

WHEAT (*Triticum aestivum* 'Pioneer 25R40', 'Pioneer 25R46', 'Otsego', 'Emmit')  
Fusarium head blight (scab); *Fusarium graminearum*  
Stagonospora blotch; *Parastagonospora nodorum*  
Septoria blotch; *Zymoseptoria tritici*

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### Evaluation of integrated methods for management of Fusarium head blight and foliar diseases of winter wheat in New York, 2015.

The trial was conducted at the Musgrave Research Farm in Aurora, NY in a Lima silt loam soil planted with four soft red winter wheat varieties, 'Pioneer Brand 25R40' (susceptible to Fusarium head blight (FHB)), 'Emmit' (moderately susceptible to FHB), 'Otsego' (moderately susceptible to FHB), and 'Pioneer Brand 25R46' (moderately resistant to FHB), following corn harvest on 7 Oct 2014. The experiment was set up as a completely randomized block design with a split-plot arrangement, with cultivar as the main plot and the treatments as subplots, randomized in six replicated blocks. Main plots were sown with wheat at 118.8 lb/A with a 10 ft wide commercial grain drill. Subplots were 20 × 10 ft including 15 rows with 7-in. row spacing. The plots were fertilized at planting (200 lb/A of 10-20-20) and topdressed on 21 Apr (60 lb/A of urea, providing an additional 27.6 lb/A of nitrogen). The first Prosaro application was at anthesis (Feekes growth stage, FGS 10.51) on 2 Jun including the surfactant Induce at 0.125% V/V. After the fungicide had dried, plots were spray-inoculated with a conidial suspension of *F. graminearum* (40,000 conidia/ml) to augment the development of FHB. The second Prosaro application occurred five days after anthesis on 7 Jun including the surfactant Induce at 0.125% V/V, and inoculated with a conidial suspension of *F. graminearum* (40,000 conidia/ml) after the fungicide had dried. Fungicide and *F. graminearum* treatments were applied with a tractor-mounted sprayer with paired TJ-60 8003VS nozzles mounted at an angle (30° from horizontal) forward and backward, 20-in. apart, pressurized at 30 psi, and calibrated to deliver 20 gal/A. Incidence and severity (percent of symptomatic spikelets on symptomatic heads) of FHB in each plot were rated on 22 Jun and used to calculate FHB Index, where FHB index = (FHB severity \* FHB incidence)/100. Foliar diseases were rated on 22 Jun as percent severity on flag leaves (average rating for whole plot). Grain was harvested from a 20 × 5 ft area in each subplot using an Almaco plot combine on 23 Jul. Grain moistures, plot yields, and test weights were recorded. Yields and test weights were adjusted to bu/A at 13.5% moisture. Fusarium damaged kernels (FDK) were evaluated post-harvest as a percentage of kernels visibly affected by FHB out of a 100 kernel subsample from each plot. Analysis of deoxynivalenol (DON) concentration in grain was conducted in the U.S. Wheat and Barley Scab Initiative-supported mycotoxin analysis laboratory at the University of Minnesota, St. Paul, MN. Treatment means were calculated, subjected to analysis of variance, and separated by Fisher's protected LSD test ( $P = 0.05$ ).

The incidence of FHB over all plots ranged from 4 to 46%. The impact of supplemental inoculation with *F. graminearum* was determined by comparing the non-inoculated and inoculum only treatment. Overall, inoculation resulted in significantly reduced yield and significantly increased FHB and DON as compared with the non-inoculated plots. FHB and DON development in 2015 were attributed primarily to supplemental rather than background inoculum. Significant cultivar responses to inoculation were observed for yield, FHB and DON for the moderately susceptible variety Emmit and the susceptible variety Otsego, but only for FHB and DON for the moderately susceptible variety P25R40, and only for FHB for the moderately resistant variety Pioneer 25R46. These data support the current qualitative designations of varieties as moderately susceptible (Pioneer 25R40), moderately resistant (Pioneer 25R46). However, according to the results of this study, the quantitative susceptibility of Otsego, Emmit, and Pioneer 25R40 was indistinguishable. Under moderately low disease pressure, significant differences were detected in yield among varieties, with both Pioneer varieties yielding significantly higher than Otsego and Emmit, regardless of treatment. Otsego had significantly greater FHB incidence and FDK than all the other varieties, regardless of treatment, but had FHB index similar to that of Emmit and P25R40. P25R46 had significantly lower FHB incidence, FDK and DON than all the other varieties, regardless of treatment, but had similar FHB index to that of P25R40. When results of all the cultivars were combined, the overall impact of each of the two Prosaro application timings was to significantly decrease FHB incidence, index, FDK, DON, and to significantly increase yield, as compared with the inoculum only treatment. Though not statistically significant, the Prosaro application at 7 days after the initiation of flowering resulted in the lowest FHB incidence, index and DON as compared with the Prosaro application at FGS 10.5.1. But it is also worth noting that sufficient fungicide remained on spikes from the FGS 10.51 Prosaro application to give significant suppression of FHB and DON resulting from fungal spores deposited on plants at 7 days after 10.51.

Cultivar, treatment, and rate/A	Leaf blotch (%) <sup>x</sup>	FHB incidence (%)	FHB index	FDK (%)	DON (ppm)	Yield (bu/A)
<b>Emmit</b>						
Non-sprayed, non-inoculated control	4.5 a	20.3 b	5.1 b	8.7 b	1.1 c	64.9 a
Inoculated FGS 10.51, and inoculated 7 days later	4.7 a	36.0 a	17.2 a	14.0 a	2.2 a	54.7 b
Prosaro SC (6.5 fl oz) and inoculated FGS 10.51, then inoculated 7 days later	1.2 b	22.0 b	5.3 b	7.7 b	1.7 b	59.7 ab
Inoculated FGS 10.51, then Prosaro SC (6.5 fl oz) and inoculated 7 days later	1.0 b	18.0 b	2.8 b	7.0 b	0.9 c	66.2 a
LSD ( <i>P</i> =0.05)	0.97	9.41	7.49	4.41	0.46	8.56
CV (%)	71.9	41.5	107.0	46.8	41.8	12.4
<b>Otsego</b>						
Non-sprayed, non-inoculated control	4.8 a	24.7 b	2.9 b	10.8 b	0.9 b	64.8 ab
Inoculated FGS 10.51, and inoculated 7 days later	5.5 a	46.3 a	11.2 a	17.7 a	2.4 a	59.0 b
Prosaro SC (6.5 fl oz) and inoculated FGS 10.51, then inoculated 7 days later	1.0 b	23.7 b	2.9 b	8.2 b	1.0 b	67.0 a
Inoculated FGS 10.51, then Prosaro SC (6.5 fl oz) and inoculated 7 days later	1.3 b	24.3 b	3.9 c	10.5 b	1.1 b	64.9 ab
LSD ( <i>P</i> =0.05)	1.22	7.82	2.35	4.38	0.32	6.39
CV (%)	71.3	38.3	80.5	42.5	49.3	9.1
<b>Pioneer 25R40</b>						
Non-sprayed, non-inoculated control	3.8 b	21.0 b	2.7 b	5.7 b	1.2 b	71.5 a
Inoculated FGS 10.51, and inoculated 7 days later	5.7 a	31.7 a	5.7 a	10.5 a	2.2 a	64.6 a
Prosaro SC (6.5 fl oz) and inoculated FGS 10.51, then inoculated 7 days later	1.3 c	14.3 b	1.1 c	7.0 b	1.5 b	66.0 a
Inoculated FGS 10.51, then Prosaro SC (6.5 fl oz) and inoculated 7 days later	1.5 c	17.0 b	1.4 bc	7.2 b	1.6 b	68.1 a
LSD ( <i>P</i> =0.05)	1.67	7.68	1.39	3.28	0.54	NS
CV (%)	72.2	41.8	79.1	39.1	34.2	8.3
<b>P25R46</b>						
Non-sprayed, non-inoculated control	7.0 a	4.0 c	0.1 b	4.0	0.4	70.1
Inoculated FGS 10.51, and inoculated 7 days later	6.5 a	11.0 a	0.4 a	4.7	0.8	65.2
Prosaro SC (6.5 fl oz) and inoculated FGS 10.51, then inoculated 7 days later	1.7 b	9.7 ab	0.4 a	3.7	0.8	72.9
Inoculated FGS 10.51, then Prosaro SC (6.5 fl oz) and inoculated 7 days later	2.0 b	5.7 bc	0.2 b	4.0	0.8	71.6
LSD ( <i>P</i> =0.05)	1.43	4.09	0.23	NS	NS	NS
CV (%)	64.3	59.2	90.2	24.9	51.3	8.4
<b>Cultivar mean</b>						
Emmit	2.8	24.1 b	7.6 a	9.4 b	1.5 a	61.2 b
Otsego	3.2	29.8 a	5.2 ab	11.8 a	1.3 a	63.9 b
P25R40	3.1	21.0 b	2.8 bc	7.6 b	1.6 a	67.5 a
P25R46	4.3	7.6 c	0.3 c	4.1 c	0.6 b	69.9 a
LSD ( <i>P</i> =0.05)	NS	5.18	2.68	2.11	0.32	3.59
CV (%)	70.6	58.7	135.5	56.1	53.4	10.7
<b>Treatment mean</b>						
Non-sprayed, non-inoculated control	5.0 a	17.5 b	2.7 b	7.3 b	0.9 c	60.9 b
Inoculated FGS 10.51, and inoculated 7 days later	5.6 a	31.3 a	8.6 a	11.7 a	1.9 a	67.8 a
Prosaro SC (6.5 fl oz) and inoculated FGS 10.51, then inoculated 7 days later	1.3 b	17.4 b	2.4 b	6.6 b	1.2 b	66.4 a
Inoculated FGS 10.51, then Prosaro SC (6.5 fl oz) and inoculated 7 days later	1.5 b	16.3 b	2.1 b	7.2 b	1.0 bc	67.7 a
LSD ( <i>P</i> =0.05)	0.72	6.09	2.69	2.40	0.32	3.73
CV (%)	70.6	58.7	135.5	56.1	53.4	10.7

<sup>x</sup> Column numbers followed by different letters are significantly different at *P*=0.05 as determined by Fisher's protected LSD