

Fusarium Management Guide

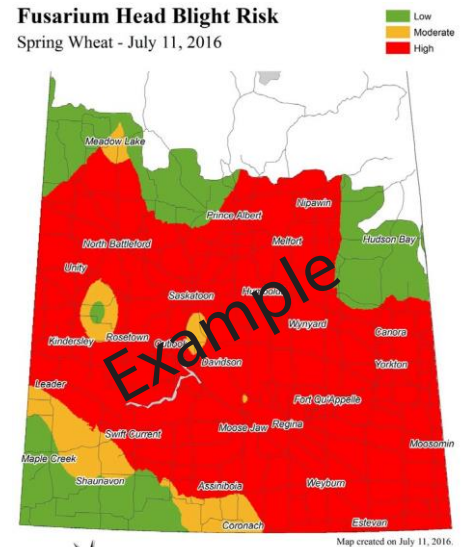
Help manage the quality of your wheat by using Sask Wheat's Fusarium Head Blight Risk Maps

The FHB risk map is a tool that helps producers identify the level of risk of FHB infection. The maps, in conjunction with a cost/benefit analysis tool and field monitoring, helps producers determine if a spray application of a fungicide is necessary.

The FHB risk map is based on the heading date for a specific crop. Producers should determine their heading date, then follow the map generated for that date.

The maps will be updated daily in June and July.

Fusarium Head Blight Risk
Spring Wheat - July 11, 2016



INSIDE

PAGE 2: When should fungicide management start?

PAGE 4: Spraying application tips for fusarium head blight.

When should fusarium management start?

Mitchell Japp, PAg,
Provincial Specialist, Cereal Crops
and
Barb Ziesman, PAg,
Provincial Specialist, Plant Disease

Fusarium head blight (FHB) continues to be on the minds of producers and many others in the industry. Thanks to the dry conditions in 2017, FHB did not pose the problems it did in 2016, which was a rough year for FHB in Saskatchewan. FHB management was still a central focus at many producer meetings this winter and should still be a major concern for wheat producers.

FHB is where *Fusarium* infection really hurts—it reduces yield by causing florets to abort, dockage and reduced grades with fusarium damaged kernels (FDK, also called “tombstone”). Mycotoxins such as deoxynivalenol (DON, also called vomitoxin) produced by the fungus may result in reduced prices or reduced ability to sell the infected grain. Even though FHB hits hard, *Fusarium* species can also affect the growth and development of new seedlings.

If you are wondering when fusarium disease management should start, or when it should end, this is the guide for you.

Fusarium species on seed

It is important to get seed tested for germinability and to know the levels of seed borne diseases. This can be done at several seed testing labs in and around Saskatchewan. It is worth checking with the lab to be sure they can identify different species of *Fusarium*—not every lab offers this service.

The Ministry updated the recommendations for *Fusarium* infection levels on seed in 2016. When the original guidelines were written, FHB was not as common as it has now become. The new guidelines ask if *Fusarium graminearum* has been in a region recently. If a producer or their neighbour has not had infection from *F. graminearum* in the past two to three years, it might be worth considering



applying a stricter threshold for *F. graminearum* infection on the seed separately from total *Fusarium* species infection. *F. graminearum* is not known to be more aggressive than other *Fusarium* species as a seedling or root pathogen, but it is more aggressive for FHB. The goal of monitoring *F. graminearum* on the seed is to prevent the introduction of the species to an area that has not had it before or where the pathogen is not currently established.

When considering total *Fusarium* species, a seed treatment should be considered, especially when infection rises above 10 per-cent.

Fusarium infection cannot be predicted from either FDK or DON levels on the grain. *Fusarium* infection is a measure of seed quality, while FDK and DON are measures of grain quality. *Fusarium* infection is calculated as the proportion of seeds that have viable fusarium spores contained on the surface of the seed or fungal infection within the seed and is determined by plating the seeds on a growth medium.

Fusarium infected seed is a risk, primarily to the seedling as it develops, but also for the potential introduction of species to a new area. *Fusarium* infected seed is not known to cause FHB.

FHB management

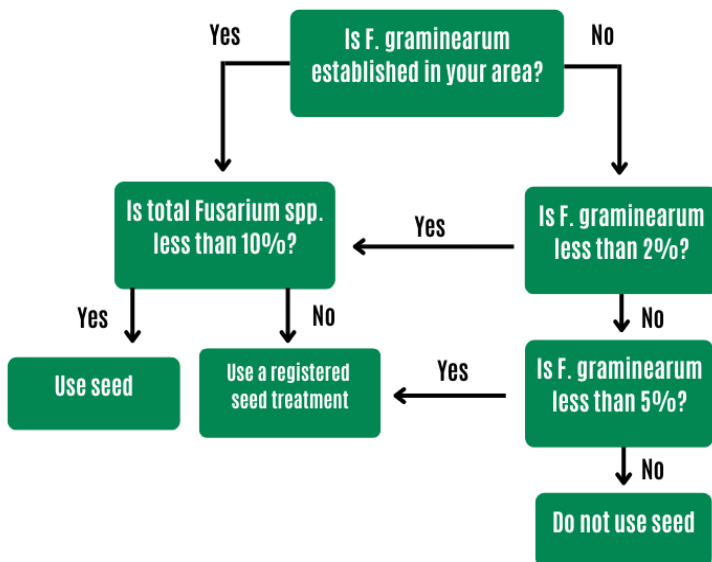
FHB is problematic to manage because there is no individual solution that provides satisfactory results. The environmental conditions seem to be the most important factor in whether FHB is a minor or major problem. Once the environmental conditions are in place that make it a major problem, there are

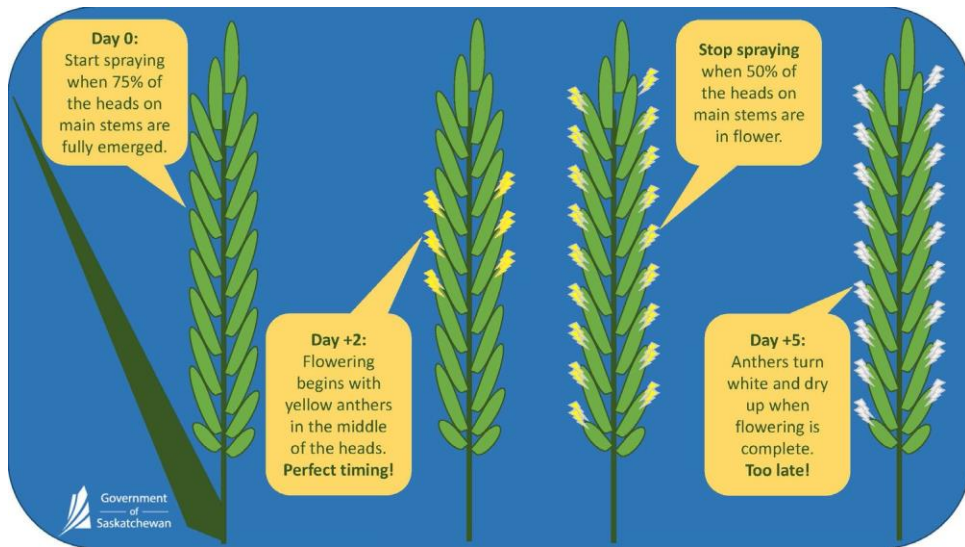
no tools to resolve early mismanagement for FHB.

While there are many cultural practices to consider for FHB management, the big three appear to be using resistant varieties, using tools to monitor for the potential of FHB and the timely application of fungicide.

selecting a variety

Ten years ago, options were much more limited—there was only 1 CWRS (Canada Western Red Spring wheat) with an MR (Moderately Resistant) rating and all durum were rated S (Susceptible). Now there are 15 CWRS with an MR rating and most durum varieties have an MS rating. There are even R (Resistant) ratings in the CPSR (Canada Prairie Spring Red) and CWRW (Canada Western Red Winter) classes.





Wheat heads are most susceptible to infection during flowering (anthesis), but infection can occur up to the soft dough stage. Later infection may not result in fusarium damaged kernels or visible symptoms, but the infected kernels may still harbour the fungus and contribute to DON levels. The period while the wheat is flowering should be watched closely.

Fusarium graminearum is the most aggressive species causing FHB and produces DON. The preferred conditions for *F. graminearum* are temperatures in the range of 25°C and high humidity, but it will cause infections outside of its preferred range.

Wet conditions prior to heading favours spore production. Spores can be effectively moved from the residue on the soil surface to

Also, producers had to choose between FHB resistance and wheat midge tolerance. Now, midge tolerance and reasonable FHB resistance are available in a combined package.

Selecting a variety goes beyond looking at the yield column in the SaskSeed Guide. There are so many variables to choose from, it works well to decide what factors are of concern before reviewing the tables. For example, if a producer is expecting high moisture, they might look at FHB resistance, resistance to lodging and sprouting and height, in addition to yield.

Monitoring or FHB

Monitoring for FHB is different than monitoring for other diseases like leaf spotting. FHB is a mono-cyclic disease, which means that once the disease is discovered, it is too late to apply any treatment.

FHB monitoring is not about watching for the symptoms of FHB— it is to monitor the conditions that may lead to FHB infection. The conditions for FHB relate most specifically to weather conditions and the time window when the crop is most susceptible to FHB.

wheat heads by rain splash or wind. Infection of the wheat heads can occur within 24 hours.

Flowering in wheat can range from 4-7 days but is affected by many factors including moisture, humidity, fertility and stress.

FHB infection can be rapid and the window for fungicide control is narrow. Producers can access FHB risk maps from Sask Wheat to aid in the decision-making process. The maps are based on weather related factors that contribute to FHB, but the maps must be used with the correct timing for head emergence on every crop to be effective.

When the conditions for FHB are present, a decision must be made whether to spray. The maps are a helpful tool, but local conditions should be taken into consideration as well. Producers must also assess the risk from the pathogen and the expected financial return from the use of a fungicide.

Applying Fungicides

Fungicides are registered for FHB suppression only. So, it is critical for producers applying fungicides for FHB control to make the most of the application.

Assessing Fusarium Head Blight Risk in Saskatchewan		Lower Risk	Medium Risk	Higher Risk
Step 1: Predict Pathogen Is <i>Fusarium</i> established here?	Has wheat produced in this field been downgraded due to fusarium damaged kernels? Has >5% <i>F. graminearum</i> been isolated from wheat seed produced in this field? Has >10% other <i>Fusarium</i> species been isolated from seed produced in this field? Have any crops produced in this field experienced root rots due to <i>Fusarium</i> spp?	No No No No	By a grade >4 years ago >2 years ago > 2 years ago	By >1 grade Within 4 years Within 2 years Within 2 years
Step 2: Stage Crop When crop will be susceptible?	Stage crop at least 1 week before expected flowering date. Use experience or estimate GDD from seeding date. Anticipate Day 0 , when 75% of the heads on main stems to be fully emerged, to be 1-2 days before flowering . Also consider susceptibility of crop. Seeding Date + 807 to 901 GGD°C or 1484 to 1653 GGD°F = Expected Flowering Date	Even Crop, FHB Rating G or VG	Uneven Crop, More Tillers, FHB Rating F	Uneven Crop, Many Tillers, FHB Rating P or VP
Step 3: Watch Weather Check FHB Map	Select the FHB forecast map for the estimated head emergence date (Day 0), and determine risk for the area. At least 12 hours of precipitation or high humidity (above 80%) is required for <i>Fusarium</i> spore germination and infection, as well as favouring temperatures ranging from 16 to 30°C (<i>F. graminearum</i> optimum is 25 to 28°C).	Low	Moderate	High
Step 4: Crunch Numbers	Estimated Yield (unit/acre) x Estimated Yield Savings (%) x Selling Price (\$/unit) MINUS the Fungicide Application Cost (\$/acre) = Expected Net Return (\$/acre)	Negative Net Return	Net Return \$0	Positive Net Return
Step 5: Make a Decision	Note that foliar fungicides are registered for the suppression of FHB on wheat, rather than control. Flowering may be variable, but aim for when at least 75% of the heads on main stems are fully emerged to 50% of the heads on main stems are in flower. Ensure adequate water volumes and spray coverage to get the most benefit from application.	Mostly Low Risk? Do Not Spray	Medium Risk? Pencil it in; reassess risk before spray day	Mostly High Risk? Likely to see a benefit from a FHB fungicide

Fungicides are not found to be effective prior to full head emergence or after flowering is complete; timing is critical. Cultural practices that encourage crop uniformity for flowering can aid in making the fungicide more effective. Uneven maturity can make timing of the application challenging.

Timing can also be aided over large areas by stretching out seeding so that some wheat is planted early, and some is later. This can be further enhanced by using more than one variety with a range of maturity dates. These ranges can also spread the risk of being impacted by FHB.

Effectiveness can be further enhanced by ensuring at least 10 gallons per acre water volume, or more. Also, angle nozzles have been found to be more effective than nozzles that are strictly vertical, but twin nozzles are best. Ensuring that the sprayer speed is not too fast and is matched with the nozzle to keep the droplets coarse. Boom height should be close to the canopy and spray in low wind conditions.

Next steps

Further benefits may be achieved by ensuring a diverse crop rotation. The ideal rotation for FHB management would include a two- year break from cereal crops. Rotation may also include the use of less susceptible crops such as barley or oats. Winter wheat often flowers prior to the ideal conditions for FHB development, and as a result may escape infection or be at a lower risk.

Fusarium survives on infected crop residue. A diverse rotation with a break between susceptible cereal crops will allow sufficient time for the residue to break down and will help to manage the amount of pathogen present. This can be enhanced by ensuring that straw and chaff is chopped and spread adequately with the combine.

There are many positive benefits to good straw chopping and crop rotations. Other straw management practices like burning and tillage have numerous negative outcomes associated, without adequate evidence that they help to reduce FHB levels, so they are not recommended.

While fusarium disease management does not have a particular end, it will ebb and flow through the seasons. Getting some of the management in place at the start of the season can help. No single management practice will solve FHB. It takes a combination of different practices that are all executed well, to aid in the management of FHB.

For Further information:

Fusarium Head Blight fact sheet: saskatchewan.ca

Fusarium risk maps and resources: saskwheat.ca/fusarium-resources

Sprayers101: sprayers101.com/fungicide-cereal-pulse-oilseed/

spraying application tips for Fusarium Head Blight fungicides

By Tom Wolf, Agrimetrix Research & Training, Saskatoon
www.sprayers101.com

Fusarium Headblight is one of the more challenging diseases to control with fungicides. Factors working against us are the tight timing window, the relatively poor genetic resistance in some cultivars, the limited efficacy of registered fungicides, and the overall high disease virulence under favourable environmental conditions. Here are some things an applicator can do to maximize application performance.

- 1. Use forward-angled or twin fan sprays.** There is a large body of research that shows improved spray deposition on wheat heads when we angle the spray forward, or forward and backward. There are twin fan tips available from most manufacturers, and TwinCaps or y-adaptors for special situations.
- 2. Keep the booms low.** Angled sprays lose their direction quickly, especially with fast travel speeds. Research has shown that 20" boom height will deposit about 30 per cent more spray from a twin-fan tip on a wheat head than a 30" height. At 40" above target, angled sprays will have lost their benefit.
- 3. Use a coarse or very coarse spray quality.** We recommend this for two reasons. First, the coarser sprays tend to maintain

their angled trajectory longer than finer sprays, improving deposition should booms be a bit higher. Second, they are less prone to interception by awns in the bearded varieties. Awns just love to capture fine droplets and can filter these out before they reach the intended target, the glumes. This is especially important for the very fusarium-susceptible durum wheats. Using slightly higher volumes, 12 – 15 gpa, can also help.

- 4. Don't be afraid of slightly faster travel speeds.** Although we've been trying to get applicators to slow down to improve deposit uniformity and to reduce spray drift, there may be some value to slightly faster speeds for FHB control. Faster speeds make the droplets travel more horizontally, increasing their ability to hit a vertical target such as a wheat head. This advice must be taken with a grain of salt, as faster speeds may also necessitate a higher boom, wiping out the advantage.

Unfortunately, there is no guarantee of success with FHB control. But once the decision to treat has been made, ensure that there is as much in favour of good deposition as possible.