



The **Western corn rootworm**, *Diabrotica virgifera virgifera*, is the most predominant rootworm in the U.S. attacking roughly 30 million acres of corn. There are three other species, Northern, Mexican and Southern that also have some geographic influence.

Corn rootworms can cause significant damage if left untreated. Currently, growers have three chemical options – standard insecticides, BT genetics and seed treatments – for control of the larval stage. Adult control measures can also be included in a management program to help reduce egg laying in the fall. With heavy pressure situations, crop rotation is always the number one management option.

2018 - South Dakota – untreated check



Root feeding

Lodging from that feeding



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- **Corn Rootworms**



Photo courtesy of
USDA ARS



- **Subject Matter Expert**

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- **Contact your local FMC representative for more information**

HatchTrakSM



FMC

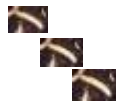


Managing rootworms starts with adult scouting programs in the late summer.



- Threshold: one beetle/plant in fall to need a spring treatment
- Assume a 50:50 ratio, one female/two plants
- Avg. 300 eggs/female = 150 larvae/plant
- Winter mortality 80%
- **Insecticide 90% control**
- **Three larvae/plant = OK**

- 10 beetles/plant – 70:30 ratio
- 2,100 eggs/plant
- Mild winter mortality 40%
- **Insecticide still at 90%**
- **126 larvae/plant = problem**



Heavy rootworm infestations can happen. July 13, 2012 photo. Commercial field in South Dakota, 10 beetles per plant.

No good rescue options available. Need adult suppression programs coupled with multiple at-plant insecticide options.



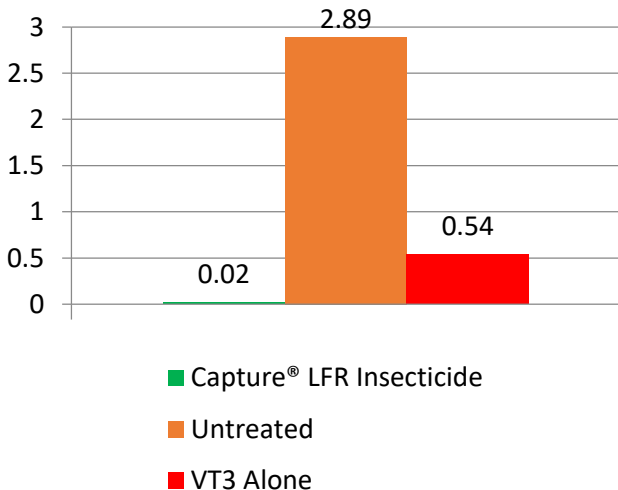
Managing and Understanding Corn Rootworm Options

First, crop rotation is always a good option. In a few geographies, corn demand is high and rotation is not an option. In a few other geographies, growers experience the extended diapause of the Northern corn rootworm where eggs hatch the year following crop rotation or the soybean variant of the Western corn rootworm that lays eggs in the soybeans. Insecticides delivered via granules, liquids, seed treatments, or through genetics are the only other alternative to crop rotation.

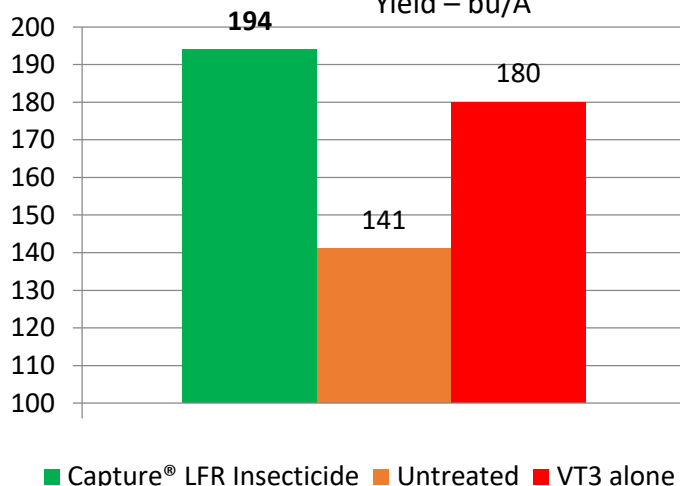
The majority of rootworm protection today is from genetics, either Cry 3Bb1 (first resistance noted in 2009), mCry3A (first resistance noted in 2011), eCry 3.1Ab and Cry 34/35 Ab1, both showing cross resistance with other rootworm traits. Although resistance is not yet widespread, we are putting ourselves at risk of losing tools. If we continue to rely on traits only, rootworm and Bt genetics may become like waterhemp and glyphosate. What specific rootworms adults have entered a particular field? For example, if a grower thinks he has no resistance but adult rootworm females move, he might be getting a population from neighboring fields that are Bt genetic resistant. When planting a pyramid-stacked corn, do the rootworms have resistance to one or both traits?

Growers have options today to apply additional protection at plant since there are no rescue options for rootworm larval control. FMC has a new mode of action, Steward[®] EC insecticide, for adult suppression to help reduce the level of infestation in the spring. The charts below show that by adding Capture[®] LFR[®] insecticide to genetic traits, rootworm control is improved and ROI is very profitable.

Root Rating 0-3 scale



Yield – bu/A



Colman, SD 2013

(VT3 still provided protection, but was losing some control)
 $14 \text{ bu} \times \$3.50 = \$49 - \$20 \text{ chemical} = \29 profit



FMC Corn Rootworm Larval Control Options



Two platforms of products: LFR[®] products are designed to mix and stay suspended evenly in starter fertilizer applied in furrow. 3RIVE 3D[®] products are designed for more accurate applications, more efficient planting and less exposure to the operator.



Apply Capture[®] LFR[®] insecticide at 8.5 oz./A with 5-7 gallons of starter fertilizer or water in furrow. Apply Ethos[®] XB insecticide/fungicide at 8.5 oz./A with 5-7 gallons of starter fertilizer or water in furrow for both insect and seedling disease protection.

Apply Capture[®] 3RIVE 3D[®] insecticide at 8 oz./A with the new 3RIVE 3D[®] equipment. Apply Ethos[®] 3D insecticide/fungicide at 9.2 oz./A with the new 3RIVE 3D equipment for both insect control and seedling disease protection.

All FMC products for in-furrow use have rootworm use rates for narrow-rowed corn down to 15" row spacing. See label for the specific rate needed.



Here is an example of a Capture 3RIVE 3D insecticide root in comparison to an untreated check.

HatchTrakSM



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FMC Corn Rootworm Adult Control Program



Use Group 22A insecticide, Steward[®] EC insecticide, for adult rootworm and select worm control. See label for specific insects. Will not flare mites. Use on field corn and seed corn (not for use on popcorn). 6 oz./A rate with two apps maximum and five days between apps minimum. 14-day PHI. PHI is 14 days for grain and stover; 1 day for forage, fodder and silage.



Photo courtesy of USDA ARS

Two timings for this pest: First, to protect the current crop, spray if silk clipping is less than 1" on new silks. Second, to reduce egg laying and manage next year's rootworm pressure, spray when 10 percent of the females are gravid. See picture. The extended yellow abdomen indicates the females are gravid.

Capture 3RIVE 3D insecticide, Capture LFR insecticide, Ethos 3D insecticide/fungicide, Ethos XB insecticide/fungicide and Hero insecticide are Restricted Use Pesticides. Always read and follow all label directions, precautions and restrictions for use. Some products may not be registered for sale or use in all states. As of November 1, 2017, the USEPA registration for DuPont™ Steward[®] EC insecticide was sold to FMC by DuPont. FMC, 3RIVE 3D, Capture, Ethos, Hero, LFR and Steward and HatchTrak are trademarks of FMC Corporation or an affiliate. ©2018 FMC Corporation. All rights reserved. 18-FMC-2118 10/18