

Corn Rootworm Management Options

- Growing corn continuously presents many challenges especially when it comes to corn rootworm (*Diabrotica* spp.) making scouting a key management consideration.
- Corn rootworm larvae and adults should be managed with multiple tactics when high populations are present.

Regular scouting, crop rotation, selecting traits with multiple modes of action, soil applied insecticides (SAI), chemigation, adult management, and proper insecticide choices will help manage fields with high corn rootworm (CRW) pressure.

Trait Selection and In-Furrow Insecticides

Corn rootworm control begins the previous season with scouting and adult management. Planting provides the next management opportunity where trait selection and insecticide applications play important roles. Selection of the right seed for corn production in areas where CRW is known to be present requires selection for multiple properties that take into account basic agronomic needs (such as Goss' Wilt tolerance) in addition to managing CRW, knowledge of CRW populations and rotations can help growers make informed decisions about selecting effective management strategies.

Scouting soybeans. Monitoring CRW beetles is the cornerstone for decision-making. During the later part of July and August, yellow sticky traps should be used in 12 locations throughout a field, positioned just above the soybean canopy, to obtain weekly counts of beetles.⁹ Replace traps every 7 days. Determine the average number of beetles/plant/day to help predict the level of potential injury to corn.

First year corn. Except in areas with known populations of the western CRW soybean variant, such as northeastern Illinois, first year corn products can generally be planted without any CRW traits. An example would be planting a Genuity® VT Double PRO® product alone, or with a soil applied insecticide (SAI). In some areas, principally in northeastern Illinois, where the western CRW variant is present, corn products should be protected with pyramided mode of action CRW traits. To help determine the risk potential from CRW, soybean fields should be scouted to measure the density of CRW beetles.

Second and subsequent year corn. Scouting the previous crop for CRW beetles to evaluate the potential risk of CRW pressure in fields is an important part of product selection.

- In fields with low to moderate CRW pressure, use Genuity® VT Triple PRO® plus a SAI or a pyramided trait product such as Genuity® SmartStax® RIB Complete® corn blend.
- If more that 5 beetles per plant are found, a pyramided trait product, such as Genuity® SmartStax® RIB Complete® corn blend should be selected.
- If more than 25 beetles per plant or no adult control measures were taken, rotation is recommended.

Insecticide Selection

A decision to use an insecticide should consider several factors to provide an adequate level of protection from CRW.

- To help manage insecticide resistance, rotate insecticide modes of action. Wherever possible use a different insecticide for each insecticide application.^{1,2}
- Efficacy of SAI can vary based on formulation, soil conditions, application timing, and placement. As a general rule, granular insecticides have had better performance results than other formulations or seed treatments.
- Some insecticides, when used in conjunction with certain herbicides, may have detrimental effects on crop safety. Read and follow all label instructions to avoid possible problems.

Crop Rotation

Crop rotation should be a primary consideration for any field which has been planted to 3 or more years of continuous corn and has experienced CRW performance issues. Population studies have shown that about 25-35% of second year corn fields have a high potential of a damaging rootworm population while 50-70% of 3rd year fields and 80-100% of 4th year and older fields have a high potential of economic rootworm populations.³ Agronomists have also demonstrated additional rotation benefits such as improved soil tilth and increased yield potential.

Selection of a rotation crop is often dependent on the agronomics of the field to be rotated. Crop rotation to soybean is a frequent choice. Other crops that can be used for rotation include sunflower, sorghum (grain and forage), oats, and wheat.⁴ Crop rotation is a powerful tool for managing CRW. However, some CRW populations are able to overcome the benefit of rotation. Northern corn rootworm (NCRW) have developed an extended diapause (egg hatch delayed more than one year) in some areas. The soybean variant of western corn rootworm (WCRW) has also adapted to annual rotation of corn and soybean. In areas where CRW variants are present, farmers should not rely on rotation alone to prevent CRW root damage.

Multiyear Rotational Strategies

There is a misconception among many growers that rotation means only 50/50 rotation management plan. There are several rotational strategies that can help farmers successfully manage CRW populations.

Corn Rootworm Management Options

1) Three year rotation (33% of acreage is rotated each year)

Year 1 - Rotation to beans, sorghum, sunflower, wheat, etc. Being mindful to control volunteer corn.

Year 2 - Plant Genuity® VT Double PRO® or Genuity® VT Triple PRO® corn

Year 3 - Plant Genuity® SmartStax® corn blend.

Repeat

2) Four year rotation (25% of acreage is rotated each year)

Year 1 - Rotation to beans, sorghum, sunflower, wheat, etc. Control volunteer corn.

Year 2 - Plant Genuity® VT Double PRO® or Genuity® VT Triple PRO® corn.

Year 3 - Plant Genuity® SmartStax® corn blend.

Year 4 - Plant Genuity® SmartStax® corn blend.

Repeat

3) Five year rotation (20% of acreage is rotated each year)

Year 1 - Rotation to beans, sorghum, sunflower, wheat, etc. Control volunteer corn.

Year 2 - Plant Genuity® VT Double PRO® or Genuity® VT Triple PRO® corn.

Year 3 - Plant Genuity® SmartStax® corn blend.

Year 4 - Plant Genuity® SmartStax® corn blend.

Year 5 - Plant Genuity® SmartStax® corn blend.

Repeat

Scouting

Fields must be scouted consistently for CRW on multiple occasions throughout the growing season, and in some cases the season before corn is planted. Using a trained professional such as a crop consultant to scout corn rootworm is an excellent choice to reliable results.



Figure 1. A root pruned by corn rootworm larval feeding (left) and a healthy root (right).

Root dig for larval presence.

In general, once 700 degree-days (base 52°F) have accumulated, corn rootworm larvae can begin to hatch from eggs laid the previous summer. This typically occurs in the month of June in most of the Corn-Growing Area. Approximately once every week until adult beetles emerge, dig 10 plants from different areas of the field and examine for larvae feeding on the roots (Figure 1). Average number of larvae per plant along with the average instar of the CRW recovered from the roots should be monitored to determine action thresholds. If action

thresholds are exceeded, a rescue treatment may be warranted. For more information please read the Genuity document, "Corn Rootworm Rescue Treatment Decision Aid".⁵

During pollination. For a short period during silk formation and pollen shed, corn is vulnerable to feeding by corn rootworm adults. Typically if the silks are being eaten to less than 0.5 inches from the husk, a foliar insecticide treatment should be applied.⁶ Once pollination has occurred, control is no longer needed to protect pollination.

Egg Laying Prevention. After pollination, scout and determine the number of beetles per plant and their reproductive status. Based on data for continuous non-B.t. corn, if there are more than one beetle per plant and the females are gravid (full of eggs) then an application should be made (Figure 2).⁸ This may need to be repeated several times to keep oviposition (egg laying) to a minimum. To learn more about adult management, please read "Managing Corn Rootworm Beetles".⁷



Figure 2. Gravid female with eggs (left) and non-gravid female (right). Photo courtesy of Kevin Black, GROWMARK, Inc.

Summary

Successful corn rootworm management is possible by using multiple management strategies such as rotation, scouting, insecticide applications when warranted, and by planting corn products such as Genuity® SmartStax® RIB Complete® corn blend and Genuity® VT Triple PRO® RIB Complete® corn blend in a comprehensive management plan.

Sources: ¹ Insecticide treatments for corn rootworm larvae in field corn, 2013. <http://entomology.unl.edu> (verified 10/20/13); ² Insecticide treatments for corn rootworm larvae in field corn, 2013. <http://entomology.unl.edu> (verified 10/20/13); ³ Shields, E. 2001. Corn rootworm management options for 2001. Cornell University. <http://css.cals.cornell.edu> (verified 10/20/13); ⁴ Clark, T. L. and B. E. Hibbard. 2004. Comparison of nonmaize hosts to support western corn rootworm (Coleoptera: Chrysomelidae) larval biology. *Environ. Entomol.* 33(3): 681- 689; ⁵ Corn rootworm rescue treatment decision aid. <http://www.aganytime.com> (verified 10/20/13); ⁶ Gray, M. E., et al. 2010. Field crop scouting manual. X880b. University of Illinois; ⁷ Managing corn rootworm beetles. <http://www.aganytime.com> (verified 10/20/13); ⁸ B. Wright. 2009. Use of corn rootworm scouting numbers as basis for 2010 production decisions. Crop Watch. University of Nebraska-Lincoln. ⁹ Cook, K.A. 2005. Western corn rootworm variant. University of Illinois IPM.

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