

TDOC
Z TA245.7
B873
NO.5083

Texas Agricultural Extension Service

The Texas A&M University System

LIBRARY B-5083

JAN 25 1994

Texas A&M University

Integrated Pest Management of Texas Turfgrass

Bastiaan M. Drees, Garland McIlveen, Robert L. Crocker, Charles Allen,
Mike Merchant and James Reinert*

A number of arthropods and related pests can damage turfgrass in Texas. These pests occur throughout the year and can be anticipated to a certain extent. Preventive treatments have largely been replaced with the integrated pest management (IPM) approach. Using this method, managed turfgrass areas are routinely monitored (scouted) to detect pests and their damage (Table 1). When available, "action levels" (economic threshold levels) should be used to determine the need for and timing of treatments. In addition, the least environmentally destructive method of pest suppression is used. IPM programs can reduce reliance on pesticides, which can destroy organisms that help decompose the thatch.

Good agronomic practices. Many pest problems can be avoided by planting turfgrass species or varieties that are not pest-prone or that are tolerant/resistant to pests. For example, the St. Augustinegrass variety 'Floritam' is resistant to chinch bugs. Other good agronomic practices such as proper watering and fertilizing with moderate amounts of slow-release fertilizers reduce the likelihood of severe pest problems. Thatch buildup should be kept less than 1/2 inch thick because it encourages high pest populations and has other adverse consequences.

Table 2 lists pesticides registered as of September 1993 for suppressing insect, mite and related pests of Texas turfgrass. This table also includes pesticides that control minor, nuisance and some medically important

pests. The listing of products does not constitute a recommendation for their use or imply their effectiveness. Following are discussions of common insect, mite and related pests that occur in Texas turfgrass.

Ants

The primary ant pest in Texas turf is the **red imported fire ant**. This species is found throughout the eastern half of the state and in some urban areas in West Texas. Several native fire ant species also occur in the state, and in south Texas the **tropical fire ant** is also occasionally considered to be a pest in turfgrass. Fire ants do not damage turf directly, but their numerous mounds are unattractive, can hinder mowing operations and can smother the grass. Their presence is also a potential hazard to people and pets since these ants can inflict painful bites and stings.

Several other species of ants occasionally cause concern. Many of these species are native to the state and are not considered to be major pests. **Pyramid ants** are grayish black and produce small mounds featuring an edge or rim around the top. These ants are not harmful. Another native species, the **little black ant**, is common and its colonies are seldom encountered. This species is known to prey upon the queens of the red imported fire ant. Although the **red harvester ant** produces denuded areas of coarse soil particles around

* Professor and Extension Entomologist; Associate Professor and Extension Urban Entomologist; Associate Professor of Entomology; Associate Professor and Extension Entomologist; Assistant Professor and Extension Urban Entomologist; and Professor and Resident Director of Research, The Texas A&M University System.

the central openings to its colonies, this native species is seldom harmful. Harvester ants can bite and sting and can be dangerous to sensitive individuals. These ants also serve as food for the ever rarer horned toad.

The **Texas leaf-cutting ants** produce numerous hills or "towns" around their colony sites. These ants harvest vegetation on which to grow a fungus, and then feed on the fungus. The leaf-cutting ant is not very common, but colonies can be a problem in turfgrass areas. Although vegetation can be protected by repeated applications of contact insecticides, eliminating the colony is the only way to prevent recurring damage. There are few methods of safely eliminating colonies.

Caterpillars

Caterpillars, the immature stages of moths and butterflies, have chewing mouthparts and feed mainly on foliage. Blades of grass damaged by caterpillars often appear ragged or may be skeletonized with only the leaf veins and one surface of the leaf remaining. Close examination of the thatch around damaged grass often reveals silk webbing and "frass" (excrement) left by the caterpillars. Damage often is spotty or localized. Several species of caterpillars can be found in Texas turfgrass.

Armyworms are grayish-brown caterpillars that may grow to 1 1/4 inches in length. They often have a cream-colored upside-down "Y" on the fronts of their head capsules. True armyworms appear in the spring, while fall armyworms appear in August and September following a wet summer. Tips of grass turn white from feeding by the young larvae. **Cutworms** also are dull-colored caterpillars. When disturbed, cutworms curl up tightly. They appear in early spring, feed at night and are found in the soil during the day. Leaves and stems are cut off by caterpillars but may not be eaten. **Sod webworm** caterpillars also feed during the night. During the day, they burrow into the thatch or soil. Young larvae skeletonize blades of grass. Older larvae cut off grass completely and form tunnels of silk in the grass. The **tropical sod webworm** has been particularly damaging in recent years to turfgrass in the upper coastal region of Texas. Caterpillars of this species are translucent cream or greenish with dark spots.

Action levels for some turf caterpillars have been proposed. For armyworms and cutworms, a suggested action threshold is four to five caterpillars per square foot. For sod webworms, treatment should be initiated when three to four caterpillars per 6 square inches of turf are detected using the soapy water drench method. Begin to inspect for damage 2 weeks after peak adult flight is detected with a black light trap.

Chinch Bugs

The **southern chinch bug** is a pest of St. Augustinegrass, particularly during periods of hot, dry weather as is common in July and August. Winter is spent in the adult stage except where weather permits year-round reproduction. Adults are black, about 3/16 inch long, and have either fully developed or very short wings which, when held in place across the back (abdomen), appear bone-white. The bugs have a gradual life cycle, and during the warmer months nymphs and adults often are often found together. Nymphs range from 1/16 inch to 3/16 inch long. Smaller, early instar nymphs are orange-pink and have whitish bands on their abdomens just behind the thorax. As nymphs grow they become progressively darker and develop wing pads.

Chinch bug infestations often are spotty and may be restricted to certain lawns or parts of lawns. Nymphal and adult stages have sucking mouthparts with which they draw sap from the grass stems (stolons) and inject saliva. When chinch bug numbers are large, and particularly during extended dry periods, severely damaged grass turns yellow and dies. Because of the uneven (clumped) distribution of the insects in the grass, damage is usually seen as irregular patches of dead or dying grass; as damage progresses, these patches grow and coalesce until the whole lawn may be lost.

Treatment is usually considered when damage symptoms appear and chinch bugs are detected at the edge of the damaged area using the flotation or vacuum method.

White Grubs/June Beetle Larvae

White grubs are the immature stages of May or June beetles. Actually, there are more than 90 species of scarab beetles in Texas that are considered to be white grubs or May and June beetles. Their biologies are similar, but they differ in distribution, habitat preference, length of life cycle and seasonal occurrence. Common white grub species belong to the genus *Phyllophaga*, with *P. crinita* being particularly common in Texas on bermudagrass, St. Augustinegrass and tall fescue. The **southern masked chafer** and the **green June beetle** are other species within the white grub group. The **Japanese beetle** does not occur in Texas.

White grubs are whitish, "C" shaped larvae (up to 1 inch long) with brown head capsules and chewing mouthparts. They have three pairs of legs (one pair on each of the first three segments behind the head), which separates them from larval billbugs (weevils), which they otherwise superficially resemble. White grubs feed on the roots of many plants including

turfgrasses, weeds, vegetable transplants and ornamentals. Larvae develop mainly during the fall and spring. During extreme environmental conditions (cold, drought), the larvae burrow deeper into the soil. In Texas pupation occurs mainly during the spring. Severely damaged turfgrass dies and can be rolled up like a carpet because of the lack of roots. Heavily infested lawns are attractive to moles, raccoons, skunks and armadillos, which dig through the surface to feed on the grubs.

Adults of many May and June beetle species begin emerging in February. However, peak emergence of turf-infesting species usually occurs during late June in central Texas, somewhat earlier in South Texas and later in North Texas. Peak adult emergence is important because approximately 2 weeks afterwards eggs laid by mated females will hatch. This is the best time for insecticide treatment to prevent white grub damage where there is a history of white grub problems. Insecticides are most effective when the turf is watered thoroughly just before and after treatment. Turfgrasses that are highly fertilized and frequently watered, have a thick thatch layer and/or are grown in highly organic soils are most vulnerable to attack. The need for insecticide treatments also can be determined by sampling for white grubs. One proposed action level is four grubs per square foot. Applying insecticide while white grubs still are small prevents unnecessary damage to turf and increases the chances that the chemical will be effective in controlling the grubs.

Mole Crickets

Mole cricket problems in Texas are highly localized but can be persistent over time. The **southern mole cricket** is found along the Texas coast westward to College Station and north to Longview. This species preys on other turf pests. Unfortunately, in searching for its prey it disrupts turf by tunnelling just under the soil surface. A mole cricket can tunnel several meters per day. Bermudagrass and bahiagrass, particularly in areas with sandy soil, are more affected than is St. Augustinegrass. One proposed action level for initiating treatment is two crickets per square foot as determined using the soapy water drench method.

Mites

The **bermudagrass (stunt) mite** is a host specific mite. Its characteristic damage is shortened internodes that produce a typical rosetting and tufted growth, or a "witch broom" effect. When left uncontrolled, large areas of turf are killed. This has become a problem on some lawns in north and central Texas. A similar mite

causes almost identical damage to buffalograss. Another mite that can damage turfgrass is the **clover mite**. It is red, smaller than the head of a pin and has long front legs. It feeds on grass blades, causing grass to appear silvery. These mites build up in high numbers in the spring, often next to house foundations. Occasionally, clover mites migrate into homes.

Scale Insects

The **Rhodesgrass scale** (also called Rhodesgrass mealybug) was introduced into the United States in 1942. Sixty-nine species of range, lawn and golf course grasses in much of southern and coastal Texas became infested, resulting in yield loss and plant death. The scale forms white cottony masses of wax, about 1/8 inch in diameter, at the base of the grass stem and in the leaf axis. A scale insect parasite, *Neodusmetia sangwani*, was introduced into Texas from India in 1959. Biological control of Rhodesgrass scale has been successful since that time. Help maintain biological control by minimizing the use of long residual insecticides.

Ground pearls are subterranean scales that feed on the roots of grasses, primarily in west Texas. Scales are hard, globular, whitish to purplish and somewhat iridescent. They resemble small pearls and are up to 1/8 inch diameter. Their feeding causes grass to turn yellow and die. Damage occurs during the spring and dry periods of the year, when small, irregular areas of unthrifty or dead grass appear. No insecticide products are specifically registered for control of ground pearls in turfgrass (although malathion was suggested in a 1980 publication). Good cultural practices can help minimize damage from ground pearls. Avoid using infested sod when establishing a new planting.

Earthworms and Crawfish

Earthworms are generally considered to be beneficial organisms. Their tunnelling aerates the soil and reduces compaction. However, in the upper coast area of Texas earthworms occasionally become so numerous as to make the turf sponge-like. They deposit large numbers of castings or fecal pellets on the turf surface. **Crawfish** can become numerous in poorly drained soil. They build unsightly tubes that may reach several inches in height. Although some insecticides such as carbaryl and ethoprop are known to be relatively more toxic to earthworms, and bendiocarb, benomyl, carbaryl and pyrethroids are known to be relatively more toxic to crawfish than are other turf insecticides, NONE is registered or recommended for earthworm or crawfish control. Improving drainage may reduce earthworm populations and crawfish activity.

Digger Wasps

Solitary wasps and cicada killers dig nesting burrows in turf. Large numbers of wasps occasionally nest in sandy embankments, where they may be a source of concern. The wasps are highly selective in choosing nesting sites and the same locations often are used year after year. Insecticides may temporarily suppress nesting activities. Care should be taken when applying insecticides to avoid being stung. Social wasps and yellow jackets, bumble bees and honey bees also occasionally nest in the ground.

Sampling Methods for Turfgrass

Visual inspection. Inspect turfgrass for pests and damage symptoms regularly (weekly or semi-weekly). If there are irregular spots of stressed, yellow, dying or dead grass, inspect the edges of the spots where damaged and healthy grass come together. Part the grass and look at the thatch and exposed roots.

Soapy water drench. Surface-feeding turf pests such as caterpillars, mole crickets and chinch bugs can be driven up out of the thatch with an irritating liquid. Mix about 1 ounce (1/4 cup) liquid soap in a gallon of water and pour evenly over a 1-square-yard area of turfgrass with a watering can. Pyrethrum extract (Pyrenone® Crop Spray) also can be used as an ingredient in this mixture. Within minutes, the mobile pests can be observed and counted.

Flotation method. Cut the bottom from a coffee can or similar container so that it can be forced into the surface of the soil. Sample in areas where damaged grass and healthy grass meet. Once in place, fill the can to the top with water. Insects such as chinch bugs will float to the surface within minutes, where they can be counted.

Vacuum method. A shop vacuum cleaner or other vacuum device can be used to quickly and effectively sample for chinch bugs, although care should be taken to avoid moist areas where electrical shock might result. A leaf blower with a vacuum intake can be modified for this purpose by placing a fabric mesh screen between two of the sections of intake tube to catch the chinch bugs.

Digging small turf samples. These methods are used to sample for white grubs. Using a shovel, spade, trowel or hatchet, cut three sides of a 12- x 12-inch or smaller section of sod at a depth of 4 to 6 inches. Fold the sod back like a flap and record the number of white grubs present. Return the sod to its original position and water. If a golf cup cutter is used, a sample of 1/10 square foot of sod can be removed for examination. Using either method, take several samples from

different locations and convert the number of white grubs found per sample to a square foot equivalent. Thorough sampling may reveal restricted infestation which can then be spot treated.

Black light traps. These traps, similar to bug zappers but without the electronic grid, are used to collect flying insects such as beetles and moths. They can be used to monitor for initial and peak flight periods, which helps in timing treatments.

Tips for Selecting and Using Pesticides

Determine the need for a pesticide application by using historical information from the site and/or by using good pest detection and monitoring methods. If a treatment is deemed necessary, select the least toxic, most target specific product whenever possible. Apply the pesticide in strict accordance with directions on the label. Adhere to all state and federal regulations governing the use of pesticides, including the use of protective clothing, re-entry intervals, compliance with endangered species regulations, etc.

The purchase and application of Restricted Use pesticides requires a commercial or non-commercial license issued by the Texas Department of Agriculture for commercial sod producers or by the Structural Pest Control Board for private pest control operators and turf maintenance personnel.

Mowing and watering practices before and after a pesticide application affect product performance. Generally, mow and water the lawn before treatment. For night-feeding armyworms, cutworms and sod webworms that damage grass plant parts above the ground, treat in the afternoon or early evening. Do not water after treatment and do not cut grass for 1 to 3 days following application. For white grubs, mole crickets, fleas and ants living below the soil surface, water the lawn after treatment to soak pesticides into the soil. Wetting agents may help pesticides penetrate heavy thatch accumulation or poorly drained soils.

Biological control. Certain products (BioSafe® and others) containing parasitic nematodes, *Steinernema carpocapsae*, are being marketed for the control of billbugs, white grubs, armyworms, cutworms and sod webworm in turf. Such products containing multicellular organisms are not considered to be pesticides requiring registration by the Environmental Protection Agency.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas Agricultural Extension Service is implied.

Table 1. Damage Symptoms of Common Turfgrass Pest Problems and Possible Causes.

Symptom(s):	Possible causal agent(s):
A. Disruption of soil:	
1. Hills, piles or structures of loose dirt on turf	ants
a. Mounds up to 18 inches tall with no visible entrance(s) on mound with ants emerging in mass when disturbed	red imported fire ant
b. Small mounds with rims around single central entrance holes and presence of small (3/16 in.) grayish-black ants	pyramid ants
c. Many hills of course soil with central exit holes and presence of large (3/8 in.) red-brown ant with spines on the thorax	Texas leafcutting ant
d. Flat cleared areas up to 3 ft. in diameter made of course soil particles with a single central exit hole and with the presence of large (3/8 in.) reddish-brown ants with square heads and no spines	red harvester ant
2. Trails of raised, loose dirt through turf roughly 1/2 inch wide in an "S" shaped pattern	mole crickets
3. Small piles of dirt "pellets" (1/8 in.) scattered through thatch	earth worms
4. Earthen "chimneys" with central holes (about 1/2 in. diameter)	crawfish
5. Small piles of loose dirt which are associated with exit holes	green June beetle larvae
6. Round holes (up to 1/2 in. diameter) in soil	digger wasp nests or cicada exit holes
B. Direct damage to grass causing yellowing or plant death:	
1. Grass blades chewed or missing	caterpillars
a. Presence of gray-brown caterpillars up to 1 in. long with an inverted cream-colored "Y" on the fronts of the head capsules	armyworms
b. Presence of gray-brown caterpillars up to 1 in. long that curl into a tight "C" position when disturbed	cutworms
c. Presence of translucent greenish caterpillars up to 3/4 in. long with black raised spots on each body segment	tropical sod webworm
2. Yellow or dead grass:	
a. Roots missing and presence of cream-colored "C" shaped grubs with three legs on body segments behind brown head capsule	white grubs
b. No tissue removed, with presence of pinkish-orange, white and black nymph and adult stages of bugs up to 3/16 in. long	chinch bugs
c. No tissue removed, but with "galls" or globular objects (scales) in the root zone	Rhodesgrass scale or ground pearls
d. No tissue removed, but with shortened internodes producing a typical rosetting and tufted growth, or "witch broom" effect; grass may be very yellow or whitish in appearance with no insects visible to the naked eye	bermudagrass (stunt) mites or buffalograss (stunt) mites

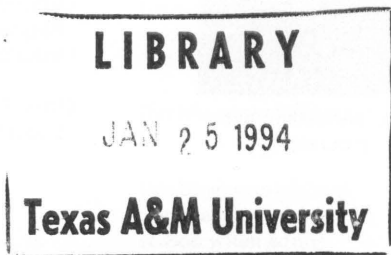


Table 2. Pesticides Registered for Insects and Related Pests of Turfgrass.



Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
ANTS			
	acephate Ortho Orthene Systemic Insect Control	2 tbsps./1 gal./mound	(for imported fire ant) Apply when weather is cool to 4-ft.-diameter area around each mound.
	Ortho Orthene Fire Ant Killer Orthene Tree, Turf & Ornamental Spray	2 tsps./imported fire ant mound or 1 tbsp./1 gal./mound	Apply in early morning or late afternoon (60 to 80 degrees F). Do not disturb mound.
Red imported fire ant	bendiocarb Turcam, Ficom W	0.5 to 1 oz./1,000 sq. ft. or 2 to 3 tsps./2 gals./imported fire ant mound 8 ins. in diameter or larger	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.
	Ficom 2 1/2G	0.9 to 1.9 lbs./1,000 sq. ft.	
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft. or 1 oz./2 gals./imported fire ant mound	Use at least 1 qt. per 6 ins. of mound diameter.
	Ortho Liquid Sevin	8 fl. oz./15 gals./750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E	0.75 fl. oz./1,000 sq. ft. or 0.25 fl. oz./gal./imported fire ant mound	
	Dursban 50W, Pageant DF	0.75 oz./1,000 sq. ft. or 0.75 oz./gal./imported fire ant mound	
	Ortho Dursban Grub & Insect Control	2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation. See above.
	Ortho Dursban Lawn & Garden Insect Control Ortho Lawn Insect Spray	2.5 lbs./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft. or 2.5 fl. oz./gal./imported fire ant mound	
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Granules	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 1 tbsp./mound	Spot spray ant hills. Wet grass a few hours before applying. Water in lightly after application. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
Texas leaf-cutting ant mounds	Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.; 1.5 tsps./hill for ants; 0.5 cup per imported fire ant mound watered in after application with 1 gal. water	
	fenoxycarb Award, Logic	1 to 1.5 lbs./acre or 1 to 3 tbsps./mound	(for imported fire ants, big-headed ants)

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(Ants, continued)			
	hydramethylnon Amdro Granular Insecticide	1 to 1.5 lbs./acre or 5 tbsps./mound	(for imported fire ants, harvester ants and big-headed ants, with supplemental labeling for Texas leaf-cutting ant formulated product)
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	isofenphos Oftanol 2 Insecticide	3 fl. oz./1,000 sq. ft. or 1 ml./3 gals./imported fire ant mound	Water immediately after application using 1/2 to 1 in. of water.
	Oftanol 5% Granular	0.9 lbs./1,000 sq. ft.	
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft. or 1.2 oz./2.5 gals./imported fire ant mound	(including fire ants) Apply on mound and in 4-ft. diameter circle around mound.
	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate Spectracide Lawn & Garden Insect Control	2 tsps./3 gals./1,000 sq. ft. or 2 tbsps./gal./ imported fire ant mound 2 fl.oz./3 gals./1,000 sq. ft. 6 fl. oz./1 gal. water/ imported fire ant mound	
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	resmethrin Earthfire Vaporizing Fluid	See label directions	(for Texas leaf-cutting ant and red imported fire ant) Special equipment required for injection.
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
BEEPLES			
billbugs			(see Biological Control section)
	bendiocarb Turcam	1 to 1.5 oz./1,000 sq. ft.	(for larvae) Apply when pests become evident. Irrigate after treat- ment with 1/4 to 3/4 in. of water.
	carbaryl Chipco Sevimol	6 fl. oz./1,000 sq. ft.	(for bluegrass billbug)
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 to 3 fl. oz./1,000 sq. ft. 0.75 to 3 oz./1,000 sq. ft.	(for bluegrass billbug) Spray early in season when adults first appear.
	cyfluthrin Tempo® 2 Ornamental Insecticide	6 ml./1,000 sq. ft.	(for bluegrass billbug adults)
	diazinon D-Z-N Diazinon 4E	2 to 3 fl. oz./1,000 sq. ft.	

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(billbugs, continued)	Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass is dry. Water lawn thoroughly after treatment. Repeat in 10 to 14 days or as necessary.
	Ortho Diazinon Plus Insect Spray	3 fl. oz./15 gals./500 sq. ft.	Wet grass a few hours before applying. Water lawn immediately after treatment.
	ethoprop Chipco Mocap 10G	1.15 lbs./1,000 sq. ft.	(bluegrass billbugs)
	fonofos Crusade 5G Granular Insecticide	1.8 lbs./1,000 sq. ft.	Irrigate after treatment with 1/4 to 1/2 in. of water. Avoid runoff.
	isazophos Triumph 4E	1.5 fl. oz./1,000 sq. ft.	Apply in the spring when adults first appear.
	isofenphos Oftanol 2 Insecticide Oftanol 5% Granular	3 fl. oz./1,000 sq. ft. 0.9 lbs./1,000 sq. ft.	Apply sufficient water to penetrate soil 1 to 1 1/2 ins. deep immediately after application.
	Ortho Oftanol Grub Control	3 lbs./1,000 sq. ft.	Apply 1 in. irrigation immediately after application.
	lambda-cyhalothrin Scimitar WP Insecticide	6 gms./1,000 sq. ft.	(bluegrass billbug adults) Do not mow or water for 24 hrs. after treatment.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	flea beetles	acephate Orthene Tree, Turf & Ornamental Spray	1.0 to 1.9 oz./1,000 sq. ft.
chlorpyrifos Ortho Lawn Insect Spray		4 fl. oz./15 gals./500 sq. ft.	(Dichondria flea beetle) Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
diazinon Ortho Diazinon Plus Insect Spray		3 fl. oz./15 gals./500 sq. ft.	(Dichondria flea beetle) Wet grass a few hours before applying
isofenphos Oftanol 2 Insecticide		1.5 to 3 fl. oz./1,000 sq. ft.	Irrigate within 12 hrs. after application using 1/4 to 1/2 in. of water.
green June beetle	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	(for grubs) Treat when grubs are feeding close to soil surface. Irrigate after treatment.

Table 2, continued.

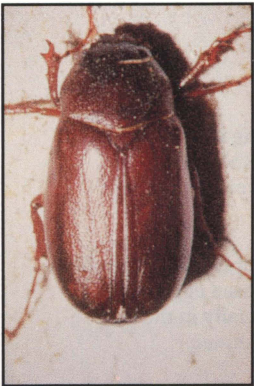
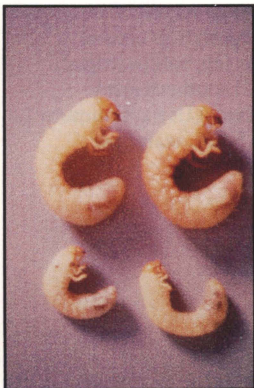
Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
June beetles (<i>Phyllophaga</i> spp.)	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	(adults)
	chlorpyrifos Dursban 50W, Pageant DF	0.75 oz./1,000 sq. ft.	(adults)
May or June Beetle			
white grubs	bendiocarb Turcam Ficam W Ficam 2 1/2G	1 to 1.5 oz./1,000 sq. ft. 1 to 2 oz./1,000 sq. ft. 1.9 to 3.7 lbs./1,000 sq. ft.	(see Biological Control section) Apply when pests become evident and when grubs are small in late summer. Irrigate after treatment with 1/4 to 3/4 in. of water.
	carbaryl Chipco Sevimol	6 fl. oz./1,000 sq. ft.	Treat when grubs are feeding close to soil surface. Water after treatment to help insecticide penetrate thatch.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W	1.5 to 3 fl. oz./1,000 sq. ft. 1.5 to 3 oz./1,000 sq. ft.	Spray when grubs are young and feeding near soil surface, usually during July and August. Immediately after spraying, irrigate with 1/2 to 1 in. of water to wash the insecticide into the soil. Apply in late July or August when young grubs are feeding close to soil surface. After application, water lawn with 1/2 in. water. See above.
White grubs	Ortho Dursban Grub & Insect Control	4 lbs./1,000 sq. ft.	
	Ortho Dursban Lawn & Garden Insect Control Ortho Lawn Insect Spray	5.0 lbs./1,000 sq. ft. 16 fl. oz./15 gals./500 sq. ft.	
	diazinon D-Z-N Diazinon 4E	3 fl. oz./1,000 sq. ft.	Apply any time between late June and early October.
	Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(white grubs, continued)			is dry. Water lawn thoroughly after treatment.
	ethoprop Chipco Mocap 10G	1.15 lbs./1,000 sq. ft.	
	fonofos Crusade 5G Granular Insecticide	1.8 lbs./1,000 sq. ft.	Irrigate after treatment with 1/4 to 1/2 in. Avoid runoff.
	isazophos Triumph 4E	1.5 fl. oz./1,000 sq. ft.	Apply after adults have ceased egg laying, usually in the late summer.
	isofenphos Oftanol 2 Insecticide Oftanol 5% Granular Insecticide	3 fl. oz./ 1,000 sq. ft. 0.9 lb./1,000 sq. ft.	Apply sufficient water to penetrate soil 1 to 1 1/2 ins. deep immediately after application. Apply 1 in. irrigation immediately after application.
	Ortho Oftanol Grub Control	3 lbs./1,000 sq. ft.	
	trichlorfon Dylox 80 Turf and Ornamental Insecticide	3.75 oz./1,000 sq. ft.	Apply in 15 to 30 gals. water. Thoroughly irrigate after application.
CATERPILLARS armyworms (including fall and true armyworms)			(see Biological Control section) (for fall armyworms) Apply when insects are present and damage first occurs. Repeat if reinfestation occurs. (for fall, yellowstriped, and southern armyworms) Use a minimum of 5 gals. water per 5,000 sq. ft.
	acephate Ortho Orthene Systemic Insect Control	1.5 fl. oz./1 gal./ 1,000 sq. ft.	
	Orthene Tree, Turf & Ornamental Spray	0.5 to 1.2 oz./ 1,000 sq. ft.	
	Ortho Orthene Fire Ant Killer	4.5 tbsps./6 gals./ 1,000 sq. ft.	
	<i>Bacillus thuringiensis</i> var. <i>kurstaki</i> Javelin WG	1 lb./acre	
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	(true, yellowstriped and fall armyworms) Do not irrigate treated areas following application.
	Ortho Liquid Sevin	8 fl. oz./15 gals./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.	(for beet, fall and yellowstriped armyworms)




Armyworm

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(armyworms, continued)			
	Ortho Dursban Grub & Insect Control	2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.
	Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	(for fall armyworms) See above.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	Delay watering or mowing for 24 hrs. following application.
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Turf Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	isofenphos Oftanol 2 Insecticide	1.5 to 3 fl. oz./1,000 sq. ft.	(true and fall armyworms) Irrigate within 12 hrs. after application using 1/4 to 1/2 in. of water.
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate Spectracide Lawn & Garden Insect Control	5 tsps./10 gals./1,000 sq. ft. 6 fl. oz./10 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
cutworms (including black and granulate cutworms)	acephate Orthene Tree, Turf & Ornamental Spray	1.2 to 2.4 oz./1,000 sq. ft.	(see Biological Control section) Use a minimum of 5 gals. water per 5,000 sq. ft.

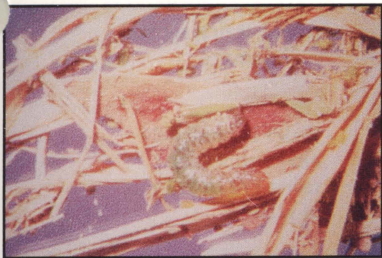
Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(cutworms, continued)			
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	Do not irrigate treated areas following application. Apply after mowing and watering. Do not water again for 2 days.
	Ortho Liquid Sevin	8 fl. oz./15 gal./750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation. See above.
	Ortho Dursban Lawn & Garden Insect Control Ortho Lawn Insect Spray	2.5 lbs./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	Delay watering or mowing for 24 hrs. following application.
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	ethoprop Chipco Mocap 10G	1.15 lbs./1,000 sq. ft.	
	fonofos Crusade 5G Granular Insecticide	1.5 to 1.8 lbs./1,000 sq. ft.	Irrigate 10 to 15 mins. after treatment.
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate Spectracide Lawn & Garden Insect Control	5 tsps./10 gals./1,000 sq. ft. 6 fl. oz./10 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.	
pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.		

Cutworm

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(cutworms, continued)	isofenphos Oftanol 2 Insecticide	1.5 to 3 fl. oz./ 1,000 sq. ft.	Irrigate within 12 hrs. after application using 1/4 to 1/2 in. of water.
	trichlorfon Dylox® 80 Turf and Ornamental Insecticide	2.5 to 3.75 oz./1,000 sq. ft.	Apply in 15 to 30 gals. water. Do not irrigate after application.
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
fiery skipper (larvae)	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	(also Essex skipper)
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.	
sod webworms (including <i>Crambus</i> spp. and tropical sod webworms)	acephate Ortho Orthene Systemic Insect Control	1.5 fl. oz./1 gal./ 1,000 sq. ft.	(see Biological Control section)
	Orthene Tree, Turf & Ornamental Spray	0.5 to 1 oz./ 1,000 sq. ft.	Apply when insects are present and damage first occurs. Repeat if reinfestation occurs. (for <i>Crambus</i> spp.) Use 1 to 15 gals. water per 5,000 sq. ft.
	Ortho Orthene Fire Ant Killer	4.5 tbsps./6 gals./ 1,000 sq. ft.	
	<i>Bacillus thuringiensis</i> var. <i>kurstaki</i> Dipel 2X Javelin WG	1 to 2 lbs./acre 1 lb./acre	(including tropical sod webworm)
	bendiocarb Ficam W, Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are evident using adequate water to thoroughly moisten grass and thatch.
	Ficam 2 1/2G	0.9 to 1.9 lbs./1,000 sq. ft.	
	carbaryl Chipco Sevimol	4.4 to 6 fl. oz./1,000 sq. ft.	Irrigate areas following application.
	Ortho Liquid Sevin	8 fl. oz./15 gal./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.	Delay mowing or watering of treated area for 12 to 24 hrs. after treatment.
	Ortho Dursban Grub & Insect Control	2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.



Tropical sod webworm

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(sod webworms, continued)	Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	See above.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	Delay watering or mowing for 24 hrs. following application.
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	ethoprop Chipco Mocap 10G	1.15 lbs./1,000 sq. ft.	
	fonofos Crusade 5G Granular Insecticide	1.5 to 1.8 lbs./1,000 sq. ft.	Irrigate 10 to 15 mins. after treatment.
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	isofenphos Oftanol 2 Insecticide Oftanol 5% Granular	1.5 to 3 fl. oz./1,000 sq. ft. 0.9 lbs./1,000 sq. ft.	Water immediately after application using 1/4 to 1/2 in. of water.
	Ortho Oftanol Grub Control	1.5 lbs./1,000 sq. ft.	Apply 1/2 in. irrigation immediately after application.
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment
	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate	5 tsps./10 gals./1,000 sq. ft.	
	Spectracide Lawn & Garden Insect Control	6 fl. oz./10 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	trichlorfon Dylox 80 Turf and Ornamental Insecticide	2.5 to 3.75 oz./1,000 sq. ft.	Apply in 15 to 30 gals. water. Do not irrigate after application.

Table 2, continued.

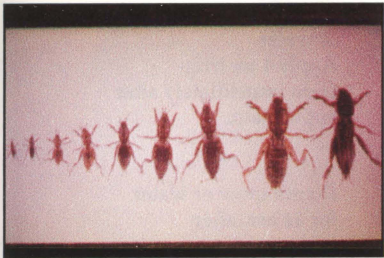


Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
MOLE CRICKETS	acephate Orthene Tree, Turf & Ornamental Spray	1.0 to 1.9 oz./1,000 sq. ft.	Use 1 to 15 gals. water per 5,000 sq. ft. Apply during late afternoon or early evening after an irrigation. Do not irrigate after treatment. Treat when insects are present and damage is first noticed.
	Ortho Orthene Fire Ant Killer	9 tbsps./6 gals./ 1,000 sq. ft.	Apply when pests become evident. Irrigate after treat- ment with 1/4 to 3/4 in. of water.
Mole crickets	bendiocarb Turcam Ficam 2 1/2G	1 to 1.5 oz./1,000 sq. ft. 1.9 to 3.7 lbs./1,000 sq. ft.	Make application in afternoon or early morning following irrigation. Do not irrigate following application.
	carbaryl Chipco Sevimol	4.4 to 6 fl. oz./1,000 sq. ft.	Apply in a minimum of 50 gals. water per acre. Spray when young nymphs are active.
Mole cricket damage	chlorpyrifos Dursban Turf Insecticide Dursban 50W	1.5 fl. oz./1,000 sq. ft., 1.5 oz./1,000 sq. ft.	Treat when insects first appear. After appli- cation, water lawn to wash granules into zone of infestation. See above.
	Ortho Dursban Grub & Insect Control	2 lbs./1,000 sq. ft.	Mow and water thor- oughly before treatment. Apply at dusk or over- night after first signs of damage.
	Ortho Dursban Lawn & Garden Insect Control Ortho Mole Cricket Bait Formula III	5.0 lbs./1,000 sq. ft. 1 lb./500 sq. ft.	
	cyfluthrin Tempo 2 Ornamental Insecticide	6 ml./1,000 sq. ft.	
	diazinon Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	ethoprop Chipco Mocap 10G	1.7 to 2.3 lbs./1,000 sq. ft.	Use higher rate for heavier infestations and older insects.
	fonofos Crusade 5G Granular Insecticide	1.8 lbs./1,000 sq. ft.	Irrigate after treatment with 1/4 to 1/2 in. Avoid runoff.
	isazophos Triumph 4E	1.5 fl. oz./1,000 sq. ft.	Apply in the spring when nymphs are small.

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(Mole crickets, continued)			
	isofenphos Oftanol 2 Insecticide Oftanol 5% Granular	3 fl. oz./1,000 sq. ft. 0.9 lbs./1,000 sq. ft.	Water immediately after application using 1/2 to 1 in. of water. Apply 1 in. irrigation immediately after application.
	Ortho Oftanol Grub Control	3 lbs./1,000 sq. ft.	
	lambda-cyhalothrin Scimitar WP Insecticide	6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate Spectracide Lawn & Garden Insect Control	5 tsps./10 gals./1,000 sq. ft. 6 fl. oz./10 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
SUCKING INSECTS			
aphids	acephate Ortho Orthene Systemic Insect Control Orthene Tree, Turf & Ornamental Spray	1.5 fl. oz./1 gal./1,000 sq. ft. 0.5 oz./1,000 sq. ft.	(for greenbugs) Apply when insects are present and damage first occurs. Repeat if reinfestation occurs. Use 4 gals. water per 1,000 sq. ft. Do not mow turfgrass for 24 hrs. after application.
	chlorpyrifos Dursban 50W, Pageant DF	0.75 oz./1,000 sq. ft.	(for greenbugs)
chinch bugs	acephate Orthene Tree, Turf & Ornamental Spray	1.2 to 2.4 oz./1,000 sq. ft.	Use 1 to 15 gals. water per 5,000 sq. ft.
	bendiocarb Ficam W, Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are evident using adequate water to thoroughly moisten grass and thatch.
	carbaryl Chipco Sevimol	4.4 to 6 fl. oz./1,000 sq. ft.	Irrigation of turf will aid in penetration of insecticide into turf.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.

Chinch bugs

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(chinch bugs, continued)			
	Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	See above.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
	cyfluthrin		
	Tempo 2 Ornamental Insecticide	6 ml./1,000 sq. ft.	
	diazinon		
	D-Z-N Diazinon 4E	2 to 3 fl. oz./1,000 sq. ft.	Use higher rate for longer residual control and in lawns of dense growth.
	D-Z-N Diazinon 50W	2 to 3 oz./1,000 sq. ft.	
	Ortho Diazinon Plus Insect Spray	3 fl. oz./15 gals./500 sq. ft.	Wet grass a few hours before applying.
	Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	ethoprop		
	Chipco Mocap 10G	1.15 lbs./1,000 sq. ft.	
	fonofos		
	Crusade 5G Granular Insecticide	1.5 to 1.8 lbs./1,000 sq. ft.	Irrigate 10 to 15 mins. after treatment.
	isazophos		
	Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	isofenphos		
	Oftanol 2 Insecticide	1.5 to 3 fl. oz./1,000 sq. ft.	Water immediately after application using 1/4 to 1/2 in. of water.
	Oftanol 5% Granular	0.9 lbs./1,000 sq. ft.	
	Ortho Oftanol Grub Control	1.5 lbs./1,000 sq. ft.	Apply 1/2 in. irrigation immediately after application.
	lambda-cyhalothrin		
	Scimitar WP Insecticide	6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
	permethrin		
	Quick-Kill Home, Garden, Pet Insecticide Concentrate	5 tsps./10 gals./1,000 sq. ft.	
	Spectracide Lawn & Garden Insect Control	6 fl. oz./10 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins		
	Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
leafhoppers	acephate		
	Orthene Tree, Turf & Ornamental Spray	1 oz./1,000 sq. ft.	Use 1 to 15 gals. water per 5,000 sq. ft.

Table 2, continued.


Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(leafhoppers, continued)	bendiocarb Ficam W, Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are evident using adequate water to thoroughly moisten grass and thatch.
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Lawn & Garden Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2.5 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 1.25 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
Rhodesgrass scales			Note: Rhodesgrass scales are controlled using a parasitic wasp. Insecticide use can eliminate this biological control agent.
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W	3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft.	
Rhodesgrass scale			
spittlebugs	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	
	chlorpyrifos Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.
MITES			
Bermudagrass (stunt) mites	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.	

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(bermudagrass [stunt] mites, continued)	<p>diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control</p>	<p>2 to 3 fl. oz./1,000 sq. ft. 1.25 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 2 lbs./1,000 sq. ft.</p>	<p>Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.</p>
	<p>Bermudagrass (stunt) mite damage</p>		
clover mites	<p>chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control</p>	<p>0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.</p>	<p>Treat when insects first appear. After application, water lawn to wash granules into zone of infestation. See above.</p>
	<p>Ortho Dursban Lawn & Garden Insect Control Ortho Lawn Insect Spray</p>	<p>2.5 lbs./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft.</p>	<p>Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.</p>
	<p>diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control</p>	<p>2 to 3 fl. oz./1,000 sq. ft. 1.25 oz./1,000 sq. ft. 3 fl. oz./15 gals./500 sq. ft. 2 lbs./1,000 sq. ft.</p>	<p>Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.</p>
	<p>isazophos Triumph 4E</p>	<p>0.75 fl. oz./1,000 sq. ft.</p>	<p>Apply at first sign of pest damage.</p>
	<p>malathion Ortho Malathion 50 Plus Insect Spray</p>	<p>2 tsps./gal.</p>	<p>Treat 10-ft. strip along outside of house.</p>
winter grain mites	<p>chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF</p>	<p>0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.</p>	

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks	
MINOR, SOME MEDICALLY IMPORTANT AND NUISANCE PESTS				
centipedes	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.		
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft.		
	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.	
chiggers	carbaryl Chipco Sevimol Ortho Liquid Sevin	1.5 to 3 fl. oz./1,000 sq. ft. 8 fl. oz./15 gal./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.	
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.	
	Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	See above.	
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.	
	cyfluthrin Tempo 2 Ornamental Insecticide	6 ml./1,000 sq. ft.		
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	3 fl. oz./1,000 sq. ft. 1.25 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.	
	lambda-cyhalothrin Scimitar WP Insecticide	6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.	
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.		
	crickets	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(crickets, continued)	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Lawn & Garden Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2.5 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation. Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	isazophos Triumph	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate Spectracide Lawn & Garden Insect Control	2 tsps./3 gals./1,000 sq. ft. 2 fl. oz./3 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
digger wasps	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Granules Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 1 tbsp. around each nest opening 1.5 tsps. around each nest opening	Spot spray wasp nest openings at dusk. Apply at dusk when wasps are inactive.
earwigs			Note: Predaceous earwigs are beneficial and should be left untreated.

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks	
(earwigs, continued)	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.	
	carbaryl Chipco Sevimol Ortho Liquid Sevin	1.5 to 3 fl. oz./1,000 sq. ft. 8 fl. oz./15 gals./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.	
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.	
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.	
	cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.		
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.	
	fonofos Crusade 5G Granular Insecticide	1.5 to 1.8 lbs./1,000 sq. ft.	Irrigate 10 to 15 mins. after treatment.	
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.	
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.		
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.		
	European crane fly (larvae)	bendiocarb Turcam	2 oz./1,000 sq. ft.	Apply when pests become evident.
		carbaryl Chipco Sevimol	6 fl. oz./1,000 sq. ft.	Apply in early spring (April 1 to 15). Water soon after treatment to help insecticide penetrate thatch.

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks	
(European crane fly [larvae], continued)	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Lawn Insect Spray	1.0 fl. oz./1,000 sq. ft. 1.0 oz./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.	
	diazinon Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn thoroughly after treatment. Repeat in 10 to 14 days or as necessary.	
	isofenphos Oftanol 2 Insecticide	1.5 to 3 fl. oz./ 1,000 sq. ft.	Water within 12 hours after application using sufficient water to saturate soil 1 to 1 1/2 ins. deep.	
	grasshoppers	carbaryl Chipco Sevimol Ortho Liquid Sevin	1.5 to 3 fl. oz./1,000 sq. ft. 8 fl. oz./15 gals./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days.
		chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Treat when insects first appear. After applic- ation, water lawn to wash granules into zone of infestation. See above.
		Ortho Dursban Lawn & Garden Insect Control Ortho Lawn Insect Spray	2.5 lbs./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft.	Mow and water well 1 to 2 days before treatment. Do not water again for 2 to 3 days afterwards.
		cyfluthrin Tempo 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	
		isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
		lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(grasshoppers, continued)	permethrin Quick-Kill Home, Garden, Pet Insecticide Concentrate	2 tsps./3 gals./1,000 sq. ft.	
	Spectracide Lawn & Garden Insect Control	2 fl. oz./3 gals./1,000 sq. ft.	Wet lawn thoroughly a few hours before applying.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
millipedes	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Lawn Insect Spray	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 4 fl. oz./15 gals./500 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	isazophos Triumph 4E	0.75 fl. oz./1,000 sq. ft.	Apply at first sign of pest damage.
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
snails and slugs	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	
	methiocarb Ortho Slug-Geta Snail & Slug Bait	1 lb./1,000 sq. ft.	
sowbugs	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	(and pillbugs) Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.
	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(sowbugs, continued)	chlorpyrifos Dursban Turf Insecticide, Dursban 4E Dursban 50W, Pageant DF Ortho Dursban Lawn & Garden Insect Control	0.75 fl. oz./1,000 sq. ft. 0.75 oz./1,000 sq. ft. 2.5 lbs./1,000 sq. ft.	(and pillbugs) Treat when insects first appear. After application, water lawn to wash granules into zone of infestation.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	carbaryl + metaldehyde Ortho Bug-Geta Plus Snail, Slug & Insect Granules	0.5 lb./1,000 sq. ft.	(and pillbugs)
spiders			Note: Spiders are generally beneficial arthropods.
	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.
springtails (Collembola)	carbaryl Chipco Sevimol	1.5 to 3 fl. oz./1,000 sq. ft.	
	chlorpyrifos Dursban 50W, Pageant DF	0.75 oz./1,000 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray Ortho Diazinon Soil & Insect Control	2 to 3 fl. oz./1,000 sq. ft. 3 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 sq. ft. 2 lbs./1,000 sq. ft.	Wet grass a few hours before applying. Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
ticks	bendiocarb Turcam Ficam 2 1/2G	0.5 to 1 oz./1,000 sq. ft. 0.9 to 1.9 lbs./1,000 sq. ft.	(brown dog ticks) Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.
	carbaryl Chipco Sevimol Ortho Liquid Sevin	1.5 to 3 fl. oz./1,000 sq. ft. 8 fl. oz./15 gals./ 750 sq. ft.	Apply after mowing and watering. Do not water again for 2 days. See remarks.
	chlorpyrifos Dursban Turf Insecticide, Dursban 4E	0.75 fl. oz./1,000 sq. ft.	

Table 2, continued.

Insect/Pest	Pesticide/Product*	Treatment Rate	Remarks
(ticks, continued)	Dursban 50W, Pageant DF Ortho Dursban Grub & Insect Control	0.75 oz./1,000 sq. ft. 2 lbs./1,000 sq. ft.	(for brown dog ticks) Treat when insects first appear. After applic- ation, water lawn to wash granules into zone of infestation.
	Ortho Dursban Lawn & Garden Insect Control	2.5 lbs./1,000 sq. ft.	See above.
	Ortho Lawn Insect Spray	4 fl. oz./15 gals./500 sq. ft.	
	cyfluthrin Tempo® 2 Ornamental Insecticide	4 ml./1,000 sq. ft.	
	diazinon D-Z-N Diazinon 4E D-Z-N Diazinon 50W Ortho Diazinon Plus Insect Spray	3 fl. oz./1,000 sq. ft. 1.25 oz./1,000 sq. ft. 3 fl. oz./15 gals./ 500 ft.	(for brown dog ticks) Wet grass a few hours before applying. Treat grass and shrubbery near the house.
	Ortho Diazinon Soil & Insect Control	2 lbs./1,000 sq. ft.	Apply with fertilizer spreader when grass is dry. Water lawn lightly after treatment.
	lambda-cyhalothrin Scimitar WP Insecticide	3 to 6 gms./1,000 sq. ft.	Do not mow or water for 24 hrs. after treatment.
	permethrin Spectracide Lawn & Garden Insect Control	6 fl. oz./10 gals./1,000 sq. ft.	(for brown dog ticks) Wet lawn thoroughly a few hours before application.
	pyrethins Pyrenone Crop Spray	0.25 to 0.5 fl. oz./2.5 to 5.0 gals./1,000 sq. ft.	
wasps	bendiocarb Turcam	0.5 to 1 oz./1,000 sq. ft.	Apply when pests are present. Use adequate water to thoroughly moisten grass and thatch.

*Product concentration, trade name of representative product used to compile this table, signal word and special remarks provided, listed by (generic) active ingredient below:

acephate

9.4% EC, Ortho® Orthene® Systemic Insect Control. **WARNING.** For Bermudagrass, Bluegrass, Bentgrass, Fescue, St. Augustine. For imported fire ant control on Bermudagrass, Centipede, Bahia, St. Augustine or bare ground, apply in cool weather or in early morning or late afternoon. Treat new mounds as they appear.

75% WP, Orthene® Tree, Turf and Ornamental Spray. **CAUTION.** Grass treated using the imported fire ant mound treatment method may be injured. Do not treat mound more than once per season.

75% WP, Ortho® Orthene® Fire Ant Killer. **CAUTION.** Keep children and domestic animals off treated areas until these areas are completely dry.

Bacillus thuringiensis var. kurstaki

Dipel® 2X. **CAUTION.**

Javelin® WG. **CAUTION.**

Table 2, continued.

bendiocarb

- 76% WP, Turcam®. **WARNING.** Restricted use pesticide.
- 76% WP, Ficam® W. **WARNING.** For use only by pest control operators.
- 2.5% G, Ficam® 2 1/2G. **CAUTION.** For use only by pest control operators.

carbaryl

- 40% EC, 4 lbs./gal., Chipco® Sevimol®. **CAUTION.**
- 27% EC, Ortho® Liquid Sevin®. **CAUTION.** For control of ticks which transmit Lyme disease (juvenile and adult *Ixodes* spp. including deer tick and black legged tick, and *Amblyomma* spp. including Lone Star tick), apply at a rate of 2 tbsps. (1 fl. oz.) per gal. Begin applications in the late spring or early summer (May/June). Thoroughly wet entire lawn, perimeter wooded areas and property boundaries, including shrub beds, ornamental plantings and wooded areas where exposure to ticks may occur. Repeat at 3- to 4-week intervals since ticks may be reintroduced from surrounding areas by animals.

chlorpyrifos

- 44.9%, 4 lbs./gal, Dursban® Turf Insecticide. **WARNING.** For commercial applicators only. (also Dursban® 4E Insecticide).
- 50% WP & DF, Dursban® 50W. **WARNING.** For commercial applicators only. (also Pageant® DF Insecticide).
 - 1.14% G, Ortho® Dursban® Grub & Insect Control. **CAUTION.** Keep children and pets off treated area until this material is washed into the soil and grass is dry. Do not mow for 24 hours following treatment. Use a fertilizer spreader to ensure an even application.
- 1.0% G, Ortho® Dursban® Lawn & Garden Insect Control. **CAUTION.**
- 5.3% EC, Ortho® Lawn Insect Spray. **CAUTION.** (also, 12.6% EC, Ortho® Ortho-Klor® Soil Insect & Termite Killer. **WARNING.**)
- 0.5% Bait, Ortho® Mole Cricket Bait Formula III. **CAUTION.**

cyfluthrin

- 24.3%, 2 lbs./gal., Tempo® 2 Ornamental Insecticide. **CAUTION.** For use by lawn care and landscape applicators. Keep children and pets off of treated areas until lawn has dried.

diazinon

- NOTE: These products must not be used on golf courses and sod farms.
- 47.5 EC, 4 lbs./gal., D-Z-N® Diazinon 4E. **CAUTION.** (Also D-Z-N® Diazinon AG500. **WARNING,** and T&O Diazinon® 4E-Insecticide. **WARNING.**)
- 14% G, D-Z-N® Diazinon 50W. **WARNING.** (Also T&O Diazinon® 50WP-Insecticide. **WARNING.**)
- 25% EC, Ortho® Diazinon Plus® Insect Spray. **WARNING.** For use on the home lawn.
- 2% G, Ortho® Diazinon Granules. **CAUTION.**
- 5% G, Ortho® Diazinon Soil & Turf Insect Control. **CAUTION.**

ethoprop

- 10% G, Chipco® Mocap® 10G. **WARNING.** Incorporate immediately after application with at least 1/10 in. of rainfall or irrigation. The unpleasant odor is due to mercaptan, a breakdown product of ethoprop. To prevent turfgrass injury avoid application to wet foliage. Do not apply rates greater than 2.3 lbs. of product per 1,000 sq. ft. (100 lbs./A) to greens, tees or other turfgrass cut less than 0.375 in. Bentgrass and ryegrass are more sensitive to ethoprop than other turfgrass species. Do not apply ethoprop within the dripline of Chinese elm. Do not apply more than 400 lbs. product per acre per year or 200 lbs. in a single application.

fenoxycarb

- 1% Bait, Logic®, Award™. **CAUTION.**

fonofos

- 5% G, Crusade® 5G Granular Insecticide. **WARNING.** Do not allow people or pets on treated area for 24 hrs. and unless grass is dry. For use on golf courses and commercial sod growing areas only.

hydramethylnon

- 0.73% Bait, Amdro® Granular Insecticide. **CAUTION.**

azophos

- 46.8% (4 lbs./gal/), Triumph® 4E. **WARNING.** Restricted use pesticide. Do not apply to golf course fairways. Do not apply in areas that border lakes, ponds or streams. A maximum of one application of Triumph 4E per year is permitted for the 1.5 fl. oz./1,000 sq. ft. (2 qts./A) rate. A maximum of two applications per year at least 60 days apart is permitted for the 0.75 fl. oz./1,000 sq. ft. (1 qt./A) rate. Apply in sufficient volume of water to provide uniform coverage.

Table 2, continued.

isofenphos

- 22% EC, 2 lbs./gal., Oftanol® 2 Insecticide. **WARNING.** For commercial applicators only. Water grass thoroughly after application. Keep children and pets off treated area until foliage has dried. Do not mow treated turf area before rainfall or irrigation has been applied as per directions for use. Do not apply more than 2 gals. per acre per year. Minimum interval between treatments is 30 days for the 3 fl. oz./1,000 sq. ft. rate and 15 days for the lower rate.
- 5% G, Oftanol® 5% Granular Insecticide. **CAUTION.** For commercial applicators only. See restrictions above. Do not apply more than 80 lbs. per acre per year. Minimum interval between treatments is 30 days.
- 1.5 G, Ortho® Oftanol® Grub Control. **CAUTION.** Do not mow lawn after application until after rainfall or irrigation has been applied. Do not apply more than 6 lbs. product per 1,000 sq. ft. per year. Minimum interval between applications is 15 days at the 1.5-lbs. rate., 30 days at the 3.0-lbs. rate.

lambda-cyhalothrin

- 9.52% WP, Scimitar™ WP Insecticide (in water soluble packets). **WARNING.** For commercial applicators only; for use in residential lawns. Apply at 21-day intervals if retreatment is necessary. Do not make more than three applications per acre per year or 0.28 lbs. active ingredient per acre per year. Do not mow or water for 24 hrs. for optimum control. Keep children and pets off treated areas until lawn has dried.

malathion

- 50% EC, Ortho® Malathion 50 Plus™ Insect Spray. **WARNING.** For roaches, ants, clover mites, spiders, silverfish, crickets and earwigs, use 8 tbsps. (4 oz.) per gal. and apply as a course spray to lower foundation of house and firewood piles. Repeat as necessary.

methiocarb

- 2% Bait, Ortho® Slug-Geta® Snail & Slug Bait. **CAUTION.** Withhold heavy watering for at least 2 days after treatment. After treatment, sprinkle dichondria and grass lightly to wash granules from foliage to soil. Keep children and pets off the treated area until it has dried.

permethrin

- 13.3% EC, Quick-Kill™ Home, Garden, Pet Insecticide Concentrate. **WARNING.** Lawns should be no taller than 3 ins. at the time of application. Slightly more water may be used as long as the amount of product per acre is listed above. Keep children and pets off the treated area until it has dried.
- 2.5% EC, Spectracide® Lawn and Garden Insect Control. **CAUTION.**

pyrethrins

- 6.0% pyrethrins + 60% piperonyl butoxide, Pyrenone® Crop Spray. **CAUTION.**

resmethrin

- 1.0% vaporizing fluid, Earthfire™ Vaporizing Fluid. **CAUTION.** Requires specialized application equipment.

trichlorfon

- 80% WP, Dylox® 80 Turf and Ornamental Insecticide. **WARNING.** For use by professional or commercial applicators.

carbaryl + metaldehyde

- 5% + 2% G, Ortho® Bug-Geta® Plus Snail, Slug & Insect Granules. **CAUTION.** If ground is dry, water area to be treated thoroughly. Always sprinkle lightly with water after application to moisten granules and make them more attractive to slugs, snails and other registered pests. Withhold heavy watering for at least 2 days after treatment.

Acknowledgments

The authors wish to thank Judy Winn, Associate Professor and Extension Communications Specialist, for editing this manuscript for publication. Photographs are those of the authors except the red imported fire ant by S.B. Vinson and mole crickets by D. Short.

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, disability or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.