

## Pest control information and recommendations for turfgrass

These recommendations have been compiled from several sources that were updated this past year, including cooperative extension publications from Cornell, The Ohio State and North Carolina State Universities. Our thanks to the Green Industry programs at these fine universities. Even so, they are still recommendations and may not apply to your area because of state and local regulations. While they indicate active ingredients that have been proven to be effective against particular pests —when used ac-

ording to label directions and under proper conditions — make sure there are no restrictions on their use in your market. When in doubt, check with Cooperative Extension or with the turfgrass and ornamental experts at your state land grant university.

Always read and follow label directions. When in doubt about a label's intent or the proper or most effective way to use a particular product, contact the manufacturer (use the toll-free number on the label) or visit the manufacturer's Web site.

### TURF PEST INSECTS AND CHEMICAL CONTROLS

#### ARMYWORMS

Treat at first sign of damage. Use a soap flush to disclose populations.

Insecticidal treatment	Chemical class	Lbs. ai/acre
Azadirachtin	biological	0.02-0.43
<i>Bacillus thuringiensis kurstaki</i>	biological	0.67-1.67 qt/acre
<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.046-0.07
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Halofenozide	growth regulator	1.0
<i>Heterorhabditis bacteriophora</i>	biological	(0.6-1.0 bill./acre)
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Permethrin <sup>c</sup>	pyrethroid	0.44-0.87
Spinosad	spinosyn	0.07 (small larvae), 0.4 (large larvae)
<i>Steinernema carpocapsae</i>	biological	(1.0 bill./acre)

#### BERMUDAGRASS MITE

Found in southern states

<i>Beauveria bassiana</i> JW-1	biological	see label
Bifenthrin <sup>e</sup>	pyrethroid	0.05-0.1
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-4.0

#### BLUEGRASS BILLBUG ADULTS

Control adults when first noticed migrating in spring. Use pitfall traps to monitor adults or observe on warm, sunny days. Adults lay eggs in turf stems as soon as they become active.

<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.046-0.07

Bifenthrin <sup>e</sup>	pyrethroid	0.05
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
<i>Heterorhabditis bacteriophora</i>	biological	see label
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
<i>Steinernema carpocapsae</i>	biological	see label

#### BLUEGRASS BILLBUG LARVAE

Control larvae in late spring. Thatch reduction and good irrigation improve efficacy of products.

<i>Beauveria bassiana</i> JW-1	biological	see label
Carbaryl	carbamate	2.0-4.0
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Halofenozide	growth regulator	1.0
<i>Heterorhabditis bacteriophora</i>	biological	see label
Imidacloprid	chloronicotinyl	0.3-0.4
<i>Steinernema carpocapsae</i>	biological	see label

#### CHINCH BUGS

Acephate	organophosphate	2.4-5.0
<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.046-0.07
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
<i>Heterorhabditis bacteriophora</i>	biological	see label
Imidacloprid	chloronicotinyl	0.40 (suppression only)
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Permethrin <sup>e</sup>	pyrethroid	0.44-0.87
<i>Steinernema carpocapsae</i>	biological	see label

**■ CLOVER MITE**

Insecticidal treatment	Chemical class	Lbs. ai/acre
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Dicofol	organochlorine	0.46-0.92
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055

**■ EUROPEAN CRANE FLY LARVAE**

Carbaryl	carbamate	8.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Diazinon	organophosphate	2.7

**■ GENERAL CRANE FLY LARVAE**

Bifenthrin <sup>e</sup>	pyrethroid	0.05-0.1
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**■ CUTWORMS**

Acephate	organophosphate	2.4-5.0
Azadirachtin	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.046-0.07
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Halofenozide	growth regulator	1.0
<i>Heterorhabditis bacteriophora</i>	biological	see label
Imidacloprid	chloronicotinyl	0.3-0.4 (suppression only)
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Spinosad	spinosad	0.24 (small larvae), 0.4 (large larvae)
<i>Steinernema carpocapsae</i>	biological	see label
Trichlorfon	organophosphate	5.4-8.0

**■ FALL ARMYWORM**

Acephate	organophosphate	1.0-2.4
Azadirachtin	biological	0.02-0.43
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Halofenozide	growth regulator	1.0
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Spinosad	spinosad	0.07 (small larvae), 0.4 (large larvae)

<i>Steinernema carpocapsae</i>	biological	see label
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**■ GREENBUG**

Aphids		
Acephate	organophosphate	1.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0

**■ MOLE CRICKETS**

Imported mole crickets are pests of southern turf.

Acephate	organophosphate	2.0-4.0
<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.046-0.07
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Fipronil	phenyl pyrazole	0.0125-0.025 (golf course and commercial grounds only)
Imidocloprid	chloronicotinyl	0.4
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Permethrine	pyrethroid	0.44-0.87
<i>Steinernema riobravus</i>	biological	see label
<i>Steinernema scapterisci</i>	biological	see label

**■ SOD WEBWORMS**

Acephate	organophosphate	2.4-5.0
Azadirachtin	biological	0.02-0.43
<i>Bacillus thuringiensis kurstaki</i>	biological	see label
<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>e</sup>	pyrethroid	0.046-0.07
Bifenthrin <sup>e</sup>	pyrethroid	0.05
Carbaryl	carbamate	2.0-4.0
Chlorpyrifos <sup>b</sup>	organophosphate	1.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.1-0.2
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13
Diazinon <sup>a</sup>	organophosphate	2.7-5.5
Fluvalinate	pyrethroid	0.05-0.16
Halofenozide	growth regulator	1.0
<i>Heterorhabditis bacteriophora</i>	biological	see label
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.027-0.055
Permethrin <sup>c</sup>	pyrethroid	0.44-0.87
Spinosad	spinosad	0.24 (small larvae), 0.4 (large larvae)
<i>Steinernema carpocapsae</i>	biological	see label
Trichlorfon	organophosphate	5.4-8.0

**TURF PEST INSECTS AND CHEMICAL CONTROLS (CONTINUED)**

■ **WHITE GRUBS**

Japanese beetle, masked chafers, European chafers, Asiatic garden beetle, oriental beetle

<i>Bacillus popilliae</i> Japanese beetle only	biological	see label
<i>Beauveria bassiana</i> JW-1	biological	see label
Bifenthrin <sup>e</sup>	pyrethroid	0.1 (adults only)
Carbaryl	carbamate	8.0
Chlorpyrifos <sup>b</sup>	organophosphate	2.0-4.0
Cyfluthrin <sup>e</sup>	pyrethroid	0.2 (JP adults only)
Deltamethrin <sup>e</sup>	pyrethroid	0.08-0.13 (JP adults only)
Diazinon <sup>a</sup>	organophosphate	4.0-5.5
Halofenozide	growth regulator	1.5-2.0
<i>Heterorhabditis bacteriophora</i>	biological	see label
Imidacloprid	chloronicotinyl	0.3-0.4
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.055 (suppression)
Permethrin <sup>c</sup>	pyrethroid	0.44-0.87
<i>Steinernema glaseri</i>	biological	see label
Trichlorfon		8.0

■ **MAY/JUNE BEETLES, PHYLLOPHAGA SPP**

Carbaryl	carbamate	8.0
Halofenozide	growth regulator	1.5
Imidacloprid	chloronicotinyl	0.3
Trichlorfon	organophosphate	8.0

■ **BLACK TURFGRASS ATAENIUS**

Acephate	organophosphate	3.0-4.0
<i>Beauveria bassiana</i> JW-1	biological	see label
Beta-cyfluthrin <sup>c</sup>	pyrethroid	0.07 (adults)
Bifenthrin <sup>e</sup>	pyrethroid	0.05-0.1 (adults)
Chlorpyrifos <sup>b</sup>	organophosphate	2.0-4.0
Halofenozide	growth regulator	1.5
Imidacloprid	chloronicotinyl	0.3-0.4
Lambda-cyhalothrin <sup>e</sup>	pyrethroid	0.055 (adults)
Spinosad	spinosad	0.4 (adults)
Trichlorfon	organophosphate	8.0

■ **GREEN JUNE BEETLE**

<i>Beauveria bassiana</i> JW-1	biological	see label
Carbaryl	carbamate	2.0-4.0
Halofenozide	growth regulator	1.5
Trichlorfon	organophosphate	8.0

<sup>a</sup> Not registered for use on golf courses or sod farms.

<sup>b</sup> Not to be used on residential turf.

<sup>c</sup> For home lawns only.

<sup>d</sup> Actual formulation

<sup>e</sup> Different trade names exist for golf course, sod farms and other turf areas

SOURCE: "2002 MANAGEMENT OF TURFGRASS PESTS," OHIO STATE UNIVERSITY EXTENSION

# Grub identification tips

BY PAT VITNUM, PH.D.

Two factors in determining how to control grubs in your turf are: 1. identifying which grubs are attacking your turfgrass, and 2. figuring out how many there are.

To identify grub species, inspect the shape of the anal slit and the pattern of hairs on its posterior. Use a hand lens; it makes the job a lot easier. Next, figure out what the threshold is that grubs must cross before they seriously damage the turf.

The following are some identifying characteristics of each grub species and ac-

tion thresholds for each. Use this information strictly as a guide. It serves as a way to compare damage potential between species.

**Japanese beetles**

**Identifier:** Transverse anal slit and a v-shaped row of spines just in front of the slit, pointing toward the head.

**Range:** Found east of the Mississippi River and north of central Georgia. They're also beginning to show up in parts of Minnesota and some of the Central Plains.

**Action threshold:** Six to 15 grubs per sq. ft. in moderately maintained turfgrass.

**European chafers**

**Identifier:** Branched anal slit and two almost parallel rows of spines that look like an opening zipper.

**Range:** Eastern third of Massachusetts, Rhode Island and along the Erie Canal in New York, southern New Hampshire and southern Maine. Other areas of infestation include the shores of the Great Lakes and parts of southern Michigan.

**Action threshold:** five to 10 grubs per sq. ft.

**Oriental beetles**

**Identifier:** A transverse anal slit (like the Japanese beetle) and two almost parallel rows of spines

**Range:** Coastal New England (including most of Rhode Island and Connecticut), Long Island, eastern New Jersey and parts of Pennsylvania, with populations also reported along the Connecticut River and perhaps into southern Vermont and New Hampshire. Other locations will probably be confirmed through pheromone trapping.

**Action threshold:** Six to 15 grubs per sq. ft.

**Asiatic garden beetles**

**Identifier:** Branched anal slit with a distinct semicircle of spines just in front of the slit.

**Range:** Throughout the Northeast and Midwest.

**Action threshold:** 10 to 20 grubs per sq. ft.

**Northern and southern masked chafers**

**Identifier:** Transverse anal slit. Spines are scattered with no obvious pattern.

**Range:** Throughout the Northeast and Midwest but are more common in the Midwest and Plains states.

**Action threshold:** Eight to 20 grubs per sq. ft.

**Green June beetles**

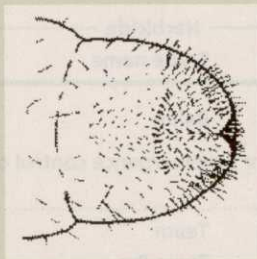
**Identifier:** Transverse anal slit and two fairly compact parallel rows of spines. These grubs have short legs that aren't used for locomotion.

**Range:** Eastern U.S., from southeastern New York to Florida and westward to Texas and Kansas.

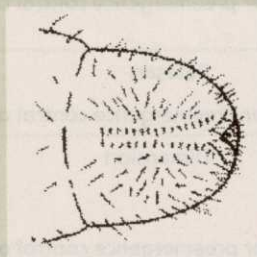
**Action threshold:** Because the grubs feed more in the thatch and not as much on the roots, thresholds are usually higher than for the direct root-feeding species like the Japanese beetle.

— From the November 2002 issue of *Turfgrass Trends*. Visit [www.turfgrasstrends.com](http://www.turfgrasstrends.com)

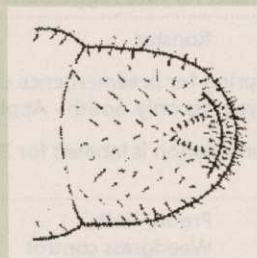
**The raster patterns for common turfgrass grubs:**



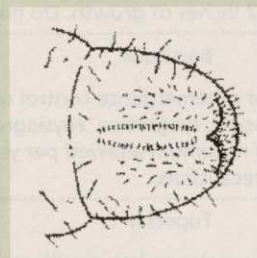
**Asiatic garden beetles:** Action thresholds are higher than for Japanese beetles (at 10 to 20 grubs per square foot) because they're significantly smaller.



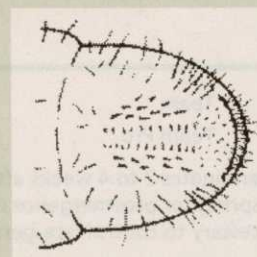
**Europe chafers:** Action thresholds usually are slightly lower than those for Japanese beetles, at five to 10 grubs per square foot.



**Japanese beetles:** Action thresholds typically range from six to 15 grubs per square foot in moderately maintained turfgrass.



**Green June beetles:** Action thresholds are usually a bit higher than for the direct root-feeding species, like the Japanese beetle.



**Oriental beetles:** Action thresholds typically range from six to 15 grubs per square foot in moderately maintained turfgrass.