2015

Small Grain Disease and Insect Pest Scouting Report

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Introduction

A survey of small grain diseases and insect pests were conducted in Vermont and Massachusetts during the 2015 growing season. Pests were scouted at six Vermont farm locations in the towns of Alburgh, Berlin, Bridport, North Troy, Shelburne, and Shoreham, as well as in Northfield, Massachusetts.

Table 1. The small grain diseases and insect pests identified in 2015 survey.

Diseases Identified
Fusarium head blight (*Fusarium graminearum*)
Leaf rust (*Puccinia recondite*)
Loose smut (*Ustilago tritici*)
Septoria tritici blotch (STB)(*Zymoseptoria tritici*)
Stagonospora leaf and glume blotch (*Stagonospora nodorum)*
Tan spot (*Pyrenophora tritici-repentis*)
Wheat powdery mildew (*Erysiphe graminis f. sp. Tritici*)
Insect Pests Identified
Brown wheat mite (*Petrobia latens*)
Cereal leaf beetle (*Oulema melanopus*)
Thrips spp. (order *Thysanoptera*)
Other
Disease resistance color

The grains scouted included: winter wheat, spring wheat, winter and spring wheat heirlooms, rye, and spring barley. Fields were scouted between the spike emergence and soft dough stages of growth. Disease and insect samples were taken and identified with assistance from the University of Vermont (UVM) Plant Diagnostic Laboratory.

The small grain diseases and insect pests identified during on-farm scouting surveys are listed in Table 1. Overall, the foliar diseases and insect pests identified did not appear to have an impact on grain quality or yields. However, the mycotoxin, Deoxynivalenol (DON), did pose problems for several of the farms scouted. DON levels fluctuated from below 1 ppm to greater than 5 ppm, depending on inoculum levels and weather conditions during grain flowering.

Diseases Identified

Weather patterns in 2015, especially the cool and wet conditions during the month of June, created ideal conditions for plant pathogens to thrive. Both foliar and head diseases were identified, described below.

Foliar Diseases

Foliar diseases reduce photosynthetic leaf area, use nutrients, and increase respiration and transpiration within the infected plant tissues. A diseased plant typically exhibits reduced vigor, growth and seed fill. The earlier the occurrence, the greater degree of infection, and the longer duration of conditions favorable for disease development the yield loss will be greater. The following foliar diseases were identified by our scouting efforts in 2015.

Figure 1. Powdery mildew infection on winter wheat, Alburgh, VT.

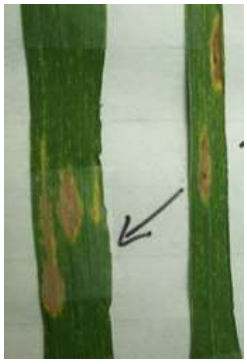

Figure 2. Tan spot, North Troy, VT.

Powdery mildew *(Erysiphe graminis f. sp. Tritici)* was identified on the leaves of several winter heirloom wheat varieties in Alburgh, Vermont (Figure 1).

The foliar disease, tan spot *(Pyrenophora tritici-repentis)*, was pervasive at all of the on-farm sites in Vermont, and interestingly, on all grain types (Figure 2). The Tan Spot fungus produces elongated asymmetrical spots (1/8 to 1/2-inch long and 1/16 to1/18-inch wide). Here, a tiny, dark spot forms (best observed by holding the leaf up to the light) The spot enlarges into a tan lesion, surrounded with a narrow to broad yellow border to produce an "eyespot" type of symptom, characteristic of this disease.

Septoria tritici blotch (STB) *(Zymoseptoria tritici)* and/or Stagonospora leaf and glume blotch *(Stagonospora nodorum)* were identified in Alburgh, Charlotte, Shoreham, and Berlin, and Northfield, MA. These two diseases look very similar and are often confused with one another (Figure 3). Both start out as yellow spots. However, as STB spreads, irregular brown lesions form along leaf veins giving the appearance of stripes. In the middle of these lesions, dark brown spore masses (pycnidia) form that can be seen with the naked eye, making a distinguishing characteristic between these two diseases. In contrast, as Stagonaspora spreads, the yellowing increases and forms lens-shaped blotches on the leaf that eventually turn red-brown. As Stagonaspora progresses, the lesions develop an ashen gray-brown center containing brown specks (but without the distinct yellow border typical of tan spot lesions.).

Figure 3. Septoria tritici blotch infected leaf (left) and a Staganospora Leaf and glume blotch infected leaf (right).

Figure 4. Barley infected with leaf rust.

Leaf rust was observed at only two on-farm sites, Alburgh, VT and Northfield, MA (Figure 4). Leaf rust is the most common of the rust pathogens. It is characterized by round rusty-red/orange masses of spores on the leaf surface.

Also observed at all sites scouted was foliar disease resistance discoloring (Figure 5). While the discoloring looks a leaf disease, it is actually a genetic resistance response.

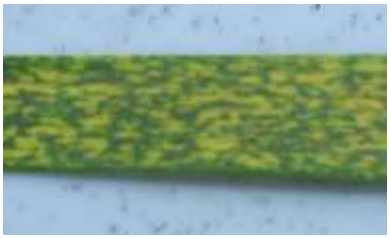

Figure 5. Disease resistant color.

Grain Head Diseases

There are two primary grain head diseases found in the Northeast: loose smut *(Ustilago tritici)* and *Fusarium* head blight (FHB) (*Fusarium graminearum*). Loose smut was identified at the Alburgh site on all grain types, and on spring wheat at the Bridport location. The loose smut fungus is carried as dormant mycelium within healthy-looking seed and is spread by planting infected seed. A smut-infected seed and plant cannot be distinguished from an uninfected one until the head starts to emerge. The disease is most obvious just after the time of heading by the characteristic dusty black appearance of diseased heads (Figure 6). The spores are dispersed by the wind during wheat flowering and can infect healthy plants.

Figure 6. Loose smut infected wheat head.

If you find heads with loose smut in your fields, do ***not*** save the seed for future planting. Loose smut is not considered a human health risk, but planting infected seed will exponentially increase diseased seed and result in yield losses.

Figure 7. FHB infected wheat.

The pathogen of most concern among grain growers is *Fusarium* head blight (FHB). It is predominantly caused by the species, *Fusarium graminearum*. Signs of FHB infection was observed at all of the Vermont on-farm sites. This disease can be very destructive and cause yield losses, low test weights, low seed germination, and contamination of grain with a special mycotoxin, a vomitoxin, called deoxynivalenol (DON). The spores are usually transported by air currents and can infect plants at flowering through grain fill. Spores can also overwinter on grain stubble. A telltale sign of FHB infection is the premature bleaching of grain heads (Figure 7). Another symptom is a pink or orange colored mold at the base of the spikelet. Additionally, once the grains are harvested, infected kernels will be pink, white, chalky and/or shriveled (Figure 8). *Fusarium* can pose a health risk to both humans and livestock. Consumption of contaminated grains at DON levels of greater than 1 ppm in humans and x ppm for certain livestock can cause illness; therefore, it is critically important to test grain for DON. More information on DON testing can be found at: www.uvm.edu/extension/cropsoil/grains.

Managing Grain Diseases

In our cool, moist climate, practices that are critical to managing the multitude of diseases that impact small grains include: planting clean seed, rotating crops, and improving air flow. We highly recommend buying "certified" seed when possible. Certified seed guarantees that the seed meets or exceeds a strict set of quality control standards. Weed management is important, especially in spring grains to improve airflow and assist with keeping the plants as dry as possible. Spores from many of the fungal diseases can survive in the soil or plant debris for several years waiting for their host plant and/or ideal conditions. Therefore, crop rotation and healthy soil is critical to minimizing diseases present during grain production. Conventional growers may purchase fungicide-treated seed to help mitigate so of the disease issues. There are also several commercial pesticides available as a last resort to control extreme outbreaks.

Figure 8. *Fusarium* infected grain.

Insect Pests Identified

Three predominant insect pests identified through on-farm scouting were: 1) cereal leaf beetle, 2) brown wheat mite, and 3) thrips. All of these insect pests were observed at all on-farm scouting locations; however, none appeared to pose a major threat to any of the grain crops scouted. Figure 9 illustrates the type of leaf damage caused by cereal leaf beetles and thrips.

Figure 9. Thrip damage (left) and cereal leaf beetle (right).

Scouting Tips

Start scouting grains for foliar diseases and insect pests at the flag leaf growth stage; be on the lookout for grain head diseases starting at spike emergence. Rogue out any smutted heads and do not save seed where loose smut is present. Keep an eye out for premature bleaching of grain heads and salmon colored fungus on spikelets, but remember, just because you have the fungus, doesn't necessarily mean you have the mycotoxin and vice versa—so be sure to test your grains for DON.

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