30. Insect Resistant Field Corn (3)

Corn rootworms (CRW) are the most serious insect pests in field corn in the US. Adults begin laying eggs in the soil of corn fields in mid to late summer, and the eggs overwinter in the soil. In late spring or early summer, egg hatch begins and emerging larvae feed on corn roots for three to four weeks.

Yield loss caused by corn rootworm infestations could be as high as 50%. Damage to roots from rootworm larval feeding reduces the plant’s ability to absorb and distribute water and nutrients from the soil.

Corn crop rotation has provided adequate protection in most corn growing areas. Corn rootworm adults normally lay eggs in cornfields and they do not hatch until the following season, they have only one generation per year, and their larvae only feed on corn roots. Consequently, rotating corn with other crops can effectively break the rootworm life cycle. A large percentage of U.S. corn acreage is not rotated but rather is planted to continuous corn. Growers who produce corn as feed for their own livestock may find it more economical to plant a steady supply of corn rather than purchase feed offsite during the non-corn rotation years. Corn is more effective at preventing erosion than is soybean. Continuous corn is protected against rootworm damage by soil-applied insecticides.

Approximately 12 million pounds of soil-applied insecticides were used in 1997 to control rootworms on 18 million acres in 18 major corn acreage states. Soil insecticides applied for corn rootworm larvae control also help control other soil-borne insect pests in corn, such as wireworms, black cutworms, and white grubs.

Crop rotation has failed to control CRW damage in some areas, resulting in economic losses in first year corn. A new biotype of beetles appearing in eastern Illinois, northern Indiana and parts of Michigan will lay eggs in soybean fields rather than corn, so that egg hatch the next season coincides with a corn rotation. A trend towards increasing insecticide use in corn, where rotation-resistant rootworm is the most widespread, is becoming discernable.

Two new transgenic corn varieties have been developed which produce Bt proteins toxic to corn rootworm beetles. One potential benefit Bt corn for rootworm protection may offer is more consistent and reliable protection than that provided by soil insecticides. The efficacy of soil-applied insecticides is dependent on proper timing and placement, and the environmental conditions that affect insecticide duration in the soil and rootworm larval emergence. In terms of level of root damage and consistency of protection, the transgenic varieties performed equally well or better than the soil insecticide treatments used for comparisons.

It is estimated that acreage likely to be planted to rootworm-protected corn includes corn acreage that is treated with soil insecticides at planting. In addition, corn acreage that is at risk of infestation with rotation-resistant rootworm would also be planted to rootworm-protected corn. Insecticide treatment may still be needed to manage risk of feeding by secondary pests. Seed treatments may provide a viable alternative to soil insecticides for management of secondary pest damage. If the cost of insecticide-treated Bt seed is still comparable to the current cost of soil insecticide application, the convenience of having soil insect protection in and on the seed without having to apply a separate insecticide should facilitate its adoption.

Impacts of Insect Resistant Transgenic Field Corn (3)
Change in pesticide use: 14 million lbs/yr. Reduction

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National Center for Food and Agricultural Policy, June 2002.

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