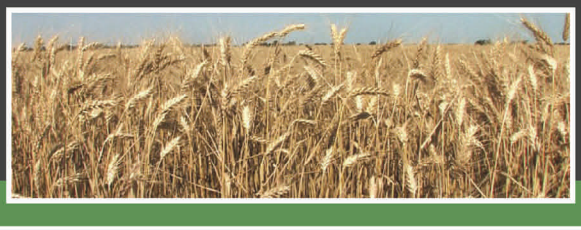

Agronomic Spotlight

Insect and Disease Management for Wheat

- Proactive approaches to managing pests are often more effective and economical than in-season, reactive methods.
- Some diseases such as take-all, Fusarium head blight and viral diseases must be managed before symptoms appear to protect yield potential.
- The use of host plant resistance and timely planting may help to prevent many disease and insect problems.

Cultural Management Practices

Proactive approaches to managing pests are often more effective and economical than in-season, reactive methods. Common cultural practices for pest control in wheat are discussed below.

Timely planting (after the Hessian fly-free planting date, where applicable) is important for avoidance of certain insects and diseases. Planting prior to this date allows an extended period of vegetative growth (between planting and the first freeze) for insects and diseases to colonize the crop. Early planting may necessitate the use of resistant products, diligent scouting and seed treatments.

Seeding rates and **nitrogen fertility rates** that are too high can result in excessively thick, lush stands that may have reduced air circulation and light penetration into the canopy, making the crop more vulnerable to foliar and head diseases. This is especially true where planting dates are relatively early to near normal for the geography.

Planting multiple wheat products of **differing maturities**, **staggering planting dates**, and choosing **products with resistance or tolerance** to key pests and diseases can help to minimize the risk of severe losses. Planting different maturities has the added advantage of helping with the logistics of harvesting and planting the next crop.

Use of tillage and crop rotation can help in the management of insects and diseases that survive in the soil or crop residue because it breaks the organism's life cycle by removing the host or interrupting winter survival.

Broad spectrum insecticide and fungicide seed treatments are commonly used on commercial wheat seed. Fungicide seed treatments can provide protection from certain seed and soil-borne pathogens for which limited to no in-season options are available for management. Such diseases may include smuts, bunts, root rots, damping-off, take-all and general seed rot. Insecticide seed treatments are commonly used for control of pests such as wireworm which can be detrimental to young wheat stands and virus-vectoring pests such as the bird cherry-oat aphid which is one of as many as 20 aphid species capable of vectoring the Barley Yellow Dwarf Virus.

Scouting is an essential part of pest and disease management that can help preserve yield potential and improve the economics and sustainability in a farming operation. Effective scouting, knowledge of key pest and disease life cycles, and management thresholds can help to ensure pesticide applications are made at the appropriate times and pest densities, and unnecessary applications are avoided.

Diseases

Barley Yellow Dwarf Virus (BYDV) is a viral disease transmitted by several species of aphid. Infection can occur in the fall or spring; however, the potential for significant symptom expression and yield loss is greatest from fall infections. Symptoms commonly occur in patches throughout the field and can include stunting, reduced tillering and a yellow or reddish discoloration of the flag leaf, leaf tips and margins (Figure 1). Plants may also appear unusually erect with thickened, stiff leaves. Significant yield loss can result. Management strategies may involve timely planting (to avoid prolonged periods of aphid feeding for viral transmission), planting resistant products, insecticidal seed treatments to help reduce early-season aphid populations, and foliar insecticides to control aphid populations in the crop if thresholds are reached.

Figure 1. Barley yellow dwarf.

Fusarium head blight (head scab) can become a serious problem when favorable conditions for spore production (warm and humid weather) occur during and after heading and inoculum is present (commonly in corn stubble). Individual spikelets to entire heads may become infected. Infected spikelets will turn tan to brown (Figure 2) and may have salmon-colored fungal growth. Grain may appear white to pinkish and shriveled with low test weight or fail to develop altogether. A crop with more than five percent infected kernels may contain enough mycotoxins to be

Figure 2. Fusarium head blight. *Photo by Mary Burrows, Montana State University, Bugwood.org.*

Insect and Disease Management for Wheat

harmful to humans and animals.[1]

Harvested grain containing mycotoxins may incur significant dockage at the elevator or mill and may result in rejection of the grain if levels are above acceptable thresholds. Management involves avoidance of the most susceptible wheat products and triazole fungicides (E.g. Prosaro® or Caramba®) applied at early flowering when weather conditions are conducive for spore production. The effectiveness of tillage and crop rotation may be limited because spores can blow in from neighboring fields.

Leaf rust is characterized by small, randomly distributed orange-brown lesions on upper leaf surfaces and leaf sheaths that do not coalesce (Figure 3). **Stem rust** pustules are larger, dark reddish-brown and can be found on upper and lower leaf surfaces, stems and spikes. Initially the lesions will be scattered but may coalesce in heavy infestations (Figure 3). **Stripe (yellow) rust** is characterized by linear rows of bright yellow-orange pustules that follow leaf veins. These diseases can develop rapidly in appropriate temperatures and prolonged periods of leaf wetness. Severe losses can occur due to significant loss of photosynthetically-active leaf tissue resulting in a reduction in kernels, test weight and grain quality, as well as lodging. Plant resistant products where available. Foliar fungicides can be effective if applied before the infection becomes severe.

Figure 3. **Leaf rust** (top). *Photo by Louisiana State University Ag Center Archive, Louisiana State University AgCenter, Bugwood.org.* **Stem rust** (bottom). *Photo by Mary Burrows, Montana State University, Bugwood.org.*

Powdery mildew appears as white powdery-looking fungal growth on the upper leaf surfaces, but can spread throughout the plant. Black spots (fungal survival structures) eventually develop in the lesions. The fungus survives in wheat stubble and can sporulate in cool to moderate temperatures and humid conditions. The disease can affect yield and test weight and lead to lodging. Management involves planting resistant products and using foliar fungicides when necessary.

Take-all disease causes roots and lower stems to rot. The lower stems and roots of infected plants often have a shiny, black discoloration. Infected plants will eventually become stunted and die prematurely resulting in patches of white colored plants with heads that are sterile. Yield can be severely compromised in infested fields. The fungus survives in the residue of wheat, barley and grassy weeds. Crop rotation away from wheat or barley for one or two years is the best management practice. Control weed hosts and volunteer wheat/barley. It is also important to properly manage soil drainage and soil fertility since the disease can be more severe in poorly drained, alkaline or nutrient deficient soils.

Insects

Aphids can appear in the fall and spring and compromise wheat yields through direct feeding and transmission of viruses. Aphid feeding can cause yellowing and necrosis of affected leaves and also encourage the growth of sooty mold on leaves because of a sugary substance (honeydew) they exude when feeding. Unique symptoms may occur depending on the species. Aphid population control is important in the fall after planting to prevent transmission of viral diseases and in the spring during the grain filling stage. Diligent scouting is important as aphid populations can grow exponentially, quickly surpassing economic thresholds. The aphid population in a field should be accurately identified prior to control as management approaches may vary by species, environmental conditions and crop growth stage. General management approaches include use of resistant products where available, timely insecticide applications and conservation of natural enemies.

Hessian fly larvae feed on wheat in the fall and spring. The larvae inject a toxin into the plant when feeding which interferes with normal plant growth. Fall feeding can kill young seedlings, reducing stands. Surviving plants may have an unusual bluish coloration, be stunted with reduced vigor, and have reduced winter survival. Spring feeding can cause lodging. A heavy infestation can cause a reduction in grain quality and yield. Excellent control can be achieved by planting resistant products after the Hessian fly-free date. Control volunteer wheat to prevent egg laying. Tillage can help to reduce the survival of the pupa stage (called flaxseed, Figure 4) in wheat stubble. In some areas, properly timed insecticide applications targeted at adults prior to egg laying can be effective, but appropriate timing is critical and difficult to predict.

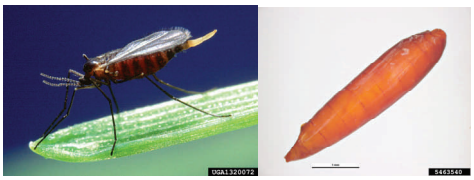

Figure 4. **Hessian fly adult** (left), *Photo by Scott Bauer, USDA Agricultural Research Service, Bugwood.org.*, **and pupa (flaxseed)** (right), *Photo courtesy Pest and Diseases Image Library, Bugwood.org.*

Sources:

[1] Prescott, J.M., Burnett, P.A., Saari, E.E., Ranson, J., Bowman, J., de Milliano, W., Singh, R.P., and Bekele, G. Wheat diseases and pests: a guide for field identification. CIMMYT. http://wheat.pw.usda.gov/ggpages/wheatpests.html. Other sources: Lee, C., Herbek, J. (editors), Bruening, W., et al. 2009. A comprehensive guide to wheat management in Kentucky. ID-125. University of Kentucky Extension. www2.ca.uky.edu. Foster, J.E. and Hein, G.L. 2009. Hessian fly on wheat. NebGuide G1923. University of Nebraska-Lincoln Extension. http://cropwatch.unl.edu/wheat/disease. Hein, G.L., Kalisch, J.A., and Thomas, J. 2005. Cereal aphids. NebGuide G1284. University of Nebraska-Lincoln Extension. http://cropwatch.unl.edu/wheat/disease. Web sources verified 8/28/15.