Corn Rootworm Beetle Management

When economic threshold levels are reached, adult management may help protect yield potential for the current crop and may help decrease the amount of egg hatch the next season. Different control measures may be used for the protection of corn silks and decreasing the potential amount of eggs laid may be different. Scouting, counting, and distinguishing between male and female beetles can be labor intensive. Late planted and prevented plant acres are especially attractive to feeding adults.

Identification and Economic Importance

The two potentially damaging corn rootworm (CRW) species are the western and the northern. Western CRW adults are identifiable by the stripes or nearly blackish wings (Figure 1, top). Northern CRW adults are green to yellowish green (Figure 1, middle) and females are slightly longer and have larger abdomens. There are two main reasons for managing CRW beetles; potential interference with corn fertilization, and reducing the amount of eggs laid. In high numbers, CRW adults can interfere with corn fertilization by clipping silks prior to the ovules (potential kernels) being fertilized (Figure 1, bottom). Unfertilized ovules can have an economic effect on the current crop through potential yield reduction. Reducing the number of eggs that can hatch the following year (exception being northern CRW diapause variants) by decreasing the number of egg laden females can help keep populations within a range where other control measures, such as traits containing Bacillus thuringiensis (B.t.) or soil-applied insecticides are effective. Future CRW larvae populations in continuous corn are dependent on CRW adults emerging from within the field and those that migrate from other fields. Adult control for the purpose of protecting a silking ear may not be the same as beetle control for future population suppression. The latter requires a more intensive scouting and monitoring schedule. Prevention of egg laying may require multiple insecticide applications, and the proper timing may or may not coincide with an application during pollination.

Damage and Impact on Crop

Severe root feeding can increase the incidence of lodging. As a result, most modern control strategies are implemented in the root zone. Crop rotation, soil-applied insecticides, and B.t. traits are effective tools for managing CRW larvae. However, in some instances, significant populations of CRW beetles can become established within or near fields where larval management has been implemented. Consequently, management of adults may be necessary.

Scouting Procedure

Regardless of the objective, CRW beetle counts are a key component in assessing the need for warranted insecticide applications. Scout at least once each week, beginning at early tassel and continuing through early September for CRW beetles. This is a labor intensive task and require the scouts to accurately count beetles, identify males and females, and be able to determine if a female is laden with eggs (gravid). All corn fields should be scouted for CRW beetles, especially late planted corn fields, prevented plant fields with volunteer corn, and corn fields in geographies where extended diapause of northern CRW is common. In other areas, the presence of the western CRW variant may necessitate scouting of soybean fields for egg-laying adults. Late planted corn can act as a trap crop for CRW beetles, which may result in high adult counts and a high number of egg laying females. Prevented plant fields are fields that were unable to be planted before the last insurance defined planting date. These fields, which are often left untouched and if the prior crop was corn, may become populated with volunteer corn plants that can be hosts for CRW. Weed management is also important in volunteer corn or other untouched fields. Certain grassy weeds, such as foxtail species, may support CRW larvae or attract CRW beetles from neighboring fields. Northern CRW diapause variant eggs hatch after two winter seasons; therefore, crop rotation may not provide sufficient management. Western CRW female variants have the ability to feed and lay eggs in soybean fields, which can result in the following corn crop becoming infested with CRW larvae.

Figure 1. (Top) Male (left) and female (right) western corn rootworm beetles; (Middle) Northern corn rootworm beetle; and (Bottom) Corn rootworm beetles feeding on silks.
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Scouting Guidelines and Information to Collect

- Randomly select 10 to 25 locations within the field and count the total number of beetles on at least 2 plants within each location. Minimum number of plants sampled should be between 20 and 50 depending on field size and beetle activity level. In larger fields, when beetles are actively moving through the canopy, additional counts to calculate a more representative field average may be required.4

- Collect beetles and determine the number of males and females. Beetles can be captured by hand, with a small sweep net, or use of a motorized hand held vacuum. The proportion of gravid females, in the sample should be determined. This is done by selecting females with swollen abdomens and gently squeezing to express abdomen contents. Expression of a gelatinous, opaque or milky substance, when rubbed between the fingers, reveals the presence of individual eggs that are slightly granular in texture, which indicates that the female is gravid and has been laying eggs or will be within the next few days (Figure 2).

- If scouting for the purpose of determining the need for a pollination rescue, examine the ear of each plant sampled for silk feeding. Gently husk the ear, hold parallel to the ground, and gently shake to determine if the ear has completed pollination. The silks of pollinated kernels will easily detach while silks from unfertilized ovules will fall to fail away from the ear (Figure 3).

Thresholds Levels for Silk Protection and Egg Laying

In general, treatment with foliar insecticides to control beetles during pollination is warranted when: beetles counts of 5 or more/plant are found, fewer than 75% of the plants have emerged silks, and clipped silks are present.2

Thresholds vary by state and planting density. In general, if adult beetle populations exceed an average of 0.75 - 1.0 beetle/plant, the potential for significant yield loss the next season in continuous corn may exist if no control tactics are instituted.3 Insecticide applications should be timed when the proportion of gravid females reaches 10% of the females collected. If the number of gravid females exceeds 25%, then it is likely that significant egg laying has already occurred. Under this scenario, the opportunity to control adults to reduce the potential number of eggs laid that can hatch the following season has been reduced.

Integrated CRW Management

Following an initial adult control tactic and after application reentry restrictions have expired, field scouting should resume to monitor rebounding CRW adult population levels from extended egg hatch and beetles immigrating from surrounding fields.

- When timed correctly, suppression of CRW adults can be an effective strategy for protecting the yield potential of the current crop and potentially reducing the overall population the following season.

- An intensive scouting program forms the basis of integrated strategies to manage CRW larvae and beetles through the use of crop rotation, Bt traits, and warranted soil-applied and foliar insecticides.

Sources:


Additional sources:

- Websites verified 7/25/2018. 130621060801 072518 RDH.