INSECT CONTROL IN COMMERCIAL TURF

Will Hudson, Extension Entomologist and Shimat Joseph, Associate Professor

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.

The pyrethroid class of active ingredients (those ending in -thrin, MOA 3A) are all off patent and available in hundreds of products. Brand names listed are examples and are not intended as endorsements.

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

			TURF INSI	ECT CONTROL (continu	ied)
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire Ants/ Ants (continued)	MOUND DRENCH TREATMENTS (continued)				The most effective method for control of ants over a broad area is the use of a broadcast
	<i>carbaryl</i> Sevin SL	1A	0.75 fl oz/gal	12	bait two times per year (spring/fall) coupled with individual mound treatments as needed.
	<i>chlorpyrifos</i> Dursban 50W (golf courses & sod farms only) Dursban Pro	1B	RUP 0.24 oz/gal 1 fl oz/2 gal	24	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.
	<i>deltamethrin</i> DeltaGard GC 5SC	3A	1.5 fl oz/gal		barts just before of after infigation of fam.
	<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	Individual Mound Treatments Do not disturb mounds before treatment. Drenches: 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.
	lambda-cyhalothrin Scimitar CS (landscape turf only) Scimitar GC	3A	0.5 fl oz/2.5 gal	12	<i>Granules:</i> Scatter granules around the edge of the nest, not on top. <i>Dusts:</i> Dust evenly over top mound.
	<i>permethrin</i> Astro (landscape turf only)	3A	1.6 fl oz/gal	12	Many generic formulations of the pyrethroid insecticides are available for use on commercial turf.
	spinosad Conserve	3A	0.1 fl oz/gal	4	
	DRY MOUND TREATMENTS	1	1		
	acephate Orthene TTO 75WP	1B	1-2 tsp/mound	24	
	<i>cyfluthrin</i> Bayer Fire Ant Killer	3A	1 tsp/mound	12	
	deltamethrin 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	

			TURF INSEC	T CONTROL (continued	
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS
Imported Fire	BROADCAST TREATMENTS	(continued)			
Ants/ Ants (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	Many formulations and brand names are available.
	<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	
	fipronil + bifethrin + lambda- cyhalothyrin Taurus Trio	2B + 3A	2 lb/1000 ft ²	24 (sod farms)	REI for Taurus Trio labeled 24 H for sod farms, or until material has been watered in (landscapes and other sites).
	<i>imidacloprid</i> + <i>bifinthrin</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	12	Many formulations and brand names are available.
D 1		1	7 ml/1,000 ft ²		
Bees and Wasps (burrowing)	acephate Orthene TTO 75WP, Surrender, others	1B	1-2 tsp/hole (do not exceed this amount in 1ft ²)	24	Apply in late afternoon or early evening at insect entrance/exit holes.
	<i>carbaryl</i> 10% Sevin granules	1A	1.4-1.9 lb/1,000 ft ² Water in after application	12	Bee, wasp, and hornet sprays in pressurized cans are also effective. Follow label instructions
	various pyrethroids	3A	See label.		

			TURF INSECT	CONTROL (continue	d)
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 generations 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	12	
	chlorantraniliprole Acelepryn	28	8-20 oz	4	
	chlorpyrifos Dursban 50W	1B	RUP 2-4 lb/A	24	
	clothianidin Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	
	<i>clothianidin</i> + <i>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</i> + <i>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	
	trichlorfon 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 ft ² or 130 lb/A		For use on residential and golf course turf only. Post-application irrigation required. Not for sod farm use.
	NOTE: Premixed formulations of s Aloft). These may provide control of				
Chinch bugs	acephate Orthene 75WP Orthene 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.
	<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	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
	<i>carbaryl</i> Sevin SL	1A	6-8 fl oz/1,000 ft ²	12	pyrethroids expected. Rotation of chemistries is, therefore, important. In most cases, irrigate turf area prior to application unless noted otherwise on the product label.
	<i>clothianidin</i> Arena 50WDG Arena 0.5G	4A	10.67 oz/A 66.67 lb/A	12	Granules can be used but must be watered in thoroughly. Use high volume application (5 gal/1000 ft^2) especially with pyrethroids.
	<i>clothianidin</i> + <i>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	

	TURF INSECT CONTROL (continued)						
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS		
Chinch bugs (continued)	cyfluthrin 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 ft ²		Many formulations and brand names available. 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.		
	deltamethrin DeltaGard T&O 5SC (landscape turf only) DeltaGard GC 5SC DeltaGard G (landscape turf only) DeltaGard T&OGranular	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		 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 ft²) especially with pyrethroids. 		
	dinotefuran Zylam 20 SG	4A	1 oz/1,000 ft ²	12			
	inidacloprid + bifenthrin 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		Many formulations and brand names available.		
	trichlorfon Dylox 420 SL	1B	4.6-6.9 fl oz or 200-300 fl oz/A		Post application irrigation required.		
Ground Pearls	None				No effective chemical control. Practice good management.		
Millipedes, sowbugs and	<i>bifenthrin</i> Talstar F, GC, G	3A	0.25-0.5 fl oz/1,000 ft ²	12	Many formulations and brand names available.		
pillbugs	various pyrethroids*		See label				
Mites/Eriophyid mites	none				Carbaryl may provide some suppression, but no effective miticides are labeled.		
Mole Crickets	acephate Orthene 75WP Orthene 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. Fipornil 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		
	<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	economics must be considered in that context. Indoxacarb, acephate, and bifenthrin + imidacloprid combination baits are available for		
	<i>carbaryl</i> Mole Cricket Bait	1A	0.75-0.9 lb/1,000 ft ²	12	use against larger nymphs in late summer.		
	clothianidin Arena 50WDG	4A	Suppression only 10.67 oz/A	12			

TURF INSECT CONTROL (continued)						
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS	
Mole Crickets (continued)	clothianidin + bifenthrin Aloft LC SC	4A + 3A	11.65-23.3 oz	12	The pyrethroids and imidacloprid are less effective, particularly on larger nymphs and adults. Imidacloprid should be applied at or just before egg hatch.	
	<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		Clothianidin is less susceptible to photodegradation than imidacloprid. For most treatments irrigate 24 hours before treatment if soil is dry. Apply in late	
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O Granular	3A	0.6-0.9 fl oz/1,000 ft ² 2-3 lb/1,000 ft ²		afternoon to dry turf, then do not irrigate for 48 hrs. Rates of Chipco Choice higher than 12.5 lb/A must be applied through slit-seed	
	(landscape turf only) fipronil	2B	2 lb/1,000 ft ²	24	(subsurface) application equipment.	
	Chipco Top Choice		2 lb/1,000 ft ²		REI for Taurus Trio labeled for 24 H for sod farms, or until material has been watered in (landscapes and other sites).	
	fipronil + bifethrin + lambda- cyhalothrin Taurus Trio	2B + 3A		24 (sod farms)		
	<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		
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only) Scimitar GC	3A	Nymphs: 7 mL/1,000ft ² Adults: 14 mL/1,000 ft ²	12	Many formulations and brand names available.	
	<i>permethrin</i> Astro (landscape turf only)	3A	1.6 fl oz/gal	12		
	trichlorfon Dylox 420 SL Dylox 6.2 G	1B	4.6-6.9 fl 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 75WP Orthene 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.	
	carbaryl	1A	1.5-3 fl oz/1,000 sq ft or	12		
	Sevin SL		2-4 qt / acre 2.5-5 lb/acre			
	<i>deltamethrin</i> DeltaGard GC 5SC DeltaGard T&O 5 SC	3A	0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A	12	Many formulations and brand names available.	
	(landscape turf only)		0.2-0.4 fl oz/1,000 ft ² or 8.75-17.5 fl oz/A	1112 2 123		

	TURF INSECT CONTROL (continued)						
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS		
Turf caterpillars (cutworms, armyworms, webworms, loopers)	acephate Orthene 75WP Orthene 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.		
	<i>bifenthrin</i> Talstar GC Flowable	3A	RUP 0.25-0.5 fl oz/1,000 ft ² or 10 fl oz/A	12	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		
	<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	toxic to non-lepidopterous pests.		
	chlorantraniliprole Acelepryn	28	2-16 oz/A	4			
	<i>clothiaidin</i> + <i>bifenthrin</i> Aloft LCSC	4A + 3A	11.65-23.3 fl oz/A	12			
	cyfluthrin 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	12	Many formulations and brand names available.		
	<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		Many formulations and brand names available.		
	<i>lambda-cyhalothrin</i> Scimitar CS (landscape turf only)	3A	3.4-7 ml/1,000 ft ² or 5-10 fl oz/A	12			
	spinosad Conserve 1SC	5	0.25-0.8 fl oz/1,000 ft ² or 10-35 fl oz/A	4			
	trichlorfon Dylox 420 SL	1B	4.6-6.9 fl oz/1000 ft ² or 200-300 fl oz/A		Post application irrigation required.		
	<i>tetraniliprole</i> Tetrino	28	0.367-0.735 fl oz/1000 ft ²				
White Grubs (Japanese Beetle,	carbaryl Sevin SL	1A	6 fl oz/1,000 ft² or 8 qt/A	12	Best results can be expected if early instars are treated.		
Chafers, Green June Beetle)	clothianidin Arena 50WDG Arena 0.5G	4A	8 oz/A 50 lb/A	12	The number of grubs per ft^2 or damage threshold varies by grub species, grass species and variety, and management intensity or use.		
	<i>chlorantraniliprole</i> Acelepryn	28	8-16 oz/A	4	Identification of pest grub species is important for effective control recommendations. Consult your County Extension Agent.		
	dinotefuran 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.		
	<i>imidacloprid</i> Merit 75 WSP Merit 0.5 G	4A	6.8-8.6 oz/A 1.4 lb/1,000 ft ² or 60 lb/A	12	Curative control of older larvae is excellent with trichlorfon for most grub species .		

	TURF INSECT CONTROL (continued)								
PESTS	INSECTICIDE AND FORMULATION	IRAC GROUP	RATE	REI/PHI (HOURS)	REMARKS AND PRECAUTIONS				
White Grubs (Japanese Beetle, Chafers, Green June Beetle) (continued)	<i>imidacloprid</i> + <i>bifenthrin</i> Allectus SC (landscape turf only) Allectus GC	4A + 3A	RUP 1.32-1.65 fl oz/1,000 ft ² 2.3-2.9 lb/1,000 ft ²	12					
	<i>tetraniliprole</i> Tetrino	28	0.367-0.735 fl oz/1000 ft ²						
	trichlorfon Dylox 6.2 G	1B	3 lb/1000 ft ² or 130 lb/A		Not for sod farms. Must be watered in on day of application. Do not enter until water-in has dried.				
	trichlorfon Dylox 420 SL	1B	4.6-6.9 fl oz/1,000 ft ² or 200-300 fl oz/A		Post application irrigation required.				