

PLANT DISEASE AND INSECT ADVISORY



Entomology and Plant Pathology
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Wheat Disease Update Bob Hunger, Extension Plant Pathologist

Wheat foliar diseases: The wheat I've seen around Stillwater this past week was at or a little beyond GS 8 (flag leaf just visible). Ray Sidwell at the Lahoma Station indicated that the wheat in his area also was approaching GS 8. Dr. Brett Carver on his trip to southwestern OK indicated that the wheat is mostly at or around GS 10 (full boot).



Over the last week a higher incidence of powdery mildew (PM) on susceptible varieties has been observed at several locations. Dr. Art Klatt from Oklahoma State reported seeing either the highest or one of the highest levels of PM in one of his nurseries near Stillwater. I also have seen more PM on lower and mid leaves in my plots near Stillwater, and Dr. Brett Carver reported similar levels of PM on his recent (March 31) trip to southwestern OK. Brett also saw a few leaf rust pustules on wheat around El Reno, but very few. So far, no confirmed occurrence of stripe rusts.

Here are some updates from other states.

TEXAS (03/28/06; Rex Herrington, Res. Assoc.-Small Grains, Texas A&M Univ.)

During this past week, I took notes and made rust collections at College Station, McGregor, Castroville, and Uvalde. Wheat leaf rust infections are lighter than normal due to the drought. The race that is virulent on Cutter has been around College Station and McGregor since December. I did not find any evidence of wheat stripe rust, except at College Station, where it is dried up and only affected a few plots. No wheat stem rust was found.

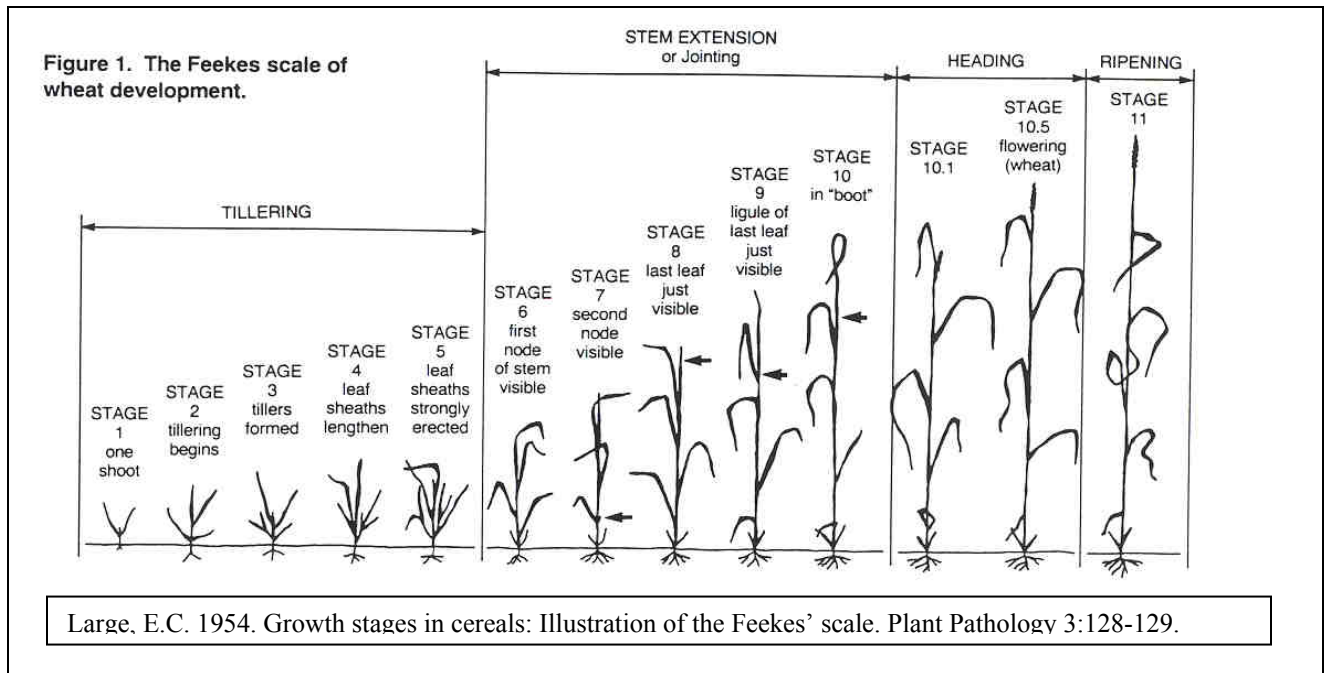
Oat crown rust is light, but increasing on Brooks border rows at College Station. I found a trace of CR on Brooks at Castroville. No oat stem rust was found.

We have received 1 and 1/2 inches of rain this AM, and expect more throughout the week. Temperatures are also ideal for rust development. Wheat and oats have been heading over the last two weeks.

Foliar Fungicides and Wheat Production in Oklahoma – April, 2006
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Question: How is wheat growth described?

Answer: The Feekes' scale. This scale, which is named after the person that developed it, describes the stages of wheat with a numerical scale. This is the most commonly used descriptor in recommendations for pesticide applications.



Question: How much damage can a foliar disease such as leaf rust cause on wheat?

Answer: A foliar disease such as leaf rust causes the most damage when high severities occur at early growth stages such as heading, flowering or milk (Table 1).

Table 1. Approximate percent loss of yield caused by leaf rust at combinations of leaf rust severity and growth stage of wheat.

Growth stage	Severity (%) of leaf rust on the flag leaf				
	10	25	40	65	100
Flowering	10	15	20	30	35
Milk	2	5	8	14	20
Soft dough	1	3	4	7	10
Hard dough	1	1	1	3	5

Question: When should I apply a fungicide?

Answer: All the fungicides listed in Tables 2 & 3 can be applied up to growth stage 10.5, which is when heads are completely emerged. However, applying a fungicide at 10.5 usually is later than desired in order to receive the maximum benefit from the fungicide. In most years, the optimum period for application is between growth stages 9 (flag leaf fully emerged) to 10 (full boot) because application in this range of growth stages will provide protection during the critical times of flowering and milk (Table 1).

Table 2. Effect of Foliar Fungicides on Grain Yield and Test Weight

STILLWATER – 2005:	Growth stage*	Yield (bu/A)	Test wt. (lb/bu)	Leaf rust (16-May)	Powdery mildew (26-Apr)
No treatment	-----	67.6	56.8	90.0	17.5
Tilt 3.6 EC; 4 oz	9	68.6	56.7	63.8*	6.3*
Tilt 3.6 EC; 4 oz	10.5	72.2	57.0	35.0*	15.0
Stratego 250 EC; 10 oz	9	76.4	57.6	32.5*	2.5*
Stratego 250 EC; 10 oz	10.5	78.2*	58.0	5.0*	12.5
Quilt 200 SE; 14 oz.....	9	76.3	57.3	12.5*	1.3*
Quilt 200 SE; 14 oz.....	10.5	79.4*	57.1	5.0*	10.0*
LSD (P=0.05)		9.0	1.3 (NS)	20.0	7.2
PERKINS – 2005:	Growth stage*	Yield (bu/A)	Test wt. (lb/bu)	Leaf rust (06-May)	Powdery mildew (14-Apr)
No treatment	-----	48.1	55.5	2.0	15.0
Tilt 3.6 EC; 4 oz	9	47.5	56.2	0.0*	4.0*
Tilt 3.6 EC; 4 oz	10.5	49.3	56.3	0.0*	10.0
Stratego 250 EC; 10 oz	9	52.5	56.3	0.0*	10.0
Stratego 250 EC; 10 oz	10.5	48.5	56.0	0.0*	10.0
Quilt 200 SE; 14 oz.....	9	54.1	57.2	0.0*	6.5*
Quilt 200 SE; 14 oz.....	10.5	52.2	56.4	0.0*	10.0
LSD (P=0.05)		6.3 (NS)	2.2 (NS)	0.1	6.7
STILLWATER - 2004:	Growth stage*	Yield (bu/A)	Test wt. (lb/bu)	Leaf rust severity	Powdery mildew severity
No treatment	-----	75.1	56.8	50.0	15.0
Stratego 250 EC (10 fl oz)	9	86.8*	57.3	20.0*	6.5
Stratego 250 EC (10 fl oz)	10.2	83.2*	58.0*	17.5*	10.0
Quilt 200 SE (14 fl oz).....	9	86.6*	57.2	17.5*	7.5
Quilt 200 SE (14 fl oz).....	10.2	87.5*	57.3	4.0*	15.0
Headline 250 F (6.1 fl oz)	9	86.8*	57.3	15.0*	7.5
Headline 250 F (6.1 fl oz)	10.2	82.8*	57.7	6.5*	12.5
LSD (P=0.05)		5.6	1.1	8.1	8.8 (NS)

*GS9=flag leaf fully emerged; 10.2=heads ¼ emerged; 10.5=heads fully emerged.

*=indicates significant difference from the mean value for the "No treatment."

NS=no significant differences.

Question: What fungicides are available for use in Oklahoma?

Answer: Currently there are four fungicides most commonly mentioned in relation to controlling foliar wheat diseases. These include Propiconazole [marketed under the trade names of Tilt (Syngenta) and PropiMax (Dow AgroSciences)], Quilt (Syngenta), Stratego (Bayer Crop Science), and Headline (BASF). A comparison of these fungicides is presented in Table 3. These fungicide costs are estimates, and **REMEMBER** to consult the label for the most current and accurate information.

Question: What is the potential benefit from using a foliar fungicide?

Answer: More than 20 years of fungicide trials including years with little or no disease and several years with high disease pressure have documented an average yield increase of approximately 10% from using fungicides. Such an increase justifies fungicide use if the yield potential and price of wheat are high. Hence, consider the following to assist in deciding whether to apply a fungicide to control a foliar disease:

- Will a foliar fungicide help to regain yield? The answer to this is "NO!" Foliar fungicides can only help to protect the yield potential present at application.
- What is the yield potential of the wheat? This should be 40-50 bu/acre at a minimum, but can go up or down depending on the price of wheat.
- What is the price of wheat? \$3.00-3.50/bu or more is desirable.
- What is the growth stage of the wheat? Foliar diseases do the most harm when infection severities are high at stages such as heading, flowering and milk.
- What disease is present? Be sure it is a foliar fungal disease. Stripe rust can be especially damaging because of its ability to kill entire leaves. Hence, if you are considering a spray application to protect against stripe rust, the window of application is less than it is for leaf rust.
- What is the disease reaction of the variety? Refer to the O.S.U. Variety Characteristic Chart by selecting "Variety Info" on the web site at: <http://www.wit.okstate.edu/varietyinfo/index.html>. Some pathogens (e.g., the pathogen that causes wheat leaf rust) can adapt to resistance genes, and hence, a resistant variety may become susceptible when a new race appears.
- What is the weather forecast? Hot and dry conditions inhibit further disease development and hasten ripening, while cool and moist conditions promote disease and lengthen the period of time for grain development and filling.

► The above considerations can be used to help determine the potential value of a fungicide application, that is, a simple cost-benefit evaluation. For example:

Grain production at \$3.50/bu:

$$\begin{array}{ccccccc} \frac{10\%}{\text{Potential}} & \times & \frac{50 \text{ bu/A}}{\text{Estimated}} & \times & \frac{\$3.50/\text{bu}}{\text{Estimated}} & - & \frac{\$16.00/\text{A}}{\text{Fungicide +}} & = & \frac{\$1.50/\text{A}}{\text{Potential}} \\ \text{increase} & & \text{yield goal} & & \text{selling price} & & \text{application cost} & & \text{profit} \end{array}$$

Seed production (e.g. certified seed) at \$8.00/bu:

$$\begin{array}{ccccccc} \frac{10\%}{\text{Potential}} & \times & \frac{50 \text{ bu/A}}{\text{Estimated}} & \times & \frac{\$8.00/\text{bu}}{\text{Estimated}} & - & \frac{\$16.00/\text{A}}{\text{Fungicide +}} & = & \frac{\$24.00/\text{A}}{\text{Potential}} \\ \text{increase} & & \text{yield goal} & & \text{selling price} & & \text{application cost} & & \text{profit} \end{array}$$

Table 3. Fungicide cost and efficacy for control of foliar wheat diseases. [This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. No endorsement is intended for products listed, nor is criticism meant for products not listed].

Product & (Company)	Fungicide type	Rate/acre (fl oz)	PHI ^A (days)	Approx cost/oz ^B	Approx cost/A ^B	Leaf rust	Stripe rust ^C	Powdery mildew	Septoria complex	Tan spot
Propiconazole	triazole	4.0	40	2.89-2.97	11.56-11.88	G ^D	VG	E	VG	G
(Syngenta=Tilt)										
(Dow AgroSciences =PropiMax)										
Quilt	strobilurin + triazole	14.0	45	1.03	14.42	VG	VG	E	VG	VG
(Syngenta)										
Stratego	strobilurin + triazole	10.0	35	1.41	14.10	VG	VG	E	VG	G
(Bayer)										
Headline	strobilurin	6.1-9.0	14 ^A (hay)	2.06	12.36-18.54	E	E	G	VG	VG
(BASF)										

^APHI = pre-harvest interval, that is the number of days required between last application & grain harvest (or in the case of Headline, hay harvest).
^BEstimated chemical costs as of March, 2006. Prices do not include application charges and may vary with time, dealer, rebate offers, etc.
^CEfficacy ratings for stripe rust control based on information obtained in 2004 from the North Central Regional Committee on Management of Small Grains Diseases
^D=excellent; VG=very good; G=good; F=fair; P=poor.

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