Fungicide efficacy trial: response of a stripe rust susceptible soft winter wheat variety, 2016

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A fungicide efficacy trial was conducted on soft winter wheat in collaboration with industry to observe the performance of various fungicide products. Ambassador soft white winter wheat was used in a randomized, complete block design with four replications. The variety is susceptible to stripe rust, which reached unprecedented levels in MI and in this trial. The variety is also susceptible to Fusarium head blight; and moderately susceptible to powdery mildew, Septoria leaf spot and leaf rust.

Location:	JGDM McConnachie Fms Sandusky, MI
Collaborators:	Bayer, Syngenta & BASF, MI Wheat
Soil Type	Capac silt loam
Previous crop:	dry beans
Variety:	Ambassador
Nitrogen rate:	125 lbs/ac
Plot design:	RCB
Replications:	four
Plot area:	15 x 60 ft
Treatment area:	15 x 60 ft
Harvest area:	15 x 55 ft
Planting date:	Oct 2, 2014
Seeding rate:	1.8 m/ac
Harvest date:	July 24, 2015
Herbicide:	none
Insecticide:	none

The fungicide products, rates and application timings employed in this trial are provided in the table below. All fungicide treatments included a nonionic surfactant (Induce) at the rate of 0.125 %, except for Trivapro which had a use rate of 0.025 %. The fungicides were applied using a tractor mounted boom sprayer. The T1 (first joint; feekes growth stage 6) treatments were applied on May 6 and the T2 (full flag leaf; growth stage 9) treatments on May 24. Both timings utilized 15 gallons of water per acre, 38 psi and Turbo TeeJet 11002 nozzles. The T3 (early flower growth stage 10.51) treatments were applied on June 9 using Turbo TeeJet Duo bodies with double 11001 nozzles, 38 psi., and 15 gallons of water per acre.

A modest level of Septoria leaf spot and a trace of powdery mildew could be seen soon after tillering. On June 8, the severity of leaf spot was scored on a relative scale of 0 to 5, with "0" dennoting no disease. Prior to flag leaf emergence, stripe rust infections became evident and by flowering significant portions of the flag leaves were infected. Stripe rust ratings were made on June 8 and 17 by estimating the amount of disease on flag leaves expressed as a percent of leaf area.

The trial was harvested on July 19 using an International 2144 combine equipped with a Juniper HarvestMaster system that provided grain weight, test weight, and moisture. Grain samples were sent to University of Minnesota for analysis of DON. Statistical analysis was performed using SAS 9.3 PROC MIXED method by the Adam Byrne, Research Associate, MSU.

Table 1: Effect of fungicides on the performance of soft winter wheat and disease levels
Sandusky, MI, 2016

	fungicide treatment [1]	timing [2]			harvested grain				leaf [3] spot		stripe rust [4]				FHB [5]
					moist.	test	yield				8-Jun		17-Jun		DON
		T1	T2	T3	%	lbs/bu	bu/ac		1 to 5						ppm
1	non treated control				15.3	58.5	92.2	*d*	2.8	*a*	18	*a*	86	*a*	0
2	Trivapro 14.6 oz	x			15.3	58.5	113.4	*abc*	0.5	*cde*	7	*bc*	37	*de*	0
3	Trivapro 14.6 oz + Palisade 12.5 oz.	x			15.4	58.5	115.9	*abc*	0.3	*de*	10	*abc*	57	*bcde*	0.02
4	Trivapro 14.6 oz		x		15.6	58.4	119.4	*a*	1.3	*abcd*	1	*e*	5	*g*	0.01
5	Priaxor 2 oz	x			15.5	58.3	105.6	*c*	0.0	*e*	8	*abc*	73	*ab*	0.02
6	Priaxor 2 oz fb Caramba 13.5 oz.	x		x	15.9	58.2	119.3	*a*	0.7	*abcde*	5	*cd*	10	*fg*	0.01
7	BAS73401F 3.5 oz	x			15.9	58.4	114.2	*abc*	0.3	*de*	12	*abc*	61	*bcde*	0.01
8	BAS73401F 3.5 oz fb Caramba 13.5 o	x		x	15.6	58.4	117.6	*ab*	0.5	*cde*	3	*de*	7	*g*	0.04
9	Caramba 13.5 oz			x	15.4	58.6	114.7	*abc*	1.3	*abcd*	15	*abc*	43	*cde*	0.01
10	Caramba 17 oz			x	15.3	58.6	116.5	*ab*	1.3	*abc*	18	*a*	54	*bcde*	0.03
11	Stratego YLD 2.5 oz	x			15.2	58.6	107.4	*bc*	0.8	*bcde*	11	*abc*	58	*bcde*	0.04
12	Stratego YLD 2 oz fb Prosaro 6.5 oz	x		x	15.3	58.5	118.6	*ab*	0.3	*de*	9	*bc*	34	*ef*	0
13	Prosaro 6.5oz			x	15.5	58.4	110.3	*abc*	2.0	*abc*	15	*abc*	61	*bcde*	0.01
14	Prosaro 8.2 oz			x	15.6	58.4	112.7	*abc*	2.3	*ab*	11	*abc*	48	*cde*	0.02
15	Amtide Propiconazole 4 oz	x			15.3	58.6	109.1	*abc*	0.3	*de*	7	*bc*	51	*bcde*	0.01
16	Prosaro 6.5oz + Baythroid 3oz			x	15.5	58.3	112.5	*abc*	1.8	*abc*	12	*abc*	53	*bcde*	0
	P value				*NS*	*NS*	*0.0028*		*0.0001*		*0.0034*		*0.0001*		*NS*

[1] all fungicides applied with Induce nonionic surfactant at 0.125% except Trivapro treatments had 0.250%;
[2] T1 = first joint (g.s. 6); T2 = full flag (g.s.9); T3 = early flower (g.s.10.51).
[3] leaf spot was primarily Septoria trtici and was rated on a relative scale of 0 to 5 (0= o
[4] stripe rust; expressed as amount of visible disease on surface of flag leaf as percent.
[5] DON levels below 0.03 are undetectible and assign a value of 0

Grain yields and leaf ratings were highly variable between individual plots within treatments. Nevertheless, there was some significant separation and notable trends (Table 1). All single applications of fungicide at T1 resulted in lower disease ratings on June 8 and 17, though by the latter date the efficacy of all T1 treatments were inferior to double fungicide applications. The single T2 treatment of Trivapro performed better than all single treatments at T1 and it suppressed stripe rust better than all single T3 applications. None of the treatments fully controlled the stripe rust disease.

Table 2. Summary of fungicide application timing for stripe rust on soft winter wheat,
Sandusky MI 2016

Timing (# of trtmts*)	yield	SR rating**
UTC	92	86
T1 (6)	99	49
T2 (1)	119	5
T3 (5)	113	52
T1 & 3 (3)	119	17

** T1 = first joint (g.s. 6); T2 = full flag (g.s.9); T3 = early flower (g.s.10.51).*

*** Stripe rust rating is the amount of visible disease on the flag leaf as percent (June 17; late milk)*

All fungicide treatments significantly improved grain yields over the untreated control. Single, low rates of Priaxor and Stratego applied at tillering (T1) resulted in significantly less yield than the flag leaf (T2) treatment of Trivapro and those treatments consisting of double fungicide application or a single application at early flowering (3). A summary of the effect of application timings is provided in table 2.