

CORN ROOTWORM BEETLES

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The information in these recommendations is not as comprehensive as the product labels and is intended only as a guideline. READ THE LABEL before buying and using any pesticide. Some insecticides are sold under brand names not listed in this publication. Check labels for names of recommended active ingredients. Products in *bold italics* are ***Restricted Use***.

Three species of corn rootworm beetle occur in Kentucky. The newest to the state is the western corn rootworm beetle which was first detected in 1979 in Lyon and Daviess counties. This insect has spread rapidly in Kentucky and can pose a significant problem for fields in which corn is grown year after year.

Description

The western corn rootworm beetle (WCR) is about 1/4-inch long and yellow with a black stripe along the outer edge of each wing cover. Males and females differ somewhat in their markings. The stripes are more pronounced on the females, while the entire posterior half of the wing covers may be black on the males. Variations of these patterns also may be seen.

The northern and the southern corn rootworm beetles are easily distinguished from each other and from the WCR beetle (Figure 1). The northern corn rootworm beetle (NCR) has yellow to pale green wing covers and is about the same size as the WCR. The life cycles of these beetles are very similar. The NCR has been present in Kentucky for many years but rarely has caused significant damage.

The southern corn rootworm beetle (SCR), also known as the spotted cucumber beetle, is slightly larger than the other two rootworm beetles. It is yellow to green with 12 distinct black spots on the wing covers. The SCR does not survive the winter in Kentucky; it is seen early in the season as adults fly in from the south.

Life Cycle

The WCR and NCR have only one generation each year. Their eggs are deposited in the soil in mid to late summer and remain there until the following spring. The tiny, white eggs are usually concentrated along the base of the plants in the upper 6 inches of the soil. Tillage operations will mix the eggs vertically and horizontally in the soil.

Egg hatch depends on soil temperature and may begin as early as mid-May, with most occurring during June. Considerable variation in hatch dates can occur. Newly hatched larvae are less than 1/8 inch long but can move as much as 20 inches through the soil in search of corn roots.

The larval stage lasts about three weeks. During this time, rootworms go through three distinct larval stages or instars. Full grown larvae are about 1/2-inch long. Their slender, white bodies are marked only by a brown head and a dark plate on the upper surface of the last body segment. Southern corn rootworm larvae can be found feeding on corn roots and may be identified by two small spine-like projections on the dark terminal plate. Larvae of the NCR and WCR are not visibly different

from each other but do not have the two spines.

Mature rootworms stop feeding and construct small cells in the soil in which they transform to the adult stage. This change in body form requires 5 to 10 days. At the end of this period, the adult or beetle emerges from the soil. The total time from egg hatch to adult varies with soil temperature and moisture but usually is between 27 and 40 days. Differences in hatching date and development rate result in adult emergence from early July through August. Peak adult emergence usually occurs from mid-July to mid-August.

Female rootworm beetles begin to lay eggs in corn fields about 14 days after emergence and mating. Each female deposits an average of about 500 eggs during her life span.

Rootworm Damage

The typical rootworm damage symptom is lodging or "goose-necking" of corn plants. Frequently, this does not show up in the field until after the larval feeding period has ended.

Newly-hatched larvae feed primarily on root hairs and outer root tissue. As the larvae grow and their food requirements increase, they burrow into the inner core of root tissues containing vascular bundles. Damage is usually most severe after the secondary root system is well-established and brace roots are developing. The entire root system may be destroyed under heavy population pressure (Figure 3). Infested root tips appear brown, are often tunneled and may be chewed back to the base of the plant. Larvae may be found tunneling in larger roots and occasionally in the plant crown.

Reduction of the root system, especially the lateral roots, results in lodging. Severe lodging increases yield loss at harvest. In addition, pruned roots place physiological stress on the plant by reducing water and nutrient uptake. This can reduce yields, especially when coupled with low moisture or poor fertility.

All corn rootworm beetles may feed on green silks or pollen. In addition, WCR and SCR beetles will also feed on the green epidermal layer of corn leaves in fields which have not yet silked. Leaf feeding does not produce significant damage but may indicate a high population level in the field that could result in severe silk clipping. Information on this topic is contained in Extension publication ID-45, "Silk Clipping Insects on Corn," available from your county Extension agent.

Rootworm beetles are strong fliers and move easily within and between corn fields. Late maturing corn is especially attractive and beetles may congregate there when short season corn stops producing pollen. Beetles may also move to fields with an abundance of pollen producing weeds such as smartweed or foxtail. While rootworm adults may be found in soybean, alfalfa or sorghum late in the growing season, damage by rootworm larvae to corn following these crops is rare. Exceptions have occurred following soybeans heavily infested with volunteer corn which has progressed to the silking stage or in weedy small grain fields. Treatment of first year corn for rootworms is rarely justified.

Soil type can influence the degree of rootworm infestation. Adults prefer sites with large soil particles and cracks and moisture for egg-laying. More eggs will be laid in moist soil than in dry soil. Rootworms are generally not a problem in muck soils or sandy soils.

Crop rotation is the most effective method of controlling rootworm damage because the larvae cannot complete their development on crops other than corn and a few species of grasses. Most rootworm eggs are laid in corn fields during the growing season. These eggs are, in effect, "trapped" in the soil. If corn is not planted in the field the following year, the hatching larvae are left without food and will starve. If corn is never grown in the same field for two consecutive years, then the potential for rootworm damage is very low.

Scouting For Adult Beetles

Growing corn continuously in the same fields increases the potential for rootworm damage but does not automatically mean problems will develop. Field visits from mid-July through mid-August provide valuable information for determining the need for a soil insecticide the following year. Watch very carefully when green silks are present. If the average number of beetles found per plant is less than one, then economic problems are not likely the following year. If one or more WCR or NCR beetles are found per plant, then a control measure (crop rotation or soil insecticide) should be considered.

When scouting for rootworm adults:

1. Count beetles in fields to be planted to corn again the following year.
2. Make at least three or four counts at 7 to 10 day intervals between mid-July and mid-August. Examine ten randomly selected plants in each of five areas of the field. Counts are especially important during the green silk stage. Each corn variety and field should be scouted separately.
3. Count the number of WCR and NCR beetles and record each type separately.
4. Move quietly as you approach the plant so as not to disturb the beetles. Count beetles on the ear tip, leaf surface and behind the leaf axils. For the ear tip count, grasp the silks in the palm of the hand and squeeze to trap beetles before they escape. Open the hand slowly and count beetles as they come out of the silks. If a second ear is present, count the beetles there as well.

Scouting for corn rootworm beetles is included in the Integrated Pest Management programs available in some counties through the county Extension office or, through private crop consulting businesses.

Control With Insecticides

Soil insecticides, applied in a 7-inch band over the row at planting, can do a good job of controlling rootworm larvae. For best results, the insecticide should be incorporated lightly into the soil with the press wheel, drag chain or tynes. In general, banded treatments will provide better protection of the root zone than in-furrow applications.

Cultivation treatments can be applied later in the season but must coincide with the beginning of larval feeding (early June). These may be applied at the base of the plant or over the row with most of the granules falling to the ground. Basal or "over the row" applications must be followed by cultivation to be effective.

Cultivation treatments can be as effective as planting time treatments, but they must be timed properly. Unfortunately, there is no good method of sampling for small rootworm larvae in order to time cultivator treatments. Cultivation treatments may be advantageous for early planted fields (early

to mid-April). In these cases, decomposition of insecticide applied at planting may result in an inadequate amount of insecticide to satisfactorily control rootworms.

Sufficient insecticide must be present in the soil to protect the root zone. Heavy rainfall immediately following planting may result in premature degradation or movement of some products out of the root zone area. Under very dry conditions, insufficient soil moisture may prevent movement of the product into the root zone. Applying less than the recommended rate because of improper calibration also can cause reduced control. Early planting may result in decomposition or degradation of rootworm products so that soil residues are below that required for satisfactory control. Any one or a combination of these can affect the performance of insecticides used for rootworm control.

Control of rootworm larvae by soil insecticides has been erratic in scattered locations across the Corn Belt. Research has indicated that enhanced microbial degradation through continuous use of a product in certain fields is a major contributing factor to control failures. To date, no documented problems have been detected in Kentucky. Farmers should be aware, however, that some fields may be predisposed to more rapid insecticide decomposition, based on the history of a single product.

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