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Fungicides Compared For The Control Of Diseases Of Wheat In The Deep South

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Diseases can greatly lower wheat yield and grain quality. Leaf rust, Stagnospora (Septoria) glume blotch, Septoria leaf blotch, and powdery mildew have historically been the most damaging diseases on wheat in Alabama. Stripe rust has recently emerged in the Deep South as a very destructive disease of wheat. Field cropping history, cultivar selection, and weather patterns all have a tremendous impact on disease outbreaks in wheat. Typically, warmer and wetter late winter and early spring weather patterns favor damaging disease outbreaks while drier conditions slow the onset and spread of all the above diseases.

Fungicide use for the control of diseases is nothing new for wheat producers in Alabama and surrounding states. Until recently, low prices for wheat have greatly limited the return to the producer for the investment in costly fungicide treatments. Higher prices have increased the wheat acreage likely to be combined for grain this spring.

Over the past quarter century or more, Alabama field trials have shown the consistently highest yield gains from fungicide treatments have been seen in Southwest Alabama. Results in trials at other Alabama locations, where disease pressure usually is not very high, have been mixed. Typically, yield gains have not been large enough to cover fungicide and application costs.

Fungicide use is strongly suggested, particularly in Baldwin, Mobile, and surrounding coastal counties, on wheat that has a thick, uniform stand, and a yield potential in excess of 40 bu/A as well as when rainfall is plentiful from the time the flag leaf begins to emerge through the dough stage. Disease development is more likely in fields that have been cropped to wheat in previous years. In contrast, dry weather patterns during this time frame will suppress disease development, thereby reducing the need for costly fungicide treatments.

Producers are urged to visit their fields weekly over the next few weeks to check for the appearance of damaging diseases on their wheat. Recommend that they check several

locations in each field for symptoms of common wheat diseases. Descriptions of all damaging diseases except for stripe rust can be found in ANR-543 'Wheat Diseases and Their Control (http://www.aces.edu/pubs/docs/A/ANR-0543/).

Results of several Alabama wheat fungicide trials are summarized in Tables 1 and 2. Both studies were conducted at the Gulf Coast Research and Extension Center in Fairhope, AL. All of the fungicides were screened at label rates for the control of leaf rust and Septoria leaf blotch. In 2005, a single application of each fungicide was made either at GS 8 (flag leaf emergence) or GS 9 (boot stage), while one and two application programs were evaluated in 2006.

While all fungicide treatments reduced the severity of both diseases in 2005 when compared with the unsprayed control, significant differences in the level of disease control were seen between these treatments (Table 1). Absolute 500SC applied at GS9 gave better control of leaf rust than all other treatments except for Headline 2.09E and Tilt 3.6E applied at GS 9. In addition, Tilt 3.6E controlled this disease better when applied at GS 9 than earlier at GS 8. Stratego proved less effective in controlling Septoria leaf spot than Headline 2.09E, Tilt 3.6E applied at GS 9, and Absolute 500SC. Application timing with Tilt 3.6E did not have a significant impact on the level of Septoria leaf spot control. When compared with the unsprayed control, yield gains of 9 to nearly 14 bu/A were obtained with fungicide treatments. Best yield response was obtained with Headline 2.09SC. In addition, all fungicide treatments also increased 100 kernel test weights (data not shown).

Table 1. Single applications of recommended fungicides compared for control of leaf rust and Septoria leaf blotch on Pioneer 26R24 wheat at the GCREC in 2005[1].

Fungicide	Application		Leaf Rust[2]	Leaf Blotch[2]	Yield Bu/A
	Rate/A	Timing			
Unsprayed	---	---	3.9 a[3]	2.8 a	30.5 c
Tilt 3.6E	4 fl oz	GS 8	2.8 b	0.7 cd	41.1 b
Stratego 250E	10 fl oz	GS 8	3.4 ab	1.1 b	40.0 b
Absolute 500SC	5 fl oz	GS 9	0.3 e	0.6 cd	39.9 b
Tilt 3.6E	4 fl oz	GS 9	0.9 d	0.5 cd	41.1 b
Quilt	11 fl oz	GS 9	2.2 c	0.8 bc	41.3 b
Quilt	14 fl oz	GS 9	2.7 bc	0.7 cd	41.3 b
Headline 2.09E	9 fl oz	GS 9	0.6 de	0.4 d	44.4 a

[1]Burch, Bowen, and Pegues. 2005. F&N Tests 61:CF014.
[2]Leaf rust and Septoria leaf spot were rated on a 0 to 10 scale; 0 = no disease, 10 = severe disease.
[3]Data in each column followed by the same letter are not significantly different according to DMRT (P=0.05).

Due primarily to drier weather patterns, disease pressure was lower in 2006 at the GCREC than in the previous year. Leaf rust was the only damaging disease observed on the Pioneer 26R12 wheat (Table 2). Again, disease ratings for the fungicide treated

wheat were lower compared with that recorded for the unsprayed wheat. While two applications of Quilt gave better rust control than a single application of the same fungicide, application number did not influence the level of disease control obtained with Stratego 250E and Headline 2.09E. Among the single fungicide treatments, Stratego 250E controlled rust better than Headline 2.09E. Disease ratings for all of the two application fungicide programs were similar. Yield response to the fungicide treatments was not as high in 2006 than in the previous year. When compared with the unsprayed controls, significant yield gains were seen with one and two applications of Stratego 250E as well as two but not one application of Quilt and Headline 2.09E. The two application programs for Stratego 250E, Quilt, and Headline 2.09E also increased seed test weights (data not shown).

Table 2. Single and two application fungicide programs compared for leaf rust control on Pioneer 26R12 wheat at the GCREC in 2006[1].

	Application		Leaf	Yield
Fungicide	Rate/A	Timing	Rust[2]	Bu/A
Unsprayed	---	---	1.5 a[3]	32.8 d
Tilt 3.6E	4 fl oz	GS 8	0.7 bc	36.6 bcd
Stratego 250E	10 fl oz	GS 8	0.4 cd	41.0 a
Headline 2.09E	9 fl oz	GS 8	0.8 b	36.4 bcd
Quilt	11 fl oz	GS 8	0.7 bc	35.6 cd
Stratego 250E	4 fl oz	GS 8 and 10.5	0.5 bcd	38.4 abc
Quilt	5.5 fl oz	GS 8 and 10.5	0.3 d	39.8 ab
Headline 2.09E	9 fl oz	GS 8 and 10.5	0.7 bc	37.9 abc

[1]Burch, Bowen, and Pegues. 2006. PDRM (submitted).
[2]Leaf rust was rated on a 0 to 10 scale: 0 = no disease, 10 = severe disease.
[3]Data in each column followed by the same letter are not significantly different according to DMRT (P=0.05).

The following fungicide trials, which were conducted at locations near Baton Rouge and the delta region of Louisiana in 2005, targeted stripe rust. When compared with other foliar diseases of wheat, stripe rust appears to be more aggressive and damaging. This disease appears to be more common in the Mississippi River drainage than most of Alabama. Given the combination of warm temperatures and frequent shows, this disease is a threat wherever wheat is grown in the South.

At the Baton Rouge site, most of the fungicide treatments, except for Headline 2.09E, gave some control of stripe rust through the April 20, 2005 rating date (Table 3). A single application of Quilt gave the best rust control. Regardless of the number of fungicide applications, stripe rust exploded within 8 days on the flag^{-1} and flag leaf across all fungicide plots as well as the unsprayed control. On April 28, none of the fungicide treatments proved particularly effective in controlling stripe rust. A single application of Quadris 2.08SC and Headline 2.09E at GS 10.2 (head extension) had the lowest rust rating. However, significant increases in seed test weight were obtained with most fungicide treatments except for Stratego 250E when applied at GS8. Higher test weights

for the Quadris 2.08SC and Headline 2.09E-treated wheat compared with most other fungicide treatments and the unsprayed control. When compared with the unsprayed control, all fungicide programs except for the GS 10.2 application of Stratego 250E increased wheat yield. The biggest yield gains of approximately 20 bu/A were obtained with the programs that included an application of 2.0 fl oz/A of Tilt 3.6E at GS8 followed by an application of either 3.1 fl oz/A of either Quadris 2.08SC or Headline 2.09E at GS 10.2 as well as a single application of Quilt at 14 fl oz/A at GS 8. Yield gains with the single application of Quadris 2.08SC and Headline 2.09E, which gave numerically the best stripe rust control, were a disappointingly low 5 bu/A.

Table 3. Fungicide application timing and control of stripe rust on AGS200 wheat at Baton Rouge, LA in 2005[1].

Fungicide	Application		Stripe Rust[2]		Test	Yield
	Rate/A	Timing	20 Apr	28 Apr	Weight[3]	Bu/A
Unsprayed	---	---	69	83	59.1 g[4]	24.3 f
Tilt 3.6E	4 fl oz	GS 8	37	95	60.0 c	36.0 d
Quadris 2.08SC	6.2 fl oz	GS 10.2	59	70	60.9 a	29.0 e
Headline 2.09E	6.2 fl oz	GS 10.2	63	68	60.4 b	29.2 e
Stratego 250E	8 fl oz	GS 8	32	96	59.4 fg	37.0 cd
Stratego 250E	8 fl oz	GS 10.2	64	76	60.2 bc	27.5 ef
Quilt	10 fl oz	GS 8	27	95	59.6 ef	40.2 bc
Quilt	14 fl oz	GS 8	17	98	59.6 ef	43.0 ab
PropiMax	4 fl oz	GS 8	46	94	60.0 cd	36.0 d
Tilt 3.6E	2.0 fl oz	GS 8	40	92	59.8 de	44.9 a
Headline 2.08EC	3.1 fl oz	GS 10.2				
Tilt 3.6E	2.0 fl oz	GS 8	56	77	59.8 de	44.4 a
Quadris 2.08SC	3.1 fl oz	GS 10.2				

[1]Padgett, Harrison, Arcenaux, and Purvis. 2006. F&N Test 61:CF005.
[2]Percent area of flag leaf and flag leaf $^{-1}$ colonized by the stripe rust fungus on the above rating dates.
[3]Test Weight = pounds of seed per bushel.
[4]Data in each column followed by the same letter are not significantly different according to DMRT (P=0.05).

Near St. Joseph, LA, single applications of Stratego 250E, Tilt 3.6E, Quilt, Quadris 2.08SC, and Headline 2.09E were compared for the control of stripe rust on the susceptible wheat cultivar AGS2000. On April 12, best rust control was obtained with Quilt, Headline 2.09E, and Stratego 250E applied at GS 8. While application timing had little effect on rust control with Quadris 208SC, Headline 2.09E gave better rust control on April 12 when applied at GS 8 than GS 10.2. Stripe rust severity increased sharply between the 12th and 27th of April 2005. Lowest rust ratings were recorded with the GS 10.2 applications of Quadris 2.08SC and Headline 2.09E. The remaining fungicide treatments had rust ratings that were intermediate between those of Quadris 2.08SC and Headline 2.09E as well as the unsprayed control. Only Quadris 2.08SC applied at GS 10.2 increased seed test weight above that of the unsprayed wheat. When compared with

the unsprayed control, the single application of Quilt increased wheat yield by over 25 lb/A. Of the remaining fungicide treatments, only Stratego 250E-treated wheat had yields that were similar to those obtained with Quilt. Yield gains of 6 to 9 bu/A were obtained with most of the remaining fungicide treatments.

Table 4. Single applications of several fungicides compared for stripe rust control on AGS2000 wheat in the Delta Region of Louisiana in 2005.

Fungicide	Application		Stripe Rust[2]		Test	Yield
	Rate/A	Timing	12 Apr	27 Apr	Weight[3]	Bu/A
Unsprayed	---	---	26	88	57.8 bc[4]	24.5 d
Tilt 3.6E	4 fl oz	GS 8	18	77	57.4 bc	31.7 bc
Quilt	14 fl oz	GS 8	6	77	58.0 bc	51.0 a
Quadris 2.08SC	6.2 fl oz	GS 8	14	78	58.5 ab	37.8 bc
Quadris 2.08SC	6.2 fl oz	GS 10.2	19	61	59.9 a	27.4 cd
Headline 2.09E	6.1 fl oz	GS 8	4	75	56.7 c	33.8 bcd
Headline 2.09E	6.1 fl oz	GS 10.2	34	64	58.4 b	31.1 bc
Stratego 250E	10 fl oz	GS 8	7	71	57.7 b	41.1 ab

[1]Padgett, Purvis, Mascagni, and Bell. 2006. F&N Tests 61:FC006.
[2]Percent area of flag leaf and flag leaf $^{-1}$ colonized by the stripe rust fungus on the above rating dates.
[3]Test Weight = pounds of seed per bushel.
[4]Data in each column followed by the same letter are not significantly different according to DMRT (P=0.05).

Summary

The use of fungicides can not only provide some protection from damaging diseases but also prevent sizable yield losses and declines in grain quality due to the premature death of wheat. Of the three diseases, stripe rust appeared to have the biggest impact on wheat yield and be the toughest to control with fungicide inputs. Across both Louisiana field trials, a single application of Quilt proved to the best one shot treatment for stripe rust. However, a two application fungicide program, with full and not reduced rates of the target fungicides, may be required to really get good stripe rust control and avoid sizable yield losses, particularly on a rust susceptible variety like AGS2000. There was not a great deal of difference in the effectiveness of fungicides that are labeled for the control of leaf rust and Septoria diseases on wheat.

See page 6 for listing of some fungicides registered for use on wheat for the control of glume and leaf blotch, rust diseases, powdery mildew, and tan spot.

Some fungicides registered for the control of diseases of wheat.

Fungicide	Rate/A	Comments
Quadris 2.08SC	6.2-12.3 fl oz	For control of leaf rust, tan spot, Septoria glume and leaf blotch on wheat. Apply at early stage of disease development between jointing (GS 6) and flowering (GS 10.5). Add 1% v/v crop oil concentrate. Make no more than 2 applications of Quadris 2.08SC per year.
	7.7-10.8 fl oz	For control of powdery mildew on wheat. Apply at early stage of disease development between jointing (GS 6) and flowering (GS 10.5). Add 1% v/v crop oil concentrate. Make no more than 2 applications of Quadris 2.08SC per year.
Tilt 3.6E PropiMax EC Bumper 41.8EC	4 fl oz 4 fl oz 4 fl oz	For control of leaf rust, Septoria glume and leaf blotch, and scab (Tilt only) on wheat. Apply up to GS 10.5 (flowering). Make only one application per year.
Quilt	14 fl oz	For control of Septoria glume and leaf blotch, rust, and powdery mildew on wheat. One application may be made through GS 10.5 by ground or by air.
Stratego 250E	10 fl oz	For control of rust, powdery mildew, Septoria glume and leaf blotch, and tan spot on wheat. May be applied through GS 10.5.
Headline 2.09E	6-9 fl oz	For control of Septoria glume and leaf blotch, rust, tan spot and powdery mildew on wheat. Apply immediately after flag leaf emergence and repeat if conditions favor further disease spread 10 to 14 days later. Apply no later than flowering (GS 10.5). Do not make more than two applications of no more than 18 fl oz/A/yr.