

Western Corn Rootworm

Early Season Management in Kansas

Average corn planting dates in some areas of the state have been earlier in the past few years for a combination of reasons. Earlier planting and extensive use of Bt corn rootworm hybrids have increased the number of complaints about corn rootworm control failures. This fact sheet addresses common questions about the management of corn rootworms in early planted corn.

Q: How early is too early to plant corn and still expect good corn rootworm control when using a planting-time soil insecticide?

This is an interesting question that can be addressed with a series of simpler questions.

Q: How do planting-time soil insecticides control corn rootworm larvae in continuous corn fields?

Before Bt corn rootworm hybrids, the most common way to control corn rootworm larvae was the application of a granular soil insecticide in a band over the row or a liquid in-furrow treatment when corn was planted. Insecticides provide plants with a protective barrier, killing rootworm larvae on contact when they enter the treated zone.

Q: When do soil insecticides become effective?

Corn rootworm hatch usually begins in early May and continues through mid-June. Egg hatch can vary from year to year, depending on soil temperatures. Insecticide materials must be present at a toxic level from mid-May through early June to control corn rootworm.

Q: What is meant by toxic level?

There is a saying that the dose makes the poison. To kill the rootworm larvae as they enter the treated zone, insecticide must be present in the soil at a certain level or concentration. If the concentration falls below this level, some of the rootworm larvae will survive.

Q: Is the toxic concentration the same for all pesticides?

No, there appear to be big differences in the inherent toxicity of insecticides labeled for corn rootworm control.

Q: So the most toxic materials should work the best against corn rootworm larvae, right?

Unfortunately, it is not that simple. There can be a lot of difference between toxicities seen in the laboratory and what happens in the field because of variations in soil types and possible effects of formulation on product activity.

Q: What happens to the chemical between application time and egg hatch?

Actually, some of the most toxic materials break down faster in the soil than some of the less toxic materials. Even starting with the same amount of material, before long there may be less of one material than the other. This may equalize the advantage that certain chemicals had in terms of toxicity.

Q: Does this mean that as long as I am planting near the time of rootworm hatch, I should use the most toxic materials?

Not necessarily. Another factor that comes into play is solubility. To be effective, insecticides must be distributed in the soil around the plants. Typically, they are sprinkled on the surface and incorporated lightly by the press wheel. Water is required to move them into the soil. The distance a product moves depends on the amount of water and the product's solubility. Too little water on a material with low solubility may prevent the chemical from penetrating the soil enough to provide good protection. Too much water on a highly soluble material may disperse the chemical so it is no longer present in a high enough concentration to kill the rootworm larvae.

Q: What is the bottom line, given all these differences in toxicity, breakdown rates and solubilities?

Basically, all insecticides registered for corn rootworm were designed and tested to provide 4 to 6 weeks of activity against corn rootworm larvae. Tests using “normal” planting dates show all these materials to provide adequate control under most conditions.

Q: What do you mean, normal planting date?

This varies from one location to another, but in southwest Kansas, the first week of May used to be considered optimal. Now, a lot of growers are beginning to plant in late March and early April. So it may be 8 to 10 weeks before the rootworms hatch.

Q: Getting back to the original question, how early is too early to plant corn and still expect good control when using a planting-time soil insecticide?

This varies somewhat from one area of the state to another, but in southwest Kansas, corn planted before mid-April probably will not be well protected by planting time with soil-applied insecticides. Corn planted from mid- to late-April probably will receive some benefit most years, but also may have some failures. Corn planted after the first of May should be adequately protected in most situations.

Q: Then why not just develop a new insecticide that will give 8 to 10 weeks of control?

That probably won't happen. Experts have worked to develop insecticides that break down over time and do not remain in the environment too long.

Q: If soil insecticides aren't the answer for control of corn rootworms in early planted corn, what else is there?

Emphasize crop rotation. Rootworm beetles lay their eggs in corn fields, and larvae only feed on corn roots the following season. They are only a problem in continuous corn. Several Bt corn hybrids with resistance to rootworms and other corn pests are available. Overuse of one of these hybrids has led to failures and a renewed interest in soil insecticides.

Q: I thought I read somewhere that crop rotation was no longer always effective against the corn rootworm. Is that true?

In some areas of the Corn Belt corn rootworm eggs have survived in the soil for more than one winter. This phenomenon is known as extended diapause. Although extended diapause has been documented, it is a rare event, causing significant injury in only about 2 percent of the fields planted to corn following another crop such as soybeans. So far, extended diapause has not been documented in corn rootworms in the state of Kansas. Rotation is still a viable option, especially in Kansas.

Q: In continuous corn fields, is there a way to tell which fields are going to have a significant rootworm problem?

Yes, by counting adults in corn fields each year, you can predict which fields will have a serious problem the following year. Fields with low beetle counts can be planted early without risk of corn rootworm injury.

Q: What about fields that have potential for a serious corn rootworm population based on last year's beetle counts?

In that case, you have three options. Delay planting until late April or early May so a planting-time soil insecticide is more likely to work, use a cultivation time (rescue) treatment, or use a corn hybrid with BT resistance.

Q: What are the advantages and disadvantages of the cultivation time treatment?

With an application made at cultivation time (mid-May to early June) nearer to the time rootworm eggs hatch, there is less chance that the chemical will break down too early. And by using a bander mounted on a cultivator, the insecticide materials can be concentrated over the row to better protect the root zone.

The disadvantage is that weather may interfere with timing of treatments because of too much rain or wet soils. If there isn't enough rain after cultivation, the material may not be activated and fail to reach the larvae. Plus, there is the added cost of acquiring or building cultivation application equipment and the limits on the acreage that can be treated in a timely manner. Because weather may interfere with application, most growers use a Roundup Ready corn variety, which usually eliminates the need for cultivation.

Q: What about spraying or chemigating a material to control rootworm larvae?

Aerial applications have been attempted several times as rescue treatments in western Kansas. We don't recommend this practice because we have not seen research data showing aerial application to be effective for larval control. For this type of rescue application to be effective, it must be made early enough to significantly reduce larval feeding, and enough moisture must be available to bring insecticide into contact with the larvae. Thus, this practice would probably work better on sprinkler irrigated fields.

Another option is to use a chemigated insecticide registered for use through an irrigation system. A Nebraska study indicates that a chemigated registered insecticide can be just as effective as normal planting-time applications in reducing rootworm injury.

Q: When should rescue treatments be applied?

Logically, they should be applied during the peak rootworm hatch from mid-May to early June. Treatments after mid-June are questionable, as the larvae are beginning to pupate and the damage is nearly over. You can be certain that once the beetles begin to emerge or after corn already has lodged, it is too late for a soil-applied insecticide to be beneficial.

Q: Are there other options?

Adult corn rootworm control is an option that deserves more attention. This approach has been successful in some areas of the country, but there is some concern, especially in western Kansas, that spraying for rootworm beetles could increase spider mite problems because beneficials may be killed. A system has been developed that uses a bait to attract rootworm beetles to a pesticide. It provides a high level of control with a low level of pesticide and reduces the impact on beneficial insects. This system works and is registered. It may be a viable option for growers who want to produce continuous corn and plant early.

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