

**Agronomy Technical Note #14**

**INTEGRATED PEST (INSECTS) MANAGEMENT IN HIGH RESIDUE CROPPING SYSTEMS**

**November 2018 Natural Resources Conservation Service – Indiana**

***AGRONOMY TECHNICAL NOTE – Soil Health Series***

The *Soil Health Series* provides management techniques for the successful integration of Quality No-till Cropping Systems, Adaptive Nutrient Management, Prescriptive Cover Crops, Integrated Pest (Insect / Weed / Disease) Management and Diverse Crop Rotations. This information is applicable to most Indiana soils and cropping conditions and covers broad application.

**Implementing INTEGRATED PEST (INSECT) MANAGEMENT (IPM) during the Transition(s) to a High-Residue** **Cropping System**

Insect pest management can be challenging in all cropping systems, and significant time and money may be spent on a variety of control practices. It is critical to utilize scouting to establish if economic treatment thresholds have been met prior to making insecticide applications. Develop long-term Prevention, Avoidance, Monitoring and Suppression (PAMS) strategies to reduce the potential of insect pests developing resistance to insecticides. Understand why and how extreme situations (e.g., insect outbreaks) happen prior to using short-term fixes such as unnecessary chemical treatments and / or tillage.

High-residue cropping systems (Never/No-Till, Strip-Till, and Reduced-Till and/or cover crops) require different understanding of insect pests and beneficial organisms. During the first 3-4 years, the soil biology and chemistry undergoes significant changes. Soil microbial populations shift as soil disturbance decreases and the organic matter stabilizes. In addition to insects, also understand the different changes that will happen with nutrients, weeds & diseases while making the transition(s) to these systems.

**Management Strategies During Transition to High-Residue Systems**

* Healthy crops are more resilient against insects which equates to enhanced cash crop health and growth.  Transition items to keep in mind include but are not limited to: improve drainage where needed; minimize compaction and surface crusting; provide proper soil pH and fertility; control weeds and diseases; and pay attention to planter depth, speed and seed-slot closure to promote consistent crop emergence.
* What are the current pest problems in the field? Identify “hot spots” and diagnose why those pests are present. A review of the past year(s) is important to plan for future integrated pest management.
* Spread harvested residues evenly across the full width of the combine header. This will better ensure more uniform soil temperatures and moisture that favor crop growth and development.
* Plant when soils are ready – too early, cold, or wet conditions can slow germination and plant emergence making plants more susceptible to early season pests (such as seedcorn maggot, wireworms and slugs).
* Insecticidal seed treatments are meant to suppress occasional pests, but they often have negative effects on beneficial insects / organisms – ensure they are necessary, especially in soybeans. If using insecticidal seed treatments, use the lowest rate to suppress anticipated insect pests. Insecticidal seed treatments do not control slugs, and beneficial insects feeding on slugs can be inadvertently killed.
* As with all integrated pest management programs, important items to keep in mind include:
  + Use scouting of beneficial and problem insects alike to determine if economic thresholds have been met to warrant treatment. Understand that crops can sustain damage without yield loss and there is often a lag before beneficial organisms can catch up with a pest outbreak. And the damage to beneficial insects is usually longer lasting.
  + Properly identify and consider all beneficial species. Encourage beneficial species such as, but not limited to: ground beetles, minute pirate bug, and spiders with a soil health management system (no-till/strip-till, cover crops, nutrient management and buffers). Properly planned buffers can also act as insectary strips promoting beneficial organisms and pollinators.
  + Properly identify all pest species. Scouting, early and often, is key to any IPM program. If using cover crops, especially be on the lookout for species such as, but not limited to: black cutworm; armyworm; stink bugs and slugs.
* Use multiple cultural methods for long-term, sustainable control (crop rotation, cover crops).
* If economic treatment thresholds have been met and pesticide applications are planned, be sure to follow these recommendations, as applicable:
  + Determine if spray tank water quality (hardness, pH) is an issue and address it.
  + Pay attention to different product formulations. Determine the rate and correctly measure the amount of product needed. Calibrate the sprayer.
  + Determine the proper coverage, spray solution volume and pressure. Select the proper nozzle (droplet size). If applicable, select the proper spray additives (AMS, surfactant).
  + Identify and follow the proper mixing order of products to be used. Beware of potential antagonism between pesticide products and additives.
* Environmental conditions such as, but not limited to: rain, dew, dust, drought, and temperature can impact insects and effectiveness of the products to be used.
* If scouting determines that a foliar fungicide application is justified to treat a crop disease, do not also add insecticides to this treatment unless economic thresholds have also been met for an insect or other pest, as appropriate.
* During herbicide applications to terminate cover crops or weeds, do not also add insecticides to this treatment unless economic thresholds have also been met for an insect or other pest, as appropriate.
* To reduce the potential of pests (weeds, disease, and insects) developing resistance, it is important not to use the same class of pesticides repeatedly. For more details see: <http://www.irac-online.org/>.
* **Be sure to follow all pesticide label instructions.**

Proper identification and treatment of problematic pests along with IPM strategies by utilizing a PAMS approach can help to reduce damage from pests and from making unnecessary pesticide applications. Integrated Pest Management is important to maintain the gains that have been made in conservation agriculture and to improve all conservation cropping systems.

**References**

[Pest & Crop Newsletter](https://extension.entm.purdue.edu/pestcrop/) – Purdue University Extension.

[Corn & Soybean Field Guide](https://ag.purdue.edu/agry/dtc/Pages/CSFG.aspx) – Purdue University Extension, ID-179, current version.

[Corn Scouting Calendar](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030962.pdf) (PDF, 18 KB) & [Soybean Scouting Calendar](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030983.pdf) (PDF, 19 KB) – Purdue Extension.

[Crop Scouting Reports](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030936.pdf) (PDF, 20 KB) – Purdue University Extension.

Corn Insect Control Recommendations ([**Web**](https://extension.entm.purdue.edu/publications/E-219/E-219.html) | **[PDF logo](https://extension.entm.purdue.edu/publications/E-219/E-219.pdf)**) – Purdue University Extension, E-219, current version.

Soybean Insect Control Recommendations ([**Web**](https://extension.entm.purdue.edu/publications/E-77/E-77.html) | **[PDF logo](https://extension.entm.purdue.edu/publications/E-77/E-77.pdf)**) – Purdue Extension, E-77, current version.

Entomology – [Field Crop Insects](https://extension.entm.purdue.edu/publications/pubs/f_crop.html) (website) – Purdue University Extension.

Insecticide Resistance Action Committee <http://www.irac-online.org/> (website)

Pests and Natural Enemies Often Associated with Cover Crop Systems (handout) – Purdue Extension.

The Effectiveness of Neonicotinoid Seed Treatments in Soybean ([**Web**](https://extension.entm.purdue.edu/publications/E-268/E-268.html) | **[PDF logo](https://extension.entm.purdue.edu/publications/E-268/E-268-W.pdf)**) – Purdue Extension, E-268.

Protecting Pollinators Tips for Commercial Agricultural Pesticide Applicators ([**Web**](https://extension.entm.purdue.edu/publications/POL-3/POL-3.html)| **[PDF logo](https://extension.entm.purdue.edu/publications/POL-3/PPP-113-POL-3.pdf)**) – Purdue, PPP-113/POL103.

Protecting Pollinators in Agronomic Crop Production ([**Web**](https://extension.entm.purdue.edu/publications/POL-4/POL-4.html) | **[PDF logo](https://extension.entm.purdue.edu/publications/POL-4/POL-4.pdf)**) – Purdue Extension, POL-4.

[Natural Enemy Field Guide](http://www.canr.msu.edu/foodsystems/uploads/files/natural-enemies-flyer.pdf) flyer – North Central IPM Center.

Biointensive Integrated Pest Mgmt (IPM): Fundamentals of Sustainable Agriculture ([**Download PDF**](https://attra.ncat.org/attra-pub/download.php?id=146)) – ATTRA (2001).

*Farming with Native Beneficial Insects*:*Ecological Pest Control Solutions* (book) - The Xerces Society, 2014.