damage. Insects will crawl to the surface if present. Examine several suspected areas. Adults can be seen flying to lights at night.

**Bermudagrass Mite**

The bermudagrass mite, *Eriophyes cynodoniensis* (Figure 2), is tiny (about 1/125 inch long), and just visible with a 15- to 20-power hand lens. It is creamy white in color, somewhat wormlike in shape, and has 2 pairs of legs.

Bermudagrass is the only host for this mite species. The cultivars FloraTex, Midiron and Tifdwarf are resistant, but Tifway and other varieties are susceptible to the mite. The leaf tips of infested grass yellow slightly and internodes and leaves are shortened. This results in a tufted look or "witches' broom" effect. Large areas of grass may die and become infested with weeds. Damage is worse during hot, dry weather.

One generation develops in 5 to 10 days. All life stages (eggs, nymphs, adults) live under the leaf sheath. Mites may disperse on the wind, other insects, or grass clippings. Infestations usually develop in the taller grass (roughs, around sand traps, fence rows, etc.), so keep grass mowed as low as possible.

**Cutworms**

Several species of cutworms (e.g., black or granulate cutworms) (Figure 3) occur in Florida, but seldom are serious pests in turfgrass.

Larvae usually dig a burrow in the ground or thatch (or use an aeration hole) and emerge at night to chew off grass blades and shoots. This damage may appear as circular spots of dead grass or depressed spots that look like ball marks on golf greens.

Larvae are mostly hairless, have 3 pairs of true legs and 5 pairs of fleshy prolegs on the abdomen. Most cutworms curl up when disturbed. Moths are dull-colored with wing spans up to 1 1/2 inches. Eggs are laid randomly on leaf blades, and hatch within 10 days. Three to seven generations may occur each year.

Monitor using a soap flush, as described for armyworms.

**Fire Ants**

The red imported fire ant, *Solenopsis invicta* (Figure 4), is an introduced pest that creates large mounds in turfgrass and inflicts painful bites and stings. Mounds can also damage mowing equipment.

Imported fire ants are aggressive, reddish-brown ants that are 1/8 to 1/4 inches long. Mounds (up to 3 feet wide and 1 1/2 feet high) often occur in sunny, open areas. If a nest is disturbed, many ants immediately emerge to defend their nest and attack intruders. Nests are frequently moved.
Ants are social insects and live in colonies. White immature ants ("brood") include eggs, larvae, and pupae. Adult ants have different jobs ("castes"), including winged males, winged females, workers of varying sizes, and one or more mated queens. New offspring are produced in the spring. For more information, see Imported Fire Ants on Lawns and Turf (ENY-226).

**Hunting Billbug**

Billbug larvae are white, legless grubs with brown head capsules. Adults are black beetles (weevils) with chewing mouthparts at the end of the "bill." Hunting billbug, *Sphenophorus venatus verstitus* (Figure 5), adults have a raised Y-shaped area surrounded by curved lines on the prothorax and rows of large and small pits on the wing covers.

Zoysiagrass, bermudagrass and seashore paspalum are preferred hosts. Most damage may occur in the fall, when populations are high. Damage may be misdiagnosed as dormancy in the fall, and dead patches or areas that green up slowly may be noticed in the spring. Stems and rhizomes break easily and have many irregular feeding marks. Infested sod will not hold together when cut. Most damage occurs on infertile or dry soil.

Hunting billbugs have 2 generations per year, but all life stages may be present at a time. Eggs are laid in the leaf sheaths or top of the crown and hatch within 10 days. Young larvae feed on the inner leaves and chew down to the roots. Pupation occurs in the soil or roots and may last up to 7 days.

Monitor off-color areas by cutting 1 square foot of sod, 2 inches deep. Lay back the sod and examine roots for chewing damage and check soil and plants for larvae. Adult activity may be monitored using soap flushes. Parasitic nematodes (*Steinernema* and *Heterorhabditis*) and *Beauveria* fungi can effectively control billbug larvae and adults.

**Mole Crickets**

Three pest mole cricket species (tawny, southern, and short-winged; *Scapteriscus* spp.) are significant pests in Florida. The native mole cricket is rarely a pest.

Damage is caused by mole cricket tunneling in the soil, which exposes and dries out roots. Nymphs and adults of the tawny (Figure 6) and short-winged mole crickets are vegetarians, and feed on roots and grass blades at night. Bermudagrass, bahiagrass, and centipedegrass are often attacked. The southern mole cricket is mainly a predator, and feeds on small soil animals. However, it may also eat some plant material.
Large crickets grow to be 1 1/2 inches long. They have a covering of fine brown hair giving them a velvety appearance. The front legs are flattened and adapted for digging. The tawny and short-winged mole crickets are golden brown with a mottled brown pronotum (located on the back between head and abdomen). The tawny mole cricket has a V-shaped space between the two dactyls (digging claws). The short-winged mole cricket has short wings and cannot fly. The southern mole cricket is grayish brown, has 4 pale-colored dots on the pronotum, and a U-shaped space between the two dactyls.

Monitor using a soap flush early in the day. Southern and tawny mole cricket adults are attracted to light at dusk, especially in the spring.

Scales/Mealybugs

The most common pest in this group is the Rhodesgrass mealybug, *Antonina graminis* (Figure 7). It prefers Rhodesgrass, Johnsonsgrass, bermudagrass, and St. Augustinegrass.

![Figure 7. Rhodesgrass mealybug. Credits: E.A. Buss](image)

Infested grass plants gradually turn brown and die. St. Augustinegrass may become discolored and develop spots. Heavy infestations look like too much fertilizer has caked around the grass nodes.

Females give birth to live young without mating (no males exist). The crawlers disperse and begin feeding under a leaf sheath at a node. A white waxy sac, roughly spherical, is secreted around them. The insects don't move again.

Cultural control includes collecting and destroying grass clippings.

Spittlebugs

The two-lined spittlebug, *Propsapia bicincta* (Figure 8), is the most common leafhopper-like insect to damage turfgrasses, especially bermuda, St. Augustine, centipede, bahia, crab, Johnson, and orchard grasses. It also feeds on many crops, ornamentals, and weeds.

![Figure 8. Two-lined spittlebug. Credits: J.L. Castner](image)

Spittlebugs are rarely a problem on well-managed turf, but problems appear to be increasing in northern Florida. Nymphs and adults both suck plant juices through their straw-like mouthparts. Heavy infestations may kill, wither, or reduce the growth of turfgrasses. Infested grass has a reddish-purple stripe, cream-colored stripe, or a combination of stripes running lengthwise along the blade.

Nymphs may be yellow, orange, or white, and are covered by a frothy spittle mass. Adults are about 1/4 to 1/2 inch long, black with two red-orange lines across the wings. Eyes are dark red.

About 2 generations occur each year. Eggs are laid in hollow stems, beneath leaf sheaths, or in thatch. Eggs overwinter and nymphs emerge in the spring to feed in humid, protected areas. One generation may last about 2 months.

Tropical Sod Webworm

Tropical sod webworm, *Herpetogramma phaeopteralis*, larvae (Figure 9) are gray-green, and have brown spots on each segment. Mature larvae can be about 3/4 to 1 inch in length. Larvae remain curled up in the soil during the day and feed at night. Newly hatched larvae skeletonize the grass blades of all
warm-season grasses, while older larvae chew on grass blades near the soil surface.

![Figure 9. Tropical sod webworm. Credits: D.J. Shetlar, Ohio State University](image)

Damage begins in small patches of short-clipped grass, about 1 to 3 inches in diameter. The grass may look ragged, and irregularly-shaped, larger brown patches may form.

Sod webworm adults are small, tan to gray moths with a wingspan of 3/4 to 1 inch. They do not cause damage. Moths hide in shrubs and other sheltered areas during the day, begin flying at dusk, and lay eggs on grass at night. Eggs hatch in about 1 week.

This pest is most active from April through November, but may occur year-round in south Florida. Three generations occur in north Florida and four generations occur in south Florida. Use a soap flush to monitor for damaging populations. For more information, see Biology and Management of Tropical Sod Webworms (ENY-318).

**White Grubs**

There is a complex of at least 4 genera in Florida: *Phyllophaga, Cyclocephala, Tomarus and Strategus*. Some of these grubs are also pests on sugarcane and sweet potato, as well as other ornamental plants.

Larvae are fat-looking grubs which lie in C-shaped positions (Figure 10). They are whitish in color with dark areas at the rear and a brownish head. The adults are scarab beetles.

The adults are most active from April-July, when they mate and lay eggs in moist soil. Grubs live in the soil and feed on roots. Different species take varying times to complete the life cycle of 1 to 4 years. Most grubs seem to continue feeding during Florida winters. The adults do not feed on grass, but some may be pests of ornamental plants.

Too much organic matter in the soil and over-irrigation during adult flights may increase susceptibility to infestation by some species.

To monitor, watch for adult scarab beetles flying at night near lights in the spring and early summer. To monitor white grub populations, cut 2 inches deep in a 1 foot square area of damaged grass. Lay the grass back, check the quality of the roots, and look for grubs in the soil.

**Additional Information**

For more information, please refer to these UF extension publications:

- Ants (ENY-203)
- Chiggers (ENY-212)
- Fleas (ENY-205)
- Pillbugs, Centipedes, Millipedes and Earwigs (ENY-221)
- Ticks (ENY-206)
- Insecticides Used in the Urban Environment: Mode of Action (ENY-282)
## Table 1. Insecticides registered for use on turfgrass in Florida

<table>
<thead>
<tr>
<th>Insect</th>
<th>Chemical Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bermudagrass Mite</strong></td>
<td>Bifenthrin</td>
<td>Repeated applications may be needed. Responsible irrigation and fertilization may help grass outgrow damage.</td>
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<td></td>
<td>Deltamethrin</td>
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<td></td>
<td>Diazinon</td>
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<td></td>
<td>Fluvalinate</td>
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<tr>
<td><strong>Billbugs</strong></td>
<td>Adults:</td>
<td>If possible, plant resistant grass species or varieties of bermudagrass of zoysiagrass. Billbug larvae can be treated as if they were white grubs.</td>
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<tr>
<td></td>
<td>Bifenthrin</td>
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<td>Cyfluthrin</td>
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<td></td>
<td>Deltamethrin</td>
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<td></td>
<td>Lambda-cyhalothrin</td>
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<tr>
<td><strong>Grubs:</strong></td>
<td>Bifenthrin</td>
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<td>Carbaryl</td>
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<td>Cyfluthrin</td>
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<td>Halofenozone</td>
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<td>Imidacloprid</td>
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<td></td>
<td>Lambda-cyhalothrin</td>
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<td></td>
<td>Trichlorfon</td>
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<tr>
<td><strong>Caterpillars</strong></td>
<td>Acephate</td>
<td>Treat at first sign of damage. Monitor adult activity using UV light traps or pheromone traps. Follow label directions for irrigation.</td>
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<tr>
<td>(armyworm, cutworm, sod webworm)</td>
<td>Bacillus thuringiensis k.</td>
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<td></td>
<td>Bifenthrin</td>
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<td>Carbaryl</td>
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<td>Chlorpyrifos</td>
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<td>Cyfluthrin</td>
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<td>Halofenozone</td>
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<td>Lambda-cyhalothrin</td>
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<td></td>
<td>Permethrin</td>
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<td></td>
<td>Spinosad</td>
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<td></td>
<td>Trichlorfon</td>
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<tr>
<td><strong>Fire Ants</strong></td>
<td>Acephate</td>
<td>A combination of baits, mound treatments, and broadcast applications may be necessary for adequate control.</td>
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<td></td>
<td>Bifenthrin</td>
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<td>Carbaryl</td>
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<td>Chlorpyrifos</td>
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<td>Deltamethrin</td>
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<td></td>
<td>Fenoxycarb</td>
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<td>Fipronil</td>
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<td></td>
<td>Hydramethylnon</td>
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<td></td>
<td>Lambda-cyhalothrin</td>
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<td></td>
<td>Pyriproxyfen</td>
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<td></td>
<td>Spinosad</td>
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<tr>
<td>Mole Crickets</td>
<td>Acephate</td>
<td>Irrigate before treatment, and water in after certain products are used (check labels). Apply all insecticides as late in day as possible. Timing is important to control young nymphs. Baits may be used to control large nymphs in late summer. Chipco Choice (fipronil) and Dursban 2 Coat (chlorpyrifos) must be slit-injected.</td>
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<tr>
<td></td>
<td>Bifenthrin</td>
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<td></td>
<td>Chlorpyrifos</td>
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<td></td>
<td>Cyfluthrin</td>
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<td>Deltamethrin</td>
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<td>Fipronil</td>
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<td>Imidacloprid</td>
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<td>Lambda-cyhalothrin</td>
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<td></td>
<td>Permethrin</td>
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<td></td>
<td>Steinernema scapterisci</td>
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<td></td>
<td>Trichlorfon</td>
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<td>Baits:</td>
<td>Bifenthrin</td>
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<td></td>
<td>Carbaryl</td>
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<tr>
<td></td>
<td>Chlorpyrifos</td>
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<tr>
<td>Scales/Mealybugs</td>
<td>Bifenthrin</td>
<td>Apply treatment when crawlers are active.</td>
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<td></td>
<td>Deltamethrin</td>
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<td></td>
<td>Horticultural oil</td>
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<td></td>
<td>Imidacloprid</td>
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<tr>
<td></td>
<td>Insecticidal soap</td>
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<tr>
<td>Spittlebugs</td>
<td>Acephate</td>
<td>Treat when most of the spittlebugs have become adults. Mow and irrigate before application.</td>
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<td></td>
<td>Carbaryl</td>
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<td>Cyfluthrin</td>
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<td></td>
<td>Deltamethrin</td>
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<td></td>
<td>Lambda-cyhalothrin</td>
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<tr>
<td>White Grubs</td>
<td>Bifenthrin</td>
<td>Accurate timing is important for control. Preventive treatments may be applied in late spring or early summer. Curative treatments (e.g., trichlorfon) are more effective for late season grub control.</td>
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<tr>
<td></td>
<td>Carbaryl</td>
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<td>Halofenozide</td>
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<td>Lambda-cyhalothrin</td>
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<td></td>
<td>Trichlorfon</td>
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**Note:** Only a few formulations of recommended insecticides are listed to serve as examples. Many others are available. Read the label carefully for use directions, application techniques, irrigation requirements and precautions.

### Table 2. Chemical names, trade names, formulations, and manufacturers of turfgrass pesticides.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Florida Registered Products</th>
<th>Chemical Class</th>
<th>Signal Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acephate</td>
<td>Acephate Pro 75</td>
<td>Organophosphate</td>
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<tr>
<td></td>
<td>Orthene Turf, Tree &amp; Ornamental Spray</td>
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<td></td>
<td>Ortho Orthene</td>
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<td>Caution</td>
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<td>Bacillus thuringiensis var. kurstaki</td>
<td>Dipel Dust</td>
<td>Microbial</td>
<td>Caution</td>
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<tr>
<td></td>
<td>Safer Caterpillar Killer</td>
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<td>Caution</td>
</tr>
<tr>
<td>Bifenthrin</td>
<td>Talstar GC Flowable*</td>
<td>Pyrethroid</td>
<td>Caution</td>
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<tr>
<td></td>
<td>Talstar GC Granular*</td>
<td></td>
<td>Caution</td>
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<tr>
<td></td>
<td>Talstar Insecticide Mole Cricket Bait</td>
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<tr>
<td></td>
<td>Talstar Lawn &amp; Tree Flowable</td>
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<tr>
<td></td>
<td>Talstar PL Granular</td>
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<td>Caution</td>
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<tbody>
<tr>
<td>Carbaryl</td>
<td>Carbaryl 4L</td>
<td>Carbamate</td>
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<td>Carbaryl 50 WP</td>
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<td>Parkway’s Mole Cricket Bait</td>
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<td>Sevin 10G</td>
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<td>Sevin 80 WSP</td>
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<td>Chlorpyrifos</td>
<td>Dursban 2 Coated Granules</td>
<td>Organophosphate</td>
<td>Warning</td>
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<td>Dursban Granular Bait, 1%</td>
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<td>Dursban Pro</td>
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<td>Tempo 2 EC</td>
<td>Pyrethroid</td>
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<td>Tempo 20 WP</td>
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<td>Tempo SC Ultra</td>
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<td>Deltamethrin</td>
<td>DeltaGard GC*</td>
<td>Pyrethroid</td>
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<td>DeltaGard T&amp;O</td>
<td>Caution</td>
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<td>Fenoxycarb</td>
<td>Award</td>
<td>Carbamate</td>
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<td>Combat Fire Ant Killer</td>
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<td>Chipco Fire Star Fire Ant Bait</td>
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<td>Chipco Top Choice</td>
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<td>Fluvalinate</td>
<td>Mavrik Aquaflow</td>
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<td>Caution</td>
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<td>Halofenozide</td>
<td>Mach 2 Granular</td>
<td>Insect Growth</td>
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<td>Battle GC T&amp;O*</td>
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<td>Dylox 80 T&amp;O</td>
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* Restricted use pesticide

Always read the label before selecting and using a product.

Note: Only a few formulations of recommended insecticides are listed to serve as examples. Many others are available. Read the label carefully for use directions, application techniques, irrigation requirements and precautions.