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Fungicide Management of Foliar Diseases of Corn

Jim Stack, Extension Plant Pathologist

Foliar diseases can be important limitations to maximizing profitability in corn production systems. Minimizing loss to disease requires a season-long management plan beginning with selecting hybrids appropriate for the location. This requires considering the disease history of the field and the susceptibility of the hybrids to the prevailing diseases. Estimating disease impact on profitability requires knowledge of the damage potential of a given disease and an understanding of plant growth and development and the epidemiology of the disease. In particular, the dynamics of disease development relative to the dynamics of physiological plant maturity must be known. For seed and seedling pathogens that kill corn plants, final yield will be a function of the number of plants in the stand that have been killed. With foliar diseases it is more difficult to project economic impact because of variation in hybrid susceptibility and the timing of the epidemic relative to physiological maturity of the plant.

Fungicide Decision Criteria

When deciding whether to incorporate a fungicide application into a disease management plan, consider the potential for disease development (weather and cropping history), the potential for yield loss if disease does occur (hybrid tolerance), and the potential for economic benefit from an application (fungicide and application costs, projected yield return, market value). For seed corn production, economic benefit can be realized under moderate to high disease pressures. For field corn production, this decision is more difficult.

The corn plant accumulates approximately 50 percent of the kernel dry matter in the 35 days preceding black layer and the upper 8-10 leaves contribute at least 75 percent of the carbohydrate that goes into the grain. Hence, it is necessary to protect the upper leaves until at least the late dough to dent stages. It is important then to monitor disease development with respect to plant development. Diseases differ with respect to rates of development and the environmental conditions that promote development.

Successful management requires knowledge of the diseases present, an accurate weather history, and a somewhat dependable forecast. The amount of disease observed at any given point is the result of infections that occurred 4-14 days previously; hence, there is usually more disease present than can be

observed. If the weather conditions over the previous 4-14 days were favorable to that disease, assume there is actually more disease present. If the field is between the tassle to early dent stages of development and the forecast for the next 7-10 days is favorable to disease development, the risk for yield loss is high and a fungicide application should be considered for diseases with high potential impact on yield (e.g., gray leaf spot, southern rust). If the field is at the dent stage of development and the forecast for the next 7-10 days is unfavorable for disease development, the risk for yield loss is low and a fungicide application may be of little or no value. Estimating risk is critical to profitable disease management (e.g., see NebGuide G99-1384, *Gray Leaf Spot of Corn*).

Disease Diagnosis

The most critical issue for profitable management of plant disease is obtaining a correct diagnosis of the problem. Symptoms can easily be confused among different diseases as well as between diseases and other factors (e.g., environmental effects on specific hybrids/varieties, mineral deficiencies and toxicities, herbicide toxicities). Early in disease development the leaf lesions caused by gray leaf spot and anthracnose can be difficult to distinguish. Only gray leaf spot can be controlled with a fungicide. Consequently a misdiagnosis could result in applying a fungicide which won't be effective. If this occurs, you lose twice: the disease is not controlled and you incur the cost of the fungicide application (ca. $12-16/acre).

Table I. Fungicides registered for use on corn to control foliar diseases.*

Product	*Target Diseases*	*Product Rate/acre*	*Application timing*
Bravo® 720 (ISK Biosciences)	Rust Helminthosporium leaf blight	0.75-2.0 pts	Start at onset of disease and repeat at 4-7 day intervals
Dithane® F-45	Common Rust Helminthosporium leaf blight	1.2 qts	Start at onset of disease and repeat at 4-7 day intervals
Manzate® 200 DF (Dupont)	Common Rust Helminthosporium leaf blight	1.5 lbs	Start at onset of disease and repeat at 4-7 day intervals
Penncozeb® 75 DF 80WP (Elf Atochem)	Gray leaf spot Common rust Helminthosporium leaf blight	1.0-1.5 lbs.	Start at onset of disease and repeat as needed
Tilt® (Novartis)	Gray leaf spot Rust Eyespot Helminthosporium leaf blight	4 fl oz 4 fl oz 4 fl oz 2-4 fl oz	Start at onset of disease and repeat at 7-14 day intervals

* The information in this table is intended for general reference only; it is not a complete description of each product or the approved usage. Read all labels completely before using any fungicide.

Foliar Diseases

Several foliar diseases of corn caused by fungi were prevalent in Nebraska in 1999. The most widespread were gray leaf spot (Cercospora zeae-maydis), Southern Rust (Puccinia polysora), northern leaf spot (Bipolaris zeicola), anthracnose leaf blight (Colletotrichum graminicola), eyespot (Kabatiella zeae), yellow leaf blight (Phyllosticta maydis), common rust (Puccinia sorghi), and Physoderma brown spot (Physoderma maydis). Of these, the most significant with respect to potential yield loss over a wide area were gray leaf spot and southern rust. With the exception of anthracnose leaf blight, all of these diseases can be managed with fungicide applications (*Table I*).

Summary

Estimating impact of disease on profitability requires a knowledge of the potential damage that a given disease can cause, an understanding of plant growth and development, and an understanding of the epidemiology of the disease, particularly the dynamics of disease development relative to the dynamics of plant maturity. The most critical issue for profitable disease management is obtaining a correct diagnosis of the problem. Fungicides can be used for cost-effective management of foliar diseases of corn in Nebraska.

Read and follow all label directions carefully.

No criticism is intended of fungicides not listed, nor is endorsement given by the University of Nebraska to those listed.

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