How Can Harvest Help Determine Future Insect Pressure in Corn?

While harvesting corn, combine operators should know how to recognize certain insect feeding injuries. Though the insect may no longer be present, injury symptoms may well be noticeable. If symptoms are present, proactive insect management—including scouting—should be considered for the next crop year.

Missing plants or skips within row

Early season injury from white grubs or wireworms could cause missing plants or skips within a row. As these insects usually occur in the same fields over time, management tactics should be considered in the next growing season.

Random ears are banana shaped or have random discolored kernels

Brown, green, or brown marmorated stink bug feeding is a likely cause of these symptoms (Figure 1).[1] Heavy stink bug pressure early in the season can lead to deformed, banana-shaped ears (Figure 2). Random kernels may have scars, holes in kernel caps, or appear bruised and dark (Figure 3). Kernels may be mottled in appearance, especially close to the tip of the ear. The following crop should be closely scouted for stink bug damage and managed accordingly, especially if the field has a history of damage.

Figure 1. Brown stink bug.

Figure 2. Banana shaped ears are characteristic of stink bug feeding.

Figure 3. Random discolored kernels occur when stink bugs pierce through the husk to feed on developing kernels.

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Kernels are damaged by larval feeding and/or have fungal growth

Mid- to late-season kernel feeding from corn earworm (Figure 4), fall armyworm, western bean cutworm (Figure 5), and European corn borer (Figure 6) can directly damage corn kernels by feeding on them, and indirectly lead to increased incidence of disease and rot.[4] When kernel feeding begins during the milk stage of kernel development, the leaking milk provides a favorable substrate for fungal growth which can then damage neighboring healthy kernels (Figure 4). Above-ground *Bacillus thuringiensis*-protected (*B.t.*-protected) corn products may resist some or all of these insect larvae. However, large moth flights of corn earworm can indirectly damage *B.t.-protected corn*. These moths may produce unusually high numbers of larvae, potentially leading to cannibalism among the larvae which further allow the surviving larvae to grow to a large enough size to tolerate the *B.t.* toxin, resulting in subsequent damage.

Figure 4. Combined kernel damage from corn earworm feeding and fungal growth on non- B.t.-protected corn.

Figure 5. Western bean cutworm larvae.

Figure 6. European corn borer larvae.

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Evidence of incomplete pollination

During pollination, insect feeding on green silks can prevent ovule (potential kernel) fertilization if the pollen tube, which is attached to an ovule, is cut. This can occur when silks are clipped to less than ½-inch long. Although the silk-clipping insects are no longer a threat to a crop being harvested, scouting for grasshoppers, corn rootworm beetles, corn earworm, and Japanese beetles should be conducted the following year (Figures 7 and 8).[4]

Figure 7. Western corn rootworm beetles feeding on silks.

Figure 8. Japanese beetles clipping silks.

Stalk or root lodging

Stalk- and/or root-lodged corn can cause substantial harvest delays and losses. European corn borer (ECB), southwestern corn borer (SCB), and common stalk borer feeding can weaken stalks and increase the potential for lodging via wind and heavy rain. Holes in the stalk rind and ear shanks are evidence of European corn borer feeding (Figure 9, left). Dropped ears with tunneled-out shanks, broken tassels, or missing tassels can also be evidence of ECB feeding.

Stalks cleanly broken off just above the brace roots are characteristic of southwestern corn borer feeding (Figure 9, right). SCB tunnel downward into the brace roots and generally stay low on the stalk.

Figure 9. European corn borer with entry hole below the ear (left) and southwestern corn borer with tunnel within brace roots (right).

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Common stalk borer tunneling usually occurs early season along fence rows, waterways, and other grassy areas (Figure 10). Injured plants can be stunted and have characteristic tillering because the growing point was killed or damaged.[5]

Severe root lodging or goosenecked plants are characteristic of mid-season rootworm feeding. Depending on the growing season, injured roots may have new growth. However, this new growth is unlikely to support the plant in severe wind or heavy rain.

Stalk and root lodging is also caused by pathogens, which can be introduced by ECB, SCB, or corn rootworm feeding. Selecting corn products with *B.t.* protection for above-ground insects, below-ground insects, or both can help protect the plants from respective insect feeding.[3]

Figure 10. Common stalk borer. Picture courtesy of and used with the permission of James Kalisch, University of Nebraska, Bugwood.org.

Figure 11. Root lodging can be caused by mid-season corn rootworm feeding.

Moldy corn

Corn contaminated by aflatoxin has been infected by either *Aspergillus flavus* or *Aspergillus parasiticus*. These molds often occur when insects feed on corn ears during droughty, high-temperature conditions. A felt-like, greenish-yellow to yellowish-brown mold can be found near insect damage on or between kernels (Figure 12). Sampling for *Aspergillus* can be done during grain loading by passing a cup multiple times within a stream of grain. Multiple samples should be taken, as distribution is not even within the field. Rapid tests are available for in-field testing.[2] It is important to know that *Aspergillus* may be present without the development of aflatoxin.

Figure 12. Ear with insect larval feeding and Aspergillus fungus that may be aflatoxin.

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Ragged-edged corn leaves or leaves with ragged holes

Leaves with ragged edges or ragged holes (Figure 13) may be evidence of fall armyworm (FAW) feeding pre-tassel. Grasshopper feeding can mimic FAW feeding and is more likely to be seen during harvest than FAW.

Figure 13. Ragged leaves and holes caused by fall armyworm.

Sources:

[1]2019. Stink bug kernel injury. The Ohio State University. Troubleshooting Abnormal Corn Ears. https://u.osu.edu/mastercorn/stink-bug-kernel-injury/

[2]Wrather, A., Sweets, L., Bailey, W., Claxton, T., Sexten, J., and Carlson, M. 2010. Aflatoxins in corn. University of Missouri Extension. G 4155. https://extension2.missouri.edu/g4155

[3]Nielsen, B. and Colville, D. 1988. Stalk lodging in corn: Guidelines for preventive management. Agronomy Guide. Purdue University. AY-262. https://www.extension.purdue.edu/extmedia/AY/AY-262.html.

[4]O'Day, M., Becker, A., Keaster, A., Kabrick, L., and Steffey, K. 1998. Corn insect pests – A diagnostic guide. University of Missouri Extension. https://mospace.umsystem.edu/xmlui/bitstream/handle/10355/16081/CornInsectPests.pdf?sequence=1&isAllowed=y.

[5]Dean, A. and Hodgson, E. Stalk borer. Integrated Crop Management. Iowa State University Extension and Outreach. https://crops.extension.iastate.edu/encyclopedia/stalk-borer.

[6]Bessin, R. 2019. Fall armyworm in corn. University of Kentucky College of Agriculture, Food and Environment, Lexington, KY. Entfact-110. https://entomology.ca.uky.edu/files/efpdf1/ef110.pdf

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