

Effect of fungicides on the performance of winter wheat, 2014

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Each year a fungicide efficacy trial is conducted on soft winter wheat in collaboration with industry to observe the performance of various fungicide products. A randomized complete block design with four replications was superimposed on a commercial stand of Ambassador soft white winter wheat. The variety is particularly susceptible to Septoria leaf spot, Stagonospora leaf blotch and Fusarium head blight.

The fungicide products, rates and application timings are provided in the table below. The fungicides were applied using a tractor mounted boom sprayer. All treatments included a nonionic surfactant (Induce) at the rate of 0.125 percent. The T1, (feekes growth stages 6) applications were made on May 9; the T1.5 (growth stage 7) on May 19; and the T2 (growth stage 9) on May 29. These three application timings were made using 16 gallons of water per acre, 45 psi and Turbo TeeJet 11002 nozzles. The early flower treatment timing (T3; growth stage 10.51) was applied on June 10 using Turbo TeeJet Duo bodies with double 11001 nozzles, 16 gallons of water per acre, and 45 psi.

Location:	JGDM McConnachie Fms Deckerville, MI
Collaborators:	Dupont, Bayer, BASF
Soil Type	Parkhill silt loam
Previous crop:	dry beans
Variety:	Ambassador
Nitrogen rate:	110 lbs/ac
Plot design:	RCB
Replications:	four
Plot area:	18 x 65 ft
Treatment area:	17 x 65 ft
Harvest area:	15 x 60 ft
Planting date:	Oct 3, 2013
Seeding rate:	1.8 m/ac
Harvest date:	July 24, 2014
Herbicide:	none
Insecticide:	none

Other than a trace of Septoria leafspot and powdery mildew, leaf diseases were not found throughout the vegetative stages. However, during grain-fill both leaf rust and Stagonospora leaf blotch levels became notable. In addition to rating leaf diseases, the severity and incidence of fusarium head blight was estimated.

The trial was harvested on July 9 using an International 2144 combine equipped with a Juniper HarvestMaster system that provided grain weight, test weight, and moisture. Grain samples were collected to test for DON levels. Statistical analysis was performed by the Adam Byrne, Research Associate, MSU.

fungicide treatment ¹	timing				harvested grain					
	T1	T1.5	T2	T3	moist. %	tst wt lbs	yield ³ bu/ac			
1 non treated control					14.5	a	61.4	a	107.5	e
2 Apr Prima 6.8oz			x		14.5	a	61.4	a	112.9	cde
3 Aproach 3oz, Apr Prima 6.8oz	x		x		14.5	a	61.4	a	111.3	cde
4 Apr Prima 3.4oz, ProSaro 6.5 oz			x	x	14.7	a	61.2	a	114.5	bcde
5 Apr Prima 6.8oz, ProSaro 6.5oz	x			x	14.5	a	61.4	a	116.2	bcd
6 Stratego 4oz			x		14.5	a	61.4	a	111.5	cde
7 ProSaro 6.5oz			x		14.7	a	61.2	a	109.6	cde
8 ProSaro 6.5oz & Baythroid 2oz				x	14.6	a	61.3	a	109.0	de
9 ProSaro 6.5				x	14.5	a	61.4	a	112.3	cde
10 ProSaro 8oz				x	14.6	a	61.4	a	114.1	bcde
11 Stratego 2oz, ProSaro 6.5oz	x			x	14.7	a	61.3	a	114.0	bcde
12 Priaxor 2oz, Caramba 13.5oz		x		x	14.5	a	61.4	a	117.0	bc
13 Priaxor 2oz, Caramba 13.5oz, (extra N) ²		x		x	14.7	a	61.4	a	121.2	ab
14 Priaxor 4oz, Caramba 13.5oz (extra N) ²		x		x	14.6	a	61.2	a	117.1	bc
15 Priaxor 2oz, Caramba 17 oz (extra N) ²		x		x	14.6	a	61.4	a	125.0	a
16 Caramba 13.5oz				x	14.4	a	61.4	a	111.1	cde

¹ all fungicides applied with Induce nonionic surfactant at 0.125% ;

² received 45 lbs additional N fertilizer per acre ³ reported as dry grain (13% moisture)

Although the site had a relatively consistent stand, the wheat exhibited considerable variability in growth presumably due to inconsistent levels of winter injury and variable soil conditions. Table 1 provides the results pertaining to the grain's moisture and test weight at harvest, and grain weight expressed as yield in bushels per acre of dry grain (13 percent moisture content). All fungicide treatments resulted in an increase in grain yield ranging from 4 to 10 bushels per acre. However, only the highest yielding treatments proved statistically significant. Where a fungicide was combined with an extra 45 lbs of fertilizer N, yields were further improved (note treatments 13, 14, and 15). At harvest, there were no significant differences in test weight or grain moisture. Grain samples were sent to the University of Minnesota to determine DON levels.



Stagonospora leaf blotch was the dominant disease on flag leaves

All fungicide applications significantly reduced levels of leaf rust, Septoria leaf spot, and Stagonospora leaf blotch (table 2). Where Prosaro or Caramba was applied at early flower (T3), the average DON levels were reduced by a third. In addition, these products at this timing consistently and significantly reduced both Fusarium incidence and index. The Fusarium severity rating was not altered by any fungicide treatment.

Table 2: Effect of fungicides on leaf diseases and Fusarium head blight if winter wheat, Deckerville, MI, 2014

fungicide treatment ¹	timing				Lf rust Septoria		Lf rust		Stag.		Fusarium head blight ratings									
	T1	T1.5	T2	T3	rated	June 23 ³	rated	July 2 ⁴	incid.	sev.	index	DON								
1 non treated control					2.6	a	4.1	a	3.3	a	10.9	a	15	a	56	a	8.2	a	0.52	ab
2 Apr Prima 6.8oz			x		0.5	bc	1.4	bcd	0.3	b	4.0	bcd	15	a	56	a	8.4	a	0.55	a
3 Aproach 3oz, Apr Prima 6.8oz	x		x		0.9	bc	1.8	bc	0.3	b	3.8	bcd	13	ab	63	a	7.9	a	0.44	abcd
4 Apr Prima 3.4oz, Prosaro 6.5 oz			x	x	0.3	c	1.4	bcd	0.0	b	2.5	d	9	bc	39	a	3.5	b	0.41	abcd
5 Apr Prima 6.8oz, Prosaro 6.5oz	x			x	0.5	bc	2.0	bc	0.0	b	4.6	bc	7	cd	34	a	2.4	b	0.31	cdef
6 Stratego 4oz			x		0.3	c	1.3	bcd	0.1	b	3.8	bcd	16	a	45	a	7.3	a	0.41	abcd
7 Prosaro 6.5oz			x		0.4	bc	1.1	cd	0.1	b	4.1	bcd	13	ab	58	a	7.1	a	0.45	abc
8 Prosaro 6.5oz & Baythroid 2oz				x	0.4	bc	2.0	bc	0.3	b	4.4	bcd	8	cd	48	a	3.4	b	0.18	f
9 Prosaro 6.5				x	0.9	bc	2.1	b	0.3	b	5.4	b	8	cd	50	a	3.7	b	0.37	abcde
10 Prosaro 8oz				x	0.8	bc	1.5	bcd	0.1	b	5.0	b	7	cd	50	a	3.6	b	0.26	def
11 Stratego 2oz, Prosaro 6.5oz	x			x	0.6	bc	1.8	bc	0.1	b	4.1	bcd	6	cd	43	a	2.3	b	0.38	abcd
12 Priaxor 2oz, Caramba 13.5oz		x		x	0.6	bc	1.5	bcd	0.0	b	4.0	bcd	7	cd	56	a	3.9	b	0.33	cdef
13 Priaxor 2oz, Caramba 13.5oz (extra N) ²		x		x	1.3	b	1.6	bcd	0.3	b	4.1	bcd	5	d	53	a	2.7	b	0.27	cdef
14 Priaxor 4oz, Caramba 13.5oz (extra N) ²		x		x	0.4	bc	0.8	d	0.1	b	3.8	bcd	6	cd	48	a	2.7	b	0.36	bcdef
15 Priaxor 2oz, Caramba 17 oz (extra N) ²		x		x	0.8	bc	1.3	bcd	0.0	b	2.6	cd	6	cd	50	a	2.7	b	0.26	def
16 Caramba 13.5oz				x	0.9	bc	1.9	bc	0.0	b	4.4	bcd	6	cd	45	a	2.5	b	0.19	ef

¹ all fungicides applied with Induce nonionic surfactant at 0.125%; ² received 45 lbs additional N fertilizer per acre

³ leaf rust on flag leaf as %; Septoria leaf spot given as relative score on no. 2 leaf

⁴ leaf rust and Stagonospora leaf blotch on flag leaf surface as percent