



Corn Rootworm: Scouting and Management Strategies

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Key Points

- Corn rootworms can evolve and overcome management tactics. Controlling this pest is difficult.
- An integrated approach is key to an effective corn rootworm management program.
- Develop a scouting program that monitors larvae and adult numbers, which predicts potential egg laying and future problems.
- In areas with high numbers of adult corn rootworms, consider incorporating a beetle suppression program that utilizes foliar-applied insecticides.

Corn Rootworm: A Challenging Pest of Corn

Corn rootworm (CRW) larvae and adults cause economic loss every year. The impact of CRW larvae on yield varies greatly depending on

1. The timing of rootworm feeding.
2. Available moisture.
3. The hybrid's ability to regenerate damaged roots.

Plants with damaged root systems are more susceptible to drought stress and lodging. Adult CRW feeding on corn silks during pollination can cause poor seed set and subsequent yield loss.

This pest's ability to evolve has made crop rotation ineffective in many areas. The soybean variant western corn rootworm has evolved to lay eggs in non-corn fields. The northern corn rootworm has shown extended diapause, in which eggs remain viable in the soil for several years before hatching. Additionally, resistant populations have now been documented for all four commercially-available Bt proteins for CRW control.



Figure 1. Corn rootworm larvae.

How to Scout for Corn Rootworm Larvae

- Begin in early to mid-June, or when the corn is in the V6 to V12 growth stage.
- Dig up 2 plants at each of 5 locations with the soil from 6" to 8" around the plant. Sift soil over a sheet of black plastic looking for 1/32" to 1/2" long larvae.
- There is no economic threshold for larvae per plant. Some consultants determine emergency controls are needed when they find an average of 2 to 3 larvae per plant using a visual search, or 8 or more larvae using soil washing.
- If average length of larvae is >1/2 inch or pupae are found, a rescue treatment may be too late.



Figure 2. Severe corn rootworm feeding damage.

How to Scout for Adult Corn Rootworm

- The western corn rootworm (WCRW) and northern corn rootworm (NCRW) are the most destructive species found throughout the Midwestern U.S. and Canada.
- Adults begin emerging in early to mid-July with male beetles emerging before females.
- Evaluate fields for silk clipping. If pollination is in progress and the beetles have chewed back the silks so that less than 1/2 inch of silks is exposed beyond the husks, beetles should be controlled.



Figure 3. Northern (left) and western (right) corn rootworm beetles.

- To control adults before egg laying, examine 2 plants in 25 locations in the field. Consider an insecticide treatment if the number of beetles averages 0.75 or more per plant and 10% of females are gravid with eggs (abdomen visibly distended with eggs).
 - The first beetles to emerge are mostly male, and females require at least 10-14 days of feeding before they can lay eggs.
 - Treatments applied too early may be ineffective if large numbers of females emerge after the residual effectiveness of the treatment has dissipated.
- If more than 10% of the adult females within a field are gravid, significant egg laying probably has already occurred, so suppression of adult rootworms will likely not be as effective in reducing larval damage the next year.
- Fields may become re-infested 2 to 3 weeks after an insecticide application, so some fields may require two applications of insecticide to significantly reduce egg laying.



Figure 4. Left: Gravid female western corn rootworm beetle. **Right:** Western corn rootworm eggs squeezed from the abdomen of a female beetle.

Corn Rootworm Management

A yearly scouting program is the first step to effective management, because corn rootworms can rebuild their populations rapidly. Monitor larvae and adult beetle numbers to predict potential egg laying and future problems. The level of rootworm feeding and beetle activity will determine the best management options. Incorporate several of these options to effectively control CRW with an integrated approach.

Crop Rotation

- Can reduce corn rootworm pressure.
- Ineffective in areas with soybean variant WCRW that lay eggs in non-corn fields or variant NCRW whose eggs may remain in the soil for several years before hatching (extended diapause).

Suppress Larval Development

- Use a granular or [seed-applied insecticide](#) at planting.
- Plant a product with multiple modes of action of control against CRW, such as [Optimum®](#), [AcreMax®](#), [Xtreme](#) or [Qrome®](#) products.
- Consider using a CRW Bt-traited product with Poncho® 1250 + VOTiVO® insecticide seed treatment for additional protection.
- Applying a soil-applied insecticide in addition to using a CRW Bt-traited product is not recommended except in limited circumstances. Consult with your [Pioneer sales professional](#), university extension, or other local experts for further guidance.

Control CRW Beetles with Insecticides

- A well-timed foliar insecticide application can effectively reduce gravid egg-laying beetles.

Be sure to alternate modes of action when using insecticides. When using corn hybrids that contain Bt traits for corn rootworm control, it is essential that refuge acre requirements are followed. Failure to comply with refuge requirements and lack of control of adult beetles within the refuge acres will only accelerate the pest's ability to develop resistance.

Areas with high numbers of adult corn rootworms should consider incorporating a beetle suppression program that utilizes foliar-applied insecticides. This should help reduce the amount of egg laying and potential problems in the future.

Table 1. Insecticide treatments for adult corn rootworms. Always read and follow product label directions.

Mode of Action	Product Name	Common Name	Rate (Formulation per acre)	Restrictions / Comments
3A R	Ambush® 2EC	permethrin	6.4-12.8 fl oz	REI 12 hrs. PHI 30 days for grain or fodder.
3A R	Asana® XL 0.66	esfenvalerate	5.8-9.6 fl oz	Field corn. May be chemigated.
3A R	Baythroid® XL	beta-cyfluthrin	1.6-2.8 fl oz	PHI 21 days for grain or fodder. REI 12 hrs.
3A R	Bifenture® 2E, Brigade® 2EC, Discipline® 2E, Sniper® 2E, Tundra® 2EC	bifenthrin*	2.1-6.4 fl oz	
3A	Delta Gold®	deltamethrin	1.5-1.9 fl oz	REI 12 hrs. PHI 21 days for grain or fodder, 12 days for cutting or grazing for forage.
1B	Dimethoate 4EC, Dimate 4E	dimethoate	1.0 pt	REI 48 hrs. PHI for harvest, feeding or grazing 14 days. Do not apply to corn during pollen-shed if bees are present.
3A R	Hero®	zeta-cypermethrin + bifenthrin	4.0-10.3 fl oz	REI 12 hrs. PHI 30 days for grain and stover, 60 days for forage, 30 days for grazing. Use of ultra-low volume on corn is prohibited. Do not make aerial or ground applications to corn if heavy rainfall is imminent.
1A R	Lannate® LV	methomyl	1-1.5 pt/acre	REI 48 hrs; PHI 21 days for field corn, 0 days for sweet corn
1B R	Lorsban® 4E	chlorpyrifos	1-2 pts	Field corn, seed corn. May be chemigated.
3A R	Mustang® Max EC, Respect®	zeta-cypermethrin	2.72-4.0 oz	Apply in a minimum of 2 gallons/acre by air and 10 gallons/acre by ground.
3A R	Proaxis™	gamma-cyhalothrin	2.56-3.84 fl oz	REI 24 hrs. PHI 21 days, grazing 1 day, feeding corn forage/fodder/silage 21 days
1A	Sevin XLR	carbaryl	1-2 qts	Field corn and popcorn. See bee caution on label. May be chemigated.
1B, 3A R	Stallion®	chlorpyrifos + zeta-cypermethrin	3.5-4.7 fl oz	PHI 30 days for grain and 60 days for forage
22A	Steward® EC	indoxacarb	6.0-11.3 fl oz	REI 12 hrs. PHI 14 days for grain and stover
3A, 4A	Swagger™	bifenthrin + imidacloprid	8.45-25.6 fl oz	PHI 30 days. Apply in a minimum of 2-5 gallons/A by air or 10 gallons/A by ground.
3A R	Warrior II w/Zeon Technology®	lambda-cyhalothrin	1.28-1.92 fl oz	

IRAC Mode of Action Classification:

Group 1 = Acetylcholine esterase inhibitors: 1A = Carbamates, 1B = Organophosphates

Group 3 = Sodium channel modulators: 3A = Pyrethroids, Pyrethrins

Group 4 = Nicotinic acetylcholine receptor (nAChR) competitive modulators: 4A = Neonicotinoids

Group 22 = Voltage-dependent sodium channel blockers: 22A = Oxadiazines

R = Restricted-use product

* Resistance to the pyrethroid insecticide bifenthrin has been documented in corn rootworm in southwest Nebraska.



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