Enjoy year-round profitability with the "Power of One"

With one Grasshopper, you'll enjoy the highest quality cut possible and replace a truckload of single-purpose equipment. A single FrontMount™ power unit can offer multiple opportunities for income, with a complete range of aeration, spraying, landscaping, leaf and debris cleanup and snow removal implements. Switching decks and attachments is easy, thanks to our patented QuikConverter™ Implement System, so you can handle multiple tasks with little downtime or effort. Putting a Grasshopper to work for year-round profits has been key to the success of many businesses for nearly 35 years.

To locate a dealer near you, visit our Web site at: www.grasshoppermower.com/LM
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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 according 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

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<thead>
<tr>
<th>INSECT</th>
<th>TREATMENTS</th>
<th>CHEMICAL CLASS</th>
<th>LBS. AI/ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARMYWORMS</strong></td>
<td><strong>Treat at first sign of damage. Use a soap flush to disclose populations.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticidal treatment</td>
<td>Chemical class</td>
<td>Lbs. ai/acre</td>
<td>Bifenthrin⁵</td>
</tr>
<tr>
<td>Azadirachtin</td>
<td>biological</td>
<td>0.02-0.43</td>
<td>Chloryprifos⁵</td>
</tr>
<tr>
<td>Bacillithuringiensis kurstaki</td>
<td>biological</td>
<td>0.67-1.67 q/t/acre</td>
<td>Cyfluthrin⁵</td>
</tr>
<tr>
<td>Beauveria bassiana JW-1</td>
<td>biological</td>
<td>see label</td>
<td>Deltamethrin⁵</td>
</tr>
<tr>
<td>Beta-cyfluthrin⁶</td>
<td>pyrethroid</td>
<td>0.046-0.07</td>
<td>Diazinon⁵</td>
</tr>
<tr>
<td>Bifenthrin⁵</td>
<td>pyrethroid</td>
<td>0.05</td>
<td>Heterorhabditis bacteriophora</td>
</tr>
<tr>
<td>Carbaryl</td>
<td>carbamate</td>
<td>2.0-4.0</td>
<td>Lambda-cyhalothrin⁶</td>
</tr>
<tr>
<td>Chlorpyrifos⁶</td>
<td>organophosphate</td>
<td>1.0</td>
<td>Permethrin⁶</td>
</tr>
<tr>
<td>Cyfluthrin⁵</td>
<td>pyrethroid</td>
<td>0.1-0.2</td>
<td>Spinosad</td>
</tr>
<tr>
<td>Deltamethrin⁵</td>
<td>pyrethroid</td>
<td>0.08-0.13</td>
<td>Steinernema carpocapsae</td>
</tr>
<tr>
<td>Diazinon³</td>
<td>organophosphate</td>
<td>2.7-5.5</td>
<td>Halofenozide</td>
</tr>
<tr>
<td>Heterorhabditis bacteriophora</td>
<td>biological</td>
<td>see label</td>
<td>Imidacloprid</td>
</tr>
<tr>
<td>Lambda-cyhalothrin⁶</td>
<td>pyrethroid</td>
<td>0.027-0.055</td>
<td></td>
</tr>
<tr>
<td>Permethrin⁶</td>
<td>pyrethroid</td>
<td>0.44-0.87</td>
<td>Steinernema carpocapsae</td>
</tr>
</tbody>
</table>

**BLUEGRASS BILLBUG LARVAE**

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

<table>
<thead>
<tr>
<th>BIFEBIOCAZERIA</th>
<th>LBS. AI/ACRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beauveria bassiana JW-1</td>
<td>biological</td>
</tr>
<tr>
<td>Carbaryl</td>
<td>carbamate</td>
</tr>
<tr>
<td>Diazinon³</td>
<td>organophosphate</td>
</tr>
<tr>
<td>Halofenozide</td>
<td>growth regulator</td>
</tr>
<tr>
<td>Heterorhabditis bacteriophora</td>
<td>biological</td>
</tr>
<tr>
<td>Lambda-cyhalothrin⁶</td>
<td>pyrethroid</td>
</tr>
<tr>
<td>Permethrin⁶</td>
<td>pyrethroid</td>
</tr>
<tr>
<td>Steinernema carpocapsae</td>
<td>biological</td>
</tr>
</tbody>
</table>

**CHINCH BUGS**

Acephate | organophosphate | 2.4-5.0 |
Beauveria bassiana JW-1 | biological | see label |
Beta-cyfluthrin⁶ | pyrethroid | 0.046-0.07 |
Bifenthrin⁵       | pyrethroid | 0.05 |
Carbaryl          | carbamate | 2.0-4.0 |
Chlorpyrifos⁵    | organophosphate | 1.0 |
Cyfluthrin⁵      | pyrethroid | 0.1-0.2 |
Deltamethrin⁵    | pyrethroid | 0.08-0.13 |
Diazinon³        | organophosphate | 2.7-5.5 |
Heterorhabditis bacteriophora | biological | see label |
Imidacloprid     | chloronicotinyl | 0.40 (suppression only) |
Lambda-cyhalothrin⁶ | pyrethroid | 0.027-0.055 |
Permethrin⁶      | pyrethroid | 0.44-0.87 |
Steinernema carpocapsae | biological | see label |
**CLOVER MITE**

<table>
<thead>
<tr>
<th>Insectidal treatment</th>
<th>Chemical class</th>
<th>Lbs. ai/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifenthrin&lt;sup&gt;e&lt;/sup&gt;</td>
<td>pyrethroid</td>
<td>0.05</td>
</tr>
<tr>
<td>Chlorpyrifos&lt;sup&gt;b&lt;/sup&gt;</td>
<td>organophosphate</td>
<td>1.0</td>
</tr>
<tr>
<td>Deltamethrin&lt;sup&gt;e&lt;/sup&gt;</td>
<td>pyrethroid</td>
<td>0.08-0.13</td>
</tr>
<tr>
<td>Diazinon&lt;sup&gt;a&lt;/sup&gt;</td>
<td>organophosphate</td>
<td>2.7-5.5</td>
</tr>
<tr>
<td>Dicofol</td>
<td>organochlorine</td>
<td>0.46-0.92</td>
</tr>
<tr>
<td>Lambda-cyhalothrin&lt;sup&gt;e&lt;/sup&gt;</td>
<td>pyrethroid</td>
<td>0.027-0.055</td>
</tr>
</tbody>
</table>

**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 |

**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 |
*Heterorhabditis bacteriophora* | 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) |
Steinernema carpocapsae | 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) |

**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 |
*Beauveria bassiana* 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 |
*Steinernema riobravis* | biological | see label |
*Steinernema scapterisci* | biological | see label |

**SOD WEBWORMS**

Acephate | organophosphate | 2.4-5.0 |
Azadirachtin | biological | 0.02-0.43 |
*Bacillus thuringiensis* kurstaki | biological | see label |
*Beauveria bassiana* 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 |
Fluvalinate | pyrethroid | 0.05-0.16 |
Halofenozide | growth regulator | 1.0 |
*Heterorhabditis bacteriophora* | biological | see label |
Lambda-cyhalothrin<sup>e</sup> | pyrethroid | 0.027-0.055 |
Permethrine | pyrethroid | 0.44-0.87 |
Spinosad | spinosad | 0.24 (small larvae), 0.4 (large larvae) |
Steinernema carpocapsae | biological | see label |
Trichlorfon | organophosphate | 5.4-8.0 |
Insect Control / LM's Quick Reference Guide

TURF PEST INSECTS AND CHEMICAL CONTROLS (CONTINUED)

- WHITE GRUBS

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

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

- BLACK TURFGRASS ATAENIUS

Acephate organophosphate 3.0-4.0

*Beauveria bassiana* JW-1 biological see label

Beta-cyfluthrin^e pyrethroid 0.07 (adults)

Bifenthrin^e pyrethroid 0.05-0.1 (adults)

Chlorpyrifos^b organophosphate 2.0-4.0

Halofenozide growth regulator 1.5

Imidacloprid chloronicotinyl 0.3-0.4

Lambda-cyhalothrin^e pyrethroid 0.055 (adults)

Spinosad spinosad 0.4 (adults)

Trichlorfon organophosphate 8.0

- GREEN JUNE BEETLE

*Beauveria bassiana* JW-1 biological see label

Carbaryl carbamate 2.0-4.0

Halofenozide growth regulator 1.5

Trichlorfon organophosphate 8.0

- MAY/JUNE BEETLES, PHYLOPHAGA SPP

<table>
<thead>
<tr>
<th>Carbaryl</th>
<th>carbamate</th>
<th>8.0</th>
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<tbody>
<tr>
<td>Halofenozide</td>
<td>growth regulator</td>
<td>1.5</td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>chloronicotinyl</td>
<td>0.3</td>
</tr>
<tr>
<td>Trichlorfon</td>
<td>organophosphate</td>
<td>8.0</td>
</tr>
</tbody>
</table>

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

Grub identification tips

BY PAT VITTUM, 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 action 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.
**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.

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**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.

---

**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.

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*From the November 2002 issue of Turfgrass Trends. Visit www.turfgrassrends.com*
# CHEMICAL CONTROL OF TURFGRASS WEEDS

## ANNUAL GRASSY WEEDS: PREEMERGENCE CONTROL

<table>
<thead>
<tr>
<th>Weed Common name</th>
<th>Herbicide</th>
<th>Trade name</th>
<th>Formulation</th>
<th>Al/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crabgrass, barnyardgrass, foxtails, panicum</td>
<td>benefin</td>
<td>Balan</td>
<td>25G</td>
<td>2 lb.</td>
</tr>
<tr>
<td>Goosegrass</td>
<td>benefin + trifluralin</td>
<td>Team</td>
<td>2G</td>
<td>2 lb.</td>
</tr>
<tr>
<td></td>
<td>benefin + trifluralin</td>
<td>Team Pro</td>
<td>0.86G</td>
<td>1.5-3.0 lb.</td>
</tr>
<tr>
<td></td>
<td>oxadiazon 2G</td>
<td>Ronstar</td>
<td>2G, 50WP</td>
<td>2-4 lb.</td>
</tr>
<tr>
<td>pendimethalin</td>
<td>Pre-M, Haits, Weedgrass control</td>
<td>65DG</td>
<td>1.5-2.0 lb.</td>
<td></td>
</tr>
<tr>
<td>*prodiamine</td>
<td>Barricade</td>
<td>65WG</td>
<td>0.65-0.75 lb.</td>
<td></td>
</tr>
<tr>
<td>siduron</td>
<td>Tupersan</td>
<td>4.6%, 50WP</td>
<td>6-12 lb.</td>
<td></td>
</tr>
</tbody>
</table>

Goosegrass generally germinates 2 to 4 weeks after crabgrass. Treat later than for crabgrass. Apply in spring for preemergence control on mature turfgrass only. Split applications may be necessary to control late-germinating goosegrass.

*Restricted-use pesticide; may be purchased and used only by certified applicators.
## ANNUAL GRASSY WEEDS: PREEMERGENCE CONTROL (CONTINUED)

<table>
<thead>
<tr>
<th>Weed</th>
<th>Herbicide</th>
<th>Common name</th>
<th>Trade name</th>
<th>Formulation</th>
<th>Al/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goosegrass (continued)</td>
<td>oxadiazon 2G</td>
<td>Ronstar</td>
<td>2G, 50WP</td>
<td>4 lb.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply in spring for preemergence control on mature Kentucky bluegrass, tall fescue, and perennial ryegrass only. NOTE: Ronstar 50WP formulation is labeled for zoysia turf but has injured other cool-season turfgrasses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bensulide + oxadiazon</td>
<td>Scott's Goosegrass/ Crabgrass Control</td>
<td>4E+50WP</td>
<td>6.5+1.5 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dithiopyr</em></td>
<td>Dimension</td>
<td>1EC</td>
<td>0.5 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply in spring for preemergence control on established turfgrasses. Tolerant turfgrasses include bluegrasses, fescues, ryegrasses, zoysiagrass, and creeping bentgrass.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pendimethalin</td>
<td>Pre-M, Halts,</td>
<td>Weedgrass Control</td>
<td>60DG</td>
<td>2 lb.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60WP</td>
<td>2 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply in spring for preemergence control on mature turfgrass only. Do not use on closely cut bentgrass. Second application may be necessary to control late-germinating goosegrass.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prodiamine</em></td>
<td>Barricade</td>
<td>65WDG</td>
<td>0.75 lb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply in early spring for preemergence control on established turfgrasses. Tolerant turfgrasses include bluegrasses, fescues, ryegrasses and zoysiagrass. More consistent control is obtained by sequential applications of 0.75 lb. followed six weeks later by 0.25 lb. This higher rate required to control goosegrass is not safe on bentgrass. Maximum dose for any application and maximum allowed per year vary with turf type.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ANNUAL GRASSY WEEDS: POSTEMERGENCE CONTROL

Crabgrass, goosegrass, foxtail, barnyardgrass, other summer annual grasses

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Common name</th>
<th>Formulation</th>
<th>Al/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dithiopyr</em></td>
<td>Dimension</td>
<td>1EC</td>
<td>0.38-0.5 lb.</td>
</tr>
<tr>
<td></td>
<td>Postemergent control of young seedling (pretillering) crabgrass but not goosegrass. Addition of 0.25% (by volume) of a nonionic surfactant may improve control. To control tillered crabgrass, dithiopyr may be mixed with Acclaim or MSMA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenoxaprop</td>
<td>Acclaim Extra</td>
<td>0.57EC</td>
<td>1/8-3/8 lb.</td>
</tr>
<tr>
<td></td>
<td>Apply to actively growing grassy weeds. Use higher rates for larger weeds. Do not tank mix with broadleaf herbicides. See label for other restrictions. Addition of a surfactant is not generally recommended.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methanearsonates</td>
<td>MSMA</td>
<td>6.0L, 6.6L, 55WG</td>
<td>2 lb.</td>
</tr>
<tr>
<td></td>
<td>Apply after crabgrass has emerged but before it is large enough to be competitive with desirable turfgrass. Repeat application may be necessary. Does not control goosegrass effectively. May discolor turfgrass. DSMA is also labeled but is used at higher rates.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Restricted-use pesticide; may be purchased and used only by certified applicators.*
## CHEMICAL CONTROL OF TURFGRASS WEEDS (CONTINUED)

### ANNUAL GRASSY WEEDS: POSTMERGENCE CONTROL (CONTINUED)

<table>
<thead>
<tr>
<th>Weed</th>
<th>Herbicide</th>
<th>Trade name</th>
<th>Formulation</th>
<th>AI/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual bluegrass in perennial ryegrass</td>
<td>ethofumesate</td>
<td>Prograss</td>
<td>1.5EC 1-2 lb./A (2/3-1 1/3 gal./A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>North - Apply in late August or early September to control seedling annual bluegrass. Apply follow-up treatment 30 to 60 days later. Do not exceed 4 lb. AI/A per year. On seedling ryegrass, apply only after ryegrass seedlings are 1 inch tall. South - First app. 30-45 days after overseeding with perennial ryegrass. Second 21-28 days later.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual bluegrass in creeping bentgrass</td>
<td>paclobutrazol</td>
<td>Scott’s TGR</td>
<td>0.36G 1/3-3/4 lb./A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>For suppression of annual bluegrass and gradual conversion to bentgrass. Use lower rate on sandy soils. Apply in late summer or early fall (no later than October 1 in north) and again in the spring after 100% green-up. Applications when turfgrass vigor is low may result in undesirable levels of discoloration and growth reduction.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** CORNELL COOPERATIVE EXTENSION'S 2001 PEST MANAGEMENT GUIDELINES FOR COMMERCIAL TURFGRASS / NORTH CAROLINA COOPERATIVE EXTENSION SERVICE

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