

Insects

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Recommendations for management of major turfgrass pests are outlined below. The remarks column contains information on timing, pest thresholds, suggested detection and monitoring techniques, and cultural and biological control recommendations to aid turfgrass professionals to maximize control effectiveness. This is an excellent opportunity for turfgrass professionals to utilize the IPM approach and reduce environmental contamination.

With the exception of Mycotrol O, the materials listed for use in this section are labeled for turf as of 9/6/06 (<http://www.kellysolutions.com/va/>). However, many materials are currently under examination due to the Food Quality Protection Act (FQPA). Users of organophosphates and carbamate pesticides should keep up to date with ongoing label cancellations.

Caution: Be sure to consider drainage, slope, type of soil, weather, and general area use to avoid contamination of water sources. Avoid using treated areas immediately after application.

Note: Unless indicated otherwise, the following recommendations for dosage are given for 1,000 sq ft of area. Formulations other than those indicated may have different rates. Always follow directions on product labels.

White Grubs (grub/larval stage)

White grubs include several species of scarab beetles in the family *Scarabaeidae*. Japanese beetle grubs are the only species that will be controlled adequately by milky spore products. Follow label instructions for application. When using these products, be aware that control is not immediate. Milky spore is a slow-acting disease agent; grubs will take up to 30 days to die. However, when the disease is established in the turf, control can be effective for years without further application. After application, the disease perpetuates and spreads by infecting and being transported by grubs. If another grub treatment is applied to an area treated with milky spore, this will slow the spread of the disease and is therefore not desirable.

White grubs can also be controlled by entomopathogenic nematodes. Not all nematode species (named on the product label under the "Active Ingredients" section) available commercially will provide adequate control. Products with *Steinernema carpocapsae* should not be used for grub control. Products with *Heterohabditis bacteriophora* are more effective. Entomopathogenic (insect killing) nematode products should be applied only when the pest is present. Apply nematodes late in the day to avoid exposure to UV light damage. Irrigate the day before and immediately after application. Early spring treatments are usually not effective because soil temperatures should be at least 60°F.

Beauveria bassiana (an entomopathogenic fungus) products also provide effective control. Follow label instructions and water 0.5 inch immediately after application. Avoid fungicide applications for at least 4 days when using these products.

Several chemical insecticides are available for grub management. These products should be applied at the labeled rate and watered in with 0.25 to 0.5 inch of water. Most insecticides provide the best control when used against early instar (smaller) grubs present from early to mid August. Populations high enough to warrant treatment are ≥ 8 grubs/sq ft on well-maintained turf, and 4 to 6 grubs per square foot or higher on unthrifty turf. White grubs stop feeding in September or October, so control during fall may not prove successful. Spring treatments generally are not effective either.

Cultural management: Reducing the thatch layer to < 0.75 inch will help increase the penetration of any treatment applied to turfgrass. Also, avoid applying grubicides when soil is saturated or waterlogged.

Table 6.2 - Insecticides for White Grubs (larval stage)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
<i>Bacillus popilliae</i> (Milky spore disease)	10.0 oz		Effective only against Japanese beetle grubs.
<i>Beauveria bassiana</i>		16.0 - 32.0 oz	Use 100 gal water/A. Check label for details.
carbaryl (Sevin 10G)	1.9 lb	82.7 lb	Sevin 10G: Lawns, recreational, and ornamental turf.
(Sevin SL [4EC])	6.0 oz	8.0 qt	Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details).
(Sevin 80 WSP)	3.67 oz	10.0 lb	

Table 6.2 - Insecticides for White Grubs (larval stage)(cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
chlorantraniliprole (Acelepryn 1.67SC)	0.184 - 0.367 oz	8.0 - 16.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses and sod farms. Acelepryn may be applied from early April to early Sept. for preventative and early curative control of all major white grub species infesting turfgrass. Use higher rate for late August or early Sept. applications due to fewer mid-instar grubs present at the time of application. Optimal results can be achieved if product is watered in (≥ 0.5 inch) immediately after application.
chlorpyrifos (Dursban 50W)	1.46 - 2.93 oz	4.0 - 8.0 lb	RESTRICTED USE. Dursban 50W can only be used on sod farms and turfgrass grown for seed to control white grubs. For best results, treat from late July through early August to reach the newly hatched grubs that are actively feeding near the soil-thatch interface. Soil should be moist before treating. Water 0.5 to 1.0 inch immediately after treating to move AI into soil.
clothianidin (Arena 0.25 G)	1.84 - 3.67 lb	80.0 - 160.0 lb	Arena 0.25G: Residential and nonresidential sites (check labels for details). For best results, treat just prior to egg laying or to early instar larvae of target pests. Treatment should be followed by sufficient water to move AI into soil.
(Arena 50 WDG)	0.147 - 0.294 oz	6.4 - 12.8 oz	Arena 50 WDG: Use high rate for control of Asiatic garden beetle grub.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites including lawns, commercial, public, parks, recreational areas, athletic fields, golf courses and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch) to release AI from carrier. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27- 0.44 oz	11.65 - 19.0 oz	
Entomopathogenic nematodes		100 million - 1 billion	
halofenozide (Mach 2 1.5G)	3.0 lb	133.0 lb	Mach 2 1.5G: Residential and nonresidential sites including sod farms.
(Mach 2 2SC)	2.9 oz	1.0 gal	Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For best results for these products, reduce heavy thatch buildup and treat prior to egg hatch or when larvae are small (≤ 2 nd instar) and actively feeding (late July-early Aug). Also, these products are not dependent upon watering after treating to activate the AI; however, water is necessary to move the AI through the thatch layer. Under drought conditions it is recommended to water in these products.
imidacloprid (Merit 2F)	0.46–0.6 oz	1.25 - 1.6 pt	Merit 2F, 75WSP and 0.5G: Residential and nonresidential sites (check labels for details). For best results, treat from early July to early August. Can also treat up to 45 days before the historical peak of adult flight to 2nd instar grub being targeted. Treatment should be followed by sufficient water to move AI into soil.
(Merit 75 WSP)	1.6 oz (1 packet)/ 8,250 - 11,000 sq ft		
(Merit 0.5G)	1.4 - 1.8 lb	60.0 - 80.0 lb	

Table 6.2 - Insecticides for White Grubs (larval stage)(cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	2.3 - 2.9 lb 2.3 - 2.9 lb	100.0 - 125.0 lb 100.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms. Allectus GC and GC SC: RESTRICTED USE. Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	For best results for all products, water within 24 hours of treating to move AI through the thatch layer.
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/5,000 sq ft	12.7 - 17.0 oz	Meridian 25WG: Residential and nonresidential sites (check label for details). For best results, treat from peak flight to peak egg hatch. Can also treat up to 45 days before historical peak of adult flight to 2nd instar grub being targeted. Treatment should be followed by sufficient water to move AI into soil.
trichlorfon (Dylox 6.2G) (Dylox 80 [soluble powder])	3.0 lb 3.75 oz	130.0 lb 5.0 qt	Dylox 6.2G and 80 [SP]: Residential, parks and golf course sites. For best results, thatch layer must be \leq 0.5 inch at time of treatment. Treat from mid July to early August when larvae are young and actively feeding near soil surface. Treatment should be followed by sufficient water to move AI into soil. Dylox 80 [SP]: Apply immediately after mixing with water. AI breaks down in high pH water.

Black Turfgrass Ataenius

Black turfgrass ataenius is the smallest white grub that attacks turfgrass in Virginia. The fully-grown grub reaches 0.31 inch (8 mm) in length. The size of the adult beetle varies from 0.125-0.22 inch (3.6-5.5 mm) in length. Black turfgrass ataenius has two generations per year in Virginia. The adult beetles overwinter in the thatch layer of the rough next to fairways or in wooded lots, so a springtime application targeting the overwintering adults after they become active (early April), but before peak egg laying has occurred, can provide effective control of not only the adults but also the first generation of new grubs. Applications targeting adults should not be watered in because the adults are in the thatch layer. First generation adults are actively laying eggs in July. Second generation adults, which represent the overwintering stage, begin emerging from late August through September. Insecticide applications targeting second generation adults are not recommended.

Spring applications targeting the first or second instar grubs of the first generation, should be timed to when Vanhoutte spirea or horse chestnut are in full bloom (early May) or when black locust begins to bloom. Insecticides targeting second generation grubs should be applied from mid-July to early August before the grubs have matured to the third (and final instar) to avoid serious damage to the turfgrass.

Insecticides recommended for annual white grubs are generally effective against black turfgrass ataenius grubs. Applications should be watered in because the grubs are feeding on turf roots beneath the thatch layer.

A degree day program (Wegner and Niemczyk 1981 in Haruo Tashiro, *Turfgrass Insects of the United States and Canada*) target treatments to control the newly hatching first instar grubs. Based on a 55°F flight threshold, the program predicts that first generation eggs should begin to appear when 180-270 DD (degree days) have accumulated. Second generation eggs are expected to appear when 1,170-1,278 DD have accumulated, which coincides with the blooming stage of Rose of Sharon. There are about 60-70 days between generations.

Thresholds for black turfgrass ataenius are not firm. Although 200-300 grubs per square foot have been reported, turf often shows damage at populations of 20 to 30 grubs per square foot, and populations of 50 per square foot can result in serious damage. However, damage often goes unnoticed in grass that is longer than 2.0 inches, properly fertilized, and not water-stressed.

To monitor for grubs, use a cup cutter and carefully check the thatch and area beneath it.

Cultural management: Reducing the thatch layer to < 0.75 inch will help increase the penetration of any treatment applied to turfgrass. Also, avoid making soil insecticide applications when the soil is saturated or waterlogged.

Table 6.3 - Insecticides for Black Turfgrass Ataenius

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
Grub/larval stage			
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.9 - 1.4 oz (use minimum 5 gal water)	2.45 - 3.81 lb	Golf courses and sod farms only. Treat when insects or their damage first appear. Water lightly (\leq 0.5 inch) after treating. Do not graze or provide livestock treated grass.
<i>Beauveria bassiana</i>		16.0 - 32.0 oz	Use 100 gal of water/A.
carbaryl (Sevin SL [4EC]) (Sevin 80 WSP)	6.0 oz 3.67 oz	8.0 qt 10.0 lb	Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details).
chlorantraniliprole (Acelepryn 1.67SC)	0.184 - 0.367 oz	8.0 - 16.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity; residential, commercial, recreational turf, including golf courses and sod farms. Acelepryn may be applied from early April to early Sept. for preventative and early curative control of all major white grub species infesting turfgrass. Use higher rate for late August or early Sept. applications due to fewer mid-instar grubs present at the time of application. Optimal results can be achieved if product is watered in (\geq 0.5 inch) immediately after application.

Table 6.3 - Insecticides for Black Turfgrass Ataenius (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
clothianidin (Arena 0.25 G)	1.84 - 3.67 lb	80.0 - 160.0 lb	Residential and nonresidential sites (check labels for details). For best results, treat just prior to egg laying or to early instar larvae of target pests. Treatment should be followed by sufficient water to move AI into soil.
(Arena 50 WDG)	0.147 - 0.294 oz	6.4 - 12.8 oz	
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE . Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial, public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch) to release AI from carrier. Check labels for details. Time application to coincide with first generation black turfgrass grubs (larvae), which usually occurs in May. White grubs also will be controlled from an application for targeting black turfgrass ataenius.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27- 0.44 oz	11.65 - 19.0 oz	
halofenozide (Mach 2 1.5G)	3.0 lb	133.0 lb	Mach 2 1.5G: Residential and nonresidential sites including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For best results for these products, reduce heavy thatch buildup and treat prior to egg hatch or when larvae are small (≤ 2 nd instar) and actively feeding (early June to early August). Also, these products are not dependent upon watering after treating to activate the AI; however, water is necessary to move the AI through the thatch layer. Under drought conditions, it is recommended to water in these products.
(Mach 2 2SC)	2.9 oz	1.0 gal	
imidacloprid (Merit 2F)	0.46 - 0.6 oz	1.25 - 1.6 pt	Merit 2F, 75WSP and 0.5G: Residential and nonresidential sites (check label for details). For best results, treat from July to early August. You can also treat up to 45 days before the historical peak of adult flight to the 2nd instar grub being targeted. Treatment should be followed by sufficient water to move AI into soil.
(Merit 75 WSP)	1.6 oz (1 packet)/ 8,250 - 11,000 sq ft		
(Merit 0.5G)	1.4 - 1.8 lb	60.0 - 80.0 lb	
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G)	2.3 - 2.9 lb	100.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms . Allectus GC and GC SC: RESTRICTED USE . Golf courses and sod farms only. For best results for all products, water within 24 hours of treating to move AI through the thatch layer.
(Allectus GC)	2.3 - 2.9 lb	100.0 - 125.0 lb	
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/5,000 sq ft	12.7 - 17.0 oz	Residential and nonresidential sites (check label for details). For best results, treat from peak flight to peak egg hatch. Can also treat up to 45 days before historical peak of adult flight to 2nd instar grub being targeted.

Table 6.3 - Insecticides for Black Turfgrass Ataenius (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
trichlorfon (Dylox 80 [soluble powder])	3.75 oz	5.0 qt	Residential, park, and golf course sites. For best results, thatch layer must be \leq 0.5 inch at time of treatment. Treat when larvae are young and actively feeding near soil surface. Treatment should be followed by sufficient water to move AI into soil. Dylox 80 [SP]: Apply immediately after mixing with water. AI breaks down in high pH water.
Adult stage			
bifenthrin (Talstar GC [flowable])	0.25 - 0.5 oz	10.0 - 20.0 oz	Residential and nonresidential sites (check labels for details). For best results to control overwintering adults, treat from mid-April to early May (usually bracketed by when spring crocus and redbuds are in bloom). To control first generation adults, treatments should be timed to coincide with the blooming stage of Rose of Sharon in July.
(TalstarOne)	0.25 - 0.5 oz	10.0 - 20.0 oz	
(Talstar EZ [granule])	1.15 - 2.3 lb	50.0 - 100.0 lb	
(Talstar GC [granule])	1.15 - 2.3 lb	50.0 - 100.0 lb	
(Talstar PL [granule])	1.15 - 2.3 lb	50.0 - 100.0 lb	
chlorpyrifos (Dursban 50W)	1.46 oz	4.0 lb	RESTRICTED USE. Dursban 50W can only be used on sod farms and turfgrass grown for seed for black turfgrass ataenius control. For best results, treat overwintering adult stage from mid-April to early May (usually bracketed by when spring crocus and red buds are in bloom). Repeat application may be needed within 1 to 2 weeks. Check label for details.
lambda-cyhalothrin (Scimitar [9.7%] GC)	7.0 ml (use 2 - 10 gal water)	10.0 oz	RESTRICTED USE. Residential and nonresidential sites. For best results, water lightly after treating (\leq 0.5 inch) to move AI into thatch layer. Check label for details.
spinosad Conserve [11.6%] SC Turf and Ornamental	1.2 oz	52.0 oz	Residential and nonresidential sites. Check label for details.

Sod Webworm

Sod webworm problems on turf are most noticeable in high-maintenance conditions where grass is kept short. Two generations per year occur in Virginia. Sod webworm densities of 15 per square yard warrant treatment. Young larvae, which are most susceptible to treatment, can be expected in turf about 2 weeks after adults are present, usually late June and again in early September. Unfortunately, by the time damage is noticeable, the larvae are not susceptible to Bt products because they are getting ready to pupate. Spring and early summer treatments may be effective against the larvae that have overwintered. Do not mow for 1 to 3 days after treatment.

Cultural management: Plant endophyte enhanced fescue and ryegrass. Damage is seldom noticeable in turf more than 2.5 inches in height.

Table 6.4 - Insecticides for Sod Webworm

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.4 - 0.8 oz (use minimum 1 - 15 gal water)	1.0 - 2.0 lb	Golf courses and sod farms only. For best results, treat when insects appear. Repeat application may be necessary, but do not treat at more than 1-week intervals. Do not graze or provide livestock treated grass.
azadirachtin (Azatrol EC [0.0987 lb AI/gal])	≤ 1.3 oz (use 1 - 2 gal water)	≤ 57.0 oz (use 40 - 100 gal)	Residential and nonresidential sites (check label for details). The most vulnerable pest stages are the early larval stages when populations are established, but before damage is noticeable. Avoid watering and mowing for 12 to 24 hours after treating, and repeat as needed every 7 days.
<i>Bacillus thuringiensis</i> var. Kurstaki (Dipel 150 D)	See label		Check label for details.
beta-cyfluthrin (Tempo Ultra SC)	4.0 - 8.0 ml	6.0 - 12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). Do not water or mow for 24 hours after treating.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 oz 0.18 - 0.25 oz 1.15 lb 1.15 lb 1.15 lb	10.0 oz 7.8 - 10.0 oz 50.0 lb 50.0 lb 50.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar GC [flowable] and TalstarOne, do not water or mow for 24 hours after treating. Higher rates (≤ 20.0 oz/A) may be needed for grass > 1.0 inch in height. For all granular treatments, water ≤ 0.1 inch immediately after treatment to release/activate AI from granule.
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.4 - 1.9 lb 4.5 - 6.0 oz 2.75 - 3.67 oz	61.0 - 82.7 lb 6.0 - 8.0 qt 7.5 - 10.0 lb	Sevin 10G: Lawns, recreational, and ornamental turf. For best results, apply granules to dry turf. Water lightly after treatment to release AI from granule. Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details). Do not water for 24 hours after treating.

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Table 6.4 - Insecticides for Sod Webworm (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
chlorantraniliprole (Acelepryn 1.67 SC)	0.046 - 0.092 oz	2.0 - 4.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses and sod farms. Provides excellent curative control of caterpillars (larvae) in turf. For optimal control, delay watering or mowing for 24 hours after application. If turf is maintained at > 1 inch in height, higher rates may be required during periods of high pest pressure.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE. Golf courses, road medians, and industrial plant sites. Dursban 50W: Can also be used on sod farms and turfgrass grown for seed. For best results for both products, turf should be moist at time of treatment; however, for sod webworm control, do not water or mow for 12 to 24 hours after treating.
clothianidin (Arena 0.25 G) (Arena 50 WDG)	1.84 - 3.67 lb 0.147 - 0.294 oz	80.0 - 160.0 lb 6.4 - 12.8 oz	Residential and nonresidential sites (check labels for details). For best results, treat just prior to egg laying or to early instar larvae of target pests. Treatment should be followed by sufficient water to move AI into soil.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Check label for details.
Entomopathogenic nematodes		100 million - 1 billion	Check label for details.
halofenozide (Mach 2 1.5G) (Mach 2 2SC)	1.55 lb 1.5 oz	67.0 lb 2.0 qt	Mach 2 1.5G: Residential and nonresidential sites including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For both products, treat at first sign of pest damage. A single repeat application can be made if needed. Check labels for details.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	1.2 - 2.9 lb 1.2 - 2.9 lb	50.0 - 125.0 lb 50.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms. Allectus GC and GC SC: RESTRICTED USE. Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.67 - 1.65 oz	1.8 - 4.5 pt	For all products, water within 24 hours of application to move the AI through the thatch layer. Avoid mowing after treating until irrigation or rainfall has occurred.
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	

Table 6.4 - Insecticides for Sod Webworm (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
indoxacarb (Provaunt [30% WDG])	0.046 - 0.092 oz	2.0 - 4.0 oz	Residential and nonresidential sites. Label specifies lawns, golf courses, and other recreational turf-grass areas. For best results, do not water or mow for 24 hours after treating. If grass is maintained at a mowing height > 1.0 inch, then consider using the higher application rate if pest pressure is high.
lambda-cyhalothrin (Scimitar GC)	3.4 - 7.0 ml (use 2 - 10 gal water)	5.0 - 10.0 oz	Scimitar GC: RESTRICTED USE . Residential and nonresidential sites (check label for details). Water lightly after treating (\leq 0.5 inch) to move AI into thatch layer.
spinosad Conserve [11.6%] SC Turf and Ornamental	0.25 oz	10.0 oz	Residential and nonresidential sites (check label for details). For best results, treat during the late afternoon or early evening, and do not water or mow for 12 to 24 hours after treating.
trichlorfon (Dylox 6.2G) (Dylox 80 [soluble powder])	2.0 lb 2.5 - 3.75 oz	87.0 lb 3.4 - 5.0 qt	Dylox 6.2G and 80 [SP]: Residential, parks, and golf course sites. For best results to control sod webworm larvae with Dylox 6.2G, treat in spring (May) to kill first generation larvae. Water lightly after treating to move AI into thatch layer. For best results using Dylox 80 [SP], do not water after treating. Apply immediately after mixing with water. AI breaks down in high pH water.

Chinch Bug

Chinch bugs are piercing-sucking insects that have two generations per year in Virginia. Chinch bugs can cause significant damage to turf when found in densities of 15 to 20 immature bugs (nymphs) per square foot. Damage usually occurs to turf in sunny areas with a heavy thatch layer that is somewhat droughty. Areas planted with fine (red) fescue are especially at risk to chinch bugs. Chinch bugs may be sampled by floatation. Drive an approximate 4-inch diameter cylinder with open ends on both sides into the turf. Then pour in water at a rate that maintains the water level in the cylinder about 1 inch above the turf-gass for 5 to 10 minutes. Chinch bugs will float to the surface where they can be easily counted. Insecticide treatment is often effective, but because chinch bugs are highly mobile, the area may be quickly recolonized. Therefore, an application in April to May followed by 1 to 2 additional applications at 2- to 3-week intervals are recommended for the first generation. Early treatment may provide season-long control through June-September. To spray, mix the suggested amount of insecticide in 15 to 30 gallons of water per 1,000 square feet. Do not mow or water the turf for 2 to 3 days after treatment. If the entomopathogenic fungus *Beauveria bassiana* is used as a control measure, do not apply fungicides immediately before or after application (see product label).

Cultural management: Plant endophyte enhanced fescue and ryegrass. Reduce the use of fine (red) fescue in sunny areas, reduce thatch, and avoid spring fertilization with high nitrogen content.

Table 6.5 - Insecticides for Chinch Bug

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.9 - 1.8 oz (use 1 - 15 gal water to obtain good coverage).	2.45 - 4.9 lb	Golf courses and sod farms only. Apply as needed for adult population knockdown at 10- to 14-day intervals. Water lightly (≤ 0.5 inch) after treating. Do not graze or provide livestock treated grass.
<i>Beauveria bassiana</i>	16.0 - 32.0 oz		Use 100 gal water/A. Check label for details.
beta-cyfluthrin (Tempo Ultra SC)	8.0 ml	12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). For best results, water turf immediately after treating to move AI into thatch layer.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 - 0.5 oz 0.5 - 1.0 oz 2.3 - 4.6 lb 2.3 - 4.6 lb 2.3 - 4.6 lb	10.0 - 20.0 oz 20.0 - 40.0 oz 100.0 - 200.0 lb 100.0 - 200.0 lb 100.0 - 200.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar GC [flowable] and TalstarOne, water before treating to move AI into thatch layer. If thatch layer is excessive, use higher spray volumes. For all granular treatments, water ≤ 0.25 inch immediately after treating to release/activate AI from granule.
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.9 lb 4.5 - 6.0 oz 2.75 - 3.67 oz	82.7 lb 6.0 - 8.0 qt 7.5 - 10.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, apply granules to dry turf. Water lightly after treating to release AI from granule. Sevin SL and 80 WSP: Residential and non-residential sites (check labels for details). For best results, water before treatment to move AI into thatch layer. Do not water for 24 hours after treatment.
chlorantraniliprole (Acelepryn 1.67 SC)	0.184 - 0.46 oz	8.0 - 20.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. For suppression of chinch bugs. Apply prior to egg hatch. Check label for details.

Table 6.5 - Insecticides for Chinch Bug (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE . Golf courses, road medians, and industrial plant sites. Dursban 50W: Can also be used on sod farms and turfgrass grown for seed. Check labels for details.
clothianidin (Arena 0.25 G) (Arena 50 WDG)	1.84 - 3.67 lb 0.294 oz	80.0 - 160.0 lb 12.8 oz	Residential and nonresidential sites (check labels for details). For best results, apply enough water to move AI to where target insects are active.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE . Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Residential and nonresidential sites (check label for details). For best results, treat when insects first appear. Use higher rates for subsurface pests and/or for extended residual control.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	1.7 - 2.9 lb 1.7 - 2.9 lb	75.0 - 125.0 lb 75.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms . Allectus GC and GC SC: RESTRICTED USE . Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.9 - 1.65 oz	2.3 - 4.5 pt	
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	
lambda-cyhalothrin (Scimitar GC)	14.0 ml (use 2 - 10 gal water)	20.0 oz	RESTRICTED USE . Residential and nonresidential sites. For best results, water lightly after treating (≤ 0.5 inch) to move AI into thatch layer.
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/5,000 sq ft	12.7 - 17.0 oz	Residential and nonresidential sites (check label for details). For suppression of chinch bugs, treat when young nymphs are first observed.
trichlorfon (Dylox 80 [soluble powder])	3.75 oz	5.0 qt	Residential, parks, and golf course sites. Check label for details. Apply immediately after mixing with water. AI breaks down in high pH water.

Billbugs

Billbugs, like weevils, belong to the Curculionidae family of insects. Billbugs have one generation per year. Effective control can be obtained by a single early-season treatment for adults in April to May. Visually monitor for active adults during this period to predict where to treat and where problems might arise later in the season (billbug adults can often be seen crossing paved areas adjacent to turf). Damage from billbug larvae is often misdiagnosed as drought stress, white grub or chinch bug damage, or late spring greening. To recognize billbug damage, pull on the grass stems. They will break off near the crown and emit a fine sawdust-like frass (insect excrement) that has been packed inside the stems from larval feeding. Larval treatments should be applied in early June if there are 6 to 8 grubs per square foot. Use a detergent drench flushing technique to help estimate grub population size.

Cultural management: Plant endophyte enhanced fescue and ryegrass in addition to other turf varieties (ryegrass and bluegrass) that are resistant to billbug feeding.

Table 6.6 - Insecticides for Billbugs (e.g., bluegrass billbug, hunting billbug)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
Grub/larval stage			
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.9 lb 6.0 oz 3.67 oz	82.7 lb 8.0 qt 10.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, treat when grubs are actively feeding near soil surface. Water thoroughly after treating to release AI from granule. Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details). For best results, treat when grubs are actively feeding near soil surface. Water soon after treatment.
chlorantraniliprole (Acelepryn 1.67 SC)	0.184 - 0.46 oz	8.0 - 20.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. Product should be applied when the overwintering stage adults are first observed. This usually occurs in late April or early May in regions with cool-season turf. Best control of the grub stage can be achieved by targeting the overwintering adult stage as it becomes active in the spring but before egg laying has occurred. An application at this time will also provide control of white grubs. Check label for details.
clothianidin (Arena 0.25 G) (Arena 50 WDG)	1.84 - 3.67 lb 0.147 - 0.294 oz	80.0 - 160.0 lb 6.4 - 12.8 oz	Residential and nonresidential sites (check labels for details). For best results, apply enough water to move AI to where target insects are active.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G) clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	1.8 - 3.6 lb 0.27 - 0.44 oz	80.0 - 160.0 lb 11.65 - 19.0 oz	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details. A spring application will control billbug larvae. Check labels for details.

Table 6.6 - Insecticides for Billbugs (e.g., bluegrass billbug, hunting billbug) (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
halofenozide (Mach 2 1.5G) (Mach 2 2SC)	3.0 lb 2.9 oz	133.0 lb 1.0 gal	Mach 2 1.5G: Residential and nonresidential sites, including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For best results, reduce heavy thatch buildup and treat prior to egg hatch (check labels for details). Also, these products are not dependent upon watering after treating to activate the AI; however, water is necessary to move the AI through the thatch layer. Under drought conditions it is recommended to water in these products.
imidacloprid (Merit 2F) (Merit 75 WSP) (Merit 0.5G)	0.46 - 0.6 oz 1.6 oz (1 packet) /8,250 - 11,000 sq ft 1.4 - 1.8 lb	1.25 - 1.6 pt 60.0 - 80.0 lb	Merit 2F, 75WSP, and 0.5G: Residential and nonresidential sites (check label for details). For best results, treat from early July to early August. Also treat up to 45 days before the historical peak of adult flight to the 2nd instar grub being targeted. Treatment should be followed by sufficient water to move AI into soil.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	1.7 - 2.9 lb 1.7 - 2.9 lb	75.0 - 125.0 lb 75.0 - 125.0 lb	Allectus G: Residential and nonresidential sites, but not for use on golf courses or sod farms. Allectus GC: RESTRICTED USE. Golf courses and sod farms only.
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/ 5,000 sq ft	12.7 - 17.0 oz	Residential and nonresidential sites (check label for details). For best results, treat from peak flight to peak egg hatch. Can also treat up to 45 days before historical peak of adult flight to 2nd instar grub being targeted.
Adult Stage			
beta-cyfluthrin (Tempo Ultra SC)	8.0 ml	12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). For best results, treat when billbug adults first appear in the spring. This application will also aid in control of overwintering chinch bug adults.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 - 0.5 oz 0.25 - 0.5 oz 1.15 - 2.3 lb 1.15 - 2.3 lb 1.15 - 2.3 lb	10.0 - 20.0 oz 10.0 - 20.0 oz 50.0 - 100.0 lb 50.0 - 100.0 lb 50.0 - 100.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar products, treat when adult billbugs are first observed in April and May. Degree-day models have been developed to optimize application timing. This application will also aid in control of overwintering chinch bug adults.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 - 1.46 oz 1.5 oz	2.0 - 4.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE. Dursban 50W: Can only be used on sod farms and turfgrass grown for seed for billbug control. Dursban Pro: Can only be used on golf courses, road medians, and industrial plant sites for billbug control. For both products, treat early in the season just prior to or coinciding with first appearance of adults (check labels for details).

Table 6.6 - Insecticides for Billbugs (e.g., bluegrass billbug, hunting billbug) (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. A spring application will control billbug larvae. Apply when overwintering adult billbugs are first observed, usually in April and May. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Residential and nonresidential sites (check label for details). For best results, treat when insects first appear.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G)	1.7 - 2.9 lb	75.0 - 125.0 lb	Allectus G; Allectus SC: Residential and nonresidential sites, but not for use on golf courses or sod farms.
(Allectus GC)	1.7 - 2.9 lb	75.0 - 125.0 lb	Allectus GC; Allectus GC SC: RESTRICTED USE. Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.9 - 1.65 oz	2.3 - 4.5 pt	
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	
lambda-cyhalothrin (Scimitar [9.7%] GC)	7.0 ml (use 2 - 10 gal water)	10.0 oz	RESTRICTED USE. Residential and nonresidential sites. For best results, water lightly after treating (≤ 0.5 inch) to move AI into thatch layer. Check label for details.

Armyworm

Up to three generations of armyworms occur per year in Virginia. Larvae appear in April, late June, and August-September. Armyworms feed on grass blades, causing skeletonizing by early instars and consumption of the whole leaf by later instars. Armyworms prefer cereal crops, so turf areas near farmland growing these crops are at higher risk; however, they typically are not a major pest of turfgrass. A detergent drench flushing technique is useful to determine larval populations. Treat at first signs of damage. If using entomopathogenic nematodes, apply late in the day and water before and after application.

Table 6.7 - Insecticides for Armyworm

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.4 - 0.9 oz (use minimum 5 gal water)	1.0 - 2.5 lb	Golf courses and sod farms only. For best results, treat when insects appear. Repeat application at 2-week intervals may be necessary. Do not graze or provide livestock treated grass.
azadirachtin (Azatrol EC [0.0987 lb AI/gal])	≤ 1.3 oz (use 1 - 2 gal water)	≤ 57.0 oz (use 40 - 100 gal water)	Residential and nonresidential sites (check label for details). The most vulnerable pest stages to azadirachtin are the early larval stages when populations are established, but before damage is noticeable. Avoid watering and mowing for 12 to 24 hours after treating, and repeat as needed every 7 days.
beta-cyfluthrin (Tempo Ultra SC)	4.0 - 8.0 ml	6.0 - 12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). Do not water or mow for 24 hours after treating.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 oz 0.18 - 0.25 oz 1.15 lb 1.15 lb 1.15 lb	10.0 oz 7.8 - 10.0 oz 50.0 lb 50.0 lb 50.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar GC [flowable] and TalstarOne, do not water or mow for 24 hours after treating. Higher rates (≤ 20 oz/A) may be needed for grass > 1 inch in height. For all granular treatments, water ≤ 0.1 inch immediately after treatment to release/activate AI from granule.
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.4 - 1.9 lb 1.5 - 3.0 oz 0.92 - 1.84 oz	82.7 lb 2.0 - 4.0 qt 2.5 - 5.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, apply granules to dry turf. Water lightly after treatment to release AI from granule. Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details). Do not water for 24 hours after treating.
chlorantraniliprole (Acelepryn 1.67 SC)	0.046 - 0.092 oz	2.0 - 4.0 oz	Acelepryn 1.65 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. Provides excellent curative control of caterpillars (larvae) in turf. For optimal control, delay watering or mowing for 24 hours after application. If turf is maintained at > 1 inch in height, higher rates may be required during periods of high pest pressure.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE . Golf courses, road medians, and industrial plant sites. Dursban 50W: Can also be used on sod farms and turfgrass grown for seed. For best results for both products, turf should be moist at time of treatment.
clothianidin (Arena 0.25 G)	2.98 - 3.67 lb	130.0 - 160.0 lb	Residential and nonresidential sites (check label for details). Use minimum of 130 lb/A. Apply enough water to move AI to where target insects are active.

Table 6.7 - Insecticides for Armyworm (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE . Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Check label for details.
Entomopathogenic nematodes		100 million - 1 billion	Check label for details.
halofenozide (Mach 2 1.5G)	1.55 lb	67.0 lb	Mach 2 1.5G: Residential and nonresidential sites, including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For both products, treat at first sign of damage. A single repeat application can be made if needed (check labels for details).
(Mach 2 2SC)	1.5 oz	2.0 qt	
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G)	1.2 - 2.9 lb	50.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms . Allectus GC and GC SC: RESTRICTED USE . Golf courses and sod farms only For all products, water within 24 hours of application to move the AI through the thatch layer. Avoid mowing after treating until irrigation or rainfall has occurred.
(Allectus GC)	1.2 - 2.9 lb	50.0 - 125.0 lb	
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.67 - 1.65 oz	1.8 - 4.5 pt	
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	
indoxacarb (Provaunt [30% WDG])	0.046 - 0.092 oz	2.0 - 4.0 oz	Residential and nonresidential sites. Label specifies lawns, golf courses, and other recreational turfgrass areas. For best results, do not water or mow for 24 hours after treating. If grass is maintained at a mowing height > 1 inch, then consider using the higher application rate if pest pressure is high.
lambda-cyhalothrin (Scimitar GC)	3.4 - 7.0 ml (use 2 - 5 gal water)	5.0 - 10.0 oz	Scimitar GC: RESTRICTED USE . Residential and non-residential sites (check label for details). For best results, do not water or mow for 12 to 24 hours after treating.
spinosad Conserve [11.6%] SC Turf and Ornamental	0.25 - 1.2 oz	10.0 - 52.0 oz	Residential and nonresidential sites (check label for details). For best results, do not water or mow for 12 to 24 hours after treating. Low and high rates are based on whether larvae are small or large, respectively.
trichlorfon (Dylox 80 [soluble powder])	2.5 - 3.75 oz	3.4 - 5.0 qt	Residential, park, and golf course sites. For best results, do not water after treating. Apply immediately after mixing with water. AI breaks down in high pH water.

Fall Armyworm

The fall armyworm has two to three generations per year in Virginia. Populations reach damaging levels late in the season. Unlike armyworms in general, the fall armyworm is a major pest of turfgrass. Monitoring and treatment strategies are similar to those for armyworms and cutworms.

Table 6.8 - Insecticides for Fall Armyworm

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.4 - 0.9 oz (use minimum 5 gal water).	1.0 - 2.5 lb	Golf courses and sod farms only. For best results, treat when insects appear. Repeat application at 2-week intervals may be necessary. Do not graze or provide livestock treated grass.
azadirachtin (Azatrol EC [0.0987 lb AI/gal])	≤ 1.3 oz (use 1 - 2 gal water)	≤ 57.0 oz (use 40 - 100 gal water)	Residential and nonresidential sites (check label for details). The most vulnerable pest stages to azadirachtin are the early larval stages when populations are established, but before damage is noticeable. Avoid watering and mowing for 12 to 24 hours after treating, and repeat as needed every 7 days.
beta-cyfluthrin (Tempo Ultra SC)	4.0 - 8.0 ml	6.0 - 12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). Do not water or mow for 24 hours after treating.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 oz 0.18 - 0.25 oz 1.15 lb 1.15 lb 1.15 lb	10.0 oz 7.8 - 10.0 oz 50.0 lb 50.0 lb 50.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar GC [flowable] and TalstarOne, do not water or mow for 24 hours after treating. Higher rates (≤ 20 oz/A) may be needed for grass > 1 inch in height. For all granular treatments, water ≤ 0.1 inch immediately after treatment to release/activate AI from granule.
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.4 - 1.9 lb 1.5 - 3.0 oz 0.92 - 1.84 oz	82.7 lb 2.0 - 4.0 qt 2.5 - 5.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, apply granules to dry turf. Water lightly after treatment to release AI from granule. Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details). Do not water for 24 hours after treating.
chlorantraniliprole (Acelepryn 1.67 SC)	0.046 - 0.092 oz	2.0 - 4.0 oz	Acelepryn 1.65 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. Provides excellent curative control of caterpillars (larvae) in turf. For optimal control, delay watering or mowing for 24 hours after application. If turf is maintained at > 1 inch in height, higher rates may be required during periods of high pest pressure.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE . Golf courses, road medians, and industrial plant sites. Dursban 50W: Can also be used on sod farms and turfgrass grown for seed. For best results for both products, turf should be moist at time of treatment.
clothianidin (Arena 0.25 G)	2.98 - 3.67 lb	130.0 - 160.0 lb	Residential and nonresidential sites (check label for details). Use minimum of 130 lb/A. Apply enough water to move AI to where target insects are active.

6-24 Turf: Insects

Table 6.8 - Insecticides for Fall Armyworm (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Check label for details.
Entomopathogenic nematodes		100 million - 1 billion	Check label for details.
halofenozide (Mach 2 1.5G)	1.55 lb	67.0 lb	Mach 2 1.5G: Residential and nonresidential sites including sod farms.
(Mach 2 2SC)	1.5 oz	2.0 qt	Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For both products, treat at first sign of damage. A single repeat application can be made if needed (check labels for details).
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G)	1.2 - 2.9 lb	50.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms.
(Allectus GC)	1.2 - 2.9 lb	50.0 - 125.0 lb	Allectus GC and GC SC: RESTRICTED USE. Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.67 - 1.65 oz	1.8 - 4.5 pt	For all products, water within 24 hours of application to move the AI through the thatch layer. Avoid mowing after treating until irrigation or rainfall has occurred.
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	
indoxacarb (Provaunt [30% WDG])	0.046 - 0.092 oz	2.0 - 4.0 oz	Residential and nonresidential sites. Label specifies lawns, golf courses, and other recreational turfgrass areas. For best results, do not water or mow for 24 hours after treating. If grass is maintained at a mowing height > 1 inch, then consider using the higher application rate if pest pressure is high.
lambda-cyhalothrin (Scimitar GC)	3.4 - 7.0 ml (use 2 - 5 gal water)	5.0 - 10.0 oz	Scimitar GC: RESTRICTED USE. Residential and nonresidential sites. For best results, do not water or mow for 12 to 24 hours after treating.
spinosad Conserve [11.6%] SC Turf and Ornamental	0.25 - 1.2 oz	10.0 - 52.0 oz	Residential and nonresidential sites (check label for details). For best results, treat during the early morning or late afternoon, and do not water or mow for 12 to 24 hours after treating. Low and high rates are based on whether larvae are small or large, respectively.
trichlorfon (Dylox 80 [soluble powder])	2.5 - 3.75 oz	3.4 - 5.0 qt	Residential, park, and golf course sites. For best results, do not water after treating. Apply immediately after mixing with water. AI breaks down in high pH water.

Cutworms

Cutworms typically have from two to four generations per year in Virginia. Cutworm populations of 3 to 8 caterpillars (larvae) per square yard may warrant treatment. To sample for cutworms, use a detergent drench flushing technique. Most insecticides used for cutworms are stomach poisons because the larvae feed at night. Apply insecticides in the early evening for the best results. Unless specified on the label, do not water or mow for 24 hours after treating. Cutworms are highly mobile, so treated areas are likely to become re-infested from surrounding areas.

Cultural management: Plant endophyte enhanced fescue and ryegrass. Turf more than 2.5 inches in height requires less treatment for cutworms. Cutworm populations can be reduced if grass clippings are removed during mowing because cutworm moths lay their eggs at the tip of grass blades. If using entomopathogenic nematodes, apply late in the day and water before and after application.

Table 6.9 - Insecticides for Cutworms

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.4 - 0.8 oz (use minimum 1 - 15 gal water)	1.0 - 2.0 lb	Golf courses and sod farms only. For best results, treat when insects appear. Repeat application may be necessary, but do not treat at more than 1-week intervals. Do not graze or provide livestock treated grass.
azadirachtin (Azatrol EC [0.0987 lb AI/gal])	≤ 1.3 oz (use 1 - 2 gal water)	≤ 57.0 oz (use 40 - 100 gal water)	Residential and nonresidential sites (check label for details). The most vulnerable pest stages to azadirachtin are the early larval stages when populations are established, but before damage is noticeable. Avoid watering and mowing for 12 to 24 hours after treating, and repeat as needed every 7 days.
beta-cyfluthrin (Tempo Ultra SC)	4-8 ml	6.0 - 12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). Do not water or mow for 24 hours after treating.
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 oz 0.18 - 0.25 oz 1.15 lb 1.15 lb 1.15 lb	10.0 oz 7.8 - 10.0 oz 50.0 lb 50.0 lb 50.0 lb	Residential and nonresidential sites (check labels for details). For best results using Talstar GC [flowable] and TalstarOne, do not water or mow for 24 hours after treating. Higher rates (≤ 20 oz/A) may be needed for grass > 1 inch in height. For all granular treatments, water ≤ 0.1 inch immediately after treatment to release/activate AI from granule.
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.4 - 1.9 lb 1.5 - 3.0 oz 0.92 - 1.84 oz	82.7 lb 2.0 - 4.0 qt 2.5 - 5.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, apply granules to dry turf. Water lightly after treatment to release AI from granule. Sevin SL and 80 WSP: Residential and nonresidential sites (check labels for details). Do not water for 24 hours after treating.
chlorantraniliprole (Acelepryn 1.67 SC)	0.046 - 0.092 oz	2.0 - 4.0 oz	Acelepryn 1.65 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. Provides excellent curative control of caterpillars (larvae) in turf. For optimal control, delay watering or mowing for 24 hours after application. If turf is maintained at > 1 inch in height, higher rates may be required during periods of high pest pressure.

Table 6.9 - Insecticides for Cutworms (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE . Golf courses, road medians, and industrial plant sites. Dursban 50W: Can also be used on sod farms and sod grown for seed. For best results for both products, turf should be moist at time of treatment.
clothianidin (Arena 0.25 G) (Arena 50 WDG)	2.98 - 3.67 lb 0.294 oz	130.0 - 160.0 lb 12.8 oz	Residential and nonresidential sites (check labels for details). Arena 0.25G: Use minimum of 130 lb/A. Apply enough water to move AI to where target insects are active. Arena 50WDG: For suppression of cutworms. Use high rate.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE . Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
deltamethrin (Deltagard G)	2.0 - 3.0 lb	87.0 - 131.0 lb	Check label for details.
Entomopathogenic nematodes		100 million - 1 billion	Check label for details.
halofenozide (Mach 2 1.5G) (Mach 2 2SC)	1.55 lb 1.5 oz	67.0 lb 2.0 qt	Mach 2 1.5G: Residential and nonresidential sites, including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details). For both products, treat at first sign of pest damage. A single repeat application can be made if needed. Check labels for details.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	1.2 - 2.9 lb 1.2 - 2.9 lb	50.0 - 125.0 lb 50.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms . Allectus GC and GC SC: RESTRICTED USE . Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	0.67 - 1.65 oz	1.8 - 4.5 pt	For all products, water within 24 hours of application to move the AI through the thatch layer. Avoid mowing after treating until irrigation or rainfall has occurred.
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	0.4 - 1.65 oz	1.1 - 4.5 pt	
indoxacarb (Provaunt [30% WDG])	0.046 - 0.092 oz	2.0 - 4.0 oz	Residential and nonresidential sites. Label specifies lawns, golf courses, and other recreational turfgrass areas. For best results, do not water or mow for 24 hours after treating. If grass is maintained at a mowing height > 1 inch, then consider using the higher application rate if pest pressure is high.

Table 6.9 - Insecticides for Cutworms (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
lambda-cyhalothrin (Scimitar GC)	3.4 - 7.0 ml (use 2 - 5 gal water)	5.0 - 10.0 oz	Scimitar GC: RESTRICTED USE . Residential and nonresidential sites. For best results, do not water or mow for 12-24 hours after treating.
spinosad Conserve [11.6%] SC Turf and Ornamental	0.8 - 1.2 oz	35.0 - 52.0 oz	Residential and nonresidential sites (check label for details). For best results for black cutworm, treat during the late afternoon or early evening, and do not water or mow for 12 to 24 hours after treating. Low and high rates are based on whether larvae are small or large, respectively.
trichlorfon (Dylox 6.2G) (Dylox 80 [soluble powder])	2.0 lb 2.5 - 3.75 oz	87.0 lb 3.4 - 5.0 qt	Dylox 6.2G and 80 [SP]: Residential, parks and golf course sites. Dylox 6.2G: For best results, water lightly after treating to move AI into thatch layer. Dylox 80 [SP]: For best results, do not water after treating. Apply immediately after mixing with water. AI breaks down in high pH water.

Green June Beetle

The green June beetle is one of the annual white grub species mentioned under “White Grubs;” however, it deserves singling out given differences in the behavior it exhibits compared to the other white grub species. Unlike the other species that crawl on their front (stomach or ventral) side and use their 3 pairs of legs in the process, the green June beetle grub crawls (or more correctly unglutes) on its back (dorsal) side with its three pairs of legs pointing up. Also, the green June beetle is nocturnal and will come up through the thatch layer at night to feed on the surface.

Monitor in late July the same way as for other white grubs. As few as 3 to 5 grubs per square foot can cause significant damage to golf fairways and greens. Treatment should be applied in late August to avoid damage from mounding caused by grub tunneling. Treatments applied in the late afternoon or early evening are better at targeting the nighttime surface-feeding grubs. Irrigate before application to attract the grubs to the surface.

Cultural management: Reducing the thatch layer to < 0.75 inch will increase the penetration of any treatment applied to turf-grass. In addition, avoid applying grubicides when soil is saturated or waterlogged.

Table 6.10 - Insecticides for Green June Beetle

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
carbaryl (Sevin 10G) (Sevin SL [4EC]) (Sevin 80 WSP)	1.4 - 1.9 lb 1.5 - 3.0 oz 0.92 - 1.84 oz	61.0 - 82.7 lb 2.0 - 4.0 qt 2.5 - 5.0 lb	Sevin 10G: Lawns, recreational turf, and ornamental turf. For best results, treat when grubs are feeding near the soil surface. Apply granules when grass is dry. Water lightly after treating to remove AI from granule. Sevin SL and 80 WSP: Residential and commercial-use sites (check labels for details). Treat when grubs are feeding near soil surface. Water soon after treating.
chlorantraniliprole (Acelepryn 1.67 SC)	0.184 - 0.367 oz	8.0 - 16.0 oz	Acelepryn 1.67 SC: Has moderate systemic activity. For residential, commercial, recreational turf, including golf courses, and sod farms. Acelepryn may be applied from early April to early Sept. for preventative and early curative control of all major white grub species infesting turfgrass. Use higher rate for late August or early Sept. applications due to fewer mid-instar grubs present at the time of application. Optimal results can be achieved if product is watered in (≥ 0.5 inch) immediately after application.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.73 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE. Golf courses, road medians, and industrial-plant sites. Dursban 50W: Can also be used on sod farms and sod grown for seed. For best results, treat from late July to early August. Soil should be moist before treating.
clothianidin (Arena 0.25 G) (Arena 50 WDG)	1.84 - 3.67 lb 0.147 - 0.294 oz	80.0 - 160.0 lb 6.4 - 12.8 oz	Residential and nonresidential sites (check labels for details). For best results, treat just prior to egg laying or to early instar larvae of target pests. Treatment should be followed by sufficient irrigation/rainfall to move AI into soil.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G) clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	1.8 - 3.6 lb 0.27 - 0.44 oz	80.0 - 160.0 lb 11.65 - 19.0 oz	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (≥ 0.5 inch), to release AI from the carrier. Check labels for details.

Table 6.10 - Insecticides for Green June Beetle (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
halofenozide (Mach 2 1.5G) (Mach 2 2SC)	3 lb 2.9 oz	133.0 lb 1.0 gal	Mach 2 1.5G: Residential and nonresidential sites including sod farms. Mach 2 2SC: Nonresidential sites and sod farms (check labels for details).
imidacloprid (Merit 2F) (Merit 75 WSP) (Merit 0.5G)	0.46 - 0.6 oz 1.6 oz (1 packet) /8,250 - 11,000 sq ft 1.4 - 1.8 lb	1.25 - 1.6 pt 60.0 - 80.0 lb	Merit 2F, 75WSP and 0.5G: Residential and nonresidential sites (check label for details). For best results, treat prior to egg hatch of the target pest. Treatment should be followed by sufficient irrigation/rainfall to move AI into soil.
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	2.3 - 2.9 lb 2.3 - 2.9 lb	100.0 - 125.0 lb 100.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms. Allectus GC and GC SC: RESTRICTED USE. Golf courses and sod farms only.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	For best results for all products, water within 24 hours of treating to move AI through the thatch layer.
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/5,000 sq ft	12.7 - 17.0 oz	Meridian 25WG: Residential and nonresidential sites (check label for details). For best results, treat from peak flight to peak egg hatch. Can also treat up to 45 days before historical peak of adult flight to 2nd instar grub being targeted. Treatment should be followed by sufficient irrigation/rainfall to move AI into soil.
trichlorfon (Dylox 6.2G) (Dylox 80 [soluble powder])	3.0 lb 3.75 oz	130.0 lb 5.0 qt	Dylox 6.2G and 80 [SP]: Residential, parks, and golf course sites. For best results, thatch layer must be ≤ 0.5 inch at time of treatment. Treat from mid July to early August when larvae are young and actively feeding near soil surface. Treatment should be followed by sufficient water to move AI into soil. Apply Dylox 80 [SP] immediately after mixing with water. AI breaks down in high pH water.

Clover Mite

Clover mites are more of a nuisance than a pest; however, they may build up populations near building foundations that can cause silvering of nearby turfgrass. The clover mite, as its name suggests, does not feed primarily on grasses. Their nuisance status occurs when they invade buildings. When crushed, they leave a red stain that can be difficult to remove. Populations high enough to warrant treatment usually occur in late winter or early spring and, occasionally, in the fall.

Table 6.11 - Insecticides for Clover Mite (and mites in general)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
azadirachtin (Azatrol EC ¹ [0.0987 lb AI/gal])	≤ 1.3 oz (use 1 - 2 gal water)	≤ 57.0 oz (use 40 - 100 gal water)	Residential and nonresidential sites (check label for details). The most vulnerable pest stages to azadirachtin are the early larval and nymphal stages when populations are established, but before damage is noticeable. Avoid watering and mowing for 12 to 24 hours after treating, and repeat as needed every 7 days.
bifenthrin (Talstar GC ² [flowable]) (TalstarOne ²)	0.25 - 0.5 oz 0.25 - 0.5 oz	10.0 - 20.0 oz 10.0 - 20.0 oz	Residential and nonresidential sites (check labels for details). Use ≤ 10 gal water/1,000 sq ft when treating dense and/or long grass foliage.
chlorpyrifos (Dursban 50W) (Dursban Pro)	0.75 oz 1.5 oz	2.0 lb 2.0 qt	Dursban 50W and Pro: RESTRICTED USE . Golf courses, road medians, and industrial-plant sites. Dursban 50W: Can also be used on sod farms and sod grown for seed. For best results for both products, turf should be moist at time of treatment.
deltamethrin (Deltagard G)	2 - 3 lb	87.0 - 131.0 lb	Check label for details.
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC ²)	0.9 - 1.65 oz	2.3 - 4.5 pt	Allectus GC SC: RESTRICTED USE . Golf courses and sod farms only. Allectus SC: Residential and nonresidential sites, but not for use on golf courses or sod farms .
imidacloprid (5%) and bifenthrin (4%) (Allectus SC ²)	0.4 - 1.65 oz	1.1 - 4.5 pt	
lambda-cyhalothrin (Scimitar GC)	3.4 - 7.0 ml (use 2 - 5 gal water)	5.0 - 10.0 oz	Scimitar GC: RESTRICTED USE . Residential and nonresidential sites (check label for details). For best results, do not water or mow for 12 to 24 hours after treating.

¹Check labels when treating for Bermudagrass mite.

²Check labels when treating for eriophyid mites.

Frit Fly

The frit fly is occasionally a pest on golf-course greens, collars, and tees. There are no action thresholds worked out for this pest. Damage can be recognized as yellowing of the central parts of the plant while the rest of the plant looks healthy. Cool-season grasses such as bluegrass or bentgrass are most susceptible to injury. Typically, annual bluegrass and/or bentgrass greens and tees, which are heavily irrigated, fertilized, and frequently mowed, produce many new shoots that are highly attractive egg-laying sites to the female frit fly.

Table 6.12 - Insecticides for Frit Fly

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G)	1.7 - 2.9 lb	75.0 - 125.0 lb	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms.
(Allectus GC)	1.7 - 2.9 lb	75.0 - 125.0 lb	
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	Allectus GC SC and SC: RESTRICTED USE. Golf courses and sod farms only. For best results for all Allectus formulations, water within 24 hours after treating to move AI through the thatch (check labels for details).
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	

Mole Crickets

Mole crickets generally are not major pests of turf. However, they can cause serious damage in turf from tunneling in and beneath the thatch layer. Adult control is difficult to achieve in the early spring because the adults are actively seeking mates and continually invading preferred grassy areas. Areas that experience heavy adult pressure in the spring may warrant treating with maximum labeled rates and additional applications immediately prior to peak egg hatch.

Summer treatments targeting the young mole cricket nymphs are usually more effective in knocking down populations. The smaller size of the young nymphs (relative to the adults) makes them much more susceptible to insecticides. In addition, given that the nymphs must actively feed close to the surface to grow and develop, their exposure to insecticides is greatly increased. Treatments applied later in the summer may warrant higher rates and additional applications to control larger nymphs and young adults.

It is important to realize that as soils dry out, mole cricket nymphs and adults will burrow down substantially into the soil profile to remain in contact with moist soil. This is why most insecticide labels for mole crickets stress the point that if the soil is dry at the time of application, sufficient irrigation (but well short of waterlogging the turf) must be done BEFORE treating to provide favorable conditions that will drive the nymphs and adults up to the surface. The efficacy of most treatments will be greatly improved if pretreatment watering is done.

Table 6.13 - Insecticides for Mole Crickets

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
acephate (Orthene Turf, Tree, and Ornamental Spray 97)	0.8 - 1.4 oz (use 1 - 15 gal water)	2.0 - 3.9 lb	Golf courses and sod farms only. Treat when mole crickets or their damage first appear. For best results, water before treating to drive the adults and nymphs to the surface, especially if soil is dry, but do not water after treating. If possible, treat in the late afternoon or early evening. More than one treatment at higher rates may be required during the growing season to knockdown existing populations. Do not graze or provide livestock treated grass.
beta-cyfluthrin (Tempo Ultra SC)	8.0 ml	12.0 oz	Residential and nonresidential sites, but not for use on golf courses, sod farms, and sod grown for seed (check label for details). For best results, water before treating to drive the adults and nymphs to the surface, especially if soil is dry (check label for details).
bifenthrin (Talstar GC [flowable]) (TalstarOne) (Talstar EZ [granule]) (Talstar GC [granule]) (Talstar PL [granule])	0.25 - 0.5 oz 0.5 - 1.0 oz 2.3 - 4.6 lb 2.3 - 4.6 lb 2.3 - 4.6 lb	10.0 - 20.0 oz 20.0 - 40.0 oz 100.0 - 200.0 lb 100.0 - 200.0 lb 100.0 - 200.0 lb	Residential and nonresidential sites (check labels for details). For best results, water before treating to drive the adults and nymphs to the surface, especially if soil is dry. Treat in late afternoon or early evening, and then water in ≤ 0.5 inch immediately after treating (check labels for details).
chlorpyrifos (Dursban 50W)	1.47 - 2.2 oz	4.0 - 6.0 lb (use ≥ 50 gal water)	RESTRICTED USE. For mole cricket control, Dursban 50W can only be used on sod farms and sod grown for seed. For best results, treat when young nymphs are active. Water soil before treating, especially if soil is dry to bring insects to surface. Treat in late afternoon or early evening.

Table 6.13 - Insecticides for Mole Crickets (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
clothianidin (Arena 0.25 G) (Arena 50 WDG)	1.84 - 3.67 lb 0.294 oz	80.0 - 160.0 lb 12.8 oz	Arena 0.25 G and 50 WDP: Residential and non-residential sites (check label for details). Arena 0.25 G: For suppression of mole crickets. Highest rate suggested. Arena 50 WDG: For suppression of mole crickets. Use high rate. For best results water before treating to drive the adults and nymphs to the surface, especially if the soil is dry. Apply enough water to move AI to where target insects are active.
clothianidin (0.025%) and bifenthrin (0.125%) (Aloft GC G)	1.8 - 3.6 lb	80.0 - 160.0 lb	Aloft GC G and GC SC: RESTRICTED USE. Contact and systemic insect pest control for turf on residential and nonresidential sites, including lawns, commercial public, parks, recreational areas, athletic fields, golf courses, and sod farms. For the granular formulation, apply enough water (\geq 0.5 inch), to release AI from the carrier. Application should be made during peak adult flight and egg laying. Check labels for details.
clothianidin (24.70%) and bifenthrin (12.30%) (Aloft GC SC)	0.27 - 0.44 oz	11.65 - 19.0 oz	
imidacloprid (0.2%) and bifenthrin (0.16%) (Allectus G) (Allectus GC)	2.9 lb 2.9 lb (for Allectus G and GC, a single annual application may be made using 4.6 - 5.7 lb)	125.0 lb 125.0 lb (for Allectus G and GC, a single annual application may be made using 200.0 - 250.0 lb)	Allectus G and SC: Residential and nonresidential sites, but not for use on golf courses or sod farms (check labels for details). Allectus GC SC and SC: RESTRICTED USE. Golf courses and sod farms only (check labels for details). For best results for all Allectus formulations, water before treating to drive the adults and nymphs to the surface, especially if soil is dry. Treat in late afternoon or early evening, and then water in \leq 0.5 inch immediately after treating (check labels for details).
imidacloprid (5%) and bifenthrin (2%) (Allectus GC SC)	1.32 - 1.65 oz (for Allectus GC SC, a single annual application may be made using 2.64 - 3.3 oz)	3.6 - 4.5 pt (for Allectus GC SC, a single annual application may be made using 7.2 - 9.0 pt)	
imidacloprid (5%) and bifenthrin (4%) (Allectus SC)	1.32 - 1.65 oz	3.6 - 4.5 pt	
indoxacarb (Advion Mole Cricket Bait)	1.15 - 4.6 lb	50.0 - 200.0 lb	Residential and nonresidential sites, but not for use on sod farms and sod grown for seed. Do not allow livestock or domestic animals to consume the bait or graze in treated areas (check label for details). For best results, apply bait in spring to control adults before they lay eggs, and in late summer and fall to control large nymphs and newly emerged adults. Water soil before treating to bring mole crickets to surface, and treat infested areas in late afternoon. If necessary, treat again in 7 days. Rainfall or irrigation within 2-3 days after treating may reduce bait effectiveness.

Table 6.13 - Insecticides for Mole Crickets (cont.)

Insecticide	Amount product per 1,000 sq ft	Amount product per acre	Remarks
lambda-cyhalothrin (Scimitar [9.7%] GC)	7.0 ml (nymphs and young adults) (use 4 - 10 gal water)	10.0 oz (nymphs and young adults)	RESTRICTED USE. Residential and nonresidential sites (check label for details). For best results, water before treating to drive nymphs and adults to the surface, especially if soil is dry. Also, use a non-ionic wetting agent, penetrant, or similar adjuvant. Use highest water application rates possible when treating. Immediately after treating, apply 0.25 to 0.5 inch of water (check label for details).
	14.0 ml (adults) (use 4 - 10 gal water)	20.0 oz (adults)	
thiamethoxam (Meridian 25WG)	1.5 - 1.95 oz/5,000 sq ft	12.7 - 17.0 oz	Residential and nonresidential sites (check label for details). For suppression of mole crickets (check label for details).
trichlorfon (Dylox 6.2G) (Dylox 80 [soluble powder])	3.0 lb 3.75 oz	130.0 lb 5.0 qt	Dylox 6.2G and 80 [SP]: Residential, park, and golf course sites. For best results, thatch layer must be \leq 0.5 inch at time of treatment (check labels for details). Apply Dylox 80 [SP] immediately after mixing with water. AI breaks down in high pH water.