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Do I Need to Spray a Foliar Fungicide in Wheat in 2009?

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During the winter meeting season, we received many questions regarding current thresholds for considering spraying a foliar fungicide on winter wheat. While we do not currently have specific spray thresholds from data obtained in Wisconsin, we can integrate current knowledge and recommendations for soft red winter wheat from neighboring states with information that we developed in Wisconsin Crop Manager articles during 2008 to help determine if a foliar fungicide is needed.

The key point that you should start with, and always remember, is that the decision process for foliar fungicides starts with knowing the variety of wheat planted in the fall. Ask yourself the following questions, “Does my wheat variety have any disease resistance, and if so, for which specific diseases?” and “Do I know the rating for that resistance?” This information can be obtained from company literature as well from data published in the 2007-08 [Wisconsin Winter Wheat Performance Tests](#).

With that information in hand, the second key point is that you need to be committed to scouting the wheat field throughout the growing season, preferably on a weekly basis. As we have previously written, we recommend scouting 10 randomly selected spots in the field and recording which diseases are present and the incidence (number of plants infected) and severity (what percentage of the leaf area is infected) of each disease on 10 main stems at each of those 10 locations (total of 100 stems assessed).

When assessing for diseases, we emphasize the following growth stages (Figure 1): (i) jointing (Feekes 4-5 or Zadoks 30), (ii) second detectable node (Feekes 7 or Zadoks 32), (iv) flag emergence into early boot (Feekes 8-10 or Zadoks 39-45), and (v) flowering (Feekes 10.51). The decisions to treat or not treat at each growth stage will be based on the leaf assessed, the disease, and the level of that disease. These estimates are all used as a guide to determine the risk of the flag leaf becoming infected, since this leaf is the primary driver for yield. Anything that significantly reduces green leaf area will likely impact yield.

Currently, the three diseases that we have the greatest knowledge of thresholds for foliar fungicides are powdery mildew, wheat leaf rust, and Septoria leaf blotch. Table 1 shows a summary of current thresholds based on growth stage, leaf assessed, and incidence and/or severity levels.

Table 1.^a Current thresholds for powdery mildew, wheat leaf rust, and Septoria leaf blotch by growth stage, leaf assessed^b, and incidence and/or severity.

Growth stage	Powdery mildew	Wheat leaf rust	Septoria leaf blotch
Jointing (Feekes 4-5)	Check the uppermost leaf –threshold of 10 pustules per leaf (average)	Fungicide not recommended	Fungicide not recommended
Second visible node (Feekes 7)	Check the uppermost leaf – threshold of 5 pustules per leaf (average)	Check any leaf – threshold of 1 pustule (average)	Check the uppermost leaf – threshold of 25% of leaves assessed with expanding blotches
Flag leaf emergence (Feekes 8)	Check from flag-2 upward – threshold for flag-2 is 5 pustules per leaf (average)	Check from flag-3 upward – threshold is 1 pustule per leaf (average)	Check from flag-2 upward – threshold is 25% of leaves with blotches
Flag leaf to flowering (Feekes 8 - 10.5)	Check from flag-1 upward – threshold for flag-1 is 5 pustules per leaf (average)	Check from flag-2 upward – threshold is 1 pustule per leaf (average)	Check from flag-2 upward – threshold is 25% of leaves with blotches

^a Adapted from Hershman, D. E. 1995. Foliar Fungicide Use in Wheat, PPFS-AG-SG-5 and Weisz, R. and Melton, T. 2004. Small Grain Production Guide, North Carolina State University Cooperative Extension Service, 9/04-3M-JMG (Revised) AG-580.

^b Definitions of leaves: flag = the last leaf that is visible at Feekes 8 (Zadoks 37); flag-1 = penultimate leaf just before the flag leaf; flag-2 = leaf that is two leaves below the flag leaf; flag-3 = leaf that is three leaves below the flag leaf.

In terms of the leaf area infected for powdery mildew and wheat leaf rust, these thresholds correspond to 5-10% for powdery mildew and 1-3% for wheat leaf rust, respectively.

Economically, the decision to make a foliar fungicide application is dependent on crop yield potential, commodity prices, pesticide cost including application, and crop yield loss caused by wheel track damage. An adequate yield potential for soft red winter wheat would be in the 55-65 bu/a range. The goal when considering yield and economics is that you want to cover the total cost of the fungicide application. In Table 2, we provide a condensed version of the number of bushels/a needed to cover the cost of a fungicide application plus product. The full table is available at:

<http://www.uwex.edu/ces/croppathology/wheat/documents/2009WheatFungicideTable.pdf>.

Based on data from 2006-2007 and 2007-2008, the average yield response we have documented from controlling powdery mildew on a susceptible variety is approximately a 7-10 bu/a increase with fungicide applications applied at the flag leaf emergence growth stage, however, this has not been consistent in all trials.

Table 2. Yield (bu/a) needed to cover the cost of a foliar fungicide application at different wheat market prices.

Application cost (\$/acre)	Product Cost (\$/acre)	Additional yield (bu/a) needed to cover the cost of a fungicide application for different wheat market prices		
		\$3.00/bu	\$5.00/bu	\$7.00/bu
6	15	7.0	4.2	3.0
8	15	7.7	4.6	3.3
10	15	8.3	5.0	3.6
12	15	9.0	5.4	3.9

Useful References:

[Wisconsin Crop Manager](#) articles regarding winter wheat production and disease management:

- 1) [Foliar Fungicides for Winter Wheat in 2008](#), 10 April 2008
- 2) [Identifying Wheat Diseases Controlled by Foliar Fungicides](#), 10 April 2008
- 3) [Flag Leaf Emergence and Foliar Fungicides in Winter Wheat](#), 29 May 2008

Online Resources to use during 2009 to stay up to date on wheat production and management in Wisconsin:

- Field Crops Plant Pathology: <http://www.uwex.edu/ces/croppathology>
- CoolBean.info: <http://coolbean.info>
- The Soy Report Blog: <http://thesoyreport.blogspot.com>
- USDA Cereal Rust Laboratory – Reports and Bulletins: <http://www.ars.usda.gov/Main/docs.htm?docid=9757>
- Fusarium Head Blight Prediction Center: <http://www.wheatcab.psu.edu/>

Figure 1. Photos illustrating important growth stages to assess for foliar and flowering diseases of winter wheat and the recommended leaf or leaves to assess.

				
Feekes 4-5 Jointing	Feekes 7 2nd node visible	Feekes 8-9 Flag leaf emergence	Feekes 10.51-11.1 Flowering to soft dough	Feekes 11.2 Scab Assessment
Assess: Newest expanded leaf	Assess: Newest expanded leaf (for rust assess all leaves)	Assess: Flag Flag-1 Flag-2 Flag-3	Assess: Flag Flag-1 Flag-2	Assess: Heads(rating for Fusarium head blight)