Ference® Insecticide

syngenta®

Ference Technical Bulletin

Innovative Technology for Annual Bluegrass Weevil Control

Ference® insecticide is targeted to control **all** larval stages (one through five) of annual bluegrass weevil (ABW). Ference contains the active ingredient, *cyantraniliprole*, which offers an innovative technology to superintendents with an effective and flexible control option for ABW.

PEST SPECTRUM

- Annual bluegrass weevil (Larval stages 1-5): 12 - 20 fl oz/A
- Billbugs: 8 - 16 fl oz/A
- European crane fly: 8 - 16 fl oz/A
- White grubs: 8 - 16 fl oz/A
- Turf caterpillars: 2 - 16 fl oz/A
- Chinch bugs (suppression only): 8 - 20 fl oz/A

Cyantraniliprole Insecticide Profile

- Group 28 class of chemistry – anthranilic diamide
- Absorbed via roots and systemically translocates through the plant
- Provides rapid cessation of feeding to quickly protect plant from insect damage
- Translaminar movement protects entire leaf surface
- For use on all turfgrass sites including tees, roughs, fairways, greens and collars. Please see label for additional use sites.
- Favorable environmental and toxicological profile
- Registered by the US Environmental Protection Agency under its Reduced Risk Program*

*A reduced risk pesticide use is defined as one which may reasonably be expected to accomplish one or more of the following; (1) reduces pesticide risks to human health; (2) reduces pesticide risks to non-target organisms; (3) reduces the potential for contamination of valued, environmental resources, or (4) broadens adoption of IPM or makes it more effective. Ference qualifies under one or more of the above criteria.

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How does *cyantraniliprole* work?

Mode of Action

Cyantraniliprole is a second generation 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.

Cyantraniliprole acts through ingestion and contact activity. Ference stops larvae turf-feeding damage within minutes after ingestion; larvae die within hours to days depending on insect life stage and species.

Cyantraniliprole is a synthetic compound that affects the ryanodine receptors in the insect muscle fiber, shown in the image below.

Phase 1: Exposure

Insects come in contact with or ingest the active ingredient.

Phase 2: Activation

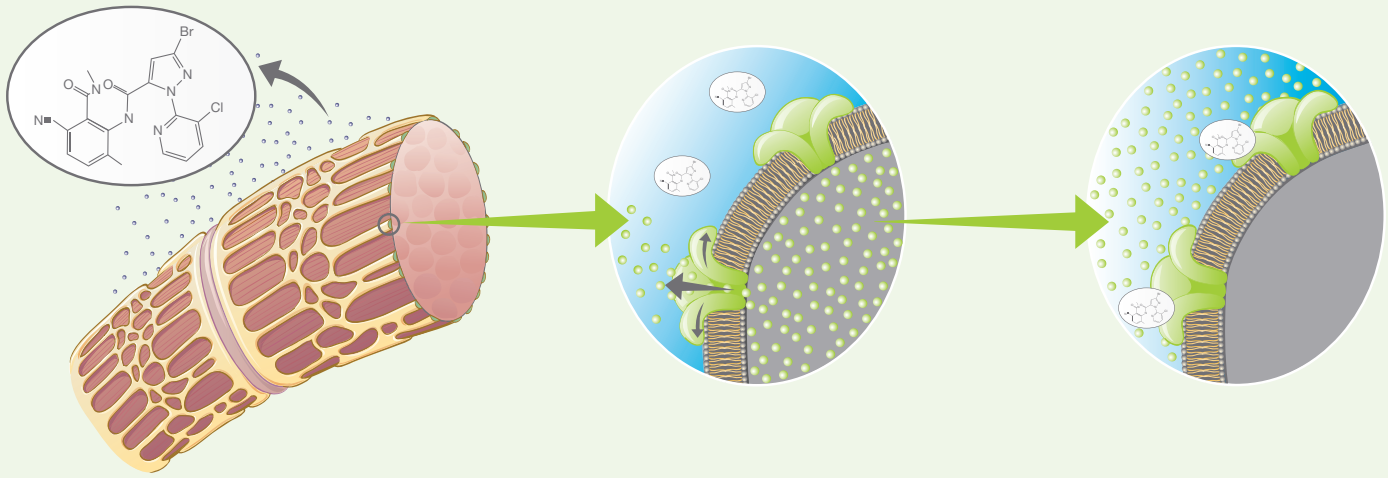
The product binds to the ryanodine receptors in the insects' muscles and causes them to open.

Phase 3: Paralysis and death of insects

Calcium flows out of the open ryanodine receptors, depleting calcium needed for muscle contraction. The resulting muscle paralysis leads to insect death.

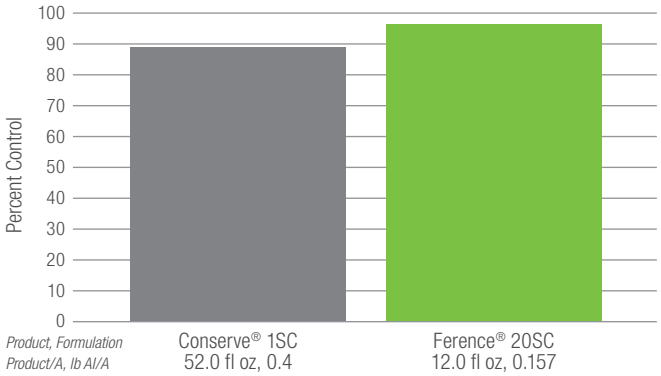
Systemic and Translaminar Activity

Root uptake of *cyantraniliprole* is gradual and uniform, allowing complete plant protection shortly after application. *Cyantraniliprole* will penetrate the leaf cuticle and move locally within the plant and accumulate in meristematic tissues. It also exhibits upward systemic movement through the plant xylem.



FERENCE DELIVERS CONSISTENT CONTROL

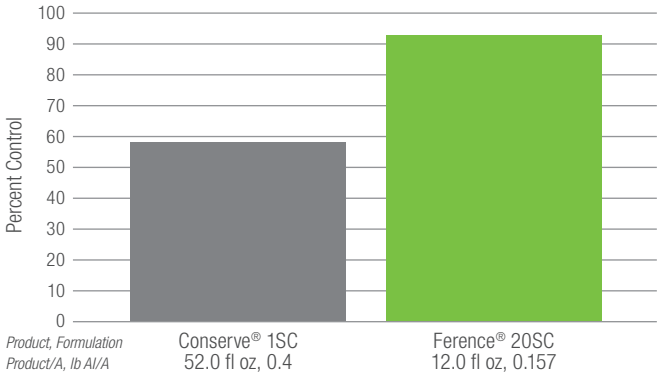
Late Instar ABW Larvae, 2010



- Average across four trials performed in NH, NJ, PA, RI in 2010
- Each treatment was in every trial

NH: PR10-11-1131 12-1421 13-1311, NJ: PR10-11-1135 12-1425 13-1315, PA: PR10-11-1134 12-1424 13-1314, RI: PR10-11-1136 12-1426 13-1316

Late Instar ABW Larvae, 2011

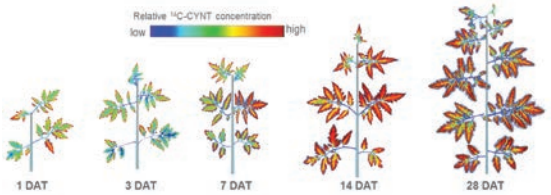


- Average across three trials performed in MA, NH, PA in 2011
- Each treatment was in every trial

MA: PR11-11-1142 13-1412, NH: PR11-11-1141 12-1411, PA: PR11-11-1143 13-1413 13-1414

Visual Translocation of Ference

- Applied as transplant drench (root uptake) in tomatoes (xylem systemic).
- Plants were harvested at 1, 3, 7, 14 and 28 days after treatment.
- Leaves were cut from the main stem and pressed flat for two or more days, mounted on 20 cm x 20 cm glass plates, covered with mylar film and exposed to imaging plates for 48 hours, which were then scanned using a Fuji Phosphorimager.



Integrated Pest Management (IPM) Programs

Ference is in GROUP 28 of the EPA's Insecticide and Acaricide Groups Based on Target Site of Action (EPA PR Notice 2001-5) and may be used in rotational resistance management programs. While research continues on additional programs, ABW is a complex pest that requires rotation of chemistries and a programmatic approach. For example, the ABW program timing chart below uses Acelepryn® insecticide in the first generation because its long residual will also provide season-long control of grubs and lepidopteran pests with this application. Ference is used in the later generations to provide effective control of the asynchronous summer populations. Ference will control larvae inside the stem (1-2 instar) and larvae outside of the stem (3-5 instar).

WeevilTrak

Insecticide Treatment program	1st Generation		
	Over wintered Adults	**Early Instar (inside of stem)**	**Late Instar (outside of stem)**
	Scimitar® GC 10 fl oz/A	Acelepryn® 12 fl oz/A	Ference® 12 fl oz/A
Timing	Application is based on degree days and ABW activity. Some areas may require two applications spaced 14 days apart. Early to mid April Forsythia half green half gold	Application should be applied prior to egg hatch to ensure that Acelepryn is in the transpiration stream prior to larvae feeding. Late April to early May Dogwood full bloom	Application should be applied when the third stage larvae exit the stem to feed on the crown and surface roots. Mid May to early June Rhododendron catawbiensis full bloom

Insecticide Treatment program	2nd Larval Generation			3rd Larval Generation (if needed)
	Adults	**Adults and Late Instar**	**Asynchronous larvae**	
	Scimitar® GC 10 fl oz/A	Provaunt® WDG 18 oz/A*	Ference® 12 fl oz/A	Provaunt® WDG 18 oz/A*
Timing	Application is based on the presence of adults. Mid to late June	Application should be applied about 7 to 14 days after adulticide. Late June to early July	Application should be applied about 14 to 21 days after Provaunt. Late July to early August	Application should be applied about 21 to 28 days after Ference. Late August to early September

*It is recommended to water in Provaunt applications with .05 to .10 inches of water immediately after application

Comparative Specimen Label

	Ference® Insecticide	Aloft® GC SC insecticide
Signal Word	None	Warning
Restricted Use	N/A	Restricted Use Pesticide
PPE	Long sleeve shirt, long pants, shoes plus socks	Long sleeve shirt, long pants, shoes plus socks, chemical resistant gloves
Hazards to Humans & Domestic Animals	When used as directed does not present hazard to humans or domestic animals.	May be fatal if swallowed. Avoid contact with skin, eyes or clothing. Causes moderate eye irritation. Harmful if inhaled or absorbed through skin. Avoid breathing spray mist.
Water Advisory	Do not make ground applications within 25 feet of lakes, rivers, reservoirs, permanent streams, marshes, natural ponds, estuaries, or coastal areas.	Application is prohibited directly into sewers or drains, or to any area like a gutter where drainage to sewers, storm drains, water bodies or aquatic habitat can occur. Do not allow the product to enter any drain during or after application. Do not apply within a 25 foot radius of the following: Lakes, reservoirs, rivers, permanent streams, marshes or natural ponds, estuaries and commercial fish farm ponds.

Toxicological and Environmental Profile Characteristics

	Cyantraniliprole	Chlorantraniliprole	Imidacloprid	Spinosad	Chlorpyrifos	Clothianidin	Bifenthrin
Acute toxicity (mg/kg)	>5000	>5000	425 (M)=Xn	4444 (M), >5000 (F)	66-195	>5000	54 (F), 70 (M)
Solubility (ppm water)	14.24	1	510	235 spinA 0.33 spinA	1	327	0.10
Mobility (Koc)	241	115-543	262	844-140434	8151	70	237,000
Soil DT50 (Days)	24 lab, 41 field	>120 lab, 34-254 field	102- >400, 230 field NL	9.4-17.3	43-111	214	95
Bee Toxicity (acute) (ug/bee)	>0.1055	>104	0.0037	0.057	0.059	0.044	0.01462
Fish Toxicity	>12.6 mg/l	>13.8 mg/l	190 mg/l	4 mg/l	0.0013 mg/l	105 mg/l	0.00015 mg/l
Acute Bird Toxicity	>2250 (B. Quail)	>2250 (B. Quail)	25-50 (Pigeon), 31 (J. Quail)	>2000 (B. Quail)	13.3 (B. Quail)	>2000 (B. Quail)	>1800 (B. Quail)

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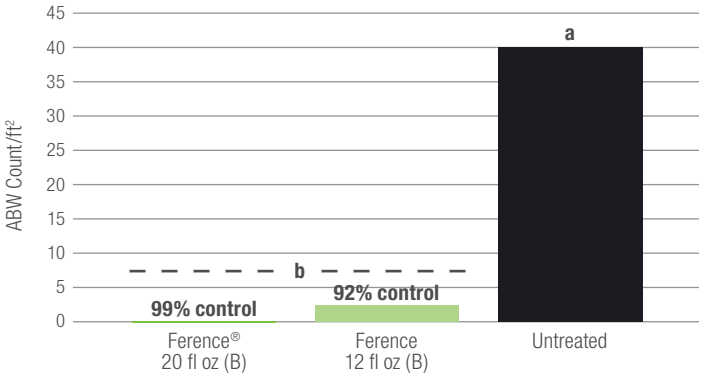
Ference Applied for ABW Control at Oviposition (Peak Egg lay)



- Average across four trials in NJ, PA

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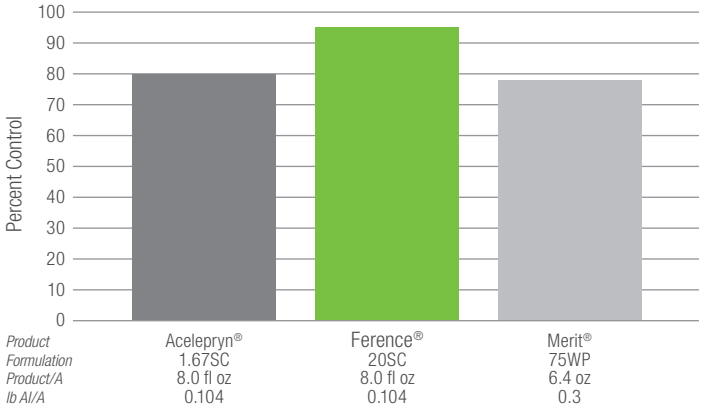
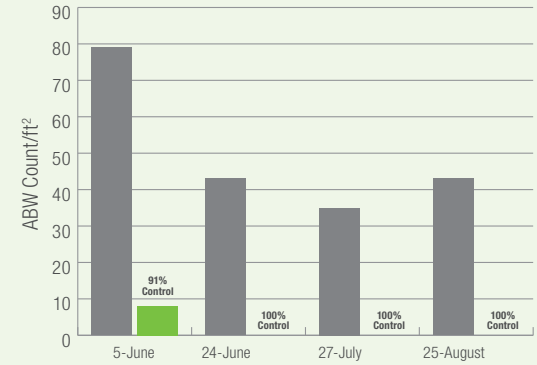
Head-to-Head Comparisons of Three Billbug Trials



- Average across three trials performed in NE, OH, PA
- Each treatment was in every trial

NE: PR11-12-1416 13-1516, OH: PR11-12-1411 13-1511, PA: PR11-12-1412 13-1512

Optimum Control Strategy Program



Trial performed in PA by McDonald, 2014

Product Formulation	Product/Acre	Date Applied, 2014
Scimitar® GC	10 fl oz	April 21
Acelepryn®	12 fl oz	May 10
Provaunt®	12 oz**	May 22
Ference®	12 fl oz	June 5
Provaunt	12 oz**	July 9
Ference	12 fl oz	August 15

**Equivalent to 18 oz of Provaunt WDG

FORMULATION DETAILS

- Formulation: Suspension concentrate (SC)
- Contains 1.67 pounds of active ingredient per gallon
- Use rate: 0.026 to 0.261 lb ai/A (2 - 20 fl oz/A)
- Maximum amount of active ingredient for turfgrass: 0.42 lb/A/year (32 fl oz/A/year)
- Odor: None
- Solubility: Water – 14.24 mg/L
- Volatility: Not volatile
- Stability: Stable in water up to pH of 9

GreenCast®

TO LEARN MORE ABOUT FERENCE, please visit **GreenCastOnline.com/Ference**, **WeevilTrak.com** or call **1-866-SYNGENTA (796-4368)**.

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