



Mexican, Western, and Southern Corn Rootworm Management

- Mexican (MCR) and Western (WCR) corn rootworm are similar in biology and the type of damage they cause.
- Southern corn rootworm (SCR) female beetles deposit eggs in emerging corn such that crop rotation may not provide adequate control.
- Compared to MCR and WCR which have one generation per year, SCR has multiple generations.
- Comprehensive management strategies include rotation, insecticide applications when warranted, scouting, root digs, and the planting of corn products with insect trait protection.

Identification

Mexican corn rootworm (MCR) adults are about 1/4-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 (WCR) adults are yellowish tan and have black stripes on the wings (Figure 2). The adult Southern corn rootworm (SCR) is about 1/4-inch long, yellow-green with a black head and antennae (Figure 2). Wing covers have 12 black spots. 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 (Figure 3).



Figure 1. Mexican Corn Rootworm

Biology

The biology of MCR and WCR and the type of damage they cause are very similar. 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 3. Rootworm larvae.

Adult SCR 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. The 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. Depending on soil temperature, development takes about 20 to 39 days.² Unlike MCR and WCR, which have one generation per year, SCR has multiple generations.

Scouting

In-season root damage assessments are an important part of managing corn rootworm (MCR, WCR, SCR) because they help to evaluate corn rootworm (CRW) pressure and compare different control measures. Root damage is greatest when the majority of larvae have completed the 3rd instar stage. This is often around tasseling. There is usually 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 on each plant 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 that economic loss may occur.

In-crop beetle counts can help determine if foliar-applied insecticides are needed to reduce beetle silk feeding, ear damage, and egg laying. Scout for beetles at least once each week, beginning at early tassel. Randomly



Figure 2. Southern (left), Northern (center), and Western (right) corn rootworm beetles (Croissant, R.L. Bugwood.org)

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select 10 to 25 locations within the field and count the total number of beetles on at least 2 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

Scouting for SCR should begin 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.

Mexican and Western Corn Rootworm Management

A comprehensive Integrated Pest Management (IPM) plan is a key factor for sustaining maximum corn yield potential, particularly in continuous corn rotations. In continuous

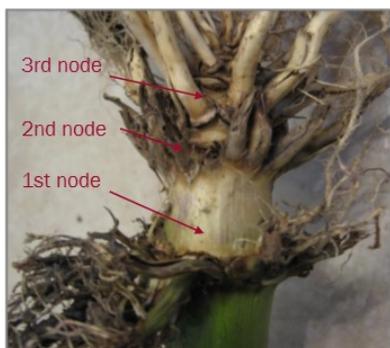


Figure 4. Corn root nodes and rootworm feeding damage.

corn rotations, an average of 1 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 from MCR or WCR. In the Corn-Growing Area, Genuity® VT Triple PRO® RIB Complete® or SmartStax® RIB Complete® corn products can be planted, or a soil-applied insecticide can be used. RIB Complete® corn products do not require a structured refuge in the Corn-Growing Area. Monsanto does not recommend the planting of seed blend products in the Cotton-Growing Area. If seed blend products are planted in the Cotton-Growing Area, an additional 20% structured refuge is required. SmartStax® RIB Complete® corn products are not allowed in the Cotton-Growing Area. A 20% refuge is required in the Cotton-Growing Area for Genuity® VT Triple PRO® and SmartStax® corn products.

Southern Corn Rootworm Management

Because SCR deposit eggs in emerging corn, crop rotation may not provide adequate control.² Several cultural practices may help reduce the SCR population. Early tillage, at least 30 days before planting corn, removes vegetation and discourages egg-laying. To get a good corn stand, plant early at high seeding rates.³ Seed-applied insecticides may provide protection if SCR infestations are light to moderate, but soil-applied insecticides can provide control under heavy infestations.² No commercial seed products with insect trait protection are effective against SCR.

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 CRW cycle.
- Plant dual mode of action corn products with SmartStax® traits to help manage MCR and WCR.
- 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.
- 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 control measures are needed to protect silks and ears. Monitoring at tassel can also 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 (where permitted) with SmartStax® and Genuity® VT Triple PRO® traits in a comprehensive management plan.

Sources

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 - ⁵ VanDyk, J. Interactive node-injury scale. Iowa State University. <http://www.ent.iastate.edu/pest/rootworm/nodeinjury/nodeinjury.html>.
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For additional agronomic information, please contact your local seed representative or visit AsgrowandDEKALB.com. Individual results may vary, and performance may vary from location to location and from year to year. Developed in partnership with Technology Development & Agronomy by Monsanto.

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