

MEXICAN AND SOUTHERN CORN ROOTWORM MANAGEMENT



WHAT YOU'LL LEARN

- Mexican and western corn rootworms (MCR, WCR) are quite similar in their biology and the type of damage they cause.
- Southern corn rootworm (SCR) deposit eggs in emerging corn such that crop rotation may not provide adequate control.
- SCR have multiple generations per year, unlike MCR and WCR which have one generation.
- In-season root digs and scouting are important components for managing corn rootworm.
- Comprehensive management strategies include rotation, scouting, insecticide applications when warranted, and planting corn products with insect trait protection.

Mexican and Western Corn Rootworm

Identification. Adults of the Mexican corn rootworm are about ¼ inch long and pale to bright green (Figure 1). Wing covers may match the body color or may have slightly contrasting yellow or orange-green stripes. Western corn rootworm adults are yellowish tan and have black stripes on the wings (Figure 2). The larvae are cream colored and about 3/4-inch long when fully developed, with a brown head capsule and bearing three pairs of short legs.

Biology. Mexican and western corn rootworms are quite similar in their biology and the type of damage they cause. Both species have one generation per year. MCR and WCR prune roots as larvae, clip silks as adults, and lay eggs in the soil of corn fields around silking time, with eggs hatching the following spring. In Texas, egg hatch begins in early April on the Gulf Coast and in mid-May on the High Plains, usually 3 or 4 weeks after corn is planted.¹ Adults emerge midseason and can move from field to field. Fields at the green silk stage of growth are more attractive to adults than more mature fields.



Figure 1. Mexican corn



Figure 2. Southern (left), Northern (center), Western (right) Corn Rootworm adult beetles. (R. L. Croissant, Bugwood.org).

Scouting. In-season root damage assessments are an important part of managing corn rootworm (MCR, WCR, SCR) because they help to evaluate CRW pressure and compare different control measures. Root damage is greatest when the majority of larvae have completed the 3rd instar larval stage. Often this is around tasseling. Usually there is a 2 to 3 week window that is optimum for root digging. Select 3 random locations in a field and dig 5 consecutive root balls to rate root injury. Three root nodes should be evaluated, starting with the uppermost node which has all of the roots at least 1.5 inches into the soil (Figure 4). To assign a damage rating, assess the root pruning and scarring using the 0 to 3 Node-Injury Scale (NIS).⁵ Generally, under good growing conditions, an NIS rating of 1.0 indicates economic loss may occur.

In-crop beetle counts can help determine if foliar-applied insecticides are needed to reduce beetle silking feeding and ear damage. Scout for beetle at least once each week, beginning at early tassel. Randomly select 10 to 25 locations within the field and count the total number of beetles on at least two plants within each location. The ear zone method samples only the middle part of the plant surrounding the ear (the lower surface of the leaf above the ear, the ear and ear leaf, and the upper surface of the leaf below the ear).⁴ Yellow sticky traps can be spaced out over a field to sample rootworm beetle numbers. Traps are placed at ear level on corn plants; checked weekly and the number of trapped beetles counted.⁴

The best way to determine if a field is at risk from MCR/WCR is to count adult beetles the previous year or in the current corn crop for continuous corn rotations.

Management. In continuous corn rotations, an average of one or more adult beetles per plant on any sampling date during the season may indicate the need to treat corn the next season to prevent economic damage. Plant corn products with Genuity® VT Triple PRO® or Genuity® SmartStax® traits, or use a soil-applied insecticide.

Insect Resistance Management. A comprehensive IPM plan is a key factor for sustaining maximum corn yield potential, particularly in continuous corn rotations. Corn products with Genuity® VT Triple PRO® or Genuity® SmartStax® traits require a 20% structured refuge in the Cotton-Growing Area. Growers are required to follow an Insect Resistance Management (IRM) plan. Growers must read the IRM Grower Guide prior to planting for details on planting a refuge,

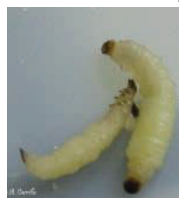


Figure 3. Corn rootworm larvae.

geographical restrictions, and other requirements of the IRM Plan. The IRM Grower Guide is on the seed bag tag or ask your seed dealer for information. Monsanto does not recommend the planting of seed blend products in the Cotton-Growing Area. If planted, an additional 20% structured refuge is required.

MEXICAN AND SOUTHERN CORN ROOTWORM MANAGEMENT

Southern Corn Rootworm

Identification. The adult SCR is about 1/4-inch long, yellow-green with a black head and antennae (Figure 2). There are twelve black spots on the wing covers. The larvae are cream colored and about 3/4-inch long when fully developed, with a brown head capsule and bearing three pairs of short legs.

Biology. Adult beetles overwinter and become active in the spring, feeding on a wide variety of host plants including weeds and grasses. Adults first become active about the middle of March and lay eggs from late April to early June.³ Eggs are laid in the soil in emerging corn. Eggs hatch in 5 to 11 days and young larvae crawl through the soil and feed on roots of corn, sorghum, or other hosts. Larvae develop through three stages (instars) in 10 to 16 days before pupating and then emerge as adults after 5 to 12 days. Development takes about 20 to 39 days, depending on soil temperature.² SCR have multiple generations per year, unlike MCR and WCR which have one generation per year.

The southern corn rootworm prefers moist soil and is most injurious to corn during cold, wet springs. No-till corn, continuous corn rotations, or corn following winter legumes are most at-risk. Both the adults and larvae damage corn, but the larvae are more destructive.³ Injury to corn and sorghum occurs in the seedling (6 to 9 leaf) stage of growth. Larvae chew along roots, excavating grooves and tunnels and tunnel directly into the base of the stalk. Damage symptoms include reduced crop stand and severe root damage that may cause lodging. Stands may be reduced 50 to 90 percent or more.³ Adult beetles feed on a wide variety of plants, including unpollinated corn silks.

Scouting. Begin initial scouting when corn emerges and continue until corn is approximately 6 inches tall. Look for symptoms of water stress or dead heart. Dig several feet of row in several locations within a field and examine roots for larvae and root feeding damage.

Management. Because SCR deposit eggs in emerging corn, crop rotation may not provide adequate control.² Several cultural practices may help reduce the southern corn rootworm population. Early tillage at least 30 days before planting corn removes vegetation and discourages egg-laying. Plant early at high seeding rates to get a good stand.³

Seed applied insecticides may provide protection if SCR infestations are light to moderate but soil-applied insecticides provide control under heavy infestations.² None of the commercial products with insect trait protection are effective against SCR.

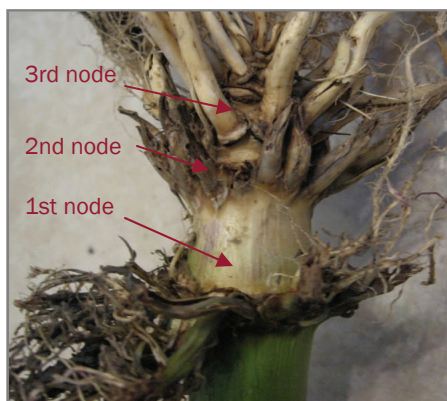


Figure 4. Corn root nodes and rootworm feeding damage.

Best Management Practices (BMPs)

BMPs provide practical solutions to reduce rootworm populations, limit rootworm damage, and enable insect resistance management.

- Rotate to non-host crops to break the corn rootworm cycle.
- Use insecticides as needed. Soil moisture status, application timing, and placement are important for insecticides to protect plants for the duration of the larval feeding period.
- Plant dual mode-of-action corn products with Genuity® SmartStax® or Genuity® VT Triple PRO® traits to help manage MCR and WCR.
- Scout regularly for
 - ⇒ Early season SCR damage.
 - ⇒ Conduct root digs to assess root damage from larval feeding.
 - ⇒ Monitor MCR and WCR beetle populations around tasseling to determine if adult control measures are needed to protect silks and ears and to help predict infestation levels for the next corn crop.

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

Sources: ¹ Porter, P. et al. 2005. Texas corn production emphasizing pest management and irrigation B-6177. Texas A & M University. ² Porter, P. et al. 2010. Managing insect and mite pests of Texas corn. Texas A & M University. ³ Southern corn rootworm. North Carolina State University - <http://ipm.ncsu.edu> [verified 05/15/2014]. ⁴ Wright, R.J. and L. Meinke. 1999. Managing corn rootworm adults. University of Nebraska. ⁵ Interactive node injury scale. Iowa State University - <http://www.ent.iastate.edu> [verified 05/15/2014].

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