

### *Corn and Soybean Disease Management with Foliar Fungicides*

Foliar crop diseases can reduce yield potential and farm profit. Integrated pest management (IPM) techniques, including seed product selection, tillage, planting date adjustment, water management, crop scouting, and foliar fungicide application(s), can be used to help manage yield potential and minimize the effects of disease outbreaks.

Each corn and soybean foliar disease has its own developmental characteristics which may be wet or dry growing conditions, cool or warm temperatures, survivability on or in crop residue, and crop stage of growth when infection is most critical. Knowing the characteristics of each disease and field histories are important when considering IPM management options.

Fungal spores on residue may spread via wind, water, equipment, and animals. In conventional tillage systems, infected residue can be buried, which can help reduce the potential for a pathogen to survive and infect a future crop. However, the potential for survivability increases with reduced tillage systems. Depending on the disease, planting earlier or later may help retard the potential for disease infection.

Foliar fungicides are an option for fungal disease management when other IPM practices are not practical or have been of limited success. A fungicide application may reduce foliar disease impact depending on corn or soybean product resistance or tolerance and disease pressure. Strobilurin and triazole fungicides and combinations of these are the primary fungicide groups for in-season corn and soybean disease management. The strobilurin fungicides are effective at controlling multiple diseases, are locally systemic, and can block spore germination and host penetration when applied prior to disease development. Triazoles are also broad-spectrum fungicides with xylem (upward) movement and can inhibit cell membrane synthesis of the

pathogen, thereby limiting disease spread.

Fungicide resistance can develop when the same fungicide mode of action (MOA) is continuously used. Therefore, a different MOA fungicide should be considered if another application is warranted.

Foliar fungicides may be best at prevention rather than curing a disease; therefore, scouting is important to identify crop growth stage for best application timing.<sup>1</sup> If a fungicide is applied before disease infection, a protective barrier preventing infection results and curative activity can occur. Curative activity may occur when the fungicide is present within plant tissue and stops early growth of the pathogen in the tissues.<sup>1</sup> Fungicides with curative activity do not “cure” a plant from a disease, but limit pathogen reproduction instead. Curatives are most effective if applied prior to infection or within the first 72 hours after infection.<sup>1</sup> Since individual diseases develop under different growing conditions, continuous scouting after planting is beneficial to help determine if any diseases and other pest issues are developing.

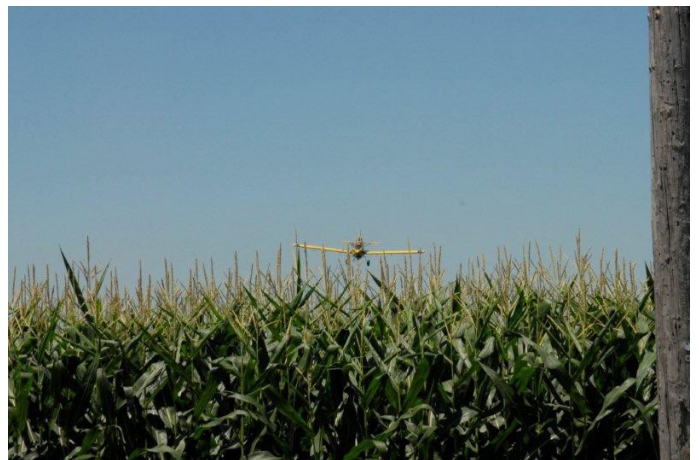
Fungicides are generally considered effective for 21 days. This is due to new, unprotected leaf growth after application and fungicide degradation on leaf surfaces.<sup>2</sup> Application timing is important to help maximize potential activity of the fungicide.

#### **Scouting**

When scouting, a general knowledge of corn and soybean diseases for identification and development characteristics is important. To help identify and understand corn and soybean diseases, please see *Identifying Key Diseases in Corn and Watching for Soybean Diseases? Remember these Key Signs, respectively.*

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- General
  - » Corn and soybean products vary in disease susceptibility, resistance, or tolerance. Scouting should be an ongoing activity after seedling emergence to identify potential disease issues. The critical timing for disease scouting is prior to tasseling in corn.
  - » Scouting is important when weather conditions favor disease development.
  - » Irrigation, late or early planting, high plant density, and high yield potential are factors that can increase the risk of disease development.
  - » Corn fields with 35% or more residue, including those with continuous corn, no-till, and reduced tillage combined with a history of foliar diseases should be scouted regularly since many foliar diseases survive on corn residue and begin producing spores when wet weather favors development.<sup>2</sup>
  - » Soybean residue can also harbor disease pathogens from year to year in continuous soybean operations and some pathogens such as white mold can exist for several years in the soil.
- Specific
  - » **Corn:** Scouting for lesions at corn growth stages early enough to prevent severe infection of ear leaves can help establish timing for an economical and effective fungicide treatment. The ear leaf and leaves higher on corn plants should be protected from pathogens because they contribute the most energy supplied during grain fill.<sup>1</sup> A general pathogen treatment guideline may be to spray when disease symptoms have developed on the third leaf below the ear leaf or higher on leaves above that on 50% of the plants at tasseling stage.<sup>3</sup> If fungicide application is warranted, generally the greatest benefit comes from a single application at tasseling (VT) through silking (R1) growth stages (Figure 1).<sup>4</sup>
  - » **Soybean:** Fungicide applications in soybean differ from corn because there is more leaf development after application. Fungicide applications made prior to R1 (beginning flower) growth stage or after R6 (full seed) growth stage are often not economical.<sup>5</sup> An early fungicide application at R2 (full flower) growth stage (Figure 2) may have a yield potential benefit over fungicide applications at R4 (full pod) growth stage (Figure 3).<sup>6</sup> White mold or sclerotinia stem rot requires different timing as infection first occurs at R1. An additional application may be necessary at a later growth stage to control other fungal pathogens.
  - » Weather conditions should be considered when determining fungicide application timing in soybean. Fungicide treatments are often beneficial in the absence of host resistance and when conditions that favor disease development are anticipated at R3 (beginning seed) growth stage (Figure 4). Subsequent fungicide applications may be needed with high disease pressure. A compatible herbicide or insecticide may be included if labeled for soybean to help manage weeds and insects, respectively.



*Figure 1. Aerial application of foliar fungicide at tasseling.*

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Figure 2. Soybean flowering (R2 growth stage).



Figure 3. Soybean plant at full pod (R4 growth stage).



Figure 4. Soybean pod at beginning seed fill (R3 growth stage).

## Sources

<sup>1</sup>Mueller, D. and Robertson, A. 2008. Preventative vs. curative fungicides. ICM News. Integrated Crop Management. Iowa State University Extension and Outreach. <https://crops.extension.iastate.edu/cropnews/2008/07/preventative-vs-curative-fungicides#:~:text=Most%20fungicides%20that%20prevent%20early,a%20plant%20from%20a%20disease.>

<sup>2</sup>Anderson, K. and Jardine, D. 2020. Fungicide considerations for corn diseases: Scouting is key. Agronomy eUpdates. Kansas State University. [https://eupdate.agronomy.ksu.edu/article\\_new/fungicide-considerations-for-corn-diseases-scouting-is-key-396-1/](https://eupdate.agronomy.ksu.edu/article_new/fungicide-considerations-for-corn-diseases-scouting-is-key-396-1/).

<sup>3</sup>Robertson, A., Abendroth, L. and Elmore, R. 2007. Yield responsiveness of corn to foliar fungicide application in Iowa. ICM News. Integrated Crop Management. Iowa State University Extension and Outreach. <https://dr.lib.iastate.edu/server/api/core/bitstreams/d7dfa238-16ec-4419-b1ee-78e1c9d7f247/content/>.

<sup>4</sup>Hershman, D.E., Vincelli, P., and Kaiser, C.A. 2011. Foliar fungicide use in corn and soybeans. Plant Pathology Fact Sheet. PPFS-GEN-12. University of Kentucky. <https://plantpathology.ca.uky.edu/>.

<sup>5</sup>Mueller, D., Robertson, A., and Pedersen, P. 2006. Asian soybean rust management strategies. PM2028. Iowa State University. <https://crops.extension.iastate.edu/>.

<sup>6</sup>Bohner, H. 2014. What is the correct time to apply foliar fungicides to soybeans? Crop Talk. Ministry of Agriculture, Food and Rural Affairs. The King's Printer for Ontario. <http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2014/ct-0614a4.htm>.

Web sites verified 11/9/22.

## Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

Tank mixtures: The applicable labeling for each product must be in the possession of the user at the time of application. Follow applicable use instructions, including application rates, precautions and restrictions of each product used in the tank mixture. Not all tank mix product formulations have been tested for compatibility or performance other than specifically listed by brand name. Always predetermine the compatibility of tank mixtures by mixing small proportional quantities in advance. Bayer and Bayer Cross are registered trademarks of Bayer Group. ©2022 Bayer Group. All rights reserved. 1111\_97001