End of Season Corn Management

Insect, disease, and environmental stress during grain fill can compromise corn yield potential and quality.[1] Monitoring the crop through harvest can help guide decision making during grain fill and provide insight for managing the harvested crop and planning for next season. Late season stress can reduce the plant's photosynthetic capacity and trigger remobilization of carbohydrates from stalks and leaves to feed developing kernels which may weaken the plant structure and overall health at the same time.

Stalk and Ear Diseases

Stress, particularly hot, dry weather, and hail damage during late vegetative and reproductive phases of growth can increase susceptibility of corn plants to foliar diseases and stalk rots. Stalk rot is often favored after excellent early season growing conditions followed by stress during grain fill. Carbohydrate remobilization, unbalanced soil nutrients, compaction, and insect injury contribute to the infection of corn plants by a complex of stalk rot fungi. Common stalk rot diseases include: anthracnose, gibberella stalk rot, diplodia ear and stalk rot, and aspergillus ear rot. (Figure 1).

Scouting to determine the infection level in a field and the lodging potential can help determine field harvest sequence and grain handling practices to help minimize the impact from diseases. The pinch and push tests can be used to assess lodging risk in your fields. Select around 100 representative plants while walking through fields and use one of the following tests to determine lodging risk:

- Pinch plants at one of the lower internodes above the brace roots. If the stalk collapses easily, stalk quality has likely been compromised , making it more prone to lodging.
- Push plants to around a 30 degree angle. If they fail to flex back, stalks may be compromised and at risk for lodging.

Different environmental conditions favor the development of different ear rots. For example, Aspergillus ear rot is favored by hot, dry conditions while Gibberella ear rot is favored by cool, wet weather during silking. The fungi that cause corn ear rots are often favored by late-season humidity and rain following pollination. Delayed planting or conditions that slow grain drying in the field and delay harvest can lead to an increased incidence of ear rot diseases. Fields with stalk rots may also be at a greater risk for developing ear rots. Common corn ear rots include Aspergillus, Fusarium, Gibberella, Diplodia, and Penicillium ear rot. Ask your local representative or agronomist for more information about ear molds, and mycotoxins, including and aflatoxins.

Figure 1.(Left to Right): Anthracnose Stalk rot, Gibberella stalk rot, Diplodia ear and stalk rots, Gibberella ear rot, and Aspergillus ear rot.

Aspergillus ear rot symptoms include olive green or yellowish tan fungal growth on and between kernels. Diplodia ear rot symptoms include bleached husks, white mold over kernels beginning at the base, and rotted ears with tightly adhering husks. Small, black fungal bodies called pycnidia are often found on husks, kernels, and cob tissues. Typical symptoms of fusarium ear include individual or groups of kernels with white streaks that have a starburst pattern. Purple to pink mycelium can be found growing in and around kernels of infected ears, especially insect damaged ears.

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Stalk and Ear Feeding Insects

Stalk and ear shank damage can be caused by SWCB or ECB, in addition to ear feeding damage. SWCB lay eggs in the ear zone and young larvae feed on ear shoots, kernels, and the cob, before tunneling down the stalk to the base of the plant.[2] ECB larvae feed on pollen and silks then enter the ear by tunneling through the shank and cob. Injury can be found at both ends and along all sides of the ear. Ear feeding insect larvae look similar but have characteristic feeding patterns (Figure 2).[3] Unlike ECB larva, which enter the ear through the husk or cob, corn earworm primarily enter through the silk channel. Larvae feed at the tip and along the sides of the ear near the tip. FAW, unlike CEW burrow through the husk or base of the ear and feed along the sides of the ear. Western bean cutworm larvae are not cannibalistic like corn earworm and may have multiple larvae feeding in an ear. The larvae enter ears through silk channels or the husk, feeding on kernels at the tip, base and sides of the ear. Insect damaged kernels can increase susceptibility to ear molds.

Figure 2. Larva of fall armyworm (top left), corn earworm (top center), European corn borer (top right), TAW (bottom left), western bean cutworm (bottom center), SWCB (bottom right). TAW, SWCB photos, Frank Peairs, Colorado State University, Bugwood.org.

Malformed Ears

Environmental or chemical stress during the vegetative and early reproductive stages (V5 to R3) of corn can cause abnormal or malformed ears. Distinctly different symptoms develop depending on the timing, type, and severity of the stress corn undergoes. Pesticide applications can be a source of stress on corn if application occurs outside of product label conditions or other stresses increase corn susceptibility.

Weeds

Late-season weed monitoring should document weed escapes, new weeds, and the distribution of species and infestations to help plan pre- or post-harvest herbicide applications and adjust the weed management plan for the next crop.

- Identifying weed species and the extent and distribution of weed infestations in a field can help determine the right herbicide and application timing to keep tough-to-control weeds in check next season.
- Weeds with late season germination and survival and/or prolific seed production, may require multiple herbicide modes of action and sequential applications to cover the emergence characteristics and competitiveness of the weed community in a field.
- Weeds present at harvest may indicate that a post-emergence (POST) herbicide application that includes a residual may need to be part of the weed management plan.
- The POST herbicide program may need a different mix of herbicide modes of action to cope with the weed spectrum.
- A pre-emergence (PRE) herbicide program alone may not provide the diversity and longevity of herbicide action necessary to manage the weed situation without a sequential POST application.

Fertility

The end of season corn stalk nitrate test which uses the lower portion of the stalk for analysis, can help provide data regarding nitrogen utilization and managment.[4] Sample an 8-inch segment of the stalk from about 6 to 14 inches above the soil 1-3 weeks after physiological maturity. Contact your agronomist or University Extension for fact sheets outlining procedure for sampling and interpretation of data.

Late season crop monitoring can help assess management practices and begin the planning process for the next crop.[5]

Sources: [1] Nielsen, R.L. 2013. Stress during grain fill: A harbinger of stalk health problems. Corny News Network. Purdue University. www.agry.purdue.edu (verified 8/11/14).[2] Sloderbeck, P.E., et al. 1996. Southwestern corn borer. Kansas State University.[3] Cook, K. 2005. Corn earworm, European corn borer, armyworm, or western bean cutworm: Which one is causing the injury I'm seeing on my corn ears? University of Illinois.[4] Laboski, C.A.M. 2010. Considerations when using the end-of-season corn stalk nitrate test. Wisconsin Crop Manager 17(26):113-114.[5] Thelen, M. 2012. Late-season scouting of corn and soybean fields is worth the effort. Michigan State University Extension. 140808131637070118