2017

Small Grain Disease and Insect Pest Scouting Report

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NORTHWEST CROPS & SOILS PROGRAM

2017 Small Grain Disease and Insect Pest Scouting Report

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A survey of small grain diseases and insect pests were conducted in Vermont, New York and Massachusetts during the 2017 growing season. Pests were scouted on seven Vermont farm locations in the towns of Alburgh, Berlin, Bridport, North Ferrisburgh, North Troy, Shelburne, and Shoreham, as well as in Essex, New York and Northfield, Massachusetts.

Winter and spring wheat (heirloom and commercially available), as well as spring barley and spelt, were scouted between spike emergence and flowering, and again at the soft dough growth stage. Disease and insect samples were taken and identified with assistance from the University of Vermont (UVM) Plant Diagnostic Clinic.

Diseases Identified

The overall wet and cool growing conditions throughout much of the season resulted in moderate to high levels of foliar diseases. The foliar and head diseases identified during the 2017 growing season are 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 greater potential for yield loss. The following foliar diseases were identified during scouting visits.

Image 1. Powdery mildew on spring wheat.

Powdery mildew *(Erysiphe graminis f. sp. Tritici)* was identified on the leaves and stems of winter and spring wheat and spelt in Northfield, MA, winter and spring

wheat and spring barley in Alburgh, VT, and on winter wheat in Bridport, VT. It was also found on the leaves of winter wheat in Shelburne, VT and Berlin, VT. Powdery mildew is relatively easy to identify, the fungus produces whitish-gray cottony growths on the upper leaf surface or stem of the infected plant (Image 1). Primarily infection occurs on the lower leaves and stem sections of the plant.

Image 2. Tan spot infected leaves *(Pyrenophora tritici-repentis)*.

Leaf spots such as Tan spot *(Pyrenophora tritici-repentis),* Septoria tritici blotch (STB) *(Zymoseptoria tritici),* and Stagonospora leaf and glume blotch *(Stagonospora nodorum)* were identified at all of the on-farm sites and on all grain types. Leaf spots on the spelt in Northfield, MA was severe.

The Tan spot fungus produces elongated asymmetrical spots (1/8 to 1/2-inch long and 1/16 to 1/18-inch wide) (Image 2). 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 Stagonospora leaf and glume blotch *(Stagonospora nodorum)* look very similar and are often confused with one another (Image 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 turns 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).

Image 3. Left leaf infected with Septoria tritici blotch (STB) (*Zymoseptoria tritici*) and the right with Stagonospora leaf blotch (*Stagonospora nodorum*).

Leaf rust (*Puccinia recondite*) was observed at only two sites, Alburgh, VT and Northfield, MA. 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 (Image 4). Striped rust (*Puccinia striiformi*) was also identified on winter and spring wheat at the Alburgh, VT location (Image 5).

Image 4. Leaf rust (*Puccinia recondite*) on winter wheat.

Image 5. Striped rust (*Puccinia striiformi*) on winter wheat.

Yellow speckling of leaves were observed at all locations, and on grain types, except for Essex, NY (Image 6). Plant samples were taken to the UVM Plant Diagnostic laboratory for identification. Interestingly, they found that this discoloration was not a disease but a genetic resistance response to foliar diseases.

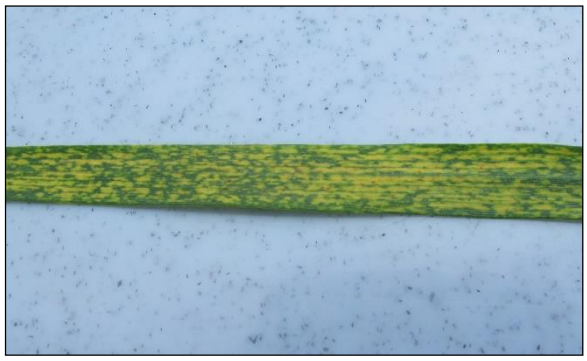

Image 6. Genetic resistance response in winter wheat.

Image 7. Loose smut *(Ustilago tritici)* infected wheat head.

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 spring and winter wheat and spring barley, and on winter wheat at the Shelburne, VT 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 (Image 7). The spores are dispersed by the wind during wheat flowering and can infect healthy plants.

If you find heads with loose smut in your fields, you should 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.

Image 8. *Fusarium* head blight (*Fusarium graminearum*) on spring barley, Alburgh, VT.

The pathogen of most concern among grain growers is *Fusarium* head blight (FHB). It is predominantly caused by the species, *Fusarium graminearum*. This disease is very destructive and causes yield losses, low test weights, low seed germination, and contamination of grain with the 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. 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. *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 10 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: http://www.uvm.edu/extension/cropsoil/cereal-grain-testing-lab). All on-farm locations were scouted at soft dough to assess FHB severity using the North Dakota State University visual scale. The cool and wet conditions during much of the growing season created the ideal conditions for *Fusarium* growth. Premature bleaching of heads and orange or pink kernels were observed on winter and spring wheat, and on spring barley at all locations (Image 8).

Managing Grain Diseases

It is important to remember we do not know directly how foliar diseases affect yields. Although we have identified these issues in the field, it is not clear as to how, or at what severity, they impact yield and quality.

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 some of the disease issues. There are also several commercial pesticides available as a last resort to control extreme outbreaks.

Insect Pests Identified

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

Overall, damage from insect pests were minimal this season most likely due to the cool and wet conditions during much of the growing season (Table 1). The most prevalent pest was Cereal leaf beetle damage (*Oulema melanopus*) (Image 9). Minimal damage was recorded at all scouted locations with the one exception of a winter wheat field in Northfield, MA. Interestingly, at this location there appeared to be some varietal tolerance to the pest. The variety Redeemer was severely impacted by Cereal leaf beetle while the variety Warthog had little if any damage. Thrips (order *Thysanoptera*) were identified at all scouting locations, however overall damage was minimal. Plant injury by the Brown wheat mite (*Petrobia latens*) was identified at the Alburgh, Bridport, North Ferrisburgh, North Troy, and Shelburne, VT scouted fields. Other insect pests identified include; wireworm (order *Elateridae*) (Alburgh, Berlin, Shelburne, VT and Northfield, MA), leaf miners (genus *Cerodontha*) (Alburgh, Berlin, Bridport, North Ferrisburgh, and Shelburne, VT), aphids (sub-order *Aphididae*) (Alburgh, VT), and slugs (*Limacidae*) (Alburgh, VT).

Table 1. Insect pests identified at the on-farm scouting locations.

Location	Grain type	Cereal leaf beetle	Thrips	Brown wheat mite	Wire-worm	Slugs	Leaf miner	Aphids
Alburgh, VT	Spring Wheat	X	X	X		X	X	
Alburgh, VT	Winter Wheat	X	X	X		X		
Alburgh, VT	Spring Barley	X	X	X	X	X	X	X
Berlin, VT	HRWW	X	X		X			
Berlin, VT	SRWW	X	X				X	
Bridport, VT	HRWW		X	X			X	
Bridport, VT	SWWW	X	X	X			X	
Essex, NY	HRSW	X	X					
N. Ferrisburgh, VT	Spring Barley	X	X	X			X	
North Troy, VT	HRWW	X	X	X				
Northfield, MA	HRWW	X						
Northfield, MA	HRWW		X					
Northfield, MA	Spelt							
Northfield, MA	HRSW	X			X			
Shoreham, VT	HRWW	X	X					
Shelburne, VT	HRWW	X	X	X			X	
Shelburne, VT	SWWW	X	X	X	X		X	

HRWW-Hard Red Winter Wheat, SRWW-Soft Red Winter Wheat, SWWW-Soft White Winter Wheat, HRSW-Hard Red Spring Wheat.

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 orange or pink colored fungus on spikelets, but remember, just because you have the fungus, does not necessarily mean you have the mycotoxin and vice versa—so be sure to test your grains for DON. After harvest, a grain sample was taken from each of the on-farm scouting sites and analyzed for DON concentration, which varied from less than 1ppm to greater than 5ppm.

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