Field Crop Disease Facts

Fusarium Head Blight

Fusarium head blight (scab) is an important disease affecting wheat and barley. Small grain producers in the United States have been struggling to manage Fusarium head blight since the early 1900s. Recent epidemics of the disease have caused devastating yield losses in many states where wheat and barley are produced. Fusarium head blight affects the developing heads of small grains directly, and yield losses that exceed 45 percent are common during years when disease is severe. Fusarium head blight also negatively affects grain quality, often resulting in lower test weights and mycotoxin contamination.

Symptoms

The first symptoms of Fusarium head blight include a tan or brown discoloration at the base of a floret within the spikelets of the head. As the infection progresses, the diseased spikelets become light tan or bleached in appearance (Figure 1). The infection may be limited to one spikelet, but if the fungus invades the rachis the entire head may develop symptoms of the disease. The base of the infected spikelets and portions of the rachis often develop a dark brown color. When weather conditions have been favorable for pathogen reproduction, the fungus may produce small orange clusters of spores or black reproductive structures called perithecia on the surface of the glumes. Infected kernels are often shriveled, white, and chalky in appearance (Figure 2). In some cases, the diseased kernels may develop a red or pink discoloration.

Disease Cycle

Fusarium head blight is caused by several species of fungi from the group of fungi known as *Fusarium*. In North America, the most common species causing the disease is *Fusarium graminearum*. In addition to Fusarium head blight, *F. graminearum* can also cause diseases in corn and grasses commonly grown for forage. The colonization of the other crops and grasses is important because the fungus survives in the crop residues that remain on the soil surface. The

Figure 1. Wheat heads with symptoms of Fusarium head blight. Diseased spikelets become (a) bleached or tan in appearance and may have signs or fungal reproduction (b; see orange structure at the base of the diseased spikelet).

Figure 2. Grain produced in heads damaged by Fusarium head blight is often shriveled, white, and chalky in appearance.

fungus reproduces in the crop residues and is moved by wind or rain to the developing wheat or barley. Wheat is most susceptible during the flowering growth stages, but some infection can still occur during kernel development. Temperatures between 65 and 86°F and extended periods of moisture in the form of rain or dew favor reproduction of the fungus on crop residues and also promote infection and disease development.

Mycotoxins

Fusarium graminearum is known to produce two important mycotoxins, deoxynivalenol (DON) and zearalenone, which can contaminate the diseased grain. The mycotoxin DON can cause reduced feed intake and lower weight gain in animals at levels as low as 1–3 ppm, especially in swine. Vomiting and feed refusal can occur when levels of DON exceed 10 ppm. Humans are also sensitive to DON, and the FDA has recommended that DON levels not exceed 1 ppm in human food. Ruminant animals, including dairy cows and beef cattle, are less sensitive to the toxin. The fungal toxin zearalenone has estrogenic properties and produces many reproductive disorders in animals. Swine are the most sensitive to the toxin, but cattle and sheep may also be affected. Zearalenone concentrations of 1–5 ppm can result in negative effects in animals and humans. Producers concerned about these mycotoxins should have grain tested prior to feeding to animals. Contact the state or local extension office for more information about testing for mycotoxins.

Management

1. Variety Selection

In most wheat production regions, high levels of resistance to Fusarium head blight are not currently available in varieties for planting. However, certain varieties have moderate levels of resistance, and the selection of these less susceptible varieties can have a significant impact on disease severity and grain quality. Growers should contact their local extension office or seed dealer for more information about availability of varieties with moderate resistance to head blight. Additionally, plan to plant several different varieties that vary in flowering date (maturity). The variation in flowering date decreases the risk that the entire wheat crop will be at vulnerable growth stages when weather conditions favor disease development.

2. Crop Rotation

Avoid planting wheat and barley adjacent to fields with large amounts of small grain or corn residue remaining on the soil surface. No-till planting wheat or barley into corn residues substantially increases the chances for Fusarium head blight development. Rotation to a legume crop between corn and small grain crops will provide time for the residues to break down and the pathogen population to decline.

3. Reduce Mycotoxin-Contaminated Grain

When high levels of Fusarium head blight are present in fields, precautions can be taken to reduce mycotoxin contaminations of the grain. The mycotoxin contamination is often highest in the severely diseased kernels. Adjusting the combine to blow out the small, shriveled kernels can help reduce mycotoxin levels. Harvested grain should be dried to 13.5 percent moisture as soon as possible to limit continued fungal growth. Grain suspected to have been damaged by Fusarium head blight should be tested for DON and zearalenone. Do not mix contaminated grain with good grain prior to a mycotoxin analysis. The mixing will result in more contaminated grain, which may be difficult to sell.

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