

Title: Effect of Actigard on Wheat Resistance to Orange Wheat Blossom Midge – 2015.

Objective: To evaluate the efficacy of Actigard for the control of OWBM in susceptible and resistant spring wheat cultivars.

Materials and Methods:

Spring wheat varieties containing the Sm1 gene for resistance to the wheat midge are available to aid in their control. However, some damage is incurred prior to the synthesis of the active compound. This study was designed to determine if treatment with Actigard prior to larval feeding could upregulate the Sm1 gene and shorten the lag phase. This study was established as a split plot design with three replications. Egan, a cultivar with resistance to the OWBM, and McNeal, a non-resistant cultivar were the whole plot treatments. Actigard was applied to both varieties at three rates and at three wheat growth stages. Actigard was applied at 0.0, 0.25, and 0.50 oz/A when wheat was at the late boot stage, 50% headed, and 50% flowering growth stages. Lorsban was applied at 50% heading to serve as a control.

Results:

The study site experienced severe drought and low midge pressure. As a result, any treatment effects that might have been present were largely masked by these environmental conditions. However, a few treatment effects were detected, and were largely associated with differences between the two spring wheat varieties. Spring wheat yields averaged 20.4 bu/A, with McNeal producing slightly higher yields than Egan (21.0 and 19.9 bu/A, respectively). Egan had greater protein and higher falling number values, but McNeal had higher test weight and greater thousand kernel weight. Most importantly, midge larvae were not detected in the heads of Egan, while McNeal averaged 0.037 larvae per head. There was a trend in the data ($P=0.0536$) which indicated a slight yield increase for the Actigard and Lorsban treatments, compared to the non-treated check. However, the timing of Actigard treatments had no impact on any of the variables measured.

Summary:

Record breaking drought and low midge populations prevented an accurate assessment of Actigard for improving crop resistance against the orange wheat blossom midge.

Table 1. Materials and Methods - Sm1 Actigard - 2015

Seeding Date:	5/6/2015	Harvest Date:	8/12/2015
Julian Date:	125	Julian Date:	224
Seeding Rate:	80 lb/A	Soil Type:	Somers Silty Clay Loam
Previous Crop:	Spring Wheat	Fertilizer (PP):	23-55-30-22
Tillage:	Conventional	Fertilizer (TD):	1.4Zn-200N
Irrigation:	None	Pesticide:	None

PP: pre-plant, TD: top dress

Table 2. Main effect of application timing

	HT	LOD	YLD ¹	PRO ²	TWT ¹	TKW ¹	FN	OWBM
Timing	in	%	bu/A	%	lb/bu	g	sec	no/ spk
Late Boot	20.0	0.0	21.2	17.4	54.0	24.8	525.0	0.0
50% Heading	19.8	0.0	20.0	17.4	54.3	24.8	533.7	0.0
50% Flowering	19.7	0.0	20.1	17.4	54.1	24.8	533.9	0.0
LSD	ns	ns	ns	ns	ns	ns	ns	ns
Pr>F	0.4718	1.0000	0.3878	0.9582	0.4585	0.9048	0.3941	0.2999

Table 3. Main effect of insecticide application

	HT	LOD	YLD ¹	PRO ²	TWT ¹	TKW ¹	FN	OWBM
Insecticide	in	%	bu/A	%	lb/bu	g	sec	no/ spk
check	19.8	0.0	18.4	17.3	54.3	24.9	522.3	0.0
Actigard 0.25	19.6	0.0	20.3	17.6	54.1	24.6	534.0	0.0
Actigard 0.50	20.1	0.0	21.0	17.3	54.3	25.2	527.4	0.0
Lorsban 1.0	19.8	0.0	22.1	17.4	53.9	24.6	539.7	0.0
LSD	ns	ns	2.6	ns	ns	ns	ns	ns
Pr>F	0.6174	1.0000	0.0536	0.7255	0.3437	0.4648	0.1628	0.5609

Table 4. Main effect of variety

	HT	LOD	YLD ¹	PRO ²	TWT ¹	TKW ¹	FN	OWBM
Variety	in	%	bu/A	%	lb/bu	g	sec	no/ spk
Egan	19.6	0.0	19.9	18.2	53.3	23.5	540.7	0.0
McNeal	20.0	0.0	21.0	16.6	55.0	26.1	521.1	0.0
LSD	ns	ns	0.9	0.2	0.2	0.4	9.2	0.0
Pr>F	0.1869	1.0000	0.0189	0.0001	0.0001	0.0001	0.0002	0.0429

HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, OWBM: orange wheat blossom midge, ns: nonsignificant

¹adjusted to 13% moisture, ²adjusted to 12%

Table 5. Effect of application timing and insecticide application

	HT	LOD	YLD ¹	PRO ²	TWT ¹	TKW ¹	FN	OWBM
	in	%	bu/A	%	lb/bu	g	sec	no/ spk
				check				
Late Boot	19.7	0.0	18.2	17.3	54.6	25.6	521.6	0.0
50% Heading	19.8	0.0	18.4	17.6	54.0	24.3	525.3	0.0
50% Flowering	19.8	0.0	18.6	17.1	54.4	24.6	520.1	0.1
				Actigard .25				
Late Boot	19.3	0.0	20.1	17.6	53.9	24.4	526.2	0.0
50% Heading	19.5	0.0	20.7	17.4	54.2	24.7	534.7	0.0
50% Flowering	19.8	0.0	20.1	17.8	54.1	24.6	541.2	0.1
				Actigard .50				
Late Boot	20.7	0.0	23.2	17.4	53.8	24.5	519.2	0.1
50% Heading	19.7	0.0	18.7	17.6	54.7	25.8	537.6	0.0
50% Flowering	19.8	0.0	21.1	16.9	54.3	25.4	525.5	0.0
				Lorsban 1.0				
Late Boot	20.2	0.0	23.3	17.4	53.9	24.8	532.9	0.0
50% Heading	20.0	0.0	22.2	17.0	54.1	24.5	537.4	0.0
50% Flowering	19.3	0.0	20.8	17.7	53.8	24.4	548.8	0.0
LSD	ns	ns	ns	ns	ns	ns	ns	ns
Pr>F	0.5984	1.0000	0.6615	0.3604	0.3743	0.4391	0.8555	0.7137

Table 6. Effect of application timing and variety

	HT	LOD	YLD ¹	PRO ²	TWT ¹	TKW ¹	FN	OWBM
	in	%	bu/A	%	lb/bu	g	sec	no/ spk
				Egan				
Late Boot	19.7	0.0	20.4	18.2	53.2	23.7	536.0	0.0
50% Heading	19.8	0.0	19.5	18.2	53.4	23.7	544.0	0.0
50% Flowering	19.5	0.0	19.8	18.2	53.2	23.1	542.1	0.0
				McNeal				
Late Boot	20.3	0.0	21.9	16.7	54.9	26.0	514.0	0.0
50% Heading	19.8	0.0	20.5	16.7	55.1	26.0	523.5	0.0
50% Flowering	19.9	0.0	20.5	16.6	55.1	26.4	525.7	0.1
LSD	ns	ns	ns	ns	ns	ns	ns	ns
Pr>F	0.6127	1.0000	0.7120	0.9511	0.3743	0.0660	0.8684	0.2764

HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, OWBM: orange wheat blossom midge, ns: nonsignificant

¹adjusted to 13% moisture, ²adjusted to 12%

Table 7. Effect of insecticide application and Variety

	HT in	LOD %	YLD ¹ bu/A	PRO ² %	TWT ¹ lb/bu	TKW ¹ g	FN sec	OWBM no/ spk
Check								
Egan	19.6	0.0	17.7	18.1	53.4	23.6	528.6	0.0
McNeal	20.0	0.0	19.1	16.5	55.2	26.2	516.0	0.0
Actigard 0.25								
Egan	19.3	0.0	20.4	18.3	53.3	23.5	552.1	0.0
McNeal	19.8	0.0	20.2	16.9	54.8	25.6	515.9	0.1
Actigard 0.50								
Egan	20.1	0.0	20.3	18.1	53.5	23.9	527.9	0.0
McNeal	20.0	0.0	21.7	16.5	55.1	26.5	526.9	0.1
Lorsban 1.0								
Egan	19.6	0.0	21.2	18.2	52.9	23.0	554.1	0.0
McNeal	20.1	0.0	22.9	16.6	54.9	26.1	525.3	0.0
LSD	ns	ns	ns	ns	ns	ns	18.5	ns
Pr>F	0.7710	1.0000	0.3595	0.7192	0.3401	0.3453	0.0436	0.6393

HT: height, LOD: lodging, YLD: yield, PRO: protein, TWT: test weight, TKW: thousand kernel weight, FN: falling number, OWBM: orange wheat blossom midge, ns: nonsignificant

¹adjusted to 13% moisture, ²adjusted to 12%

Table 8. Effect of application timing, insecticide and variety

	Height inches		Lodging %		Yield ¹ bu/A		Protien ² %		TWT ¹ lb/bu		TKW ¹ g		FN sec		OWBM no/spk	
	Egan	McNeal	Egan	McNeal	Egan	McNeal	Egan	McNeal	Egan	McNeal	Egan	McNeal	Egan	McNeal	Egan	McNeal
	Check															
Late Boot	19.3	20.0	0.0	0.0	17.5	18.9	18.1	16.5	53.9	55.2	24.7	26.6	525.6	517.6	0.0	0.0
50% Heading	19.7	20.0	0.0	0.0	17.9	18.8	18.4	16.9	53.0	54.9	23.4	25.3	531.0	519.6	0.0	0.0
50% Flowering	19.7	20.0	0.0	0.0	17.5	19.6	18.0	16.2	53.3	55.5	22.6	26.6	529.3	510.8	0.0	0.1
	Actigard .25															
Late Boot	19.0	19.7	0.0	0.0	19.5	20.8	18.1	17.0	53.2	54.5	23.8	25.1	537.7	514.7	0.0	0.1
50% Heading	19.3	19.7	0.0	0.0	20.7	20.6	18.2	16.7	53.6	54.9	23.9	25.5	554.1	515.2	0.0	0.0
50% Flowering	19.7	20.0	0.0	0.0	21.1	19.1	18.5	17.0	53.0	55.2	22.9	26.2	564.5	517.9	0.0	0.1
	Actigard .50															
Late Boot	20.7	20.7	0.0	0.0	22.6	23.7	18.2	16.6	53.1	54.6	23.2	25.7	533.1	505.4	0.0	0.1
50% Heading	20.0	19.3	0.0	0.0	18.1	19.4	18.3	17.0	54.0	55.4	24.6	27.0	536.3	538.8	0.0	0.0
50% Flowering	19.7	20.0	0.0	0.0	20.2	22.0	18.0	15.9	53.3	55.3	23.9	26.9	514.3	536.6	0.0	0.1
	Lorsban 1.0															
Late Boot	19.7	20.7	0.0	0.0	22.1	24.4	18.4	16.5	52.5	55.2	23.0	26.6	547.6	518.3	0.0	0.0
50% Heading	20.0	20.0	0.0	0.0	21.2	23.2	17.9	16.1	53.2	55.1	23.0	26.0	554.6	520.3	0.0	0.0
50% Flowering	19.0	19.7	0.0	0.0	20.4	21.2	18.3	17.2	53.0	54.5	23.1	25.8	560.2	537.5	0.0	0.0
LSD	ns		ns		ns		ns		ns		ns		ns		ns	
Pr>F	0.9948		1.0000		0.8167		0.1744		0.0866		0.3259		0.3794		0.8020	

TWT: test weight, TKW: thousand kernal weight, FN: falling number, OWBM: orange wheat blossom midge, ns: nonsignificant

¹adjusted to 13% moisture, ²adjusted to 12%