

## Chapter: 45 Scouting for Corn Diseases



Emmanuel Byamukama (Emmanuel.Byamukama@sdstate.edu) and  
Connie Strunk (Connie.Strunk@sdstate.edu)

The purpose of scouting and having field records is to provide information, from which economically and environmentally sound recommendations are developed. The economic-based pest threshold is the severity level at which the yield loss equals the cost of the controlling the plant disease. Field scouting is conducted to: 1) diagnose disease problems; 2) determine disease severity; 3) determine the need for applying fungicides; and 4) assess the effectiveness of previously applied control strategies. The purpose of this chapter is to discuss the basics of field scouting (Table 45.1).

**Table 45.1 Key factors to consider when field scouting:**

- Note the current and forecast weather conditions.
- Provide information when pest population thresholds/severity are nearing or exceeding the cost of control.
- Base the frequency and intensity of field scouting on the crop, crop growth stage, pest of concern, and timing and frequency of control practices.
- Provide site-specific data by noting location, intensity, and extent of pest problem.
- Avoid costly mistakes by checking field records and the corn trait package.
- Put the information into your field records.
- Use pest-specific sampling protocols.

### Preparing to Scout a Field

#### **Step 1.**

Understand the pathogen biology and control approaches. Have an idea when certain diseases occur in the season.

#### **Step 2.**

A grower, crop consultant, and/or commercial agronomist can perform the scouting. Scouting starts by assembling the needed tools (Table 45.2). Obtain information on the weather for the past four days and the forecast for the next four days. Be aware of disease alerts in the area (from [extension.sdstate.edu](http://extension.sdstate.edu), crop newsletters, etc.). Check the disease ratings for the cultivar planted. Also be aware of the field disease history, cropping history, and what seed treatments were used. In addition, a recent remote-sensed image of the field, if available, may be used to direct scouting activities.

#### **Step 3.**

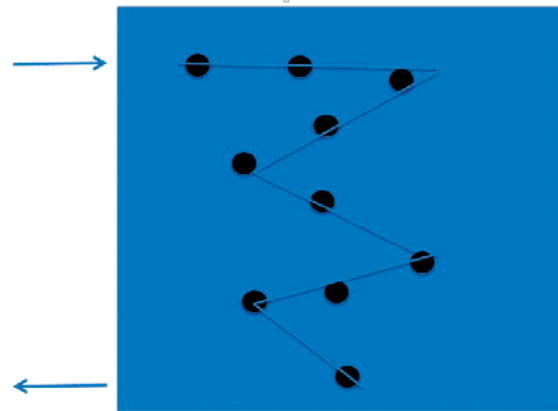
Start with the big picture – the entire field – look for stunted, yellowing plants, or areas that raise suspicion. If you see a problem, ask: Are the infected plants in any pattern (e.g., random, clustered, patchy)? Scouting

**Table 45.2 Useful tools to use when scouting production fields:**

Clipboard or notebook	Clear plastic Ziploc bags or screw-top vials
Scouting sheet	Paper bags
Plastic bucket	Camera/video recorder
Hand lens (at least 10x magnification)	Trowel or hand spade
Shovel	Hand counter
Sharp pocket knife or single-edge razor	Soil sampling probe
GPS	Field flags
Marker/sharpie	Pest ID guides

for diseases should be done periodically, starting with assessing plant-stand establishment (seed and seedling diseases), then assessing for early season diseases (foliar diseases), midseason diseases (foliar diseases), and finally, late-season diseases (stalk rots and ear rots).

If a remote-sensed image is available, scout areas that are anomalous (look different) first. If no imagery is available, then start scouting the field by first walking into the field at least 30 ft (about 10 steps) from the edge of the field and assessing 10 plants. This assessment should include the percentage of the entire plant that is covered by the disease. Do this for at least 10 stops in a zigzag pattern to cover the large portion of the field while avoiding the edges of the field (Fig. 45.1). If the field has rolling topography, make sure to include scouting points at each landscape position (footslope, shoulder, summit), as stress conditions and disease incidence may differ. The average of all the points assessed will indicate the severity of the disease.



*Figure 45.1 Sampling plan. Walk in the field at least 10 steps from the field edge and examine 10 plants at every black dot.*

#### **Step 4.**

Collecting an accurate and reliable estimate of disease intensity (severity/incidence) is important in making disease-management decisions. Inspect the infected plants to assess what parts of the plant are infected: the entire plant (systemic/wilting), lower leaves, midcanopy, top. For example, bacterial stalk rot usually infects the top part of the plant. Specific activities include:

1. Splitting the stalk and looking for any discoloration of the stalk or pith disintegration.
2. Distinguishing between fungal, bacterial, viral, and nematode diseases.
  - a. Fungal leaf spots and blight diseases usually are smaller in size. The spots could be irregular in shape, as in northern corn leaf blight, or could have a regular shape, such as gray leaf spot. Bacterial blights could have larger lesions, such as Goss's and Stewart's wilts, or small lesions, such as Holcus spot.
  - b. Yellowing and stunted growth are usually symptoms of virus and nematode infection.

Take samples of diseased plants and send to the South Dakota State University Plant Diagnostic Clinic to obtain or confirm diagnosis. Every county 4-H office has self-addressed envelopes for mailing samples to the clinic.

Finding only two or three plants with disease does not justify applying fungicides. Disease intensity can be measured as incidence or severity. Incidence is the percentage of units assessed with disease. For example, three diseased plants out of 10 sampled plants would have a 30% disease incidence. Severity, on the other hand, is the amount of unit area that is covered by disease lesions. This can be on the leaf basis or on the plant basis. For example 30% severity on whole plant basis would mean that 30% of the plant's total area is

covered by lesions. Usually severity is more informative.

#### **Step 5.**

Create and implement a management plan. The in-season rescue treatment for foliar fungal diseases is fungicide application. However, little research has been done on corn foliar disease threshold for individual foliar diseases partly because of the difficulty in keeping other stresses from interfering with yield response to disease. Additionally, diseases differ in the minimum amount of severity/incidence that can occur before significant yield loss is observed. For instance, for northern corn leaf blight, a 10% severity may cause similar yield loss as 30% eye spot severity. In sweet corn, common rust incidence threshold was found to be 80%.

The general consensus for fungal disease threshold to justify fungicide application is fungal diseases (excluding common rust) occurring on 3rd leaf below ear leaf and higher on 50% of plants. The best timing for fungicide application is between VT (tasseling) and R2 (blister). However, depending on the disease pressure, a fungicide can be applied until R5 (dent). Earlier fungicide application has not been associated with consistent yield gain, except for corn-on-corn rotations and in no-till situations. Scout for diseases at V6 to determine the need for early fungicide application (especially for corn-on-corn and no-till fields). If fungal diseases are developing on lower leaves on 50% of the plants, an early fungicide application may be beneficial. Scout again at tasseling and note the different diseases beginning to develop and which leaf positions are affected. If no disease is observed on the 3rd leaf below ear leaf and higher leaves at this stage, scout again at R2 growth stage. If the current weather is wet and warm, scout every four days.

The most critical period for yield protection is between R2 and R5 (dent). Diseases occurring past R5 will cause minimal yield loss. Protection of ear leaf and leaves above the ear from fungal infection protects against yield loss. Scout early and continue scouting for foliar fungal diseases every 4-5 days until R3 to decide the need for fungicide application.

A proactive management plan might include cultural methods (planting date, residue management, drainage, avoiding compaction, rotations); preventative treatments (seed treatments, selecting a suitable plant population, applying adequate fertilizers, selecting appropriate corn hybrids); and possible fungicide treatments.

### **References and Additional Information**

#### **Websites**

1. <http://cropdisease.cropsci.illinois.edu/corn/> (accessed 5 November 2015)
2. <https://www.pioneer.com/home/site/us/agronomy/crop-management/corn-insect-disease-main/> (accessed 5 November 2015)
3. <http://sdaba.org/agronomyconference/pdfs/FungicidesOsborne.pdf> (accessed 5 November 2015)

#### **Papers and Manual**

Mueller, D., and R. Pope. 2009. Field Guide: A Reference for Identifying Diseases of Diseases, Insects Pests of Corn. Iowa State University of Science and Technology. Available at <http://www.agronext.iastate.edu/corn/docs/corn-field-guide.pdf>. (accessed 5 November 2015).

Sweets, L.E., and S. Wright. 2008. Integrated Pest Management. Corn Diseases. University of Missouri Extension.

## Acknowledgements

Support for this document was provided by South Dakota State University, SDSU Extension, South Dakota Corn Utilization Council, and the USDA-AFRI-IPM. Special thanks to Daniel Clay for reviewing this chapter.



**A G R O W I N G I N V E S T M E N T**

Byamukama, E. and Strunk, C. 2016. Chapter 45: Scouting for Corn Diseases. In Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). *iGrow Corn: Best Management Practices*. South Dakota State University.

*The preceding is presented for informational purposes only. SDSU does not endorse the services, methods or products described herein, and makes no representations or warranties of any kind regarding them.*

*In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.*

*Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.*

*To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [http://www.ascr.usda.gov/complaint\\_filing\\_cust.html](http://www.ascr.usda.gov/complaint_filing_cust.html) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by:*

(1) mail: U.S. Department of Agriculture  
Office of the Assistant Secretary for Civil Rights  
1400 Independence Avenue, SW  
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

*USDA is an equal opportunity provider, employer, and lender.*

SDSU Extension is an equal opportunity provider and employer in accordance with the nondiscrimination policies of South Dakota State University, the South Dakota Board of Regents and the United States Department of Agriculture