

Steward® EC Insecticide



Technical Bulletin: Research Trial Update.

Control of adult Western corn rootworm

The Western corn rootworm (WCR) is considered the most important insect pest attacking field corn in the United States. According to estimates, annual yield losses and costs associated with WCR-control tactics are substantial to corn growers.

Adult WCR feed predominantly on corn foliage, silks and pollen. They begin to emerge from the soil around early to mid-July with the males emerging a week or more earlier than females. Adult beetles have a black head and yellow or gold bodies. Females have three black stripes on the wing covers, while male WCRs have black wing covers. During the adult stage, which lasts for about 10 to 12 weeks, they feed and mate, and females deposit eggs primarily from July to September. The WCR overwinter as eggs in the soil. Egg hatch usually occurs in mid-May to mid-June, and the larvae, which go through three larval stages, feed on corn root systems for approximately three weeks and then transform into a pupa. After a couple of weeks, the pupa turns into an adult beetle, which emerges from the soil and begins the life cycle over again.

Damage to corn is primarily caused by larvae feeding on the roots, which can negatively impact water and nutrient uptake and may ultimately cause a substantial reduction in grain yields. Larval root feeding can cause plants to become lodged during strong rain or wind events, making harvest difficult. At high infestation levels, adult beetles can cause damage by feeding on silks, which affects pollination and seed set.



Effective management of WCR takes an integrated approach. Control options include:

- Crop rotation to reduce rootworm pressure.
- Use of transgenic Bt corn hybrids to provide protection against WCR larval infestations.
- Use of soil insecticide treatments for protection against WCR larval feeding.
- Application of commercially applied seed treatments labeled for WCR larval control.
- Use of foliar insecticide treatment targeted at reducing gravid egg-laying WCR adults.

An effective and properly timed foliar insecticide application can suppress the number of eggs laid and potential WCR problems in the future. Scouting for adult beetles is usually initiated as the corn begins to silk. Male beetles emerge first, and females follow about a week later. Females are attracted to silking corn fields and usually are found feeding on silks, pollen or volunteer corn plants. Adults are very mobile, especially on warm, sunny days. Random stops in the cornfield should be made to estimate the number of adults on a known number of plants. Typically, one to three WCR adults per plant is the threshold for determining when to treat. Treatments are usually started when more than 10 percent of the females are gravid. It is not advisable to make treatments too early, since more females will emerge and lay eggs; nor is it advisable to make treatment too late, since egg laying will already be complete.

Once it has been determined that an adult WCR insecticide application is necessary, it should be noted that resistance has affected efficacy to four major classes of insecticides. These insecticides include pyrethroids, organophosphates, carbamates and cyclodienes. Selection of an insecticide in one of these classes may result in poor control of WCR adults. The two most common classes of insecticides currently used for WCR adults are pyrethroids such as bifenthrin and organophosphates such as chlorpyrifos. In addition to resistance, mite flare-ups, significant negative impact on beneficials and/or long re-entry intervals can be associated with these chemistry classes.

Field studies have demonstrated that Steward® EC insecticide has a unique mode of action and has been shown to be effective in controlling WCR adults. Steward EC insecticide works primarily through ingestion but has contact activity as well.

Observed benefits of using Steward EC insecticide

Steward EC insecticide delivers the reliable performance growers have come to expect:

- **Proven class of chemistry:** Indoxacarb (oxadiazine class) acts by inhibiting the sodium-ion entry into nerve cells, resulting in paralysis and death. Primary exposure is through ingestion with some contact activity for increased control levels and moderate residual activity.
- **Goes to work quickly:** Adult beetles stop feeding within zero to four hours after ingestion; pest knockdown follows within one to two days.
- **Superior rainfastness:** Steward EC insecticide resists washoff once dried. Under most conditions, drying occurs approximately two hours after application.
- There is minimal impact to most beneficial insects¹ and predators when product is used in accordance with the label.
- **Ideal resistance-management tool:** Steward EC insecticide provides an excellent fit in Integrated Pest Management (IPM) and Insect Resistance Management (IRM) programs.
- **Hassle-free formulation:** Steward EC insecticide has been formulated to help eliminate mixing, handling and cleanup issues.
- **Optimal performance:** Steward EC insecticide contains both an oil solvent and a surfactant package that provides optimal leaf wetting and surfactant characteristics for excellent crop protection.

¹ This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area. This product has a low impact on honeybees after the spray has dried.

Attributes of the Steward EC insecticide formulation

- **Simply open and pour:** This clear solution doesn't need to be shaken. Just open the container and pour contents into the tank.
- **Add to water:** Once poured into water, the EC formulation blooms into a cloudy, white emulsion, rapidly and completely dispersing in the spray tank with minimal agitation in hard or soft water.
- **No product to dissolve:** The active ingredient, indoxacarb, is completely dissolved in the formulation and no particles need resuspension.



- **Mixes readily:** When mixed in the spray tank, it forms fine droplets in soft or hard water and easily emulsifies with little agitation.
- **Easier restart after a delay:** If agitation is stopped for more than a few hours before the spray tank is emptied, a cream layer may form on the surface. The EC formulation alone or with tank-mix partners easily re-emulsifies with agitation.
- **Faster cleanup:** Containers easily rinse with water compared with containers of oil-based SC formulations.

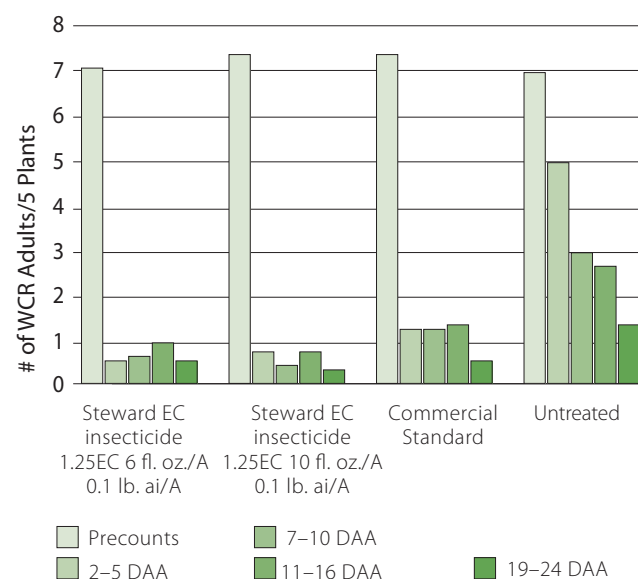
Steward® EC insecticide Label

Active Ingredient	Indoxacarb
Chemistry Class	Oxadiazine
MOA	22A
Signal Word	Caution
Restricted Use	No
REI	12 hours
Documented Resistance	No
Flares Mites	No
Conserves Beneficial Insects	Yes
Impact to Bees After Residue is Dry	Low

Field efficacy trials have shown Steward EC insecticide provides excellent knockdown and control at rates of 6-10 fl. oz./A.

There has been no known resistance or decreased sensitivity to Steward EC insecticide by WCR adults. No mite flare-ups have been noted in any field trials conducted. Steward EC insecticide has excellent rainfastness, under irrigation and rainfall, a short re-entry interval of 12 hours, caution signal word and a unique mode of action in corn. Plus, further research trials have shown control of other pests that coincide with treatments timed for adult WCR, such as Western bean cutworms, corn borers and corn earworms.

Steward EC insecticide WCR Adult Control 2013–2016 Trials (N = 19)



Commercial standard: Asana® XL insecticide at 9.6 fl. oz./A; Brigade® 2EC insecticide/miticide at 6.4 fl. oz./A; Dimethoate® 4EC insecticide/miticide at 32 fl. oz./A; PennCap-M® at 32 fl. oz./A; PennCap-M® pesticide at 32 fl. oz./A + Onager® miticide at 12 fl. oz./A; Pilot® 4E insecticide at 16 fl. oz./A; Voltage 2 at 16 fl. oz./A; Warrior® II insecticide with Zeon active at 1.92 fl. oz./A.

DAA = Days after application

For more information, contact your local FMC retailer or representative about Steward EC insecticide from FMC and visit us at FMCCrop.com.

State registrations for Steward EC insecticide for use on corn are pending. Contact your local FMC representative for details and availability. FMC acquired one or more of the referenced studies from DuPont as of November 1, 2017.

Asana, Brigade, Voltage and Warrior II with Zeon Technology are Restricted Use Pesticides. Always read and follow label directions and precautions for use. As of November 1, 2017, the USEPA registration for DuPont Steward® EC insecticide was sold to FMC by DuPont. FMC, Brigade®, Dimethoate and Steward are trademarks of FMC Corporation or an affiliate. Asana® XL insecticide is a registered trade mark of Valent USA. Onager® miticide is a registered trademark of Gowan Company, LLC. Warrior II insecticide with Zeon active is a registered trademark of a Syngenta Group Company. PennCap-m® pesticide is a trademark of United Phosphorous Inc. Pilot® 4E insecticide is a trademark of Gharda Chemicals Limited. Voltage 2 is a trademark of Innvictis Crop Care. ©2018 FMC Corporation. All rights reserved. 17-FMC-0984 05/18

