8-12-2015

Corn Rootworm Management Update

Erin W. Hodgson
Iowa State University, ewh@iastate.edu

Follow this and additional works at: http://lib.dr.iastate.edu/cropnews

Part of the Agricultural Science Commons, Agriculture Commons, and the Entomology Commons

Recommended Citation
http://lib.dr.iastate.edu/cropnews/824

The Iowa State University Digital Repository provides access to Integrated Crop Management News for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current information on integrated crop management from Iowa State University Extension and Outreach, please visit https://crops.extension.iastate.edu/.
Corn Rootworm Management Update

Abstract
For a second year in a row, corn rootworm abundance is lower than expected in Iowa. This is due, in part, to exceptionally wet spring conditions in 2014. However, scouts and farmers have noticed rebounding populations of adult corn rootworm in the landscape now, especially noting root injury to first-year corn by northern corn rootworm. It is not too early to make management decisions for next year, with the following considerations.

Keywords
Entomology

Disciplines
Agricultural Science | Agriculture | Entomology
August 12, 2015

For a second year in a row, corn rootworm abundance is lower than expected in Iowa. This is due, in part, to exceptionally wet spring conditions in 2014. However, scouts and farmers have noticed rebounding populations of adult corn rootworm in the landscape now, especially noting root injury to first-year corn by northern corn rootworm. It is not too early to make management decisions for next year, with the following considerations.

Assess larval injury to roots. Corn rootworm larvae feed on corn roots and can potentially cause severe economic loss (Photo 1). For every node of roots pruned by larvae, expect a 15% yield loss on average (Tinsley et al. 2013). Evaluate root injury in every cornfield to better understand the efficacy of your management strategy. Monitoring over several years will help establish a historical record of how larvae respond to management tactics (e.g., crop rotation, Bt corn, soil-applied insecticides, etc.). The Iowa State node-injury scale ranges from 0-3 and is directly related to yield loss. Learn
more about the scale [here](#). Root injury that exceeds 0.25 can experience economic loss.

![Photo of corn root with severe node injury](image)

**Photo 1. Severe node injury to corn roots. Photo by Erin Hodgson.**

**Monitor for adults.** Corn rootworm adults generally emerge aboveground in early July and can be found in cornfields throughout August in Iowa depending on summer temperatures. Farmers and crop consultants can measure adult rootworm abundance in fields to anticipate larval injury the next growing season. Place at least four unbaited Pherocon AM sticky cards (Photo 2) throughout a field during the period of peak adult abundance (late July through the middle of August). Replace cards weekly and count the number of adults collected per card. Based on a recent economic analysis, a field should be managed for larval corn rootworm next season if the average number of adult corn rootworm captured (either northern, western or a combination of the two species) exceeds two per card per day (Dunbar and Gassmann 2012).
**Photo 2. Sticky traps can help monitor for corn rootworm adults. Photo by Mike Dunbar.**

**Corn rootworm variants.** The typical life cycle for northern corn rootworm and western corn rootworm consists of one generation per year, with females laying eggs in cornfields to overwinter and hatch the following year. However, these highly adaptable pests have developed population variants to overcome crop rotation. To confirm variants of either species, check for larval root injury in first-year corn and whether adult western corn rootworm or northern corn rootworm are present in the field.

The northern corn rootworm has resistance to crop rotation through extended diapause. Instead of overwintering eggs hatching the following spring, it may be two or three years before larvae hatch. Female northern corn rootworms only lay eggs in corn, regardless if it is from a variant or normal population. Extended diapause is more common in western Iowa, but it is possible to find variants in central and eastern Iowa. Larval injury is possible to first-year corn if a significant extended diapause population is in the field. Although northern corn rootworm often leave cornfields to feed on pollen and leaf tissue of weeds and soybeans, this species does not lay eggs outside of cornfields.

By contrast, western corn rootworm variants are resistant to crop rotation because they can lay eggs outside of cornfields, particularly in soybean fields. Those eggs will hatch the following year and can cause injury to first-year corn. The soybean variant is very rare in Iowa but may be present in southeastern and east-central counties.

**Sustainable corn rootworm management**

Rotating fields out of corn production breaks up the life cycle of corn rootworm. This remains an extremely effective way to manage corn rootworm in Iowa. Western corn rootworm in Iowa remains susceptible to crop rotation, however, resistance to crop
rotation by northern corn rootworm does occur in Iowa through extended diapause. In
cornfields where large populations of northern corn rootworm are observed, and where
the presence of rotation resistance is suspected, farmers should protect first-year corn
against northern corn rootworm larvae.

A pyramided Bt hybrid has multiple Bt toxins that target the same pest. In Iowa, we
have observed good performance of Bt hybrids that contain the Cry34/35Ab1 trait alone
or pyramided with either Cry3Bb1 or mCry3A. However, some cases of heavy feeding
injury to corn with Cry34/35Ab1 Bt toxin have been observed in Iowa. Because western
corn rootworm in Iowa has developed resistance to both mCry3A and Cry3Bb1
(Gassmann et al. 2011, 2014), good stewardship of pyramided Bt corn is very important.
Additionally, soil-applied insecticides may be used at planting to protect from larval corn
rootworm injury. Evaluations of various Bt traits and soil-applied insecticides for
management of corn rootworm larvae can be found here.

In order to successfully manage corn rootworm, develop a long-term strategy that rotates
among a variety of management approaches over multiple seasons. This is the best way
to guard against the build-up of large populations and the development of resistance.

1. Rotate fields out of corn production at least every 4 to 5 years.
2. Plant Bt hybrids pyramided with multiple traits targeting larval rootworm.
3. Rotate between Bt hybrids without soil-applied insecticide and non-rootworm Bt
   hybrids with a soil-applied insecticide.

References

Dunbar, M.W. and A.J. Gassmann. 2013. Abundance and distribution of western and
northern corn rootworm (*Diabrotica* spp.) and prevalence of rotation resistance in eastern
Iowa. Journal of Economic Entomology. [link](#)

evolved resistance to Bt maize by western corn rootworm. PLoS ONE. DOI:
10.1371/journal.pone.0022629.

Ingber, and R.W. Keweshan. 2014. Field-evolved resistance by western corn rootworm to
multiple *Bacillus thuringiensis* toxins in transgenic maize. Proceedings of the National
Academy of Sciences of the United States of America. DOI: 10.1073/pnas.1317179111.

model to estimate damage caused by corn rootworm larvae. Journal of Applied

**Category:** Crop Production  Insects and Mites
Crop: Corn

Tags: Corn, rootworm, resistance, diapause, Bt corn

Authors:

Erin Hodgson  *Associate Professor*

Erin Hodgson started working in the Department of Entomology at Iowa State University in 2009. She is an Associate Professor with extension and research responsibilities in corn and soybean. She has a general background in integrated pest management for field crops. Erin’s current extension and...

Aaron J Gassmann