

DuPont™ Acelepryn™ Insecticide Technical Bulletin



New Mode of Action for a New Level of Performance

There's a new way to control white grubs and other turf-damaging pests while also minimizing the impact on the environment. DuPont™ Acelepryn™ is an entirely new insecticide class with a novel mode of action. Studies prove that it delivers superior results at the lowest application rate (lb ai/acre) ever utilized for white grub control. And that a single application lets turf managers control a wide variety of other turf insect pests and entire pest complexes. DuPont™ Acelepryn™ combines this performance with the lowest water solubility of any white grub control product. Plus an excellent environmental and toxicological profile.

DuPont™ Acelepryn™ Insecticide Profile

New class of chemistry—anthranilic diamide

Novel mode of action

Controls every key turf-damaging white grub species

Controls many other important turf and ornamental pests

Multiple targeting:
control many pests with a single application

Excellent environmental and toxicological profile

Low application rates (lb ai/acre)

Classified as reduced-risk under the U.S. EPA reduced-risk program



The miracles of science™

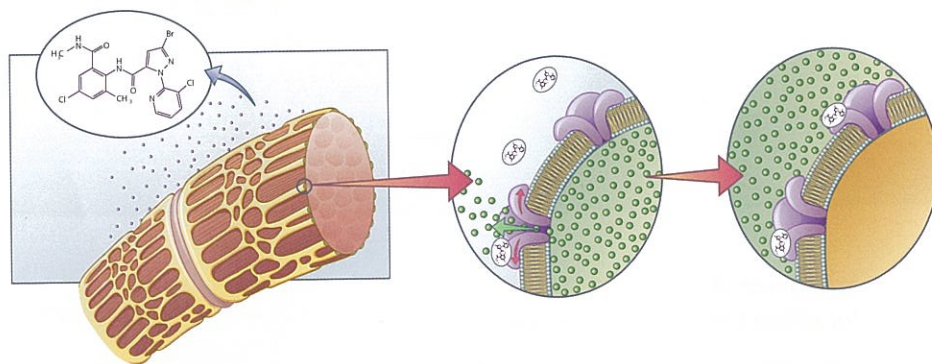
DuPont™ Acelepryn™ is not registered for sale or use in the United States.

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New Molecule, New Class of Chemistry: DuPont™ Calteryx™

The majority of turfgrass insecticides belong to a handful of chemical classes and feature even fewer physiological modes of action. And over time, insects can become less susceptible. But Calteryx™, the active ingredient in DuPont™ Acelepryn™, belongs to an entirely new class of chemistry called the anthranilic diamides. No turf insects have been exposed to this class. Which makes Acelepryn™ an excellent choice for Insecticide Resistance Management programs. Acelepryn™ also has minimal impact on beneficial arthropods, making it an excellent choice for Integrated Pest Management programs.

Calteryx™ Mode of Action



Phase 1

Exposure

Insect comes in contact with or ingests Calteryx™, the active ingredient in Acelepryn™ insecticide.

Phase 2

Activation

Calteryx™ binds to and activates the ryanodine receptors located in the insect's muscle, and causes them to open.

Phase 3

Paralysis and Death

Calcium ions flow out of the open ryanodine receptors, depleting calcium needed for muscle contraction. Insect muscle paralysis leads to death.

New Mode of Action Inspired by Nature

DuPont™ Acelepryn™ is the first turf product featuring an active ingredient from the anthranilic diamide class of chemistry. This class was inspired by research into the insecticidal properties of ryanodine—a natural substance found in the bark of trees and shrubs of the genus *Ryania*.

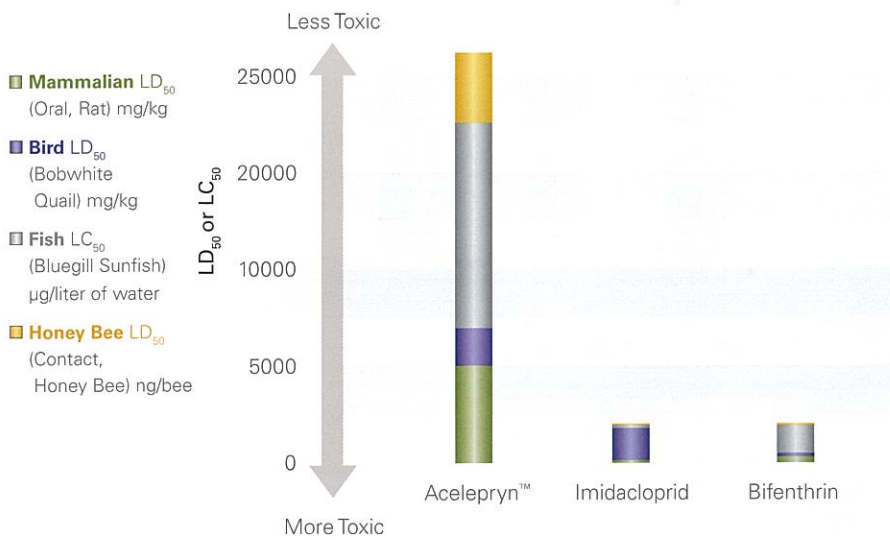
Calteryx™, the active ingredient in DuPont™ Acelepryn™, is a synthetic compound that affects the ryanodine receptors in the insect muscle fiber. These receptors regulate the flow of calcium into the cell cytoplasm to control muscle contraction.

Acelepryn™ binds to the ryanodine receptor and causes it to remain open, resulting in a depletion of calcium ions that disrupts muscle contraction.

The ryanodine receptors in the pests Acelepryn™ targets are 400 to 3,000 times more sensitive to anthranilic diamides than the receptors in mammals. This is one reason why Acelepryn™ has an excellent environmental and toxicological profile, and why the EPA has granted DuPont™ Acelepryn™ reduced-risk status.

Excellent Toxicological and Environmental Profile

DuPont™ Acelepryn™ is an excellent example of our commitment to creating more environmentally sensitive products. In 1989 DuPont became one of the first companies to publicly establish environmental goals. And since then we've broadened our sustainability commitments, with an eye toward developing safer and environmentally improved new products for key global markets.

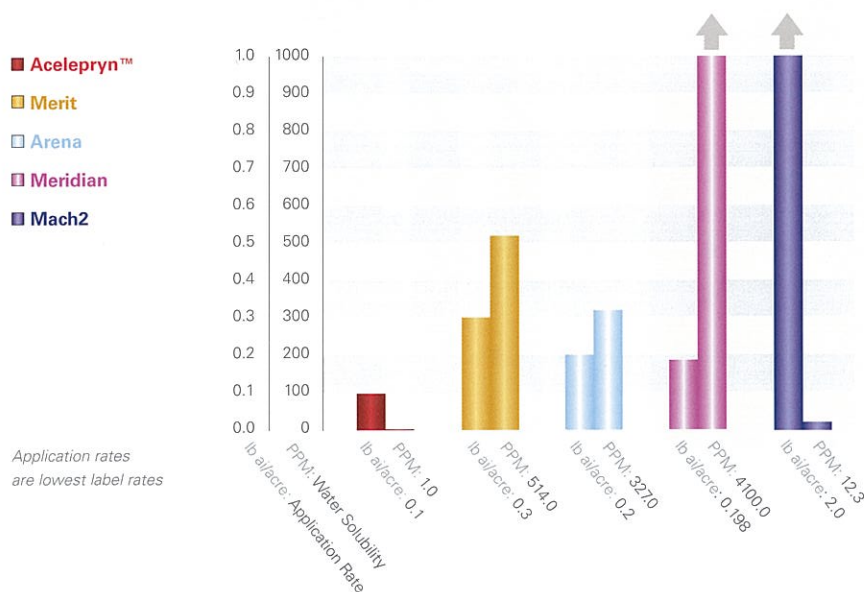


Turf Insecticide Toxicity Profile

The toxicological properties of Calterix™, the active ingredient in Acelepryn™, have been compared with the active ingredients in two of the leading turf insecticides. EPA values were used in this analysis. Calterix™ has low impact on non-target organisms such as birds, fish, mammals and honey bees.

Acelepryn™ was granted reduced-risk status by the EPA for applications to turfgrass in April 2007.

Source: DuPont Stine-Haskell Research Center



Preventative White Grub Product Environmental Profile

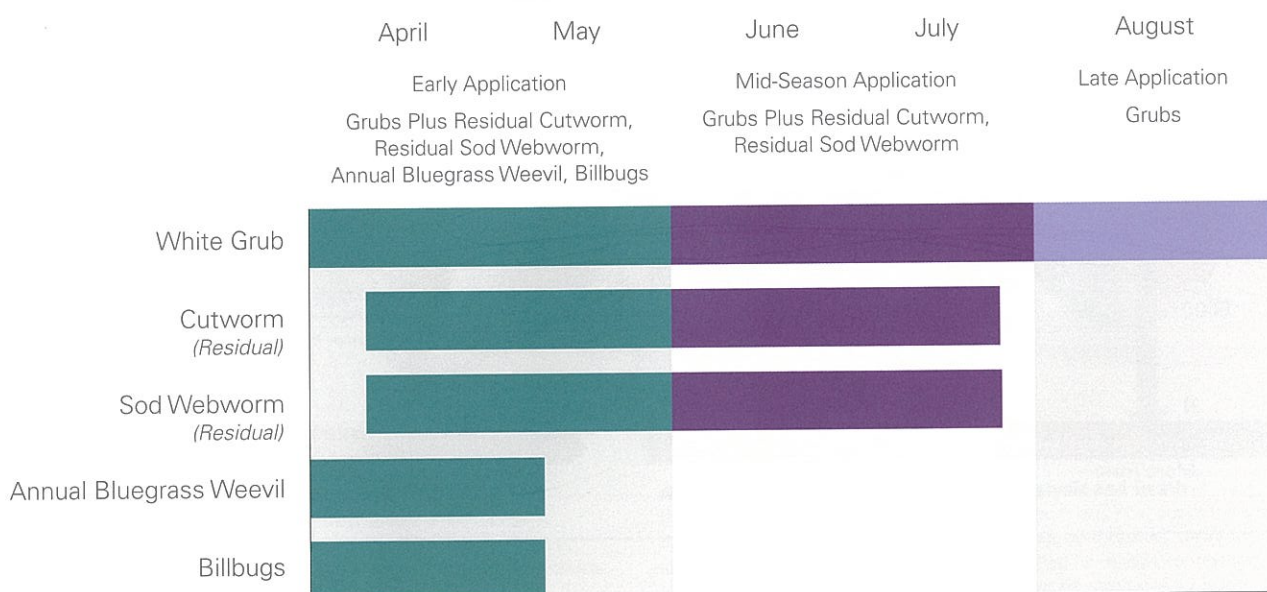
Studies show that DuPont™ Acelepryn™ has low impact on the environment when applied according to label recommendations. The binding of Acelepryn™ within the soil matrix, its low water solubility and its low volatility show low potential for movement toward surface or ground water. This chart compares the water solubility and white grub application rate (lb ai/acre) of Acelepryn™ with those of other preventative white grub control products. Acelepryn™ has the lowest water solubility of any of the products, and its application rate (lb ai/acre) is the lowest ever utilized for white grub control.

Application Sites

DuPont™ Acelepryn™ is designed to control white grubs and other key pests on a wide range of turf sites, including golf courses and commercial and residential lawns. It can also be used to control key pests infesting recreational turf, as well as pests of landscape ornamentals, including trees, shrubs, foliage plants, flowers and non-bearing fruit and nut trees.

One Early Application Controls Multiple Pests

Upon registration, Acelepryn™ will provide golf course superintendents, lawncare operators and landscape professionals consistent performance and flexible application timing. Turf professionals targeting white grubs can control multiple pests with a single application at low application rates.



Three Convenient Formulations

Upon registration, spray applications of Acelepryn™ will be available as a suspension concentrate formulation containing 1.67 pounds of active ingredient per gallon. Application rates for Acelepryn™ are very low; for white grub control, 8 fluid ounces will treat one acre of turf.

For dry applications, Acelepryn™ will be available on an inert granular.

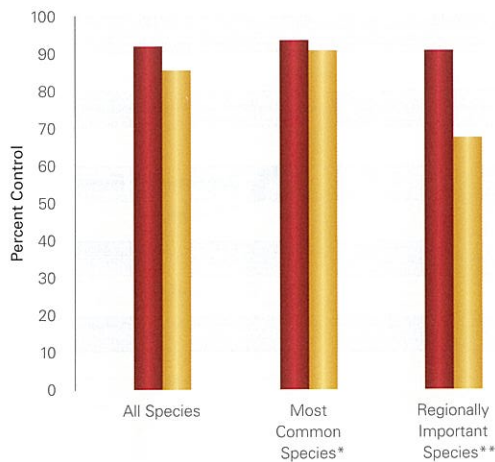
DuPont will also make the active ingredient in Acelepryn™ available for the formulation of granular fertilizers with nutrient content designed to meet a wide variety of turfgrass nutritional requirements.

Performance Summary

Since 2003, leading entomologists throughout the United States have evaluated DuPont™ Acelepryn™ for turf and ornamental insect control. In that time, nearly 500 field trial protocols with independent university researchers have demonstrated that Acelepryn™ is effective against every major turf-damaging white grub species. In particular, studies show that Acelepryn™:

- ▶ Delivers flexibility in application timing, as well as the lowest application rate (0.1 lb ai/acre) ever utilized for white grub control
- ▶ Controls other important turf insects, including annual bluegrass weevil, billbugs and caterpillars
- ▶ Provides long residual control of key turf pests
- ▶ Can be used as a foliar, soil or bark treatment for ornamental insect control

- **Acelepryn™**
1.67 SC
8.0 fl oz/acre
0.104 lb ai/acre
- **Merit**
75 WP
6.4 oz/acre
2 F
19.2 fl oz/acre
0.3 lb ai/acre



*Include Japanese Beetle; Oriental Beetle; European Chafer; Northern and Southern Masked Chafer

**Include Asiatic Garden Beetle; Green June Beetle; Black Turfgrass Ataenius; Aphodius spp.; Phyllophaga spp.

Applications Made Before August 16th



White Grub Control—Acelepryn™

University Field Trials 2005–2007

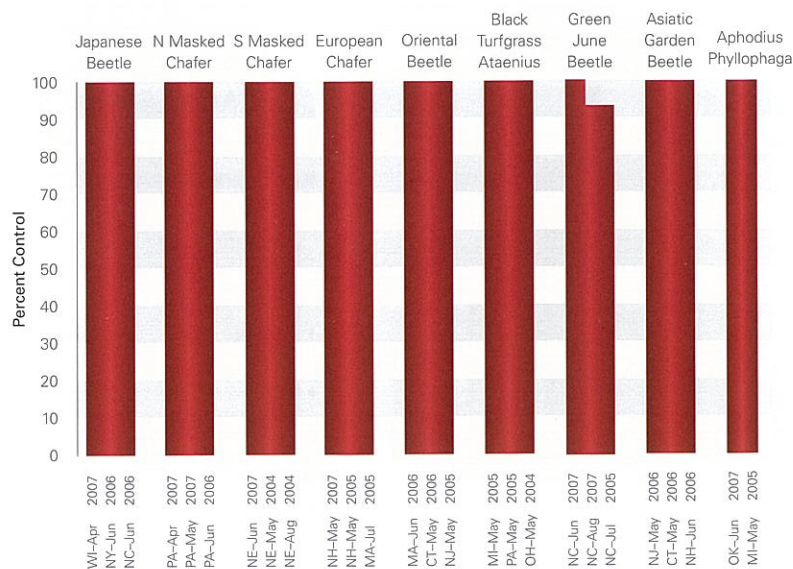
- ▶ This chart summarizes three years of trials in which liquid applications were made before August 16th. The data included in this analysis are true “head-to-head” comparisons where Acelepryn™ and Merit were applied in every trial.

Results:

- ▶ All Species:
77 field comparisons, 131 data points
Acelepryn™: 91.5% control
Merit: 86.3% control
- ▶ Most Common Species:
70 field comparisons, 111 data points
Acelepryn™: 91.8% control
Merit: 89.3% control
- ▶ Regionally Important Species:
17 field comparisons, 20 data points
Acelepryn™: 90% control
Merit: 69.8% control

Source: Comprehensive DuPont Database—Multiple Universities

- **Acelepryn™**
1.67 SC
8.0 fl oz/acre
0.104 lb ai/acre



Effective Against 10 White Grub Species

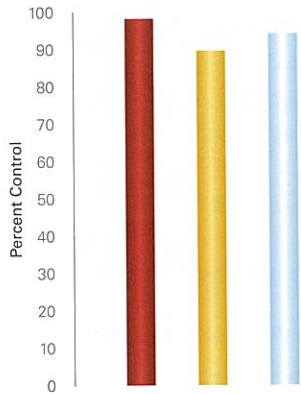
Multiple trials from 2004 to 2007 prove that Acelepryn™ insecticide is effective at controlling turf-damaging white grubs. Trials were conducted by leading entomologists in numerous independent university field trials across the country. There was a wide range of application dates, and 95%–100% control was achieved for every white grub species tested in these trials.

Source: Comprehensive DuPont Database—Multiple Universities

■ **Acelepryn™**
1.67 SC
8.0 fl oz/acre
0.104 lb ai/acre

■ **Merit**
75 WP
6.4 oz/acre
0.3 lb ai/acre

□ **Arena**
50 WG
10.56 oz/acre
0.33 lb ai/acre



European Chafer Trial New Hampshire, May 2006

Key Characteristics:

- ▶ Important white grub species infesting turfgrass in the northern states.
- ▶ Found from southern New England west across northern Pennsylvania and Ohio, and into Michigan.
- ▶ Larvae damage turf in home lawns, and on golf courses and sod farms.

Results:

Acelepryn™ provided over 98% control and required roughly 3 times less active ingredient than Merit and Arena.

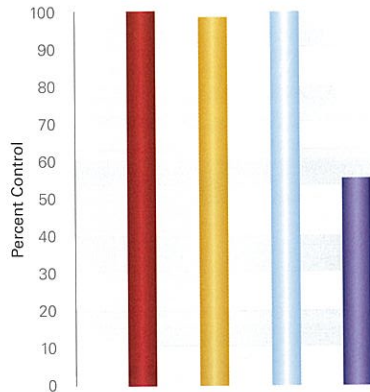
Source: University of New Hampshire

■ **Acelepryn™**
1.67 SC
8.0 fl oz/acre
0.104 lb ai/acre

■ **Merit**
75 WP
6.4 oz acre
0.3 lb ai/acre

□ **Arena**
50 WG
8.0 oz acre
0.25 lb ai/acre

■ **Mach2**
1.5 G
133.0 lb/acre
2.0 lb ai/acre



Japanese Beetle and Northern Masked Chafer Trial Ohio, May 2006

Key Characteristics:

- ▶ Japanese beetle is found in the Southeast, Midwest and northeastern states as well as Ontario, Canada.
 - Larvae damage turf in home lawns, and on golf courses and sod farms; also feed on the roots of many ornamental plants.
- ▶ Northern masked chafer is found from southern New England and Ontario west to Illinois and south to Kentucky and Missouri.
 - Larvae damage turf in home lawns, and on golf courses and sod farms.

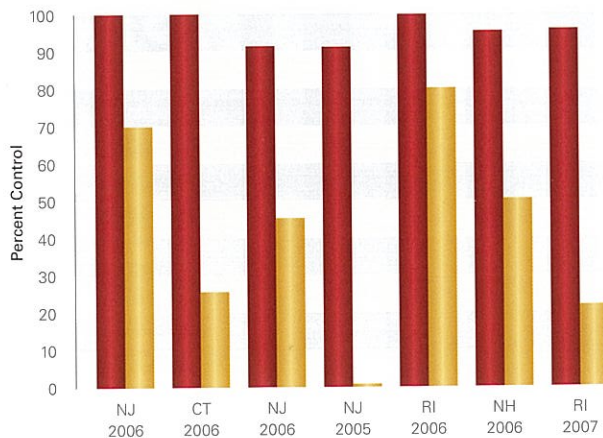
Results:

Acelepryn™ provided 100% control and required roughly 3 and 2.5 times less active ingredient than Merit and Arena, respectively, and 19 times less active ingredient than Mach2.

Source: Ohio State University

■ **Acelepryn™**
1.67 SC
0.167 G
0.067 GF
0.1–0.104 lb ai/acre

■ **Merit**
75 WP
0.5 G
0.2 GF
0.3 lb ai/acre



Asiatic Garden Beetle Trial 2005–2007

Key Characteristics:

- ▶ Found from New England west to Indiana and south to North Carolina.
- ▶ Recent surveys in New Jersey show it to be the second most prominent white grub in turfgrass.
- ▶ Larvae damage turf in home lawns, and on golf courses and sod farms.
- ▶ Adult Asiatic garden beetles feed on a wide variety of ornamental plants.

Results:

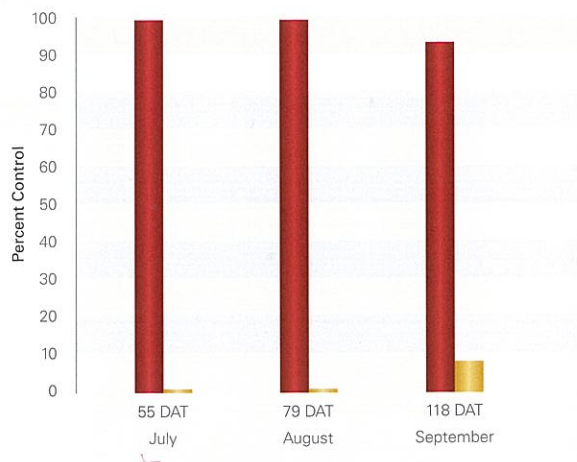
In 7 trials conducted during 2005 to 2007, Acelepryn™ averaged greater than 95% control, while Merit averaged less than 45% control.

Source: Rutgers University, University of Rhode Island, University of New Hampshire, Connecticut Agricultural Experiment Station

■ **Acelepryn™**
 1.67 SC
 8.0 fl oz/acre
 0.104 lb ai/acre

■ **Merit**
 75 WP
 6.4 oz/acre
 0.3 lb ai/acre

May applications



Black Cutworm Trial New Hampshire, May 2007

Key Characteristics:

- ▶ Black cutworms are found across most of the United States; most prevalent in the Midwest and Northeast on golf course greens, tees and fairways.

Results:

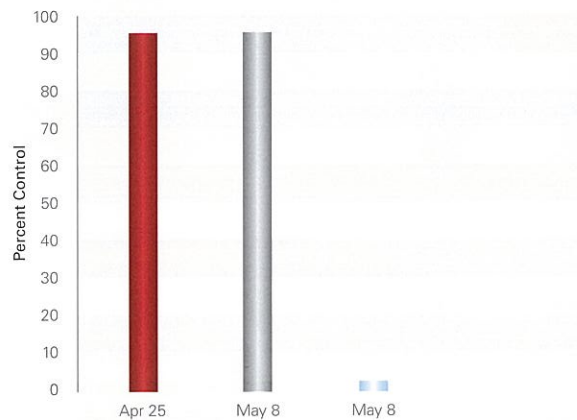
Acelepryn™ provides excellent preventative control of black cutworms. No other white grub product provides this duration of black cutworm control.

Source: University of New Hampshire

■ **Acelepryn™**
 1.67 SC
 12.0 fl oz/acre
 0.157 lb ai/acre

■ **Talstar**
 0.67 F
 19.2 fl oz/acre
 0.1 lb ai/acre

■ **Arena**
 50 WDG
 6.4 oz/acre
 0.2 lb ai/acre



Annual Bluegrass Weevil Trial New Hampshire 2007

Key Characteristics:

- ▶ Primarily a pest of short cut (less than ½ inch) annual bluegrass.
- ▶ Ranges from southern Maine west to northeastern Ohio and south to Virginia Beach.
- ▶ Pyrethroid resistance by annual bluegrass weevil has recently been documented, underscoring the need for new chemistry featuring a novel mode of action.

Results:

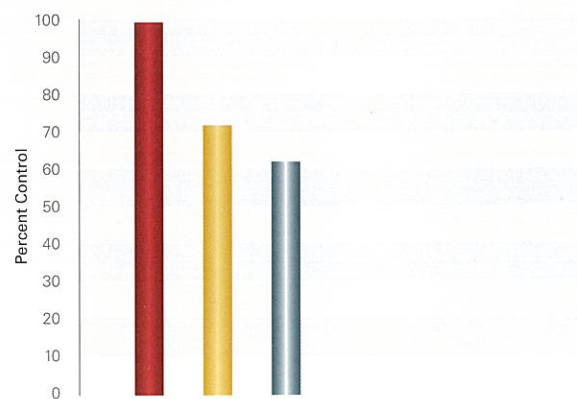
Acelepryn™ provided excellent control of annual bluegrass weevil at an application rate that provides excellent white grub control.

Source: University of New Hampshire

■ **Acelepryn™**
 1.67 SC
 8.0 fl oz/acre
 0.104 lb ai/acre

■ **Merit**
 75 WP
 6.4 oz/acre
 0.3 lb ai/acre

■ **Scimitar**
 9.7 CS
 10.0 fl oz/acre
 0.06875 lb ai/acre



Billbug Trial Pennsylvania, May 2006

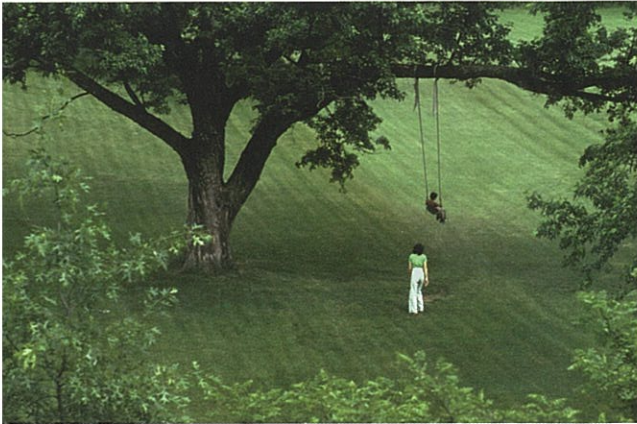
Key Characteristics:

- ▶ Widely distributed; can probably be found in each of the contiguous 48 states.
- ▶ Infests many turfgrass species and is especially troublesome in Kentucky bluegrass.

Results:

An early May application of Acelepryn™ provided 100% control of a mixed infestation of bluegrass and hunting billbugs.

Source: Penn State University



To learn more about DuPont™ Acelepryn™ insecticide, contact DuPont Professional Products at 1-888-6DuPont (1-888-638-7668) or visit us at proproducts.dupont.com.

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DuPont Professional Products

Turf and Ornamental:

Acelepryn™ Insecticide

Advion® Fire Ant Bait

Advion® Mole Cricket Bait

Provaunt™ Insecticide

TranXit® Herbicide

This reference guide is not intended as a substitute for the product label for the products referenced herein. Product labels for the above products contain important precautions, directions for use and product warranty and liability limitations that must be read before using the product. Applicators must be in possession of the product label(s) at the time of application. Always read and follow all label directions and precautions for use when using any pesticide.

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Mach2 is a registered trademark of Dow AgroSciences, LLC.

Merit is a registered trademark of Bayer Crop Science.

Scimitar is a trademark of a Syngenta Group Company.

Talstar is a registered trademark of FMC Corporation.

Registration is pending in the United States and other global turf markets.

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