

# INSECT CONTROL

Revised in January 2005, by Tim Davis  
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Many insects can be found in a turfgrass area, but most of these do not damage the quality of the turf and some can even be beneficial to the overall ecology of the turfgrass system. There are, however a number of insect pests in turfgrass that can cause serious damage. In general, the location and damage can be lumped into three categories. First are insects that feed on or damage the leafy portion of the turfgrass. Common examples might include chinch bugs, spittlebugs, Bermudagrass mites, Sod webworms, armyworms, and other lawn caterpillars. The second group are insects that feed on or damage the roots of the turfgrass such as the mole crickets, white grubs, and billbugs. The third group of insects and related pests are found but cause no damage. They are often a nuisance because they bite, sting, migrate into houses, swimming pools, and damage equipment. Examples of nuisance insects include ants, fleas, ticks, millipedes, chiggers, sowbugs, and snails. While these insects are classified as nuisance pests, their potential impacts should not be minimized. For example the impact of the Red Imported Fire Ant upon irrigation equipment, electrical boxes, and mowing equipment can be substantial. The presence of stinging insects such as bees, wasps, hornets, and fire ants can raise serious liability issues as well. Risk of disease is also present for nuisance pests such as mosquitoes, ticks, and fleas.

The decision to treat for an insect pest can often be a complicated one. Such decisions must account for the economics of the treatment, environmental and ecological concerns, and the efficacy of the treatment. The only way to correctly make management decisions is to be well informed and use a knowledge based system to integrate the information concerning biology, ecology, environment, and chemistry into a single system. In the urban environment, economic thresholds are very difficult to define. Therefore, the following steps have been outlined as a framework for an IPM program: Identification, Monitoring, Evaluation, Prediction, and Decision.

**Identification:** Insects are only one of the many causes of thinning out or off color areas in grass. Diseases, nematodes, dry weather, and nutritional disorders are frequently responsible for such injury. Correctly identify the problem before recommending a treatment. One of the most common reasons for treatment failures starts with misidentification of the pest. A correct identification not only provides information about what to treat with, but also when to treat, and how to treat. The County Extension office can help with pest identification via the Plant Problem Solving Clinic. Giving a name to the pest is not the only function of identification. By having the correct name, information about the life history of the organism can also be researched. Such information can be important in the monitoring step and the prediction step of the urban IPM program.

**Monitoring:** Monitoring is the process of looking for pest problems, and is sometimes called “scouting”. For many insect pest problems finding them early and treating early is the key to success, therefore, regular scouting is critical. Knowing the problems that are most likely to occur can help in designing a monitoring program. Monitoring can also be reactive or proactive. An example of a reactive monitoring program might be the mapping of mole crickets or white grubs to determine the area and level of infestations. Proactive monitoring programs might use traps to determine peak levels of activity and target further monitoring to the optimum time frame for treatments.

Some examples of monitoring techniques:

*To check for chinch bugs:* Insert a metal can with both ends cut out into the turf in an area where the grass is yellowed and declining. Fill the can with clean water. Wait 5 minutes for chinch bugs to float to top of water. Similar results can be obtained by cutting plugs and placing them in a 5 gallon bucket then filling the bucket with clean water. *Note: do not use soapy water when sampling for chinch bugs.* If none are present, visually examine at 3 to 4 sites in the suspected area along the margin of the damaged area. Part the grass and observe the soil surface in the yellowed areas for all stages of the chinch bug.

*Mole crickets, sod webworms, cutworms, armyworms, other lawn caterpillars:* Mix 2 - 4 fl. oz. of dishwashing detergent in 2 gallons of water and drench a 4 sq. ft. area with the solution. Insects will emerge to the soil surface if present. If none are found, examine other suspected areas and repeat.

*Billbugs and white grubs:* With a spade, cut three sides of a one foot square piece of sod to a depth of two inches at the edge of one of the off-color areas in the turf. Lay back the sod and examine roots for chewed off remnants and check soil for larvae. If 3 - 4 grubs or billbugs per square foot are found, apply an insecticide.

*Traps:* Pheromone traps and fly way traps are not usually useful as a tool for reducing pest populations. They are, however, useful as monitoring tools. For example, the optimum time to treat for white grubs is three to four weeks after the peak of the mating flight. As this time can vary from year to year and from one location to another, pheromone trapping may be a useful tool for determining the best time to make applications.

**Evaluation, Prediction, and Record Keeping:** Accurate record keeping of monitoring/scouting programs, particularly long term records, can allow detailed evaluation of the management techniques used and their efficacy. They can also provide the manager with the necessary tools to predict the time and location of pest outbreaks. Over time, they can save time and money

by targeting monitoring efforts and treatments only to “at risk” sites. Detailed records can also be invaluable to the specialist or consultant when special problems are confronted. Records should include as much detailed information as possible, for example, the number and types of pests, the location, the date, type of damage, cultural practices, environmental conditions, turf species and cultivar and so on. Provide actual numbers i.e. how many of pest species A per square yard, temperature in degrees Fahrenheit, rather than high or low infestation or hot and dry. After treatments, go back to the monitoring techniques to determine whether treatments worked or not, or for how long did they work.

**Decision:** The decisions regarding treatments are often very complex and difficult. Choices need to be made regarding the impact of the treatment vs. non-treatment. Economic and efficacy factors should also play an important role in any decisions that are made. Chemical insecticide treatments should be used as a last resort, though they are often the only choice for many pests. A strong healthy stand of turfgrass is the best defense against any pest problem. The benefits of following best management practices should not be minimized.

**Notes on Insecticide Use Issues:**

**Active Ingredients and Formulations:** Frequently, numerous formulations are available for the same active ingredient, but each formulation may have different uses on their labels. Changes in formulation can alter the method of application, the efficacy, the target pest etc. For example, fipronil formulations for the Red Imported Fire Ant include Top Choice, Ceasefire, and Over ‘n Out. Each of these products works a little differently and there are differences in the sites where these can be applied, application methods, and target pests. The formulation can also alter the means by which the pest or pests are targeted. Price alone should not be the deciding factor for which product to purchase. *Read the label carefully before making decisions, regarding the purchase or application of insecticides* to determine if they are suitable for your particular site.

**Application Rates:** The correct application rate is always the rate found on the label of the product you have in hand. Rates can vary based upon the target species, the retailer, manufacturer, distributor, or manufacture date. *Rates can often change without warning so it is important to read the label each time you use the product.* The rates provided in this manual are at best guidelines and are not intended to be authoritative.

**Site restrictions:** Many insecticides have site restrictions. For example they might say “For general insect control in turfgrass areas including athletic fields and parks and residential, commercial, institutional, and recreational lawns. Not for use on golf courses or sod farms”. *Read the label carefully before making decisions, regarding the purchase or application of insecticides* to determine if they are suitable for your particular site.

**Buffer zones:** Many products are adding buffer zones particularly with respect to water quality protection issues. *Read the label carefully before making decisions, regarding the purchase or application of insecticides* to determine if they are suitable for your particular site.

**SPECIAL NOTE:** Diazinon has been removed from the recommendations due to its ongoing phase out. The last date for retail sale was December 2004. End-use products in the hands of consumers do not have to be returned to the dealer/retailer. They can be used up according to the label. Questions regarding Diazinon should be directed to Syngenta at 1-800-334-9481.

Pesticide Application Information – While the label is the law, the following sources may be helpful when seeking information regarding specific pesticide products.

- Department of Pesticide Regulation (DPR) <http://drpsp.clemson.edu>
- Pesticide Information Page <http://entweb.clemson.edu/pesticid/index.htm>
- Environmental Protection Agency (EPA) <http://www.epa.gov/pesticides/>
- Clemson Entomology Department <http://entweb.clemson.edu> contains downloadable fact sheets on many common insect pests

## INSECT PEST CONTROL

Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
Armyworms	Astro	0.4 to 0.8 fl oz	<p>Fall Armyworm (FAW) populations fluctuate greatly from season to season. Though the last few seasons they have been more frequent problems. FAW does not over winter in SC and migrates north from FL and Southern GA. For this reason problems rarely appear until June, but problems can persist throughout the rest of the season. Eggs are laid in masses on almost any structure. At egg hatch the larvae migrate and begin to feed. Damage is rarely noticed until the last instar (stage of development) when the larvae are relatively large and difficult to control. Larvae often sequester during the day making them difficult to find until they have already damaged the turfgrass. The presence of birds that feed on the caterpillars may also be an indicator for closer inspections. In some cases the birds feeding on the worms can actually do more damage than the worms themselves.</p> <p>Pheromone traps for FAW are commercially available. The presence of adult moths in a trap should be an early warning to begin monitoring for early larval activity. Larvae are much easier to manage when they are very small. A detergent flush consisting of 1 to 2 fl oz detergent per gallon of water, will aid in detecting low populations and small larvae. Damage to turf usually occurs when more than 5 or 6 caterpillars per square yard. Treatment is also needed when droppings or damage are apparent. In cases with severe damage and larvae are not apparent, try looking for the pupae in the soil below the turf.</p> <p><b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p>Mach 2 2SC for use on commercial turfgrass sites only.</p> <p>Tempo 20WP GC is a water soluble packet formulation where 55 grams equals one packet.</p>
	Allectus G	See label	
	Allectus GC	See label	
	Onyx	See label	
	<i>Bacillus thuringiensis</i> (Dipel DF, 2X; Biobit HP; Javelin WG; XenTari)	See label	
	Battle GC T&O or Scimitar GC or CS	3.4 to 7 ml	
	Conserve SC	0.25 to 1.2 fl oz	
	Dursban PRO	1.5 fl oz	
	DeltaGard GC 5SC	0.2 to 0.4 fl oz	
	DeltaGard GC Granules	2 to 3 lb	
	Demand CS	3.4 to 7 ml	
	Mach 2 2SC	1.5 fl oz	
	Mach 2 1.5G	1.55 lbs	
	Orthene Turf, Tree & Ornamental Spray; Address T/O	0.5 to 1.2 oz	
	Sevin 10G	1.4 to 1.9 lbs	
	Sevin 80WSP	2.5 to 5 lb/acre	
	Sevin SL	1.5 to 3 fl oz	
	Talstar One	0.18 to 0.25 oz	
	Talstar EZ or EZ Golf Granular	1.15 lbs	
	Talstar GC or PL Granular	1.15 lbs	
Talstar GC Flowable	0.25 to 0.5 oz		
Tempo SC Ultra	4 to 8 ml		
Tempo Ultra WP	5 to 10 grams		
Tempo 20 WP GC	55 grams/11,000 sq ft		
Billbugs	Battle GC T&O	7 ml	
	Scimitar GC or CS	7 ml	
	Allectus G	See label	
	Allectus GC	See label	
	Onyx	See label	
	DeltaGard GC or T&O 5SC	0.6 to 0.9 fl oz	
	DeltaGard GC or T&O Granules	2 to 3 lbs	
	Demand CS	7 ml	

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
	Dursban PRO Mach 2 Liquid Mach 2 2SC Mach 2 1.5G Merit 2F Merit 75 WP Merit 0.5 G Sevin 10G Sevin 80WSP Sevin SL Talstar EZ or EZ Golf Granular Talstar One Talstar GC Granular & PL Granular Talstar GC Flowable Tempo SC Ultra Tempo Ultra WP Tempo 20 WP GC	1.5 fl oz 2.9 fl oz 3.0 lbs 4.2 to 5.6 grams See label See label 1.4 to 1.8 lbs 1.9 lbs 10 lb/acre 6 fl oz 1.15 to 2.3 lbs 0.25 to 0.5 fl oz 1.15 to 2.3 lbs 0.25 to 0.5 oz 8 ml 10 grams 55 gms per 7800 sq.ft	<p><b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p>Mach 2 2SC for use on commercial turfgrass sites only.</p> <p>Mach 2 and Merit are preventative rather than curative in nature. These products need to be applied prior to or at egg hatch.</p> <p>Talstar and Tempo are for adult billbug control only.</p> <p>Tempo 20WP GC is a water soluble packet formulation where 55 grams equals one packet.</p>
<b>Chinch Bugs</b>	Astro Battle GC T&O or Scimitar GC or CS Allectus G Allectus GC Onyx DeltaGard GC 5SC DeltaGard GC Granule Granules  Demand CS  Dursban PRO Merit 0.5 G Merit 2 E Merit 75 WP Orthene Turf, Tree & Ornamental Spray Pinpoint 15G Sevin 10G Sevin 80 WSP Sevin SL Talstar One Talstar EZ or EZ Golf Granular	0.4 to 0.8 fl oz 14 ml See label See label See label 0.6 to 0.9 fl oz 2 to 3 lbs  14 ml  1.5 fl oz 1.8 lbs 0.6 fl oz 5.6 grams 1.2 to 2.4 oz 0.6 to 0.75 lbs 1.4 to 1.9 lbs 7.5 to 10 lb/acre 4.4 to 6 fl oz 0.25 to 0.5 fl oz 2.3 to 4.6 lbs	<p>Chinch bugs are a major problem on St. Augustinegrass. When chinch bugs are found on other turfgrass species they are often planted near St. Augustinegrass. Hot, dry weather, deep thatch, and high fertility favor chinch bug development. 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 driven into the ground filled with clean water. Adults and nymphs will float to the surface within 10 minutes. Do <b>NOT</b> 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 stolens in the thatch layer may yield results.</p> <p>Treatments should be applied if 25 to 30 insects are found per square foot. Chinch bugs are often found in the thatch layer. Thus spray volume is critical 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' or 'Floralawn' are reported to have some resistance 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, spot treat the damaged area and 5 to 10 feet beyond. Recheck in 2-3 days. Spot treat again, if needed.</p> <p><b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p>Merit provides suppression of chinch bugs.</p> <p>Irrigate Sevin products <i>prior</i> to application, but do not irrigate 24 hrs. <i>after</i> application</p>

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
	Talstar GC or PL Granular Talstar GC Flowable Tempo SC Ultra Tempo Ultra WP Tempo 20 WP GC	2.3 to 4.6 lbs 0.25 to 0.5 oz 8 mls 10 grams 55 grams/11,000 sq. ft.	Tempo 20 WP GC is a water soluble packet formulation where 55 grams equals one packet.
<b>Cutworms</b>	<i>Bacillus thuringiensis</i> (Dipel DF, Javelin WG, XenTari) Allectus G Allectus GC Onyx Battle GC T&O or Scimitar GC or CS Conserve SC DeltaGard GC 5SC DeltaGard GC Granules Demand CS Dursban PRO Dylox 6.2G Advanced Lawn 24 Hour Grub Control Mach 2 1.5G Mach 2 2SC Merit 75WP Merit 0.5 G Merit 2F Orthene Turf, Tree & Ornamental Spray Sevin 10G Sevin 80 WSP Sevin SL Talstar EZ or EZ Golf Granular Talstar GC Flowable Talstar GC or PL Granular Talstar One Tempo SC Ultra Tempo Ultra WP Tempo 20 WP GC	See label See label See label See label 3.4 to 7 ml 0.8 to 1.2 fl oz 0.2 to 0.4 fl oz 2 to 3 lbs 3.4 to 7 ml 1.5 fl oz 2 lbs 1.55 lb 1.5 fl oz 4.2 to 5.6 grams 1.4 to 1.8 lbs See label 1.2 to 2.4 oz 0.9 lbs 2.5 to 5 lb/acre 1.5 to 3 fl oz 1.15 lbs 0.23 to 0.46 oz 1.15 lbs 0.23 to 0.46 oz 4 to 8 ml 5 to 10 grams 55 grams/11,000 sq ft	<p>Cutworm larvae usually spend the day in burrows. Damage is usually most apparent on golf greens where the burrows are easily visible and can interfere with the playing surface. The adult cutworm moth lays her eggs individually on the grass blades. Frequent mowing can significantly impact the cutworm population, however, this is rarely enough to control the population. Removal of clippings further away from site is also recommended. Cutworms can migrate as much as 50 ft in less than 24 hours, thus a barrier treatment around the greens may reduce migrations onto greens.</p> <p>A detergent flush consisting of 1 fl oz liquid detergent per gallon of water can be used to sample larvae. The presence of birds that feed on the caterpillars may also be an indicator for closer inspections. In some cases the birds feeding on the worms can actually do more damage than the worms themselves. Treatments should be applied when damage and larvae are present. Late afternoon applications are most effective.</p> <p>Some products require irrigation to activate. See label of specific materials for details.  <b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p>Mach 2 2SC and Mach 2 1.5G are “molt accelerating compounds”. They work by interfering with the larval molting process. To be effective, the earliest stages must be treated, thus an effective monitoring program is needed for best results. Mach 2 2SC for use on commercial turfgrass sites only.</p> <p>Formulations of Mach 2 and Merit are preventative rather than curative in nature. These products need to be applied prior or at egg hatch to be effective. For advanced infestations, curative products will be a better choice.</p> <p>Do not irrigate treated (Sevin products) area within 24 hrs following application.</p> <p>Do not irrigate treated area following Tempo application for 24 hrs.</p> <p>Tempo 20 WP GC is a water soluble packet formulation where 55 grams equals one packet.</p>

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
<b>Ground Pearls</b>	No effective insecticide is available at the present time.		This scale insect feeds on the roots of Bermudagrass, St. Augustinegrass, zoysiagrass, and centipedegrass. All stages occur on roots. Most of the stages are well-protected in a pearl-like cyst. When no insecticides are available for the pest, the best defense is sound turf management. Follow best management practices including proper fertilization, mowing heights, and irrigation to grow healthy turf.
<b>Mites: Bermuda-grass &amp; Clover</b>	Dursban Pro Kelthane 50 WSP  Onyx  Talstar GC Flowable Talstar One	1.5 fl oz 0.5 to 1 lb per acre  See label  0.25 to 0.5 fl oz 0.25 to 0.5 fl oz	Clover mites are a problem in spring and fall. Feeding causes a silvery discoloration of grass. Damage is usually near the house foundation. Bermudagrass mites are a problem on common Bermudagrass during hot, dry weather. Feeding causes yellowing and distortion of the grass. Newer, hybrid Bermudagrasses are resistant to this pest. Apply controls when damage is apparent. A wetting agent in the spray mixture improves results. Apply a second in 10-14 days. Cultural controls include collecting grass. Reduce mowing height as close as practical if mites are a problem. <b>Do not use Kelthane on residential lawns. Dursban for use on golf courses, road medians, &amp; industrial plants sites only.</b> Talstar is labeled only for clover mite control.
<b>Mole Crickets</b>	Battle GC T&O or Scimitar CS or GC Chipco Choice 0.1% G <sup>2</sup> Allectus G Allectus GC Onyx Chipco TopChoice DeltaGard GC 5SC DeltaGard GC Granules Demand CS Dylox 6.2 G Advanced Lawn 24 Hour Grub Control Merit 75WP Merit 0.5G Merit 2F Advanced Lawn Season-Long Grub Control Orthene Turf, Tree & Ornamental Spray Pinpoint 15G Sevin Baits Talstar EZ or EZ Golf Granular Talstar GC Granular Talstar GC Flowable Talstar One Talstar PL Granular Talstar GC Mole Cricket Bait Tempo SC Ultra Tempo Ultra WP Tempo 20 WP GC	7 - 14 ml 122 to 25 lbs/A See label See label See label 2 lbs 0.6 to 0.9 fl oz 2 to 3 lbs 7 to 14 ml 3 lbs 5.6 grams 1.8 lbs See label 3.8 lbs 1 to 1.9 oz 0.45 to 0.75 lb See Label 2.3 to 4.6 lbs 2.3 to 4.6 lbs 0.5 to 1 fl oz 0.5 to 1 fl oz 2.3 to 4.6 lbs 6 ml 8 mls 10 grams 55 grams/7,800 sq ft	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. Treatment in the early spring is probably beneficial. This reduces the number of mole crickets laying eggs. Treatment of small nymphs in late June and July is highly recommended.  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. Small nymphs will cause little detectable damage, but should be treated when present. Soil should be moist at time of treatment. Irrigate sprays or granulars into soil with 2" of water, except Orthene and baits. A surfactant may increase efficacy of Orthene. Apply all pesticides as late in the day as possible. Where a range of rates are given, use the high rate for adult mole cricket control. Cultural controls include not mowing turf shorter than recommended heights. Use a sharp mower blade. Irrigate turf when wilting begins with : inch water. Maintain proper fertility and pH levels.  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.) but more damage will have occurred and the crickets are more difficult to control. Irrigate after applying sprays or granules with 2 inch water (except Orthene). Apply as late in late afternoon as possible. Do not irrigate after application of baits for 2-3 days if possible. If soil is not moist, it is important to irrigate before applying sprays, granules and baits.  Tempo 20 WP GC is a water soluble packet formulation where 55 grams equals one packet.

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
<b>Sod Webworms</b>	Astro <i>Bacillus thuringiensis</i> (Dipel DF, Javelin WG, XenTari) Allectus G Allectus GC Onyx Battle GC T&O or Scimitar GC or CS Conserve SC DeltaGard GC 5SC Demand CS Dursban PRO Dylox 6.2G Advanced Lawn 24 Hour Grub Control Mach 2 Granular Mach 2 Liquid Orthene Turf, Tree & Ornamental Spray Sevin 10G Sevin 80WSP Sevin SL Talstar EZ or EZ Golf Granular Talstar GC Granular Talstar GC Flowable Talstar One Talstar PL Granular Tempo SC Ultra Tempo Ultra WP Tempo 20WP GC	0.4 to 0.8 fl oz See label See label See label See label 3.4 to 7 ml 0.25 fl oz 0.2 to 0.4 fl oz 3.4 to 7 ml 1.5 fl oz 2 lbs 1.55 lbs 1.5 fl oz 0.5 to 1.2 oz 1.4 to 1.9 lbs 7.5 to 10 lbs/acre 4.4 to 6 fl oz 1.15 lbs 1.15 lbs 0.25 fl oz 0.23 to 0.46 oz 1.15 lbs 4 to 8 ml 5 to 10 grams 55 grams/11,000 sq ft	<p>Sod webworm adult moths have a characteristic snout-like projection in front of their heads. They fly over the grass in the evening. Larvae can be forced from the grass with a detergent flush consisting of 1 fl oz liquid detergent per gallon of water which will cover a 4 sq. ft. area. Treatments should be applied when damage and larvae are present. Most materials should be watered-in immediately after application.</p> <p><b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p><b>Mach 2 2SC for use on commercial turfgrass sites only.</b> Formulations of Mach 2 and Merit are preventative rather than curative in nature. These products need to be applied prior or at egg hatch to be fully effective.</p> <p>Tempo 20WP GC is a water soluble packet formulation where 55 grams equals one packet.</p>
<b>Spittlebugs</b>	Orthene Turf Tree & Ornamental Spray Onyx Sevin 10 G Sevin 80WSP Allectus G Allectus GS Sevin SL Tempo SC Ultra	1 to 1.9 oz See label 1.4 to 1.9 lbs 2.5 to 5 lbs See label See label 12 to 3 fl oz 45 to 160 mls/100 gals	<p>Spittlebugs are a sporadic problem, primarily on centipede grass. High mowing height and thatch buildup aggravate the problem. Nymphs are found at the base of the grass plant. The nymphs are enclosed in a white, foamy, spittle mass. Feeding causes yellowing of the grass. 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.</p>
<b>White Grubs</b>	Advanced Lawn Season-Long Grub Control Dylox 6.2 G	2.87 lbs See label	<p>May and June beetle, green June beetle, masked chafer, and Japanese beetle larvae are all grouped under white grubs. To detect grubs, remove 1 sq. ft. of sod and carefully inspect the root zone. In most cases, if more than 7 grubs are found per sq. ft., treatment is needed. Apply treatment when grubs are small and feeding near the surface in late August and September.</p>

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq.ft.	Cultural Practices and Comments
	Allectus G	See label	<p>Most materials should be watered-in immediately with 2-inch after application. See label directions.</p> <p><b>Mach 2 2SC for use on commercial turfgrass sites only.</b> Formulations of Mach 2 and Merit are preventative rather than curative in nature. These products need to be applied prior or at egg hatch. For advanced infestations curative products will need to be applied.</p>
	Allectus GC	See label	
	Dylox 80	See label	
	Advanced Lawn 24 Hour Grub Control	3 lb	
	Mach 2 Liquid	2.9 fl oz	
	Mach 2 Granular	3.0 lbs	
	Merit 75WP	4.2 to 5.6 grams	
	Merit 2F	See label	
	Merit 0.5G	1.4 to 1.8 lbs	
	Sevin 10G	1.9 lbs	
	Sevin 80WSP	10 lb/acre	
	Sevin SL	6 fl oz	

**Comparison of Insecticides Registered for Mole Cricket Control in Turf.**

Material	Formulation	Residual	Comment
Chipco Choice	0.1%G	very long	Slit applications only. Caution use label.
Chipco TopChoice	0.0143%G	long	Broadcast application, water-in, 4 months control
Merit	75WP, 0.5G	intermediate	Several formulations for various sites.
Advanced Lawn Season Long Grub Control	0.2G	intermediate	Best for nymphs, apply at egg hatch.
Battle/Scimitar/Demand	0.88 EC	intermediate	Best for nymphs, apply at egg hatch.
Advanced Lawn 24 Hour Grub Control	6.2G	intermediate	Low odor; controls nymphs and adults
Orthene, Pinpoint, Velocity	75, 15G	short	Standard for nymphs in summer.
<b>Baits:</b>			
Sevin	5%	short	Good for mid- and late season nymphs.



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**NUISANCE PESTS - CHEMICAL CONTROLS**


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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq. ft.	Cultural Practices and Comments
<b>Ants</b>	Astro	0.4 to 0.8 fl oz	<p>More than 110 species of ants have been recorded in South Carolina. Less than 20 species are known to cause problems. In most cases ants are beneficial, serving as insect predators. Also a number of studies show that when numbers of native ant species are high they can have a negative impact of Red Imported Fire Ant populations.</p> <p>Ants can at times, however build up high numbers so that treatments may be deemed necessary. In such cases identification of the species causing the problem is critical as the biology can vary greatly from one species to another. An understanding of the biology is often critical in knowing 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.</p> <p><b>NOTE:</b> 5% Malathion or 5% Sevin dust may also be used for ant control.</p> <p><b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b></p> <p>Use Orthene as a spot treatment for ants.</p> <p>Tempo 20WP GC is a water soluble packet formulation where 55 grams equals one packet.</p>
	Battle GC T&O or Scimitar GC or CS	3.4 to 7 fl oz	
	Allectus G	See label	
	Allectus GC	See label	
	Onyx	See label	
	DeltaGard GC 5SC	0.4 to 0.6 fl oz	
	DeltaGard GC Granular	2 to 3 lbs	
	Demand CS	3.4 to 7 ml	
	Dursban Pro	1.5 fl oz	
	Orthene Turf, Tree & Ornamental	1.6 oz/gal	
	Pinpoint	See label	
	Sevin 10G	1.4 to 1.9 lbs	
	Sevin 80WSP	2.5 to 5 lbs	
	Sevin SL	1.5 to 3 fl oz	
	Talstar EZ or EZ Golf G	2.3 to 4.6 lbs	
	Talstar GC Flowable	0.25 to 1.0 oz	
	Talstar GC Granular & PL Granular	2.3 to 4.6 lbs	
	Talstar One	0.5 to 1.0 oz	
	Tempo SC Ultra	4 to 6 ml	
	Tempo Ultra WP	5 to 10 grams	
	Tempo 20WP GC	55 gms/11,000 sq ft	
<b>Imported Fire Ants</b>	<b>Mound Treatment</b>		
	Advanced Lawn Fire Ant Killer	See label	<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 or plant crops is intended see <a href="http://www.aphis.usda.gov/oa/pubs/ifapub.pdf">http://www.aphis.usda.gov/oa/pubs/ifapub.pdf</a> 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 (IMT), 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 rarely effective as a management strategy for reducing the RIFA population over a given area.</p> <p>Broadcast bait treatments are more effective in reducing the population in an area. They are slower acting and no results will be noticed for three or four weeks. 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. If areas greater than 100 acres are being treated aerial application may be an economical approach. 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. The 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.</p> <p>Broadcast insecticide treatments are recommended in high risk areas with zero tolerance for RIFA. Most of these applications are relatively expensive and therefore cost prohibitive in large areas. The advantage with the broadcast granular</p>
	Battle GC T&O or Scimitar GC or CS	See label	
	Allectus G	See label	
	Allectus GC	See label	
	Deltagard GC 5SC	See label	
	Deltagard GC granules	See label	
	Demand SC	See label	
	Dursban Pro	See label	
	Orthene Turf, Tree & Ornamental	See label	
	Pinpoint or Velocity	See label	
	Sevin 80 WSP, SL	See label	

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**NUISANCE PESTS - CHEMICAL CONTROLS**


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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq. ft.	Cultural Practices and Comments
	Talstar	See label	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.
	Tempo	See label	
	<b>Broadcast Baits</b>		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.  <b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b>
	Advion Fire Ant Bait	See label	
	Amdro Bait	See label	
	Amdro Granular	See label	
	Award Fire Bait	See label	
	Chipco Ceasefire Fire Ant Bait	See label	
	Distance Fire Ant Bait	See label	
	Justice Fire Ant Bait	See label	
	Siege Fire Ant Bait	See label	
	Varsity Fire Ant Bait	See label	
	<b>Broadcast Insecticide</b>		
	Battle GC/Scimitar GC or CS	3.4 - 7 ml	
	Chipco TopChoice	2 lbs	
	Chipco Choice	12.5 lbs/A	
	Onyx	See label	
	Talstar	1 fl oz	
<b>Millipedes</b>	Astro	0.4 to 0.8 fl oz	These are nuisance pests that commonly enter homes. Treat around the perimeter of the house.
<b>Centipedes</b>	Battle GC or Scimitar GC or CS	3.4 to 7 ml	Follow specific label directions for each pesticide.
<b>Sowbugs</b>	Allectus G	See label	
	Allectus GC	See label	
	Dursban Pro	1.5 fl oz	<b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b>
	Sevin SL	1.5 to 3 fl oz	
	Sevin 80WSP	2.5 to 5 lbs/acre	
	Talstar GC Flowable	0.25 to 0.5 fl oz	
	Talstar EZ or EZ Golf G	2.3 to 4.6 lbs	Granular Talstar formulations use rate of 4.6 lbs for sowbugs
	Talstar GC Granular	2.3 to 4.6 lbs	
	Talstar One	0.25 to 0.5 fl oz	
<b>Snails</b>	Deadline Bullets	0.5 to 2 lbs	For best results, apply in evening following rain or irrigation. Reapply every 3-4 weeks.
<b>Slugs</b>	Metaldehyde 7.5G	6.4 oz	Water infested area thoroughly before application. Do not re-water for 48 hours.
<b>Chiggers (Red Bugs), Ticks</b>	Astro	0.4 to 0.8 fl oz	Chiggers (red bugs) and ticks may be present in turfgrass areas. Apply controls as needed. Follow label directions. Astro, Scimitar GC and Talstar are only for tick control.  <b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b>
	Scimitar GC or CS	3.4 to 7 ml	
	DeltaGard GC 5SC	0.4 to 0.6 fl oz	
	DeltaGard GC or G Granules	2 to 3 lbs	
	Dursban Pro	1.5 fl oz	
	Allectus G	See label	
	Allectus GC	See label	
	Sevin 10G	1.6 to 1.9 lbs	

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 NUISANCE PESTS - CHEMICAL CONTROLS
 

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Pest	Pesticide Formulation <sup>1</sup>	Formulation Rate/1,000 sq. ft.	Cultural Practices and Comments
	Sevin 80 WSP	2.5 to 5 lb/acre	
	Sevin SL	1.5 to 3 fl oz	
	Talstar EZ or EZ Golf G	2.3 to 4.6 lbs	
	Talstar GC or PL Granular	2.3 to 4.6 lbs	
	Talstar One	0.5 to 1.0 fl oz	
	Talstar GC Flowable	0.5 fl oz	
	Tempo SC Ultra	4 - 8 mls	Use 8 ml rate of Tempo for chigger control.
<b>Fleas</b>	Astro	0.4 to 0.8 fl oz	
	Battle GC T&O or Scimitar GC or CS	3.4 to 7 ml	Fleas may be resident in turf areas. Area treatment as needed will reduce populations. Pets need to be treated as well.
	DeltaGard GC 5 SC	0.4 to 0.6 fl oz	
	Dursban Pro	1.5 fl oz	<b>Dursban for use on golf courses, road medians, and industrial plants sites only.</b>
	Allectus G	See label	
	Allectus GC	See label	
	Onyx	See label	
	Orthene Turf, Tree & Ornamental	1.2 to 2.4 oz	
	Talstar EZ or EZ Golf Granular	2.3 to 4.6 lbs	
	Talstar GC Flowable	0.23 to 0.46 oz	
	Talstar GC and PL Granular	2.3 to 4.6 lbs	
	Talstar One	0.5 - 1.0 fl oz	
<b>Wasps, Bees</b>	Orthene Turf, Tree, & Ornamental Spray	1.6 oz/gal water	Soil nesting bees and wasps should be treated late in the evening when foraging adults have returned to the nest. Thoroughly spray the entrance to the nest.
	Talstar One	0.25 to 0.5 fl oz	

<sup>1</sup>Always 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.

Cross reference table of insecticides for major turfgrass pests.

Insecticide	Armyworms	Bermudagrass Mites	Billbugs	Clover Mites	Cutworms	Fire Ants	Leafhoppers	Mole Crickets	Sod Webworms	So. Chinch Bugs	Spittlebugs	White Grubs
Advanced Lawn 24 Hour Grub Control					yes			yes	yes			yes
Advanced Lawn Season-Long Grub Control								yes				yes
Advion Fire Ant Bait						yes						
Allectus G	yes		yes		yes	yes	yes	Yes	yes	yes		yes
Allectus GC	yes		yes		yes	yes	yes	yes	yes	yes		yes
Amdro Pro						yes						
Astro	yes					yes	yes	yes	yes	yes	yes	
Award Fire Ant Bait						yes						
<i>Bacillus thuringiensis</i> (Dipel, Javelin, XenTari)	yes				yes				yes			
Battle GC	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes	
Ceasefire Fire Ant Bait						yes						
Chipco Choice, TopChoice						yes		yes				
Conserve SC	yes				yes				yes			
DeltaGard	yes	yes	yes		yes	yes	yes	yes	yes	yes	yes	
Demand			yes	yes		yes	yes	yes	yes	yes	yes	
Diazinon AG600, 50W, 5G	yes	yes	yes	yes	yes	yes	yes		yes	yes		yes
Distance Fire Ant Bait						yes						
Dursban PRO	yes	yes	yes	yes	yes	yes	yes		yes	yes		
Dursban Granular Bait, 1%	yes			yes	yes	yes	yes		yes	yes		

Cross reference table of insecticides for major turfgrass pests.

Insecticide	Armyworms	Bermudagrass Mites	Billbugs	Clover Mites	Cutworms	Fire Ants	Leafhoppers	Mole Crickets	Sod Webworms	So. Chinch Bugs	Spittlebugs	White Grubs
Dylox					yes			yes	yes			yes
Justice Fire Ant Bait						yes						
Kelthane		yes		yes								
Logic						yes						
Mach 2	yes		yes		yes				yes			yes
Merit 75WP, 0.5G			yes		yes		yes	yes		yes	yes	yes
Nematac S								yes				
Orthene TT&O	yes				yes	yes	yes	yes	yes	yes	yes	
Pinpoint 15G	yes				yes	yes		yes	yes	yes	yes	
Scimitar GC or CS	yes		yes	yes	yes	yes	yes	yes	yes	yes		
Sevin 10G	yes		yes		yes	yes	yes		yes	yes	yes	yes
Sevin 80 WSP	yes		yes		yes	yes	yes		yes	yes	yes	yes
Sevin SL	yes		yes		yes	yes	yes		yes	yes	yes	yes
Talstar F and G formulations	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes	
Onyx	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Tempo SC ultra, Ultra WP, & 20WP GC	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes	
Varsity Fire Ant Bait						yes						

**Cross reference table of insecticides for nuisance turfgrass pests.**

<b>Insecticide</b>	<b>Ants</b>	<b>Chiggers (Red Bugs), Ticks</b>	<b>Imported Fire Ants</b>	<b>Fleas</b>	<b>Centipdes, Millipedes, Pillbugs, Sowbugs</b>	<b>Snails, Slugs</b>	<b>Wasps, Bees</b>
Advanced Lawn 24 Hour Grub Control			yes				
Advion Fire Ant Bait			yes				
Amdro Pro	yes		yes				
Astro	yes		yes	yes	yes		yes
Award Fire Ant Bait			yes				
Battle GC	yes	yes	yes	yes			
Ceasefire Fire Ant Bait			yes				
Chipco Choice, TopChoice	yes	yes	yes	yes			
DeltaGard	yes	yes	yes	yes	yes		
Diazinon AG600, 50W, 5G	yes	yes	yes	yes	yes		yes
Distance Fire Ant Bait			yes				
Dursban PRO	yes	yes	yes	yes	yes		yes
Justice Fire Ant Bait			yes				
Logic			yes				
Metaldehyde 7.5G						yes	
Orthene TT&O	yes		yes	yes		yes	
Pinpoint 15G	yes		yes				
Scimitar GC, Demand CS	yes	yes	yes	yes	yes	yes	
Sevin SL, 80WP, XLR Plus	yes	yes	yes	yes	yes	yes	yes
Talstar	yes	yes	yes	yes	yes	yes	yes
Tempo SC ultra, Ultra WP, & 20WP GC	yes	yes	yes	yes	yes	yes	yes
Varsity Fire Ant Bait			yes				