

Corn XI-19

Western Corn Rootworm

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Western corn rootworm larva, left; adult, right.

Identification (and life cycle/seasonal history)

Western corn rootworm (WCR) larvae are white and slender with brown heads, and a dark plate on the top side of the terminal body segment. Mature rootworm larvae are about 12 millimeters (1/2 inch) long. Rootworm adults are medium sized, six millimeters (1/4 inch), beetles with black and yellow striped wings.

The WCR overwinters in the egg stage, which starts to hatch in late spring, depending on soil temperature accumulations. After egg-hatch, the small rootworm larvae move to nearby corn roots and begin feeding on root hairs and small roots. These larvae can travel at least 50 centimeters (20 inches) to find corn roots. By early July, most rootworm larvae have matured and quit feeding to construct a small pupal cell. The transformation from pupa to adult requires five to 10 days, depending on soil temperatures. By early July most larvae have changed into adult beetles, which then emerge from the soil to feed, mate, and lay eggs. Females may lay 300 to 400 eggs in the upper two to eight inches of soil, preferring moist areas with organic matter content above 1.5 percent. These eggs produce the larvae that will attack the following year's corn crop.

Plant Response and Damage

The WCR larvae feed on the underground root systems of corn plants. Peak feeding usually occurs from late June to mid-July. Lodging (goose necking) of corn plants due to larval root feeding is a typical symptom of damage. Adults often feed on corn silks. Severe silk pruning may result in yield reduction due to poor pollination. However, most damage is due to larval root feeding.

Management Approaches

Resistant Varieties

Bt corn hybrids containing the Agrisure RW, YieldGuard Rootworm and Herculex RW events are expected to provide good rootworm control. See "Managing Corn Pests with Bt Corn", <http://www.ext.colostate.edu/pubs/crops/00708.html>, for details on the use of Bt corn hybrids to control corn pests.

Conventional varieties do differ in root development, so select a material well adapted to the area that can be expected to produce a vigorous root system. Such varieties can be expected to tolerate a moderate amount of root feeding.

Cultural Control

Crop rotation is the most consistent and economical means of controlling WCR populations. Larvae

must feed on corn roots in order to grow and develop properly. If they hatch in a field that has been rotated out of corn, they will starve to death.

Early planting: Fields that have completed pollen shed are not very attractive to rootworm beetles. Early planted fields can be through with pollination before the majority of the adults have emerged, and therefore have less egg laying activity. Early fields also will have relatively larger root systems when rootworm feeding starts. This makes them somewhat more tolerant to rootworm damage.

Chemical Control

Damage from corn rootworm larvae is most likely in continuous corn. Chemical application to first year corn is not recommended. Incorporation of soil insecticides into the soil protects wildlife. If corn is planted prior to May 15, post emergent treatments are preferable. Some performance problems have occurred with all rootworm insecticides. Performance of soil insecticides should be checked by leaving an untreated strip in each field. Examine some roots from this strip in late July. If poor control should occur, switch insecticides, preferably to another class (carbamate or organophosphate). Some corn rootworm insecticide products are available in packages designed for safer handling and/or easier disposal. See your dealer for further information.

Post-emergent treatments: The granular formulations listed (except Capture, Fortress and Aztec) can be applied at the same rates, as a band on either side of the row, by cultivator shoes and disc hillers at cultivation. Liquids for cultivation applications include Furadan 4FR, chlorpyrifos 4ER, and CobaltR. Chlorpyrifos and Cobalt also may be chemigated. Consult the label for dosage and application details. RR restricted use pesticide.

Accent and Beacon herbicide labels have restrictions regarding the use of Counter insecticides and other organophosphorus insecticides. Consult current product labels for details.

Application at cultivation is usually more reliable than at planting. **Apply only before June 15.** Control of rootworm adults is intended either to protect silks during pollination or to prevent egg laying and damage to roots in next years crop. Adults rarely become numerous enough to interfere with pollination. Control may be justifiable if there are more than 10 beetles per ear zone during the wet silk stage.

If treatments are intended to prevent egg laying then treatment is recommended when beetle counts exceed 18,000 beetles per acre (three beetles in four plants at 24,000 plants per acre). This threshold also can be used for determining the need for a soil insecticide in the following year if adult control is not used. In first year corn, lower this to 12,000 beetles per acre because a higher proportion of the population will be egg-laying females. Adult treatments applied too early, that is, before 10 percent of the females are carrying fertile eggs, may not have much effect on egg laying. Determining the percentage of females with fertile eggs can be difficult, but generally the proper time for the application of adult treatments occurs two to three weeks after the first adult emerges. A second adult treatment should be considered if beetle densities rebound to above 12,000 per acre (one beetle in two plants at 24,000 plant per acre). The products listed for control of western bean cutworm, as well as Furadan 4FR, malathion, methyl parathion 4ER or PennCap-MR may be used at label rates to control adult corn rootworms.

RR restricted use pesticide.

Note: Adult control can pose a significant threat to bees which frequently visit corn fields during pollen shed. If bee safety is a significant concern, consider controlling corn rootworms by crop rotation or by use of soil insecticides at planting or cultivation.

Product list for Western Corn Rootworm:

Insecticide	Ounces Product per 1000 Row	Preharvest Interval, Remarks
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Feet

Planting time treatments – Seed treatments

(University test data are limited, but results to date indicate that seed treatments are not as effective as granules and liquids for control of heavy rootworm infestations.)

Cruiser 5FS	Seed treatment	See label.
Poncho	Seed treatment	Commercial treatment only.

Planting Time Treatments – Granules

Check label to determine if granules can be applied in-furrow and allowed to come in contact with seed (University tests have not shown any consistent advantage for this type of placement.)

Aztec 2.1 GR	6.7 (2.1G)	Band, T-band or in-furrow at planting only.
Aztec 4.67 GR	3 (4.67G)	T-band at planting.
Capture 1.15 GR	6.4 - 8	Granules must be incorporated.
chlorpyrifos 15G2	6 - 8	Do not exceed 16 oz/1000 ft. row.
Counter 15 GR	8	Do not exceed 8.7 lb (15G) per acre. Accent and Beacon herbicide labels have restrictions regarding the use of Counter insecticides and other organophosphorus insecticides. Consult current product labels for details.
Defcon 2.1 GR	6.7	Band, T-band or in-furrow at planting only.
Force 3 GR	4 - 5	Banded or in-furrow at planting.
Fortress 2.5 GR	6 – 9 (2.5G)	In-furrow or T-band only.
Fortress 5 GR	3 – 4.5 (5G)	
phorate 20 GR2	6	Do not use in-furrow application. Do not apply to popcorn.
Thimet 20 GR2	6	Do not use in-furrow application. Do not apply to popcorn.

Planting Treatments – Liquids

bifenthrin 2 ER2	0.3	T-band, use at least 3 gallons per acre finished spray.
chlorpyrifos 4 ER2	2.4	5 - 6 inch T-band.
Furadan 4 FR	32 oz per acre	Apply 7 – 10 days after initiation of western corn rootworm egg hatch. DO NOT APPLY MORE THAN 2 PT/ACRE PER SEASON.
lambda	0.66	Extremely hazardous to bees!
cyhalothrin R2		T-band or in-furrow, use at least 3 gallons per acre finished spray.
Proaxis R	0.66	T-band or in-furrow, use at least 3 gallons per acre finished spray.
Regent 4 SCR	0.24	In-furrow only.

See text for products approved for post emergence applications.

RRrestricted use pesticide. 2Generic active ingredient. Several products available.

The information herein is supplied with the understanding that no discrimination is intended and that listing of commercial products, necessary

to this guide, implies no endorsement by the authors or the Extension Services of Nebraska, Colorado, Wyoming or Montana. Criticism of products or equipment not listed is neither implied nor intended. Due to constantly changing labels, laws and regulations, the Extension Services can assume no liability for the suggested use of chemicals contained herein. Pesticides must be applied legally complying with all label directions and precautions on the pesticide container and any supplemental labeling and rules of state and federal pesticide regulatory agencies. State rules and regulations and special pesticide use allowances may vary from state to state: contact your State Department of Agriculture for the rules, regulations and allowances applicable in your state and locality.

Categories: Field corn, Insects, Western corn rootworm

Date: 5/16/2008