

Corn Fungicides 101: Tips for Protecting Your Crop and Your Bottom Line from Foliar Disease

Every year foliar diseases take a hit to corn yields across the U.S. and Canada. One way to protect corn bushels from these diseases is with corn fungicides.

But in economic times when margins are tight, farmers must consider how foliar [fungicide applications will impact their bottom line](#). Deciding whether to use corn fungicides for foliar disease depends on several factors that can vary year to year, including the disease present and its severity, hybrid resistance, weather and field conditions.

How Damaging Are Corn Foliar Diseases?

According to the Crop Protection Network (CPN), disease caused more than 10% of total estimated bushels lost in four of the five most recent data years (2014 through 2018), with foliar disease being the top culprit for yield loss.

The worst offender between 2016 and 2018 was gray leaf spot, which Kiersten Wise says is the foliar disease that annually and nationally has the greatest chance of causing economic impact.

“Gray leaf spot would probably be the most consistently, annually present, yield-limiting disease,” says the CPN director and University of Kentucky plant pathologist. “It’s the disease on an annual basis that we’re trying to protect corn from, particularly with these foliar fungicide applications.”

This is due to the disease’s wide geographic distribution, Wise says, as it’s over most of the corn-producing areas in the U.S., and the fungus that causes the disease can survive in residue from year to year. Environmental factors also favor development of the disease, which include moderate temperatures, high humidity, and leaf moisture, particularly when corn hits later vegetative stages.

“When corn is going to be its most susceptible is when there’s going to be the conditions that favor the disease,” Wise says.

But gray leaf spot isn’t the only disease to worry about. Northern corn leaf blight, which caused the biggest estimated yield loss in 2014 and 2015, can be problematic in cooler weather and

northern regions like Wisconsin, Minnesota and Michigan. Southern rust is an issue for southern states, and is becoming a bigger concern as it works its way up into the Corn Belt.

Tar spot is a newer disease that can be problematic in the right environment, although CPN is still determining what those exact conditions are.

Evaluating Your Risk for Foliar Disease

While those are some of the most concerning foliar corn diseases, what will be the biggest threat for a corn grower in a given season depends on the weather, Wise says, since the fungi that cause these diseases favor different environmental conditions.

The odds of a disease developing in your corn fields also increase with certain factors. The first is the susceptibility of the hybrid you plant. If a hybrid has a good disease resistance package, the likelihood of disease developing to a yield-reducing level are low.

“Our hybrids are really good today compared to what they were even a few years ago,” Wise says. “So plants can handle some level of disease and it won’t always cause yield loss.”

Your crop rotation and tillage practices also play a role in disease development. Because the fungal organisms that cause these diseases live in corn residue, continuous corn rotations are at a higher risk, as well as reduced- or no-till systems, since they typically have higher residue amounts. Irrigation also creates an environment favorable for foliar disease because it keeps corn leaves continuously wet, Wise says.

Planning for Fungicide Applications vs. Deciding In-Season

Once you’ve evaluated the risk of a disease developing to the point of potential yield loss, you can determine whether a fungicide application is necessary. Some farmers may decide they need one before the season even begins, while others may wait until they’ve scouted.

“A big factor that gets missed a lot in the fungicide conversation is that farmers can make an in-season decision based on scouting and reports of disease severity in the area, if they’re on the fence of whether or not to spray,” Wise says. “Because there are going to be some years where you could have a lot of those risk factors in a given field, but if the weather is not conducive to disease development, disease won’t develop and you wouldn’t need a fungicide application.”

Wise understands that making the decision in-season isn't practical for all corn growers, especially if they have a lot of acres they would need to scout. But given the potential for fungicide resistance to develop when fungicides are used in situations when they're not needed, she stresses the importance of being strategic in where those applications get made.

"There are going to be fields where we can sit down and say we need to budget for an application in these situations," she explains. "And then there's going to be a chunk of fields we need to wait and scout and make that decision prior to tasseling in a given year."

In fields that don't have many risk factors, or the environment isn't conducive to disease development, Wise says it doesn't pay to use "insurance applications" on them because it does increase the risk for fungicide resistance.

"We want farmers to think critically where these products will do the most good in their fields," she says. "Not only for the long-term impacts of using fungicide as insurance, but also for their bottom line. Using fungicide judiciously also helps their net profitability of fungicide use in corn."

It can also help protect the soil, as [fungicides also kill good fungi](#).

Best Practices in Scouting for Foliar Disease

In fields where it makes sense to scout for disease first, Wise says you'll want to be in the field looking for foliar diseases when corn is in the late vegetative stages, when tasseling is just beginning, as this is when most foliar diseases become active.

You'll want to examine broad sections of your field and look at the ear leaf and the leaves right below it. If you see signs of foliar disease, take note of disease incidence: How many leaves out of 100 have symptoms? Then note the severity of the disease. Are there a few lesions or a lot? If you're not sure what the disease is, take a sample and send it in for diagnosis.

Finally, always check your hybrid resistance rating afterward, Wise adds, because if you see disease out in the field but your hybrid has good resistance, then it's likely the disease won't develop enough to warrant a fungicide application.

"Disease-resistant hybrids doesn't mean you won't see any diseases out there," she explains. "You might see some disease, but the hybrid can restrict disease progression."

If you are seeing disease, take a look at the weather forecast, because that can help you determine whether the disease is likely going to develop quickly, or if you could wait a week, scout again and then make a decision.

Will a Fungicide Application Pay Off?

Unfortunately, it can be difficult to determine whether the presence of a disease is enough to warrant a fungicide application.

Wise says you need to have at least 5% severity of gray leaf spot on the ear leaf at the end of the season to start to see a yield loss. With Northern corn leaf blight, University of Wisconsin-Madison Extension [plant pathologist Damon L. Smith says](#) that if it's present on at least half the plants, severity is at least 5-10%, and weather is forecasted to be rainy and cool, a fungicide application will likely be needed.

But for most foliar diseases, Wise says there aren't set thresholds, so growers need to consider their risks in addition to their scouting report to decide whether a fungicide application will likely pay off. She adds that if your hybrid has good resistance to disease, a fungicide application probably won't provide a return on investment.

"The overwhelming majority of research shows that fungicide applications to hybrids that already have good disease resistance packages aren't going to be economically beneficial, because your hybrid is already doing the work of reducing the impact of the disease," she says.

In most cases a fungicide will protect yield loss, but is unlikely to result in a yield gain if disease presence and severity is low. Smith says that a meta-analysis of [yield response of field corn to foliar fungicides](#) in the Corn Belt looked at data from 14 states between 2002 and 2009 and found that pyraclostrobin, the active ingredient in Headline, provided an average yield increase of 4 bushels per acre.

But with the cost of an application around \$15 per acre (fungicide plus custom application), and corn prices at \$3 per bushel, the odds of a positive ROI are around 50% for foliar disease levels at less than 5% severity. Those odds improve to 60-70% if the severity is greater than 5%.

But some farmers are finding foliar [fungicides worth the investment](#) even if they don't lead to a yield increase. Wise explains that some are seeing improved standability from fungicides, which results in a faster and easier harvest, and they feel that justifies the cost of application. Wise adds that the research on whether it's worth using fungicides for this reason is mixed, but there are several universities conducting more research on it.

Getting the Most From Your Fungicide Application

If you decide to make a foliar fungicide application, then you'll need to determine which product to use.

There are a number of foliar fungicides available on the market, and every year CPN compiles fungicide ratings of the most widely available products from corn pathologists across the nation into a fungicide efficacy table, available on the [CPN website](#), so farmers can compare how these products work against certain diseases.

As for the application itself, timing is critical. Wise says university research has shown that making an application between VT-R1, is your best chance for preventing disease from impacting yield and also seeing the best economic return.

"R2 blister might be okay, but when we start to get beyond that we start to lose some of the gains we see from not only foliar disease control, but also yield gain from our fungicide application," Wise says.

There could be some exceptions to that timing. Southern rust is one example where you might need to go a little bit later, she says, as research has shown that applications up to R3 or the milk stage can be beneficial in preventing yield loss. She mentions there's also research being conducted on tar spot because it's a disease that could have different timing, but it's too early to tell. In general, VT-R1 is when an application should take place.

In addition to timing, the key to an effective fungicide application is getting good coverage. Unlike herbicides, fungicides have fairly limited movement in the plant — if they move, they only move up into the tissue, Wise says, so getting good fungicide coverage is important.

The best way to do that is with carrier volume, the amount of water going into the application.

"The higher carrier volume you have, the better coverage we would expect to see," she says.

For ground applications, 15-20 gallons of carrier volume should be used, with 20 being ideal, while aerial applications should use 3-5 gallons, with 5 being ideal.

She notes that carrier volume can be a touchy subject with custom applicators, because it does require more work. "But it is one of the most proven ways we can improve coverage, and coverage is directly related to efficacy."

If you hire a custom applicator, always have a conversation with them about how they'll do the application, including the carrier volume, how they're going to fly it on if they're flying, or if it's a ground application, what nozzles they're using. The nozzles should provide a fine to medium-sized droplet.

“That way if they’re not happy with the application, they have a little bit more information that they could do something different the next time,” she says.