DISEASES OF WHEAT

Stagonospora Glume Blotch

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Stagonospora glume blotch (SGB), also called Stagonosopora nodorum blotch or glume blotch, is a common disease in Indiana wheat fields (Figure 1). SGB can devastate yields by causing kernels to shrink and shrivel, thereby reducing test weight.

Parastagonospora nodorum (formerly *Stagonospora nodorum*) is the fungus that causes SGB — this is the same fungus that causes Stagonospora leaf blotch (SLB) on wheat leaves. These leaf blotch symptoms are a precursor to SGB. Leaf symptoms typically appear in the middle of the canopy during (or closely after) flowering (Feekes 10.5.1). Later in the season, SGB can develop, resulting in its telltale brown splotch symptoms on wheat heads.

This publication describes:

- How to identify Stagonospora glume blotch (SGB)
- How the SGB fungus infects wheat
- How to manage SGB to reduce its impact on yield

Symptoms and Disease Development

SGB symptoms are distinct from those of other wheat head diseases. When the fungus that causes SGB infects wheat, distinct portions of the glumes and lemmas (chaff) will turn dark brown to black, often with a purplish tint. These spots often look dirty or water-soaked (Figure 2).

After initial infection, the fungus will continue to colonize the glumes. Older portions of the infected tissue will turn light gray-brown to chocolate brown, and pycnidia (small, brown, spore-producing

Figure 1. Stagonospora glume blotch on a wheat head.

Figure 2. The characteristic dark brown, water-soaked symptoms on the glumes of a wheat head infected by glume blotch.

fungal fruiting bodies) will form (Figure 3). You can see pycnidia with a simple hand lens. The brown-black edges of the lesions will continue to expand along the plant tissue. SGB can cause kernels to shrivel and shrink, which reduces test weight.

Disease Cycle

The fungus that causes both SGB and SLB survives in infected crop residue, but can also survive in infected seed. Regardless of the source, infection occurs in much the same way. First, sexual and asexual spores will develop on the residue of the previous crop.

The sexual spores (called ascospores) can be carried over long distances by the wind to infect new fields. The asexual spores (called conidia) are typically splashed by rain or overhead irrigation onto wheat leaves. Seed infection can also be a source of initial infection.

Figure 3. Older portions of infected glume tissue begin to turn a light gray-brown.

Soon after the initial infection, SLB symptoms (leaf lesions) will appear. These lesions will produce spores within 10 to 20 days, which will in turn be splashed up into higher layers of the canopy, eventually infecting the flag leaves. From there, new spores can splash onto, and infect, the wheat heads.

Moderately warm weather (68-82°F; 20-28°C) coupled with frequent rain and high humidity (which helps splash spores from one layer of the canopy to another) favor the development of SGB.

Identifying Stagonospora Leaf Blotch

Identifying Stagonospora leaf blotch (SLB) in the field can be difficult because its symptoms closely resemble those of Septoria leaf blotch. What's more, both diseases can affect the same plant simultaneously.

SLB symptoms begin with dark, coffee-brown, round to lens-shaped spots on the leaves (Figure 4). As the disease progresses, the spots enlarge and the lesions can begin to converge with one another. Lesions typically have a yellow halo around the outside. As lesions mature, they turn gray-brown and often contain black pycnidia, which are difficult to see without a magnifying glass or hand lens.

Both Septoria leaf blotch and SLB produce pycnidia, but pycnidia will be more abundant in Septoria leaf blotch lesions. In fact, one of the early names for Septoria leaf blotch was "speckled leaf blotch" due to the abundance of pycnidia (Figure 5).

When scouting for SLB, be sure to look at both the flag leaf and the leaves lower down in the canopy. While Septoria leaf blotch typically progresses steadily up the canopy (starting from infections on the primary leaf), SLB can "jump" from lower leaves to the flag leaves all at once if a series of warm, wet days occur near the time of head emergence.

Figure 4. Characteristic round, lens-shaped lesions of Stagonospora leaf blotch on a wheat leaf.

Figure 5. Black pycnidia developing in the center of a mature Septoria leaf blotch lesion.

Resemblance to Fusarium Head Blight

The warm, humid conditions that favor SGB are also favorable to Fusarium head blight (FHB), another disease on wheat heads in Indiana. FHB bleaches the wheat heads, and symptoms progress sequentially from one spikelet to the next (Figure 6). By contrast, SGB symptoms will typically develop on many spikelets of a head at the same time, causing a dirty appearance.

FHB causes lightweight tombstone kernels to form in place of healthy grain. FHB symptoms progress as the fungus grows through the rachis to invade more spikelets until the entire head takes on a bleached appearance, often with a salmon-pink tint.

The fungus that causes FHB produces spores that are a salmon-pink tint on glumes, which is a way to distinguish it from SGB. SGB results in chocolate-brown discoloration on glumes. Also, the fungus that causes FHB does not produce black-brown pycnidia on the glumes like SGB does.

Figure 6. (A) Characteristic bleaching of wheat spikelets due to Fusarium head blight. (B) Fusarium head blight symptoms in a wet field can easily resemble the dirty, blotchy symptoms of Septoria glume blotch.

Management

Select and plant wheat varieties that are resistant to both SGB and SLB. Other management techniques include rotating crops and planting pathogen-free seed.

Crop rotation helps reduce the amount of fungal spores in the field, giving crop residues (the overwintering host for the fungal spores) time to fully decompose. Planting pathogen-free seed helps ensure that you do not introduce SGB to a field where it can infect subsequent wheat crops. If you use seed from a previous crop, be sure to use a fungicide seed treatment to protect seedlings from seed infection.

Because SLB typically precedes SGB, observing SLB in wheat can indicate the risk of SGB. If the foliar stage of this disease becomes severe during the season, applying a fungicide at flag leaf emergence or flag leaf (Feekes growth stage 8-9) can help prevent SGB.

Indiana growers frequently apply fungicides at Feekes 10.5.1 (early anthesis or flowering) to suppress FHB. These applications will also protect against SGB and (in most cases) even protect the flag leaf from SLB.

The most current fungicide efficacy recommendations for managing SGB, FHB, and other common wheat diseases is available in *Diseases of Wheat: Fungicide Efficacy for Control of Wheat Diseases* (Purdue Extension BP-162-W), available from the Education Store (www.edustore.purdue.edu).

It is important to accurately diagnose any disease before making management decisions. You can send samples to the Purdue Plant and Pest Diagnostic Laboratory to determine what is causing problem plant symptoms. More information about submitting samples is available on the lab's website, ppdl.purdue.edu.

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