

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
Annual bluegrass weevil (adults)	beta-cyfluthrin	Tempo Ultra GC	0.27 fl oz	<p>The annual bluegrass weevil is a serious pest of bluegrass (and occasionally bentgrass and perennial ryegrass) in the Northeast since the 1930s. Its pest status was elevated when resistance to pyrethroids was detected. In 2008, the first infestation in the Carolinas was detected on a golf course near Asheville. The distribution of the annual bluegrass weevil is still restricted to western North Carolina, and substantial damage has not been widely reported.</p> <p>An adult annual bluegrass weevil looks similar to an adult billbug. They can be distinguished from billbugs by their antennae that araised from the tip of the snout. Larvae of the annual bluegrass weevils and billbugs are difficult to distinguish. Adults feed on grass blades, and larvae feed on stems, crowns and roots. There are two or three generations per year. Damage threshold are considered to be 30-80 larvae per sq ft for the spring generation and 20-40 larvae per sq ft for the summer generation. Adults are typically controlled in the spring, soon after Forsythia achieves full bloom and flowering dogwood achieves full bract. The second generation can be controlled in late June to early July. Apply adulticides to the thatch layer in grrens, collars, tees and fairway perimeters. Larvicides are typically applied 2 weeks to 1 months after adult activity is observed.</p>
	bifenthrin	OnyxPro	0.08 to 0.16 fl oz	
		Talstar GC Flowable	0.25 to 0.5 fl oz	
		Taslstar GC Granular, EZ	1.15 to 2.3 lb	
	chlorpyrifos	Dursban 50W	4 lb/acre	
		Chlopyrifos 4E AG	1.5 fl oz	
	clothianidin + bifenthrin	Aloft GC G, Aloft LC G	1.8 to 3.6 lb	
		Aloft GC SC, Aloft LC SC	0.27 50 0.54 fl oz	
	lambda-cyhalothrin	Scimitar GC, CS	7 ml	
	deltamethrin	Suspend SC	0.6 to 0.9 fl oz	
	imidacloprid + bifenthrin	Allectus G	1.7 to 2.9 lb	
		Allectus GC SC	0.9 to 1.65 fl oz	
	indoxacarb	Provaunt	0.275 oz	
	mineral oil	Civitas, Civitas Turf Defence	8 to 16 fl oz	
	spinosad	Conserve SC	1.2 fl oz	
thiamethoxam + lambda-cyhalothrin	Tandem	14 to 18 fl oz/acre		
trichlorfon	Dylox 420 SL	6.9 fl oz		
zeta-cypermethrin + bifenthrin	Talstar Xtra GC, Xtra G	1.15 to 2.3 lb		
zeta-cypermethrin + bifenthrin + imidacloprid	Triple Crown Golf, T&O	0.23 to 0.46		
Annual bluegrass weevil (grubs)	acephate + imidacloprid	Avatar PLX	1.47 to 2.94 oz	
	carbaryl	Sevin SL	6 fl oz	
		Sevin 7G	3 lbs	
	chlorantraniliprole	Acelepryn	0.275 to 0.46 fl oz	
		Acelepryn G	1.72 to 2.3 lb	
	clothianidin	Arena 0.25 G	80 to 160 lb/acre	
		Arena 50 WDG	0.14 to 0.29 oz	
	clothianidin + bifenthrin	Aloft GC G, Aloft LC G	1.8 to 3.6 lbs	
		Aloft GC SC, Aloft LC SC	0.27 50 0.54 fl oz	
	cyantraniliprole	Ference	0.275 to 0.459 fl oz	
	dinotefuran	Zylam 20 SG	1 oz	
		Zylam Liquid	1.8 fl oz	
imidacloprid	Merit 2F	0.46 to 0.6 fl oz		
	Merit 0.5G	1.4 to 1.8 lb		

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	imidacloprid + bifenthrin	Allectus G	1.7 to 2.9 lb	
		Allectus GC SC	0.9 to 1.65 fl oz	
	indoxacarb	Provaunt	0.275 oz	
	spinosad	Conserve SC	1.2 fl oz	
	thiamethoxam + lambda-cyhalothrin	Tandem	14 to 18 fl oz/acre	
	trichlorfon	Dylox 420 SL	5.2 to 6.9 fl oz	
		Dylox 6.2 Granular	3 lb	
zeta-cypermethrin + bifenthrin + imidacloprid	Triple Crown Golf	0.57 to 0.8 fl oz		
Ants, Nuisance	acephate	Orthene TT&O 75 and 97	1.2 to 1.6 oz/gal, see label	In most cases ants serve as predators of turfgrass pests and competitors to red imported fire ants. Ants become a nuisance when they build up to a high number, invade buildings and equipments, and build mounds that interfere with the smoothness of the greens. Species identification and an understanding of ant biology are critical in deciding where to treat and what to treat with, especially when baits are used. Ants are very susceptible to insecticide treatments, but relief of the problem seldom occurs unless the colony itself is eliminated. Sap-sucking insects (such as aphids, mealybugs, scale insects and leafhoppers) on nearby vegetations or landscape ornamentals should be controlled to reduce their attraction to the honeydew-seeking ants.
	acephate + imidacloprid	Avatar PLX	1.5 oz/5 gal	
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	
	bifenthrin ²	Onyx	0.07 to 0.15 fl oz	
		OnyxPro	0.16 to 0.32 fl oz	
		Talstar EZ Golf , GC Gran, PL	2.3 to 4.6 lbs	
		Talstar GC Flowable, Talstar One	0.25 to 1.0 fl oz	
	bifenthrin + lambda-cyhalothrin + fipronil	Taurus Trio G	2 lb	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.46-0.80 fl oz	
	bifenthrin + zeta-cypermethrin	Talstar XTRA GC Granular	2.3 to 4.6 lb	
	carbaryl	Sevin 5 Bait	11 oz	
		Sevin 10G	1.4 to 1.9 lbs	
		Sevin 80 WSP	2.5 to 5.0 lb/acre	
		Sevin SL	1.5 to 3 fl oz	
	chlorpyrifos	Dursban 50W	2 lb/acre	
Dursban PRO		1.5 fl oz		
clothianidin	Arena .25G	1.84 to 3.67 lbs		
	Arena .5G	1.0 to 1.8 lbs		
clothianidin + bifenthrin	Aloft GC SC, LC SC	11.65 to 23.3 fl oz, see label	Use GC formulation of Aloft for golf course and sod farms. Use LC formulation of Aloft for residential and commercial lawns, parks, recreational areas, and athletic fields.	
	Aloft GC G, LC G	80 to 160 lbs, see label		
cyfluthrin	Tempo (various formulations)	See label	Check label for site restrictions.	
cypermethrin	Demon Max	0.5 fl oz/gal	Demon is for lawn and landscape uses.	
	Demon WP	0.33 oz/gal		

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	deltamethrin	DeltaGard GC, DeltaGard T&O	0.4 to 0.6 fl oz	DeltaGard is for lawns, recreational areas and athletic fields. Use GC formulation for golf courses and sod farms.
		DeltaGard G, DeltaGard GC Gran	2 to 3 lbs	
	fipronil	Chipco TopChoice	2 lbs	Broadcast or slit applications. Provide 3 months control. Not for pasture and grazing lands. Check label for buffer zone and yearly application limit requirements.
		Chipco Choice	4.6 oz	
		Maxforce Carpenter Ant Bait Gel	See label	
	hydramethylnon (bait)	Amdro Pro	1 to 1.5 lbs/acre	For fire ants, big-headed ants, and harvester ants.
	imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.7 to 2.9 lbs	Use GC formulation of Allectus on golf courses and sod farms.
		Allectus SC, Allectus GC SC	1.32 to 1.65 fl oz	
	indoxacarb	Advion Fire Ant Bait	1.5 lb/acre	For fire ants, big-headed ants, and pavement ants.
		Advion Insect Granule	1.15 to 4.6 lbs	
	iron phosphate + spinosad	Antixx Plus	0.23 to 1 lb	
	lambda-cyhalothrin	Demand EZ	13.6 to 28 ml	Demand and Scimitar for use on lawns, recreational areas and athletic fields. GC formulation also for gold course and sod farm uses.
		Demand G	2 to 3 lbs	
Demand CS, Scimitar GC and CS		3.4 to 7 ml		
s-methoprene + hydramethylnon	Extinguish Plus Fire Ant Bait	1.5 lbs/acre	For fire ants, native ants, big-headed ants, harvester ants, and Argentine ants.	
permethrin	Astro	0.4 to 0.8 fl oz	Astro is for use on lawns, recreational areas and athletic fields.	
pyriproxyfen	Distance Fire Ant Bait	1 to 1.5 lbs/acre	For fire ants and big-headed ants.	
thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs		
Ants, Red Imported Fire	Mound treatment and Broadcast insecticide			<p>The Red Imported Fire Ant (RIFA) found in South Carolina is an invasive species. Movement of soil and plant materials is regulated by a federal quarantine. If shipment of soil, sods or plant crops outside of the quarantine area is intended see http://www.aphis.usda.gov/oa/pubs/ifapub.pdf for regulations on the specific treatments required by USDA-APHIS, or consult with the SC Department of Plant Industry.</p> <p>Chemicals for RIFA management can be broken into three categories: Individual mound treatments, broadcast bait treatments and broadcast insecticide treatments. Individual mound treatments (e.g., liquid drenches or granules) are fairly fast acting, but only work to kill the mounds that are directly treated. They are most appropriate for eliminating individual mounds that present a hazard or as clean-up treatments. They are not effective as a management strategy for reducing the RIFA population in an area.</p> <p>Broadcast bait treatments are more effective in reducing the population in a given area. The speed at which the baits reduce mound numbers differs by products. Some are slower acting and no results will be noticed for three or four weeks. More recently introduced products act faster. Baits will most likely need to be applied in the spring and fall. Most baits are applied at a rate of 1 to 1.5 lbs per acre. The key to success with RIFA bait products is to broadcast the material when the ants are foraging since most of the products breakdown quickly in sunlight and water. Foraging activity is regulated by surface soil temperatures. RIFA forage when soil temperature reaches above 65°F. The</p>
	acephate	Orthene TT&O 75	Drench: 0.2 oz/gal/mound Dry: 1-2 teaspoons/mound	
		Orthene TT&O 97	Drench: 0.15 oz/gal/mound	
	acephate + imidacloprid	Avatar PLX	Drench: 0.3 oz/gal/mound	
	alpha-cypermethrin	Fendona CS	Broadcast: 0.5-1 fl oz	
	bifenthrin ²	Onyx Pro	Broadcast: 0.16 to 0.32 fl oz	
		Talstar EZ Golf, Talstar GC Gran	Broadcast: 2.3 to 4.6 lbs	
		Talstar GC Flowable, Talstar One	Broadcast: 0.5 to 1.0 fl oz Drench: 1 teaspoon/gal/mound	
Talstar F		Broadcast: 1.0 fl oz Drench: 1 teaspoon/gal/mound		
bifenthrin + lambda-cyhalothrin + fipronil	Taurus Trio G	Broadcast: 2 lb/1000 sq ft		
bifenthrin + zeta-cypermethrin	Talstar XTRA GC Granular	Mound: 2.3 to 4.6 lbs		

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	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	Broadcast: 0.46-0.80 fl oz	best way to determine if ants are actively foraging is to place a small amount of test bait in the area to be treated. If RIFA hit the bait within 30 minutes then it is a good time to use the baits.
	carbaryl	Sevin 10G	Broadcast: 1 to 1.9 oz/mound	
	chlorpyrifos	Dursban 50W	Broadcast: 2 lbs/acre Sod Broadcast: 16 lbs/acre Drench: 0.05 lb/gal/mound	Broadcast insecticide treatments are recommended for high use areas with zero tolerance for RIFA. Most of these applications are relatively expensive and therefore cost prohibitive in large areas. The advantage of the broadcast granular products is the high level of control that can be achieved. They are also relatively easy to use and can go out at any time of the year. Most of the products can give up to twelve months of control. To achieve good control, the product should be applied evenly and thoroughly to cover all areas to be treated.
		Dursban PRO	Broadcast: 1.5 fl oz Drench: 0.5 fl oz/gal/mound	
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	Broadcast: 0.27 fl oz	Combinations of IMT, bait, and/or granular broadcast treatments based upon the needs of the site are likely to produce better results than the use of a single chemical or strategy alone. The 'two-step' program is a combination of both broadcast bait and individual mound treatments, which is suitable for large and medium-sized area at a moderate cost. First step involves broadcasting slow-acting baits in the spring and/or fall, when the RIFA is actively foraging. Then individual RIFA mounds can be treated individually with a fast-acting contact insecticide in step two. This shortcoming of this treatment program is the relatively long time required before an overall reduction in the RIFA population and mounds will be observed.
		Tempo 20 WP, Tempo Ultra WP	Broadcast: 10 grams	
		Tempo 20 WP GC, Power Pak	1 packet/7,800 sq. ft.	
		Tempo 20 WSP	1 packet/5,000 sq. ft.	
	deltamethrin	DeltaGard GC, DeltaGard T&O	Drench: 1.5 fl oz/gal/mound	Check label of individual insecticide for information on site uses, application method, yearly application limit and buffer zone restrictions.
		DeltaGard G, DeltaGard GC Gran	Broadcast: 2 to 3 lbs	
	fipronil	Chipeo TopChoice	Broadcast: 2 lbs	
		Chipeo Choice	Broadcast: 4.6 oz	
	imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	Broadcast: 2.9 to 5.7 lbs Dry: 0.5 cup/mound	
		Allectus SC, Allectus GC SC	Broadcast: 1.32 to 1.65 fl oz SC Drench: 1/3 fl oz/gal/mound GC Drench: 2/3 fl oz/gal/mound	
	lambda-cyhalothrin	Demand EZ	Broadcast: 13.6 to 28 ml	
		Demand CS, Scimitar CS	Broadcast: 3.4 to 7 ml	
	permethrin	Astro	Broadcast: 0.4 to 0.8 fl oz	
	spinosad	Conserve SC	Drench: 0.1 fl oz/gal/mound	
	thiamethoxam	Meridian 25WG	Drench: 1 to 3 oz/100 gal, 2-3 gal/mound	
	thiamethoxam + lambda-cyhalothrin	Tandem	Broadcast: 14-28 fl oz/acre	
Broadcast baits				Many baits also control other nuisance ant, such as harvester ants and big-headed ants. Check label for specific instructions.
	abamectin	Award II Fire Ant Bait	Broadcast: 1 lb/acre Mound: 5 to 7 tbsp/mound	
	hydramethylnon	Amdro Pro Fire Ant Bait SiegePro Fire Ant Bait	Broadcast: 1 to 1.5 lbs/acre Mound: 2 to 5 tbsp/mound	
	indoxacarb	Advion Fire Ant Bait	Broadcast: 1.5 lb/acre Mound: 4 tablespoons/mound	Not for use on sod farms. Do not exceed 4 applications per year.
	s-methoprene	Extinguish	Broadcast: 1 to 1.5 lbs/acre Mound: 3 to 5 tbsp/mound	Mix with other baits.
	metaflumizone	Siesta Fire Ant Bait	Mound: 1-2 oz/mound	

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			Broadcast: 1-1.5 lbs/acre		
	methoprene + hydramethylnon	Extinguish Plus Fire Ant Bait	Broadcast: 1.5 lbs/acre Mound: 2 to 5 tbs/mound		
	pyriproxyfen	Distance Fire Ant Bait	Broadcast: 1 to 1.5 lbs/acre Mound: 1 to 4 tbs/mound		
	spinosad	Justice Fire Ant Bait	Broadcast: 2.5 to 5 lbs/acre Mound: 4-6 tbs/mound		
Billbugs (adults)	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	<p>Billbug adults and larvae feed on the roots and stems of various turfgrasses, with bermudagrass, zoysiagrass and seashore paspalum being the most susceptible. Symptoms are often misdiagnosed as drought stress or disease. Symptoms first appear as scattered dead stems and later enlarge to small patch turning from yellow to brown. Straw-color dead grasses are easily pulled out with the hollowed stem break away from the crown. Fine, sawdust-like frass can be seen at the base. The affected turf, which appears drought-stressed, does not recover with watering. Damage usually shows up in mid- to late-summer (worst in August) during extended drought period. Soil remains firm, not spongy underfoot as with white grub or mole cricket infestations.</p> <p>Adults can be forced from the grass with a detergent or captured with a pitfall trap. Adults can be found from March to November in SC; the peak activity occurs in May and September. Treat for grubs soon after adult peak activity. Detection and treatment for larvae are similar to white grubs. Treat when adults and/or larvae are found and damage is apparent. Most materials, particularly those against the grubs, should be watered-in with 2-inch immediately after application.</p> <p>Check label of individual insecticide for information on site uses, application method, yearly application limit and buffer zone restrictions.</p>	
	beta-cyfluthrin	Tempo Ultra GC	0.27 fl oz		
	bifenthrin ²	Onyx, OnyxPro	0.07 to 0.16 fl oz, see labels		
		Talstar EZ Golf, GC Gran, PL	1.15 to 2.3 lbs		
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz		
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz		
	carbaryl	Sevin 10G	1.4 to 1.9 lbs		
		chlorpyrifos	Dursban 50W		2 to 4 lbs/acre
			Dursban PRO		1.5 fl oz
	clothianidin + bifenthrin	Aloft GC SC, LC SC	11.65 to 23.3 fl oz, see label		
		Aloft GC G, LC G	80 to 160 lbs, see label		
	cyfluthrin	Tempo (various SC formulation)	see label		
		Tempo 20 WSP, Power Pak	1 packet/5,000 to 7,800 sq. ft.		
	deltamethrin	DeltaGard GC, DeltaGard T&O	0.6 to 0.9 fl oz		
		DeltaGard GC Gran, DeltaGard G	2 to 3 lbs		
	imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.7 to 2.9 lbs		
		Allectus SC	0.4 to 1.65 fl oz		
Allectus GC SC		0.9 to 1.65 fl oz			
lambda-cyhalothrin	Demand EZ	28 ml			
	Demand G	3 to 4 lbs			
	Demand CS, Scimitar GC and CS	7 ml			
thiamethoxam + lambda-cyhalothrin	Tandem	0.32 to 0.64 fl oz			
Billbugs (grubs)	carbaryl	Sevin 80 WSP	10 lb/acre		
		Sevin SL	6 fl oz		
	chlorpyrifos	Dursban 50W	2 to 4 lbs/acre		
	chlorantraniliprole	Acelypryn	0.184 to 0.46 fl oz		
		Acelepryn G	1.15 to 2.3 lb		

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Billbugs (grubs)	clothianidin	Arena .25G	1.84 to 3.67 lbs		
		Arena .5G	1.0 to 1.8 lbs		
		Arena 50 WDG	6.4 to 12.8 oz		
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz		
		Aloft GC G	80 to 132 lbs		
		Aloft LC SC	11.65 to 23.3 fl oz		
		Aloft LC G	80 to 160 lbs		
	cyantraniliprole	Ference	0.184-0.367 fl oz		
	dinotefuran	Zylam 20SG	1 oz		
		Zylam Liquid	1.8 fl oz		
	imidacloprid ²	Merit 0.5 G	1.4 to 1.8 lbs		0.5G is not for use on sod farms.
		Merit 2 F	0.46 to 0.6 fl oz		
		Merit 75 WP	3 to 4 teaspoons		
		Merit WSP	1 packet/8,250-11,000 sq. ft.		1 packet = 1.6 oz
imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.7 to 2.9 lbs			
	Allectus SC	0.4 to 1.65 fl oz			
	Allectus GC SC	0.9 to 1.65 fl oz			
thiamethoxam	Meridian 0.33G	1.42 to 1.88 lbs			
	Meridian 25WG	0.3 to 0.39 oz			
thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs			
thiamethoxam + lambda-cyhalothrin	Tandem	0.32-0.64 fl oz			
trichlorfon	Dylox 6.2G	3 lbs	Dylox is not for uses in sod farms, seed productions and research.		
	Dylox 80 T&O	3.75 fl oz/100 gal			
Caterpillars (Armyworms, Cutworms, Sod Webworms)	acephate	Orthene TT&O 75, 97	see label	Fall armyworm, cutworm and sod webworm are the major pest caterpillar species of turfgrass. All lawn caterpillars feed on grass blades.	
	acephate + imidacloprid	Avatar PLX	0.8 to 1.8 oz		
	alpha-cypermethrin	Fendona CS	0.5 to 1.0 fl oz	True armyworms feed in groups, creating circular patches of bare grounds. Fall armyworms are less gregarious, so the damage often occurs as thinning of grasses in a broad area. Fall armyworm migrates from FL and southern GA each year. Damage begins to appear in June but at this time the caterpillars have become too big and difficult to control. Symptoms of care grounds often appear near building, trees, posts, poles and other erected structures as adult moths often lay eggs on these structures.	
	azadirachtin	Azatrol	Up to 57 fl oz/acre		
	<i>Bacillus thuringiensis (Bt)</i>	Biobit, Crymax, Deliver, Dipel, Javelin, Lepinox, XenTari	0.5 to 3 lbs/acre, see label		
	bifenthrin ²	Onyx	0.07 to 0.15 fl oz	Cutworms dig a burrow in the thatch or soil and eat the grass around the burrow at night, resulting in small patches of dead greens and sunken areas; thus reducing the	
		OnyxPro	0.05 to 0.08 fl oz		
Talstar EZ Golf, GC Gran, PL		1.15 lbs			
Talstar GC Flowable, One, F		0.18 to 0.25 fl oz			

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Caterpillars (Armyworms, Cutworms, and Sod Webworms)	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.34 fl oz	smoothness and uniformity of putting surface. Frequent mowing and clipping removal help to reduce population but not enough to achieve control.
	carbaryl	Sevin 10G	1.4 to 1.9 oz, see label	There are several generations of sod webworm in a year. The damage begins to appear in spring and becomes progressively severe with the season. Damage begins as general thinning, followed by small patches of brown, closely-cropped grass; later coalesces into large irregular patches with severe infestations. Adult sod webworm or lawn moths, which have characteristic snout-like projections in front of their heads, are active flyers over turfgrass in the evening.
		Sevin 80 WSP	2.5 to 10 lb/acre, see label	
		Sevin SL	1.5 to 6 fl oz, see label	
	chlorpyrifos	Dursban 50W	2 lbs/acre	The presence of birds feeding on the caterpillar should also be an indicator. All caterpillar species can be monitored with detergent flush.
		Dursban PRO	1.5 fl oz	
	chlorantraniliprole	Acelypryn	0.046 to 0.092 fl oz	Treated areas (with most contact insecticides) should not be irrigated within 24 hours of treatment so that the caterpillars will come in contact with the residues.
		Acelepryn G	1.15 to 2.3 lbs	
	<i>Chromobacterium subtsugae</i>	Grandevo PTO	0.75-1.5 oz	Caterpillars are often attacked by natural enemies; therefore, conserve these natural enemies with less frequent sprays or compatible insecticides whenever possible.
	clothianidin	Arena .25G	1.84 to 3.67 lbs	
		Arena .5G	1.0 to 1.8 lbs	
		Arena 50 WDG	12.8 oz	
	clothianidin + bifenthrin	Aloft GC SC, LC SC	11.65 to 23.3 fl oz; see label	Use higher rates of Sevin for cutworm control.
		Aloft GC G	80 to 132 lbs	
		Aloft LC G	80 to 160 lbs	
	cyantraniliprole	Ference	0.046-0.367 fl oz	
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.135 to 0.27 fl oz	
		Tempo 20 WP, Tempo Ultra WP	5 to 10 grams	
		Tempo 20 WP GC, Power Pak	1 packet/7,500-11,000 sq. ft.	
		Tempo 20 WSP	1 packet/5,000-10,000 sq. ft.	
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.2 to 0.4 fl oz	
DeltaGard G, DeltaGard GC Gran		2 to 3 lbs		
diflubenzuron	Dimilin 2L	2 fl oz/acre	Dimilin for use on sod farms only.	
dinotefuran	Zylam 20SG	1 oz	Zylam is registered for use on cutworm and sod webworm.	
nematodes ²	Various products	See label	Only effective against small caterpillars.	
iron phosphate + spinosad	Antixx Plus	0.23 to 1 lb	For cutworm only.	
imidacloprid ²	Merit 0.5 G	1.4 to 1.8 lbs	Merit is for cutworm only. Must be applied against early stages. May only achieve suppression of the population.	
	Merit 2 F	0.46 to 0.6 fl oz		
	Merit 75 WP	3 to 4 teaspoons		
	Merit 75 WSP	1 packet/8,250-11,000 sq. ft.	1 packet = 1.6 oz.	
imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.2 to 2.9 lbs		
	Allectus GC SC	0.67 to 1.65 fl oz		
	Allectus SC	0.4 to 1.65 fl oz		

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	indoxacarb	Provaunt	0.046 to 0.092 oz	Not for use on sod farms.
	lambda-cyhalothrin	Demand EZ	13.6 to 28 ml	
		Demand G	2 to 3 lbs	
		Demand CS, Scimitar GC, CS	3.4 to 7 ml	
	mineral oil	Civitas	8 to 16 fl oz	
	permethrin	Astro	0.4 to 0.8 fl oz	
	spinosad	Conserve SC	0.25 to 1.2 fl oz, see label	
	thiamethoxam	Meridian 0.33G	1.4 to 1.8 lbs	
		Meridian 25WG	0.3 to 0.4 oz	
	thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs	
	thiamethoxam + lambda-cyhalothrin	Tandem	0.32 to 0.64 fl oz	
trichlorfon	Dylox 80 T&O	2.5 to 3.75 fl oz/100 gal		
	Dylox 6.2G	2 lbs		
Chinch Bugs	acephate	Orthene TT&O 75 and 97	0.9 to 2.4 oz; see label	Chinch bugs are a major problem of St. Augustinegrass. Hot, dry weather, deep thatch, and high fertility favor chinch bug development. Infested turfgrass first appear yellow and stunted. As the infestation progresses, the grass wilt and dead, creating small dead patches which will expand as the infestation continues and the damage worsens. Sampling for chinch bugs is conducted using the floating method. Plugs of turf and soil can be placed in a 5-gallon bucket filled with clean water or an open ended cylinder (metal can or PIV pipe) driven into the ground and filled with clean water. Adults and nymphs will float to the surface within 10 minutes. Do not use soapy water. For best result sample along the edge of the damage. If chinch bugs are suspected and floating yields no results, visual examination of the stolons in the thatch layer may yield results. Treatments should be applied if 25 to 30 insects are found per square foot. Chinch bugs are often found in the thatch layer. Thus higher volume is critical in delivering the insecticides through the thatch layer and to successful insecticide treatments. See insecticide label for specifics. In general, use a minimum spray volume of 50 gallons/acre (1.2 gallons/1000 sq. ft.) . St. Augustinegrass varieties 'Floratam', 'Floralawn' and 'Captiva' are resistant to chinch bugs. Cultural controls include less N, using water insoluble (slow release) N, using a sharp mower blade, mowing at 3" in sun areas, 4" in shaded areas, and controlling thatch. Irrigate with ¾-inch when grass begins to wilt. Minimize the use of atrazine on St. Augustinegrass during summer. Monitor turf regularly. To preserve beneficial arthropods, limit treatment to the damaged area and 5 to 10 feet beyond. Recheck in 2-3 days. Spot treat again, if needed. Acelypryn and Ference provide suppression only.
		Precise	2.3 lbs	
	acephate + imidacloprid	Avatar PLX	1.8 to 2.94 oz	
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	
	<i>Beauveria bassiana</i>	Botanigard	0.5 to 2 qts/100 gal	
	bifenthrin ²	Onyx, OnyxPro	See label	
		Talstar EZ Golf, GC Granular, PL	2.3 to 4.6 lbs	
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.46-0.80 fl oz	
	<i>Chromobacterium subtsugae</i> carbaryl	Grandevo PTO	2-4 lbs/acre	
		Sevin 10G	1.4 to 1.9 lbs	
		Sevin 80 WSP	7.5 to 10 lb/acre	
	chlorpyrifos	Sevin SL	4.5 to 6 fl oz	
		Dursban 50W	2 lbs/acre	
	chlorantraniliprole	Dursban PRO	1.5 fl oz	
Acelypryn		0.184 to 0.46 fl oz		
clothianidin	Acelepryn granule	1.15 to 2.3 lbs		
	Arena .25G and .5G	1.5 to 3.67 lbs, see label		
	Arena 50 WDG	12.8 oz		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments	
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz		
		Aloft GC G	80 to 132 lbs		
		Aloft LC SC	11.65 to 23.3 fl oz		
		Aloft LC G	80 to 160 lbs		
	cyantraniliprole	Ference	0.184-0.459 fl oz		
	cyfluthrin	Tempo (various formulations)	See label		
	cypermethrin	Demon Max	0.33 to 0.65 fl oz		
	deltamethrin	DeltaGard GC, DeltaGard T&O SC	0.6 to 0.9 fl oz		
		DeltaGard G, GC Gran, T&O Gran	2 to 3 lbs		
	dinotefuran	Zylam 20SG	1 oz		Zylam only achieves suppression.
		Zylam Liquid	1.8 fl oz		
	imidacloprid ²	Merit 0.5 G	1.8 lbs		Merit only achieves suppression.
		Merit 2 F	0.6 fl oz		
		Merit 75 WP	4 teaspoons		
	imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.7 to 2.9 lbs		
Allectus SC, Allectus GC SC		1.65 fl oz			
lambda-cyhalothrin	Demand EZ	56 ml			
	Demand G	3 to 4 lbs			
	Demand CS, Scimitar GC, CS	14 ml			
permethrin	Astro	0.4 to 0.8 fl oz			
thiamethoxam	Meridian 0.33G	1.42 to 1.88 lbs	Meridian may only provide suppression.		
	Meridian 25WG	0.3 to 0.39 oz			
thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs			
thiamethoxam + lambda-cyhalothrin	Tandem	0.32 to 0.64 fl oz			
trichlorfon	Dylox 80 T&O	3.75 fl oz/100 gal			
Chiggers and Ticks	azadirachtin alpha-cypermethrin bifenthrin ²	Azatrol	Up to 57 fl oz/acre	Chiggers (red bugs) and ticks may be present in turfgrass areas. Although they do not damage turfgrass, they are however significant health risks. Insecticide treatments are often ineffective. Only DeltaGard, Demand, Demon, Dursban. Scimitar, Sevin and Tempo are labeled at higher rates for chigger control. Keep grass mowed short to discourage chiggers and ticks. Avoid contact by applying repellents and wearing protective clothing.	
		Fendona CS	0.5 to 1 fl oz		
		OnyxPro	0.16 to 0.32 fl oz		
		Talstar EZ Golf, GC Gran, PL	2.3 to 4.6 lbs		
	Talstar GC Flowable, One, F	0.5 fl oz			
bifenthrin + lambda-cyhalothrin + fipronil	Taurus Tio G	2 lb			
bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.46-0.80 fl oz			

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments	
	carbaryl	Sevin 10G	1.4 to 1.9 lbs		
		Sevin 80 WSP	2.5 to 5 lb/acre		
		Sevin SL	1.5 to 3 fl oz		
	chlorpyrifos	Dursban 50W	2 lbs/acre		
		Dursban PRO	1.5 fl oz		
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.135 to 0.27 fl oz		
		Tempo 20 WP, Tempo Ultra WP	5 to 10 grams		
	cyfluthrin	Tempo 20 WP GC, Power Pak	1 packet/7,500-11,000 sq. ft.		
		Tempo 20 WSP	1 packet/5,000-10,000 sq. ft.		
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.4 to 0.6 fl oz		
		DeltaGard G, DeltaGard GC Gran	2 to 3 lbs		
	fipronil	Chipco TopChoice	2 lbs		Broadcast application. 1 month control for ticks.
		Chipco Choice	4.6 oz		
imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	2.9 lbs	0.34 to 1.38 fl oz/1,000 sq ft for ticks.		
	Allectus GC SC, Allectus SC	1.32 to 1.65 fl oz			
lambda-cyhalothrin	Demand EZ	13.6 to 28 ml			
	Demand CS, Scimitar GC, CS	3.4 to 7 ml			
<i>Metarhizium anisopliae</i>	Met52, Tick-EX	1-3 lbs			
permethrin	Astro	0.4 to 0.8 fl oz			
thiamethoxam + lambda-cyhalothrin	Tandem	0.24 fl oz			
Earthworms	No control is recommended.			Earthworms are considered beneficial organisms as they help aerate soil and decompose organic materials (such as thatch). However, when a large number of dirt and castings are pushed up to the putting greens, they will interfere with the play. At this time, no control is recommended. Earthworm castings may be managed with applications of saponin-containing products, such as the organic fertilizer Early Bird 3-0-1.	
Fleas	acephate	Orthene TT&O 75		1.2 to 2.4 oz	Flea bites result in severe irritation and discomfort for human and pets. Pet owners can prevent infestation by treating the pets with a long-lasting insecticide or with flea collars. When curative treatment is needed, both infested area and pets need to be treated. Mowing the lawn before treatment may increase effectiveness. Use higher rates of bifenthrin for larval control, see label.
		Orthene TT&O 97		0.9 to 1.8 oz	
	bifenthrin	Onyx, OnyxPro	0.07 to 0.32 fl oz, see labels		
		Talstar EZ Golf, GC Gran, PL	2.3 to 4.6 lbs		
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz		
	bifenthrin + lambda-cyhalothrin + fipronil	Taurus Trio G	2 lb		
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz		
carbaryl	Sevin 10G	1.4 to 1.9 lbs			

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments	
		Sevin 80 WSP	10 lb/acre		
		Sevin SL	6 fl oz		
	chlorpyrifos	Dursban 50W	2 lbs/acre		
		Dursban PRO	1.5 fl oz		
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.27 fl oz		
		Tempo 20 WP, Tempo Ultra WP	10 grams		
		Tempo 20 WP GC, Power Pak	1 packet/7,800 sq. ft.		
		Tempo 20 WSP	1 packet/5,000 sq. ft.		
	cypermethrin	Demon Max, TC	0.33 to 0.65 fl oz		
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.4 to 0.6 fl oz		
		DeltaGard G, DeltaGard GC Gran	2 to 3 lbs		
	fipronil	Chipco TopChoice	2 lbs		Broadcast application. 1 month control for fleas.
	Imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	2.9 lbs		
		Allectus SC, Allectus GC SC	0.4 to 1.65 fl oz, see label		
	lambda-cyhalothrin	Demand EZ	28 ml		
Demand CS, Scimitar GC, CS		3.4 to 7 ml			
permethrin	Astro	0.4 to 0.8 fl oz			
spinosad	Conserve SC	1.2 fl oz	Target flea larvae.		
Thiamethoxam + lambda-cyhalothrin	Tandem	0.34 to 1.38 fl oz	Perimeter treatment.		
Grasshoppers	acephate	Orthene TT&O 75	0.5 oz	Grasshoppers are occasional pests of turfgrass. Usually infestations do not require treatment. During severe infestation, most contact insecticides are very effective.	
		Orthene TT&O 97	0.4 oz		
	acephate + imidacloprid	Avatar PLX	0.8 oz		
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz		
	azadirachtin	Azatrol	Up to 57 fl oz/acre		
	beta-cyfluthrin	Tempo Ultra GC	0.135 to 0.27 fl oz		
		Tempo Ultra WP	5 to 10 grams		
		Tempo 20 WP Golf Course	1 pack (55 g)/7800-11000 sq ft		
	bifenthrin ²	Onyx	0.07 to 0.15 fl oz		
		OnyxPro	0.08 to 0.16 fl oz		
Talstar GC Flowable, One, F		0.25 to 0.5 fl oz			
bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23 to 0.46 fl oz			
carbaryl	Sevin 5 Bait	11 oz			

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments	
		Sevin 10G	1.4 to 1.9 oz		
		Sevin 80 WSP	2.5 to 5 lb/acre		
		Sevin SL	1.5 to 3 fl oz		
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz		
		Aloft GC G	80 to 132 lbs		
		Aloft LC SC	11.65 to 23.3 fl oz		
		Aloft LC G	80 to 160 lbs		
	chlorpyrifos	Dursban 50W	2 lbs/acre		
		Dursban PRO	1.5 fl oz		
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.135 to 0.27 fl oz		
		Tempo 20 WP, Tempo Ultra WP	5 to 10 grams		
		Tempo 20 WP GC, Power Pak	1 packet/7,500-11,000 sq. ft.		
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.4 to 0.6 fl oz		
		DeltaGard G, DeltaGard GC Gran	2 to 3 lbs		
		Suspend SC	0.4 to 0.6 fl oz		
		imidacloprid + bifenthrin	Allectus SC		0.4 to 1.65 fl oz
	Allectus GC SC		0.9 to 1.65 fl oz		
	indoxacarb	Provaunt	0.275 oz		Not for sod farms.
	lambda-cyhalothrin	Demand EZ	13.6 to 28 ml		
		Demand G	2 to 3 lbs		
Demand CS, Scimitar GC, CS		3.4 to 7 ml			
thiamethoxam + lambda-cyhalothrin	Tandem	0.24 fl oz			
Greenbugs (Aphids)	acephate	Orthene TT&O 75	0.5 oz	Greenbug is a species of aphid and is usually a pest of grain crops. In some years, greenbugs will invade turfgrass and suck sap from the grass blades. Population begins to build up in the spring; multiple generations per year. A toxic salivary injected during feeding can cause the leaf areas around the feeding site to turn yellow, then brown and eventually die. Dead grass sometimes show burnt orange coloration. Severe infestation can cause patches of dead grass. The honeydew produced by greenbugs is highly attractive to ants. Infestation is worsened in well fertilized lawns and golf courses. Avoid heavy fertilization. Also allow natural enemies to suppress aphid populations by using less frequent and more compatible insecticides.	
		Orthene TT&O 97	0.4 oz		
	acephate + imidacloprid	Avatar PLX	0.8 oz		
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz		
	bifenthrin ²	Onyx, Talstar	See label		
	carbaryl	Sevin	See label		
	chlorpyrifos	Dursban	See label		
	clothianidin	Arena .25G	See label		
	clothianidin + bifenthrin	Aloft	See label		
	cyfluthrin	Tempo	See label		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
	cypermethrin	Demon	See label	Currently, only Orthene is labeled specifically for greenbug control on golf courses and sod farms (not in landscape). Other contact and systemic insecticides are labeled for control of aphids on landscape ornamentals.
	imidacloprid + bifenthrin	Allectus	See label	
	imidacloprid ²	Merit	See label	
	lambda-cyhalothrin	Demand, Scimitar	See label	
	permethrin	Astro	See label	
	thiamethoxam	Meridian 0.33G Meridian 25WG	1.4 to 1.8 lbs 0.3 to 0.4 oz	
	thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs	
	thiamethoxam + lambda-cyhalothrin	Tandem	See label	
Leafhoppers	acephate	Orthene TT&O 75	1 oz	Leafhoppers can sometime become a significant pest of turfgrass. Leafhoppers overwinter as eggs or adults; with 1-5 generations per year. The adults and nymphs suck sap from grass blades, often causing silvery or whitish flecks or spots. Heavy infestation may cause mottled turf. Leafhopper infestations usually do not require treatment. When necessary, most contact and systemic insecticides are effective. Because of the movement of leafhoppers, repeated applications may be needed. Keep lawns and turf area well maintained. Healthy lawns can outgrow the damage.
		Orthene TT&O 97	0.75 oz	
	acephate + imidacloprid	Avatar PLX	1.6 oz	
	bifenthrin ²	Talstar EZ Golf , GC Gran, PL	1.15 to 2.3 lbs	
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz	
	bifenthrin + zeta-cypermethrin	Talstar XTRA GC Granulæ	1.15 to 2.3 lb	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz	
	carbaryl	Sevin 10G	1.4 to 1.9 lbs	
		Sevin 80 WSP	2.5 to 5 lb/acre	
		Sevin SL	1.5 to 3 fl oz	
	chlorpyrifos	Dursban 50W	2 lbs/acre	
		Dursban PRO	1.5 fl oz	
	<i>Chromobacterium subtsugae</i>	Grandevo PTO	0.75-1.5 oz	
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz	
		Aloft GC G	80 to 132 lbs	
		Aloft LC SC	11.65 to 23.3 fl oz	
		Aloft LC G	80 to 160 lbs	
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.4 to 0.6 fl oz	
DeltaGard G, T&O Gran, GC Gran		2 to 3 lbs		
imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	1.7 to 2.9 lbs		
	Allectus GC SC	0.9 to 1.65 fl oz		
	Allectus SC	0.4 to 1.65 fl oz		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
	lambda-cyhalothrin	Demand G	2 to 3 lbs	
	thiamethoxam	Meridian 0.33 G	1.4 to 1.8 lbs	
		Meridian 25WG	0.3 to 0.4 oz	
	thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs	
Rhodesgrass Mealybugs	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	Bermudagrass and St. Augustinegrass are most susceptible to attacks by the Rhodesgrass mealybug. Rhodesgrass mealybugs, similar to aphids and leafhoppers, feed by sucking the sap from leaf blades, stems and crowns. Damaged grass will first wilt, then turn from green to yellow to brown. The damage is especially serious during extended period of drought. When the grass is pulled up, the Rhodesgrass mealybugs are visible as white cottony masses attached to the nodes on grass stems. The mealybugs produce copious amount of honeydew, which is very attractive to ants and wasps.
	bifenthrin ²	Talstar EZ Golf, GC Gran, PL	1.15 to 2.3 lbs	
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz	Normally Rhodesgrass mealybugs are not a problem for turfgrass, except in areas where the natural control by predators and parasites are disrupted. Conserve these natural enemies by reducing the frequency of insecticide applications and using more compatible insecticides. Controlling fire ant may help reduce infestations. Full coverage and thorough penetration of infested grass is required to control the Rhodesgrass mealybugs. Therefore, use a high volume and a surfactant for the application. Withhold irrigation for 24 hours after the treatment to allow more contact or systemic activity against the mealybugs. Currently, only Talstar, DeltaGard and Allectus are labeled specifically for mealybug control on turfgrass. Other contact and systemic insecticides are available for control of mealybugs in landscape ornamentals.
	carbaryl	Sevin	See label	
	chlorpyrifos	Dursban	See label	
	clothianidin	Arena	See label	
	clothianidin + bifenthrin	Aloft	See label	
	cyfluthrin	Tempo	See label	
	deltamethrin	DeltaGard T&O, DeltaGard GC	0.4 to 0.6 fl oz	
		DeltaGard T&O Gran, GC Gran	2 to 3 lbs	
	imidacloprid + bifenthrin	Allectus G, GC Gran	1.7 to 2.9 lbs	
		Allectus SC, Allectus GC SC	0.9 to 1.65 fl oz	
	imidacloprid ²	Merit	See label	
	lambda-cyhalothrin	Demand, Scimitar	See label	
	mineral oil	Civitas	8 to 16 fl oz	
permethrin	Astro	See label		
thiamethoxam	Meridian	See label		
thiamethoxam + lambda-cyhalothrin	Tandem	See label		
Millipedes Centipedes Pillbugs Sowbugs (Check cross reference table for specific chemicals)	acephate	Orthene TT&O 75	1.6 oz/gal	Millipedes, centipedes, pillbugs and sowbugs are common arthropods in turfgrass areas. They do not damage turfgrass. Centipedes may be important predators of other turfgrass pests. Control of these arthropods is not recommended. When necessary, perimeter treatment with contact insecticides can reduce the frequency of these arthropods invading buildings from the turfgrass areas.
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	
	beta-cyfluthrin	Tempo Ultra WP	10 to 20 grams	
	bifenthrin ²	Talstar EZ Golf, GC Gran, PL	2.3 to 4.6 lbs	
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz	
	carbaryl	Sevin 10G	1.4 to 1.9 lbs	
Sevin 80 WSP		2.5 to 5.0 lb/acre		
Sevin SL		1.5 to 3 fl oz		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
	chlorpyrifos	Dursban PRO	1.5 fl oz	
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz	
		Aloft GC G	80 to 132 lbs	
		Aloft LC SC	11.65 to 23.3 fl oz	
		Aloft LC G	80 to 160 lbs	
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.54 fl oz	
		Tempo 20 WP, Tempo Ultra WP	10 to 20 grams	
		Tempo 20 WP GC, Power Pak	1 packet/93-100 gal, see label	
	cypermethrin	Demon Max, TC	0.5 fl oz	
	deltamethrin	DeltaGard T&O, DeltaGard GC SC	0.4 to 0.6 fl oz	
		DeltaGard G, DeltaGard GC Gran, DeltaGard T&O Gran	2 to 3 lbs	
	imidacloprid + bifenthrin	Allectus G, Allectus GC Gran	2.9-5.7 lbs	Higher rates for pillbug and sowbug control when using granules.
		Allectus SC	0.4 to 1.65 fl oz	
		Allectus GC SC	0.9 to 1.65 fl oz	
	iron phosphate + spinosad	Antixx Plus	0.23 to 1 lb	For pillbugs and sowbugs only.
	lambda-cyhalothrin	Demand G	2 to 3 lbs	
		Demand EZ	13.6 to 28 ml	
		Demand CS	3.4 to 7 ml	
		Scimitar GC, CS	3.4 to 7 ml	
	permethrin	Astro	0.4 to 0.8 fl oz	
Mites (Clover, Bermudagrass, Zoysiagrass, and other eriophyid and tetranychid mites)	abamectin	Divanem	3.125 to 6.25 fl oz/acre	For bermudagrass mite.
	alpha-cypermethrin azadirachtin bifenthrin ²	Fendona CS	0.5 to 1 fl oz	For clover mite
		Azatrol	Up to 57 fl oz/acre	For bermudagrass mite
		Onyx	0.07 to 0.15 fl oz	
		OnyxPro	0.08 to 0.16 fl oz	
		Talstar GC Flowable, One, F	0.25 to 0.5 fl oz	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.23-0.46 fl oz	Clover mites are a problem in spring and fall. Feeding damage is a silvery discoloration of grass and often near the house foundation. Bermudagrass mites (an eriophyid mite) are a problem on common bermudagrass during hot, dry weather. Feeding causes yellowing and distortion of the grass, often results in a tufted or twisted 'rosette' or 'witch-broom' growth. Another common eriophyid mite pest of warm-season turfgrass is the zoysiagrass mite which causes rosette growth on infested zoysiagrass. Newer, hybrid bermudagrasses and zoysiagrass are resistant to their respective mite pests.
	chlorpyrifos	Dursban 50W	2 lbs/acre	
		Dursban PRO	1.5 fl oz	
	cyfluthrin	Tempo 20 WP GC, Power Pak	1 packet/93-100 gal, see label	
deltamethrin	DeltaGard GC, DeltaGard T&O	0.6 to 0.9 fl oz	Management of bermudagrass mite is especially problematic because no registered products are completely effective against this species. Diazinon has been shown in a study conducted in the 1980s to be the most effective active ingredient. Studies are currently underway to determine the best timing and materials to use for the	
	DeltaGard GC Gran, DeltaGard G, DeltaGard T&O G	2 to 3 lbs		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments	
				management of bermudagrass mite. A wetting agent in the spray mixture improves control. Reapply in 10-14 days. Cultural controls include collecting and removing clippings. Reduce mowing height as close as practical if mites are a problem.	
	dicofol	Dicofol 4E	2/3 to 1 pints/acre	Do not use Dicofol on residential lawns.	
	hexythiazox	Hexygon DF, Hexcel 50 DF	0.07 to 0.14 oz		
	imidacloprid + bifenthrin	Allectus SC	0.4 to 1.65 fl oz		
		Allectus GC SC	0.9 to 1.65 fl oz		
	lambda-cyhalothrin	Demand G	2 to 3 lbs		
		Demand EZ	13.6 to 28 ml		
		Demand CS	3.4 to 7 ml		
		Scimitar GC, CS	3.4 to 7 ml		
	mineral oil	Civitas, Civitas Turf Defence	8 tp 16 fl oz		
Mole Crickets	acephate	Orthene TT&O 75	0.8 to 1.9 oz, see label	Mole cricket adults are present during later winter and early spring. Mating flights occur from April through June. Egg hatch occurs from mid-June through July. The tawny mole cricket is a much more serious problem than the southern mole cricket.	
	acephate + imidacloprid	Avatar PLX	1.6 to 2.8 oz		
	beta-cyfluthrin	Tempo Ultra GC	0.27 fl oz	Tunneling is the most obvious sign of mole cricket infestation. To detect mole crickets, use a detergent flush consisting of 1 to 2 fl oz liquid detergent per gallon of water. One gallon will flush a 4 sq. ft. area. Treat when mole crickets and damage are present.	
	bifenthrin ²	Onyx	0.07 to 0.15 fl oz		
		OnyxPro	0.16 to 0.32 fl oz		
		Talstar EZ Golf, GC Gran, PL	2.3 to 4.6 lbs		
		Talstar GC Flowable, One, F	0.25 to 1.0 fl oz		
	bifenthrin + lambda-cyhalothrin + fipronil	Taurus Trio G	2 lbs	Treatment in the early spring is probably beneficial because this will reduce the number of adult mole crickets laying eggs. Although small nymphs cause little noticeable damage, their treatment in late June and July is highly recommended. Sprays and granules should be applied during mid to late June. Application of baits and Orthene should be made when damage first appears (early- to mid-July). Insecticides can be applied later in the year (Aug.-Oct.). Soil should be moist at time of treatment. If soil is not moist, it is important to irrigate before applying sprays, granules and baits. After treatment, irrigate sprays or granulars into soil with 2 inch of water, except Orthene and baits. A surfactant may increase the efficacy of Orthene. Apply all pesticides as late in the day as possible. Do not irrigate after application of baits for 2-3 days if possible. Use a higher rate for large nymphs and adult mole cricket control.	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.46-0.80 fl oz		
	carbaryl	Sevin 5 Bait	20 to 48 lbs/acre		
		chlorpyrifos	Dursban 50W	4-6 lbs/acre	
		Chlorpyrifos 1% Mole Cricket Bait	2.5 lbs		
	clothianidin	Chlorpyrifos SPC 2.32% G	40 lbs/acre		
Arena .25G		1.84 to 3.67 lbs			
Arena .5G		1.5 to 1.8 lbs			
clothianidin + bifenthrin	Arena 50 WDG	12.8 oz			
	Aloft GC SC, LC SC	11.65 to 23.3 fl oz, see label			
	Aloft GC G, LC G	80 to 160 lbs, see label			
cyfluthrin	Tempo 20 WP Golf Course	1 pack (55 g) per 7800 sq ft	Cultural controls include not mowing turf shorter than recommended heights. Use a sharp mower blade. Maintain proper fertility and pH levels, as well as irrigation practices.		

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
Mole Crickets	deltamethrin	DeltaGard GC 5 SC	0.6 to 0.9 fl oz	
		DeltaGard GC Gran, DeltaGard G	2 to 3 lbs	
	dinotefuran	Zylam 20SG	1 oz	
	nematodes ²	Nematac S, various	See label	
	fipronil	Chipco Choice 0.1 G	4.6 to 9.4 oz	
		TopChoice	2 lbs	
	imidacloprid ²	Merit 0.5 G	1.8 lbs	
		Merit 2 F	0.6 fl oz	
		Merit 75 WP	4 teaspoons	
		Merit 75 WSP	1 packet/8,250 sq. ft.	
	imidacloprid + bifenthrin	Allectus G, Allectus GC	2.9 to 5.7 lbs	
		Allectus SC, Allectus GC SC	1.32 to 3.3 fl oz	
	indoxacarb	Advion Insect Granule	1.15 to 4.6 lbs	
		Provanut	0.275 oz	
	lambda-cyhalothrin	Demand G	3 to 4 lbs	
Demand EZ		28 to 56 ml		
Demand CS, Scimitar GC or CS		7 to 14 ml		
permethrin	Astro	0.4 to 0.8 fl oz		
thiamethoxam	Meridian 0.33G	1.42 to 1.88 lbs	Meridian provides only suppression.	
	Meridian 25WG	0.3 to 0.39 oz		
thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs		
thiamethoxam + lambda-cyhalothrin	Tandem	0.32 to 0.64 fl oz		
trichlorfon	Dylox 80 T&O	3.75 fl oz/100 gal.		
	Dylox 6.2G	3 lbs		
zeta-cypermethrin + bifenthrin	Talstar XTRA GC Granular	2.3 to 4.6 lbs		
Snails and Slugs	iron phosphate	Sluggo	1 lb	Apply late in the evening, especially after rain or irrigation. Reapply when needed. Water infested area thoroughly before application. Do not re-water for 48 hours.
	iron phosphate + spinosad	Sluggo Plus, Antixx plus	0.5 lb	
	mesurol	Mesurol 2% Bait	1 lb	
	metaldehyde	Deadline	6.4 oz	
Spittlebugs	acephate	Orthene TT&O 75, 97	0.9 to 1.9 oz, see label	Spittlebugs are increasingly damaging, particularly to centipedegrass. The most

INSECT PEST CONTROL

Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
		Precise	2.3 lbs	<p>common pest species of turfgrass in South Carolina is the two-lined spittlebugs. Adult two-lined spittle bugs have a reddish black with 2 orange or red lines across the wings and a bright red abdomen. Nymphs are found at the base of the grass plant. The nymphs are enclosed individually in white foamy spittle masses. Feeding causes yellowing of the grass. High mowing height and thatch buildup aggravate the problem.</p> <p>There are typically two generations in SC: the first peak of adults occurs in June-July and the second peak in August-September. Overwinter as eggs.</p> <p>Treat when nymphs are present and damage appears. Use a minimum of 50 gallons of water per acre (1.2 gallons/1000 sq. ft.). Mow and irrigate before treatment. Treat also the ornamentals, particularly hollies, for adults.</p> <p>Dethatching, withholding irrigation when nymphs are hatching in May and July, and avoiding planting Japanese hollies near centipedegrass can help reduce infestations.</p>
	acephate + imidacloprid	Avatar PLX	1.6 to 2.8 oz	
	bifenthrin ²	Onyx	0.07 to 0.15 fl oz	
	carbaryl	Sevin 10G	1.4 to 1.9 lbs	
		Sevin 80 WSP	2.5 to 5.0 lb/acre	
		Sevin SL	1.5 to 3 fl oz	
	clothianidin	Arena .25G	1.84 to 3.67 lbs	
		Arena .5G	1.0 to 1.8 lbs	
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz	
		Aloft GC G, LC G	80 to 160 lbs	
		Aloft LC SC	11.65 to 23.3 fl oz	
	cyfluthrin	Tempo 20 WP GC, Power Pak	1 packet/93-100 gal, see label	
	deltamethrin	DeltaGard G, GC Gran, T&O Gran	2 to 3 lbs	
	lambda-cyhalothrin	Demand G	2 to 3 lbs	
thiamethoxam	Meridian 0.33G	1.4 to 1.8 lbs		
	Meridian 25WG	0.3 to 0.4 oz		
thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs		
Wasps, Bees (Burrowing or Digging)	acephate	Orthene TT&O 75	1.6 oz/gal	<p>Mounds and nests made by soil burrowing wasps and bees can interfere with play and the appearance of the lawns and fields. Treatment should be done in the evening when foraging adults have returned to the nest. Thoroughly spray the entrance to the nest.</p> <p>Burrowing and digging wasps and bees often dig in sandy areas. Improve the grass coverage or re-sodding the thinned areas will help to dissuade the wasps and bees from building a nest.</p> <p>Treatments of landscape ornamentals that are frequented by the honeybees and the native bees, with the hope of killing or dissuading visits by the bees, are strongly discouraged.</p> <p>Lambda-cyhalothrin is registered for outdoor ornamental control of wasps.</p>
		Orthene TT&O 97	1.2 oz/gal	
	alpha-cypermethrin	Fendona CS	0.5 to 1 fl oz	
	bifenthrin ²	Talstar One	0.25 to 0.5 fl oz	
	chlorpyrifos	Dursban 50W	0.25 to 4 lbs/50 gal, see label	
		Dursban PRO	0.17 to 2.7 fl oz/gal, see label	
	cyfluthrin	Tempo Ultra SC, Tempo Ultra GC	0.54 fl oz/gal	
		Tempo 20 WP, Tempo Ultra WP	20 grams/gal	
	cypermethrin	Demon Max, TC	1 fl oz/gal	
	deltamethrin	DeltaGard G, DeltaGard GC Gran	2 to 3 lbs	
lambda-cyhalothrin	Demand	See label		
	Scimitar	See label		

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Pest	Pesticide Common Name	Pesticide Trade Name and Formulation ¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
	permethrin	Astro	0.4 to 0.8 fl oz	
White Grubs	acephate	Precise	2.3 lbs	<p>May and June beetle, green June beetle, masked chafer, European chafer, black turfgrass ataenius, oriental beetle and Japanese beetle larvae are all grouped under white grubs. Identification of the species is based on the raster (area of spines, hair and bare spaces on the underside of the last abdominal segment).</p> <p>White grubs live in the soil and feed on the grass roots. Infested turf often appears wilt and turns yellow and then brown. Heavily damaged turf feels spongy underfoot. Damaged sod easily fall apart when cut or lifted. Large green June beetle grubs also burrow to the surface at night and cause small dirt mounds on the turf.</p> <p>To detect grubs, remove 1 sq. ft. of sod and carefully inspect the root zone. Pay particular attentions to areas with high feeding and searching activity of black parasitic wasps and other animals. In most cases, if more than 7 grubs are found per sq. ft., treatment is needed. Apply preventive treatment (using neonicotinoids and chlorantraniliprole) in April – June or curative treatment against small grubs in July-August. Most materials should be watered-in immediately (at least 2 inches) after application. See label directions.</p> <p>Dursban Pro is only for green June beetle grub control.</p>
	acephate + imidacloprid	Avatar PLX	2.2 to 2.94 oz	
	<i>Bacillus thuringiensis</i> subsp. <i>galleriae</i>	grubGONE! G	37-55 oz	
	bifenthrin + zeta-cypermethrin+imidacloprid	Triple Crown T&O	0.46-0.80 fl oz	
	carbaryl	Sevin 80 WSP	10 lb/acre	
		Sevin SL	6 fl oz	
	chlorpyrifos	Dursban 50W	2 to 8 lbs/acre	
		Dursban PRO	1.5 fl oz	
	chlorantraniliprole	Acelepryn	0.184 to 0.367 fl oz	
		Acelepryn G	1.15 to 2.3 lbs	
	clothianidin	Arena .25G	1.84 to 3.67 lbs	
		Arena .5G	1.0 to 1.8 lbs	
		Arena 50 WDG	6.4 to 12.8 oz	
	clothianidin + bifenthrin	Aloft GC SC	11.65 to 19 fl oz	
		Aloft GC G	80 to 132 lbs	
		Aloft LC SC	11.65 to 23.3 fl oz	
		Aloft LC G	80 to 160 lbs	
	<i>Chromobacterium subtsugae</i>	Grandevo PTO	4 to 8 lbs	
	cyantraniliprole	Ference	0.184 to 0.367 fl oz	
	dinotefuran	Zylam 20SG	1 oz	
imidacloprid ²	Merit 0.5 G	1.4 to 1.8 lbs		
	Merit 2 F	0.4 to 0.6 fl oz		
	Merit 75 WP	3 to 4 teaspoons		
imidacloprid + bifenthrin	Allactus G, Allactus GC	2.3 to 2.9 lbs		
	Allactus SC, Allactus GC SC	1.32 to 1.65 fl oz		
lambda-cyhalothrin	Demand SC, Scimitar SC	7 ml		
	Demand EZ	28 ml		
	Demand G	3 to 4 lbs		
thiamethoxam	Meridian 0.33G	1.42 to 1.88 lbs		
	Meridian 25WG	0.3 to 0.39 oz		

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Pest	Pesticide Common Name	Pesticide Trade Name and Formulation¹	Rate/1,000 sq. ft.	Pest Biology, Symptoms, Cultural Practices, and Comments
	thiamethoxam + azoxystrobin	Caravan G	2 to 2.8 lbs	
	thiamethoxam+cyhalothrin	Tandem	0.32 to 0.64 fl oz	
	trichlorfon	Dylox 6.2G	3 lbs	
		Dylox 80 T&O	3.75 fl oz/100 gal	

¹Always check to be sure the formulation that you purchase is labeled for the site and pest you intend to use it for. No endorsement of products is intended, nor is criticism of unnamed products implied. ***Read container label carefully for, use directions, application techniques, irrigation requirements, worker protection information, and precautions.*** Be sure the formulation of pesticide you buy and use is labeled for use on turfgrass. ²Several trades names available. Check label for active ingredients, formulations and instructions.