

INSECT CONTROL IN COMMERCIAL TURF

Will Hudson, Extension Entomologist

Note on insecticide selection and use for various turfgrass sites:

Not all turfgrass sites are created equal. It is important to read the label on the product before purchasing an insecticide for a particular site use. An insecticide may not be labeled for all turfgrass uses (e.g., lawns, athletic fields, sod farms, or golf courses). Some products are only labeled for use on golf courses or sod farms. For example, Dursban 50W (chlorpyrifos) is not labeled for use on residential or commercial lawns. Furthermore, Orthene (acephate) formulations are labeled for use against fire ants in residential and commercial lawns, but not other pests.

In some instances, manufacturers will add “GC” as part of the title to inform users that a product can be used on golf courses when other formulations of that product are not labeled for that site. For example, Allectus SC is not labeled for use on golf courses but Allectus GC SC is. Labeling for sod farms will also follow similar rules. For example, Merit 0.5G is not to be used on sod farms, but Merit 2 and Merit 75WP are labeled for use on sod farms.

If product restrictions are noted on the label, they may appear as a note next to the product names in this publication. For example, when you read, “landscape turf only” that product is not available for use on golf courses or sod farms. When a product labeled for these other sites is available it is included but it may not have any restrictions noted. If no restrictions are noted, the product is likely labeled for general use on turfgrass or on all turfgrass sites. The label on your individual product may vary from the online version of the manufacturer’s label, therefore abide by all restrictions on the product label if they differ from those presented in this guide.

Restricted entry intervals (REI) listed are for sod farm use. For landscape sites, re-entry is allowed once sprays have dried completely.

Restricted Use Pesticides (RUPs), those that only a certified pesticide applicator may use, supervise the use of, or purchase, will be noted. Uncertified pesticide applicators may not purchase, use or supervise the use of these products.

Protection of pollinators: Managed landscapes often contain flowering plants and can be important foraging sites for bees and other pollinators. Many insecticides are extremely toxic to bees, and others can affect colony health with repeated exposure. Use extreme care when applying insecticides to flowering plants, including turfgrasses. The neonicotinyl insecticides (IRAC group 4A) have systemic activity and can move to pollen and nectar if applied to plants in bloom. If there are flowering weeds, such as clover, in the turf, the blossoms should be mowed before application of this class of insecticide. Read and follow all restrictions on the labels, as there have been changes made recently to neonicotinyl use instructions

PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire Ants/ Ants	BAIT TREATMENTS				<p>The most effective method for control of ants over a broad area is the use of a broadcast bait two times per year (spring/fall) coupled with individual mound treatments as needed.</p> <p>Broadcast Bait Treatments Broadcast baits when ants are actively foraging for food (typically, warm, dry days in spring and fall). Some baits work within 48 hrs, some may take a month. Avoid applying baits just before or after irrigation or rain.</p> <p>Individual Mound Treatments Do not disturb mounds before treatment. <i>Drenches:</i> Drench mounds when queen and brood are located close to soil surface on warm, dry days. Generally, it takes 1-2 gallons of water to drench a fire ant mound effectively. <i>Granules:</i> Scatter granules around the edge of the nest, not on top. <i>Dusts:</i> Dust evenly over top mound.</p> <p>Many generic formulations of the pyrethroid insecticides are available for use on commercial turf.</p>
	<i>indoxacarb</i> Advion	22A	4 Tbsp/mound or 1.5 lb/A	24	
	<i>Metaflumizone</i> Siesta	22B	2-4 Tbsp/mound or 1-1.5 lb/A	12	
	<i>hydromethylnon</i> Amdro	20A	5 Tbsp/mound or 1-1.5 lb/A	12	
	<i>Methoprene</i> Extinguish Plus	7A	2-5 Tbsp/mound or 1.5 lb/A	12	
	MOUND DRENCH TREATMENTS				
	<i>acephate</i> Orthene TTO 75WP Orthene TTO 97	1B	1 oz/5 gal 0.75 oz/5 gal	24	
<i>bifenthrin</i> Talstar GC Flowable	3A	1 tsp/gal	12		

Supplemental 2(ee) label recommendations may be available for some listed pesticides. It is the end-user’s responsibility to consult the manufacturer or websites like www.CDMS.net for additional recommendations.

PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS	
Imported Fire Ants/ Ants (continued)	MOUND DRENCH TREATMENTS (continued)				<p>The most effective method for control of ants over a broad area is the use of a broadcast bait two times per year (spring/fall) coupled with individual mound treatments as needed.</p> <p>Broadcast Bait Treatments Broadcast baits when ants are actively foraging for food (typically, warm, dry days in spring and fall). Some baits work within 48 hrs, some may take a month. Avoid applying baits just before or after irrigation or rain.</p> <p>Individual Mound Treatments Do not disturb mounds before treatment. <i>Drenches:</i> Drench mounds when queen and brood are located close to soil surface on warm, dry days. Generally, it takes 1-2 gallons of water to drench a fire ant mound effectively. <i>Granules:</i> Scatter granules around the edge of the nest, not on top. <i>Dusts:</i> Dust evenly over top mound.</p> <p>Many generic formulations of the pyrethroid insecticides are available for use on commercial turf.</p>	
	<i>carbaryl</i> Sevin SL	1A	0.75 fl oz/gal	12		
	<i>chlorpyrifos</i> Dursban 50W (golf courses & sod farms only) Dursban Pro	1B	RUP 0.24 oz/gal 1 fl oz/2 gal	24		
	<i>deltamethrin</i> DeltaGard GC 5SC	3A	1.5 fl oz/gal			
	<i>imidacloprid + bifenthrin</i> Allectus GC SC (golf courses & sod farms only) Allectus SC (landscape turf only)	4A + 3A	0.33 fl oz/gal 0.33 fl oz/gal	12		
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	0.5 fl oz/2.5 gal	12		
	<i>permethrin</i> Astro (landscape turf only)	3A	1.6 fl oz/gal	12		
	<i>spinosad</i> Conserve	3A	0.1 fl oz/gal	4		
	DRY MOUND TREATMENTS					
	<i>acephate</i> Orthene TTO 75WP	1B	1-2 tsp/mound	24		
	<i>cyfluthrin</i> Bayer Fire Ant Killer	3A	1 tsp/mound	12		
	<i>deltamethrin</i> Bengal Ultra Dust Fire Ant Killer 0.05% Terro Fire Ant Killer 0.05% DeltaGard G (landscape turf only)	3A	1 Tbsp/mound 1 Tbsp/mound 2 Tbsp/mound**	12		** Follow with 1-2 gallons water for best results
	<i>imidacloprid + bifenthrin</i> Allectus GC (golf course & sod farms only) Allectus G (landscape turf only)	4A + 3A	4 oz/mound** 4 oz/mound**	12		** Follow with 1-2 gallons water for best results
	BROADCAST TREATMENTS					
<i>bifenthrin</i> Talstar GC Flowable Talstar EZ Golf Granular	3A	0.5 fl oz/1,000 ft ² 2.3-4.6 lb/1,000 ft ²	12			

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PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS	
Imported Fire Ants/ Ants (continued)	BROADCAST TREATMENTS (continued)					
	<i>carbaryl</i> Sevin SL	1A	3 fl oz/1,000 ft ²	12		
	<i>chlorpyrifos</i> Dursban 50W (golf course & sod farms only) Dursban Pro	1B	RUP 16 lb/acre 1.5 fl oz/1,000 ft ²	24		
	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo WP Ultra (landscape turf only) Tempo WP GC (golf courses & sod farms only)	3A	8 ml/1,000 ft ² 5-10 g (1-2 scoops)/ 1,000 ft ² 1 packet/7,800 ft ²	12		
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O 5SC (landscape turf only) DeltaGard G (landscape turf only)	3A	1.5 fl oz/gal 1.5 fl oz/gal 1.5 fl oz/gal	12		
	<i>Fipronil 0.01%</i> Chipco Top Choice	2B	2 lb/1000 ft. ²	24		
	<i>imidacloprid + bifenthrin</i> Allectus GC SC Allectus SC (landscape turf only) Allectus GC Allectus G (landscape turf only)	4A + 3A	1.32-1.65 fl oz/1,000 ft ² 1.32-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12		
	<i>lambda cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	7 ml/1,000 ft ² 7 ml/1,000 ft ²	12		
	Bees and Wasps (burrowing)	<i>acephate</i> Surrender, others	1B	1-2 tsp/hole <i>(do not exceed this amount in 1ft²)</i>		24
<i>carbaryl</i> 10% Sevin granules		1A	1.4-1.9 lb/1,000 ft ² <i>Water in after application</i>	12		
Orthene TTO 75WP		1B	1-2 tsp/hole <i>(do not exceed this amount in 1ft²)</i>	24		
various pyrethroids*		3A	See label.			

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PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Billbugs	<i>bifenthrin</i> Talstar EZ Golf Granular Talstar GC flowable	3A	1.15-2.3 lb/ 1,000 ft ² 0.25-0.5 fl oz/ 1,000 ft ² 6 fl oz	12	The sporadic occurrence and multiple generation of this pest makes its appearance unpredictable. Some areas that consistently experience billbug injury may be treated in a prophylactic manner.
	<i>carbaryl</i> Sevin SL	1A	6-8 oz/1,000 ft ² or 8 qt/A 10 lb/A	12	
	<i>chlorantraniliprole</i> Acelepryn	28	8-20 oz	4	
	<i>chlorpyrifos</i> Dursban 50W	1B	RUP 2-4 lb/A	24	
	<i>chlorthiandin</i> Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	
	<i>clothiaidin + bifenthrin</i> Aloft GC SC Aloft LC G	4A +3A	0.27-0.44 fl oz/1000 ft ² 1.8-3.6 lb/1000 ft ²	12	
	<i>imidicloprid</i> Merit 75WSP Merit 0.5G	4A	1.6 oz/8250 ft ² or 8.6 oz/A 1.4 lb/1,000 ft ² or 60 lb/A	12	
	<i>imidacloprid + bifenthrin</i> Allectus GC SC Allectus GC	4A + 3A	RUP 0.4-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12	
	<i>trichlorfon</i> Dylox 420 SL Dylox 6.2 G	1B	4.6-6.9 fl oz/1000 ft ² (200-300 fl oz/A) 3 lb/1,000 sft ² or 130 lb/A		
NOTE: Premixed formulations of systemic insecticides with pyrethroids are available (Allectus, Aloft). These may provide control of multiple pests with a single spray.					
Chinch bugs	<i>acephate</i> Orthene TTO 75WP Orthene TTO 97 (golf courses & sod farms only)	1B	1.2-2.4 oz/1,000 ft ² 0.9-1.8 oz/1,000 ft ²	24	Reducing the number of treatments and applying spot treatments (which is most effective especially early in the season) will allow for the conservation of natural enemies, as native parasites and predators can play a significant role in chinch bug management. Pyrethroids are effective, but they provide no residual control and evidence of resistance has already surfaced for bifenthrin (Talstar, Bifen), with cross-resistance to other pyrethroids expected. Rotation of chemistries is, therefore, important. In most cases, irrigate turf area prior to application unless noted otherwise on the product label. Granules can be used but must be watered in thoroughly. Use high volume application (5 gal/1000 ft ²) especially with pyrethroids.
	<i>bifenthrin</i> Talstar EZ Golf Granular Talstar GC Flowable	3A	2.3-4.6 lb/1,000 ft ² 0.25-0.5 fl oz/1,000 ft ²	12	
	<i>carbaryl</i> Sevin 80 WSP Sevin SL	1A	7.5-10 lb/A 6-8 fl oz/1,000 ft ²	12	
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	10.67 oz/A 66.67 lb/A	12	
	<i>Clothiaidin + bifenthrin</i> Aloft GC SC Aloft LC G	4A + 3A	0.27-0.44 fl oz/1000 ft ² 1.8-3.6 lb/1000 ft ²	12	

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PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Chinch bugs (continued)	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo WP Ultra (landscape turf only) Tempo 20 WP (golf course only)	3A	8 ml/1,000 ft ² 7.7-15.4 oz/A 1 packet/7,800 sq ft		Reducing the number of treatments and applying spot treatments (which is most effective especially early in the season) will allow for the conservation of natural enemies, as native parasites and predators can play a significant role in chinch bug management. Pyrethroids are effective, but they provide no residual control and evidence of resistance has already surfaced for bifenthrin (Talstar, Bifen), with cross-resistance to other pyrethroids expected. Rotation of chemistries is, therefore, important. In most cases, irrigate turf area prior to application unless noted otherwise on the product label. Granules can be used but must be watered in thoroughly. Use high volume application (5 gal/1000 ft ²) especially with pyrethroids.
	<i>deltamethrin</i> DeltaGard T&O 5SC (landscape turf only) DeltaGard GC 5SC DeltaGard G (landscape turf only) DeltaGard T&O Granular	3A	0.6-0.9 fl oz/1,000 ft ² 0.6-0.9 fl oz/1,000 ft ² 2-3 lb/1,000 ft ² 2-3 lb/1,000 ft ²		
	<i>dinotefura</i> Zylam 20 SG	4A	1 oz/1,000 ft ²	12	
	<i>imidacloprid + bifenthrin</i> Allectus SC (landscape turf only) Allectus GC	4A + 3A	0.4-1.65 fl oz/1,000 ft ² 1.7-2.9 lb/1,000 ft ²	12	
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	19.2 oz/A 19.2 oz/A		
	<i>trichlorofon</i> Dylox 80	1B	3.75 oz/1,000 ft ²		
	Ground Pearls	None			
Millipedes, sowbugs and pillbugs	<i>bifenthrin</i> Talstar F, GC, G	3A	0.25-0.5 fl oz/1,000 ft ²	12	
	various pyrethroids*		See label		
Mites/Eriophyid mites	none				Carbaryl may provide some suppression, but no effective miticides are labeled.
Mole Crickets	<i>acephate</i> Orthene TTO 75WP Orthene TTO 97 (golf courses & sod farms only)	1B	1-1.9 oz/1,000 ft ² 0.8-1.4 oz/1,000 ft ²	24	Best results with early instar nymphs. Fipronil is a widely used insecticide that has proven to be the most effective and most expensive single application approach. Since it provides season-long control the economics must be considered in that context. Indoxacarb, acephate, the bifenthrin + imidacloprid combination and chlorpyrifos baits are available for use against larger nymphs in late summer.
	<i>bifenthrin</i> Talstar GC Flowable Talstar GC Granular	3A	0.25-0.5 fl oz/1,000 ft ² 2.3-4.6 lb/1,000 ft ²	12	
	<i>carbaryl</i> Mole Cricket Bait	1A	0.75-0.9 lb/1,000 ft ²	12	
	<i>clothianidin</i> Arena 50WDG Aloft LC SC	4A	Suppression only 10.67 oz/A 11.65-23.3 oz	12	

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PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Mole Crickets (continued)	<i>cyfluthrin</i> Tempo WP Ultra Tempo SC Ultra	3A	7.7-15.4 oz/acre 8 mL/1,000 sq ft or 12 fl oz/A		The pyrethroids and imidacloprid are less effective, particularly on larger nymphs and adults. Imidacloprid should be applied at or just before egg hatch.
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O Granular (landscape turf only)	3A	0.6-0.9 fl oz/1,000 ft ² 2-3 lb/1,000 ft ²		Clothianidin is less susceptible to photodegradation than imidacloprid. For most treatments irrigate 24 hrs before treatment if soil is dry. Apply in late afternoon to dry turf, then do not irrigate for 48 hrs.
	<i>fipronil</i> Chipco Topchoice	2B	2 lb/1,000 ft ²	24	
	<i>imidacloprid</i> Merit 75WSP Merit 0.5G (not for sod farms)	4A	1.6 oz/8,250 ft ² 1.8 lb/1,000 ft ²	12	Rates of Chipco Choice higher than 12.5 lb/A must be applied through slit-seed (subsurface) application equipment.
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only)	3A	Nymphs: 7 mL/1,000ft ² Adults: 14 mL/1,000 ft ²		
	Scimitar GC <i>permethrin</i> Astro (landscape turf only)	3A	Nymphs: 7 mL/1,000ft ² Adults: 14 mL/1,000 ft ² 1.6 fl oz/gal		
	<i>trichlorfon</i> Dylox 80 T&O Dylox 6.2 G	1B	3.75 oz/1,000 ft ² 3 lb/1,000 ft ²		
Slugs and Snails	Metaldehyde or mesurol	1A	Follow label directions for mixed baits	12	Apply late in afternoon. Fall applications will help control slugs and snails before egg laying.
Spittlebugs	<i>acephate</i> Orthene TTO 75WP Orthene TTO 97	1B	1-1.9 oz/1,000 sq ft 0.8-1.4 oz/10,000 sq ft	24	Pyrethroids applied with sufficient volume of water have been effective but not always consistently so.
	<i>bifenthrin</i> Onyx	3A	0.07-0.15 fl oz/ 1,000 sq ft	12	Cut grass to its recommended height and remove clippings prior to application.
	<i>carbaryl</i> Sevin SL Sevin 80 WSP	1A	1.5-3 fl oz/1,000 sq ft or 2-4 qt / acre 2.5-5 lb/acre	12	
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O 5 SC (landscape turf only)	3A	0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A 0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A		

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PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Turf caterpillars (cutworms, armyworms, webworms, loopers)	<i>acephate</i> Orthene TTO 75WP Orthene TTO 97 (golf course & sod farm only)	1B	0.5-1.2 oz/1,000 ft ² 0.4-0.9 oz/1,000 ft ²	24	Caterpillar pests are best controlled with insecticides in the early instars when they are still small. Higher rates must be used for larger caterpillars. Reduced-risk products like B.t. Mach 2, and Conserve are also more effective against younger caterpillars. On larger caterpillars even higher rates of these products may not be effective. A number of chemicals listed for control are broad-spectrum and fairly economical, especially chlorpyrifos, acephate, carbaryl and several labeled pyrethroids. Treat in late afternoon. DO NOT cut grass for 1-3 days after application. B.t. is not toxic to non-lepidopterous pests.
	<i>bifenthrin</i> Talstar GC Flowable	3A	RUP 0.25-0.5 fl oz/1,000 ft ² or 10 fl oz/A	12	
	<i>carbaryl</i> Sevin 80 WSP Sevin SL	1B	2.5-5 lb/A 1.5-3 fl oz/1,000 or 2-4 qt/A	12	
	<i>chlorantraniliprole</i> Acelepryn	28	2-16 oz/A	4	
	<i>clothiaidin + bifenthrin</i> Aloft LCSC	4A + 3A	11.65-23.3 fl oz/A	12	
	<i>cyfluthrin</i> Tempo SC Ultra (landscape turf only) Tempo 20 WP (golf courses only)	3A	4-8 mL/1,000 ft ² or 6-12 fl oz/A 55 g/7,800-11,000 ft ²		
	<i>deltamethrin</i> DeltaGard GC 5SC	3A	0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A		
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only)	3A	3.4-7 ml/1,000 ft ² or 5-10 fl oz/A		
	<i>spinosad</i> Conserve 1SC	5	0.25-0.8 fl oz/1,000 ft ² or 10-35 fl oz/A	4	
	<i>trichlorfon</i> Dylox 80 T&O	1B	2.5-3.75 oz/1,000 ft ² or 6.8-10.2 lb/A		
White Grubs (Japanese Beetle, Chafers, Green June Beetle)	<i>Acelepryn</i>	28	8-16 oz/A	4	Best results can be expected if early instars are treated. The number of grubs per ft ² or damage threshold varies by grub species, grass species and variety, and management intensity or use. Identification of pest grub species is important for effective control recommendations. Consult your County Extension Agent. (cont.)
	<i>Alllectus GC</i>	4A + 3A	2.3-2.9 lb / 1,000 ft ²		
	<i>carbaryl</i> Sevin SL Sevin 80 WSP	1A	6 fl oz/1,000 ft ² or 8 qt/A 10 lb /A	12	
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	

*NOTE: A number of pyrethroid materials are available in a variety of formulations for use as broad-spectrum contact insecticides. Common names include permethrin, bifenthrin, cypermethrin, cyfluthrin, lambda-cyhalothrin and deltamethrin.

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White Grubs (Japanese Beetle, Chafers, Green June Beetle) (continued)	<i>dinotefuran</i> Zylam 20 SG	4A	1 oz/1,000	12	Carbaryl and pyrethroids are excellent for June beetle control, less effective on other species. Generally good adult control. Curative control of older larvae is excellent with trichlorfon for most grub species .
	<i>imidacloprid</i> Merit 75 WSP Merit 0.5 G	4A	8.6 oz/A 1.4 lb/1,000 ft ² or 60 lb/A	12	
	<i>imidacloprid + bifenthrin</i> Allectus SC (landscape turf only)	4A + 3A	RUP 1.32-1.65 fl oz/1,000 ft ²	12	
	<i>trichlorfon</i> Dylox 80 T&O Dylox 6.2 G		3.75 oz/1,000 ft ² or 10.2 lb /A 3 lb/1,000 ft ² or 130 lb/A		
	<i>imidacloprid</i> Merit 75 WSP Merit 0.5 G	4A	8.6 oz. /A 1.4 lb/1,000 ft ² or 60 lb/A	12	
	<i>imidacloprid + bifenthrin</i> Allectus SC (landscape turf only)	4A + 3A	RUP 1.32-1.65 fl oz/1,000 ft ²	12	

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