INTEGRATED PEST MANAGEMENT FOR CORN

WHAT YOU'LL LEARN

- Integrated pest management (IPM) is a sequence of techniques to evaluate, identify, and manage insect pests based on economic thresholds and safety for humans and the environment.
- Scouting, monitoring, and prior knowledge of insect activity are considered to be the most important IPM functions.
- Corn products with *Bacillus thuringiensis* (*B.t.*) protection can play a significant role in IPM programs.

What is IPM?

A general definition is that IPM for insects is a sequence of pest management practices that provide for the evaluation, decision making, and management of insect pests. The practices encompass pest lifecycles and prevalence, presence of beneficial insects, agronomic factors (crop rotation, seed selection, soil management, etc.) and the timely and justified use of biological or pesticide products to minimize the potential damage from pests. The concepts of IPM are designed to help protect environmental resources and the health of humans and wildlife. Four steps are generally followed in the IPM process:

1. Establishment of an economic threshold (point at which the population causes economic loss) for the pest
2. Scouting and proper identification of the pest
3. Utilization of preventative methods to reduce the potential of the pest becoming an economic threat (crop rotation, seed selection, soil-applied insecticides (SAI), etc.)
4. Use of appropriate controls (pheromones, mechanical, trapping, beneficial insects, pesticides) when an insect pest reaches an economic threshold and damage is expected to continue based on the lifecycle of the insect.

Importance of IPM in Corn Production

Integrated pest management is important because insects appear at some level in corn fields every year. Some insects are beneficial, others can be damaging. Beneficial insects that prey on potentially damaging insects include lady beetles, lacewings, and syrphid flies. If beneficial insect populations are sufficiently high, they can keep destructive insect populations in check.

Damaging corn pests can include species of cutworm, wireworm, rootworm larvae and adults, corn borer, earworm, armyworm, Japanese beetle, aphids, spider mites, and others. Depending on the production area, crop rotation, and other agronomic factors, these insects may be present and have the potential to reach or remain below economically damaging levels. The techniques and standards of IPM allow for the measurement, evaluation, and solutions for managing insect populations.

Scouting, an Important IPM Function

Scouting or monitoring and prior knowledge of insect activity are considered to be the most important IPM functions. Fields should be physically scouted on a regular schedule, usually weekly, to determine the presence and levels of insect populations, including beneficial insects. Depending on species of interest, traps may be passive or may employ the use of an attractant such as pheromones, baits, and/or a desirable coloration to help determine populations and if control methods may be needed for future crops. An example is the use of yellow colored traps to determine the population of western corn rootworm adult variants that are feeding and laying eggs in soybean fields that will be planted to corn the next cropping season (Figure 1).

Non-protected corn seedlings could experience feeding by cutworms, billbugs, and other insects. Rescue measures may be appropriate if economic threshold levels are reached and feeding will continue. Silks clipped by corn rootworm adults or Japanese beetles can reduce ovule fertilization and potential yield. Depending on the number of

Figure 1. Western corn rootworm beetle variants and Japanese beetles feeding on soybean leaves. Pherocon® AM trap (inset) for collection of western corn rootworm beetles in soybean.

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beetles, control measures may need to be considered for the current crop and for future corn crops if continuous corn is planned.

IPM Practices That Can Help Manage Pests

Agronomic practices that can help manage destructive insects include:

- Crop rotation that disrupts the insect lifecycle (non-variant corn rootworm as an example).
- Use of seed treatments, such as Acceleron® Seed Treatment Products for Corn.
- Use of seed products containing *B.t.* traits that protect the plant from specified insects (corn rootworms, corn borers, cutworm, earworm).
- Use of an SAI if injurious soil insects (corn rootworms, true white grubs, garden symphylans, grape colaspis, billbugs), which cannot be managed after planting, are likely to be present prior to planting.
- Tillage can destroy residue that harbors insect larvae or adults.
- Control of weeds that harbor insect larvae or adults through mechanical or chemical means.
- Use of foliar insecticides to control insects that have reached economic threshold population levels (cutworms, corn rootworm adults, Japanese beetles, earworm, armyworms).

Use of *B.t.* Products

Corn products with *B.t.* protection can play a significant role in IPM programs. When planted using prescribed seed stewardship standards, the products offer protection from the individual insect or insects for which they contain protection. Products are available with single and multiple MOA protection. In the Corn-Growing Area, growers can manage their insect refuge by planting refuge-in-the-bag products while growers in the Cotton-Growing Area must plant a structured refuge.

Where a spectrum of above– and below-ground insect protection is needed and crop rotation is not an option, a dual mode of action (MOA) product like Genuity® SmartStax® technology can be planted for protection against corn rootworms, corn borers, earworm, and fall armyworm. These products also offer single MOA protection against western bean cutworm and black cutworm. In addition, the seed is treated with Acceleron® Seed Treatment Products for Corn that protects seed from common insects that attack seeds and seedlings. Fields that have been identified to be infested with corn nematodes can use Acceleron® Seed Treatment Products for Corn with Poncho®/VOTiVO®, which offers corn nematode protection.

If rotation or a dual MOA product is not an option for corn rootworm protection, an SAI such as Precept® Insecticide (Restricted Use Pesticide) can be used along with single MOA products like Genuity® VT Triple PRO® technology corn. These products also offer dual MOA protection for corn borers, earworm, and fall armyworm.

In areas where corn rootworms are not a concern, products with Genuity® VT Double PRO® technology offer dual MOA protection for corn borers, earworm, and fall armyworm.

All *B.t.* products and any necessary refuge acres, regardless of trait, should be continually scouted for the presence of insects, as well as weeds and diseases. Any populations or infestations should be appropriately managed according to IPM standards.

Sources:

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Knodel, J.J. and McMullen, M. 2012. IPM basics. Integrated pest management in North Dakota agriculture. PP863 revised. North Dakota State University. www.ag.ndsu.edu/ndipm/documents.

Web sources verified 12/2/15.

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For additional resources on this topic, contact your local seed representative or visit your seed brand website.