

# BETWEEN THE ROWS

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MANAGING CORN ROOTWORM

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## Background

Both northern and western corn rootworm (CRW) have been a pest in the Corn Belt for many years and are widely distributed in corn growing regions.

Even before the advent of genetic insect control, this pest has been difficult to control. Insecticides applied with the planter to combat feeding larvae can demonstrate control, but weather can cause failures. Either too much rain can dilute the insecticide or move it out of the root zone, or lack of rain can reduce effectiveness and limit the zone of control. In either case, survival of larvae feeding on roots can cause economic damage.

This pest has shown an ability to adapt to control measures as evidenced in some areas by an “extended diapause” (northern CRW) or the “soybean variant” (western CRW). Extended diapause causes eggs laid to delay hatch until the second year, thereby defeating crop rotation strategies. The soybean variants are adult CRW laying eggs in soybean fields, also defeating crop rotation control plans. Both of these adaptations change the normal growth and expected development, and challenge the corn grower’s pest management plans.

## Current Conditions

Last year’s growing conditions were conducive to emergence and survival of rootworm adults. Those adults deposited an economically significant number of eggs in many areas. This spring, in many areas, we saw significant rainfall and saturated soils that

coincided with the timing of early egg hatch. If the conditions are right to limit oxygen in the soil for an extended period of time around egg hatch it can kill rootworm larvae. It is unknown exactly how much saturation and time is needed



for this to happen, so survival rates of rootworm larvae are hard to determine. With the conditions we saw this spring, it is likely that populations were reduced in some areas, but economically significant levels will still likely be present.

Delayed planting in some areas of the Corn Belt, coupled with close to average GDU accumulation, means that corn rootworm larvae may be found feeding on corn plants and root systems that are smaller than you would find in a normal year. An abundance of moisture may mask root feeding, as there is adequate moisture available to the plant, even with a damaged root system. Severe root system damage that occurs early can cause uneven growth and root lodging later in the season.

The best way to determine corn rootworm larvae presence is to dig corn roots and examine them for root damage. Root damage can be severe in many cases with high populations of larvae. It is not known if this is associated with insect resistance, but high numbers and lack of control is evident. Fields investigated with severe damage have several things in common; at least 4 years continuous corn, the same control method is repeated, single mode of action traits, and often a lack of refuge management.

## Best Management Practices

Production practices that may favor increases in corn rootworm populations include planting continuous corn, late planted corn relative to other nearby fields, and planting late maturing hybrids such as those used for silage. Later pollinating fields are attractive to adults feeding on fresh silks as other food sources diminish.

To combat high insect pressure and greater than expected damage on CRW traited products, several pest management strategies should be considered.

## Corn soybeans rotation

To break the life cycle and build up of rootworm numbers, rotating to soybeans or an alternative crop is an effective pest management strategy. Historically, this has been widely used throughout the Corn Belt and is recommended to effectively manage rootworm pressure. Exceptions may be in locations where the “extended diapause” is present or the “soybean variant” has been identified.

## Continuous corn

Producing continuous corn requires careful management of many agronomic factors. Residue management, tillage, hybrid selection, and integrated pest management as it relates particularly to insect scouting are all important for successful corn production. As continuous corn production goes beyond two years and the same control tactic is repeated (same CRW event), it appears the chance of greater than expected damage from rootworm larva feeding increases. Scouting for adult beetles after emergence (July, August) is instrumental in determining the control tactics that may be needed for next year's corn crop.

If CRW beetles average about one beetle per plant, it is likely that economic damage is possible on next year's corn and control is necessary. This control can be a CRW trait hybrid, an insecticide application, or both.

When CRW traits were first tested against an insecticide application, traits provided consistent control and improved yield performance. While a combination of traits and insecticide may be warranted in high population scenarios, returning to an insecticide application alone is likely a step backward and may be more inconsistent due to the impact weather may have on control (particularly soil moisture). "Stacked" traits that offer multiple modes of action against CRW appear to be the most durable and efficacious control mechanism.

When CRW beetle numbers are high, averaging more than 3-5 beetles per plant, additional control tactics may be needed for the next corn crop. High larvae numbers can overwhelm the protection provided by the CRW trait. Using multiple modes of action for CRW control like GENSS, available as Wyffels RIB, provides more consistent control and reduces the chances of insect resistance developing.



*Western corn rootworm beetles*

In addition, using an insecticide along with a trait at planting may improve control and reduce the risk of economic root damage when insect pressure is very high. Current CRW traits that are available contain what's called low dose insecticidal protein. This means larvae need to ingest a larger quantity of root material and control can be incomplete. When populations are high, surviving larvae may cause economic damage and multiple control tactics are necessary.

Adult beetle control can be an effective way to manage corn rootworm populations. Insecticide applications for adult control can prevent egg laying that turns into damaging larvae that feed on corn roots. Unfortunately, weather and timing can impact success. Because beetle emergence and egg laying is spread out, a single application may not control a large enough segment of the population to avoid control tactics on the next crop. But population reductions can help lessen feeding pressure to a manageable level.

Lack of refuge management is one of the factors listed as part of the concern in resistance developing in some severe damage cases investigated. Part of the requirements when using insect protected hybrids is stewardship of the technology. In order to reduce the chances of insect resistance development, an insect refuge needs to be included in crop management plans. This refuge plan also allows continued access to the technology and protects the technology for future use.

If higher than expected feeding has been identified on your farm and corn following corn is planned, several control tactics should be employed.

1. Scout field this July and August to determine CRW pressure so the proper tactics can be considered.
2. If adult numbers are high, consider control measures to reduce adults available to lay eggs. Timing is critical to reduce population before significant egg laying occurs.
3. Use CRW protected hybrids with dual modes of action like GENSS, available as Wyffels RIB, to improve consistency of control.
4. When beetle numbers are high, add a soil applied insecticide alongside a CRW trait to reduce the risk of greater than expected damage.