

WHEAT (*Triticum aestivum*), SPELT (*Triticum spelta*), and EMMER (*Triticum turgidum*)

Fusarium head blight (scab); *Fusarium graminearum*
 Powdery mildew; *Blumeria graminis* f.sp. *tritici*
 Leaf rust; *Puccinia triticina*
 Septoria blotch; *Zymoseptoria tritici*
 Stagonospora blotch; *Parastagonospora nodorum*

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Evaluation of foliar and spike diseases on wheat, spelt, emmer, and einkorn varieties in central New York, 2015

Wheat, spelt, and emmer varieties were evaluated at a research farm in Tompkins County, New York. The trials were designed in randomized complete blocks split by crop with triplicates of every variety. Each replicate was a six row sub-plot measuring 13.12 ft by 4.13 ft. For the winter grains, 1,400 lb/A of 5:4:3 (70 lb/A of N) Kreher's composted chicken manure was applied before planting, and fields were top-dressed in the spring with 600 lb/A (30 lb/A of N). The spring grains received only the pre-planting fertilization. Both were tilled and weeded at the three leaf stage (Feekes 1-2). Seeds were sown at 118.8 lb/A on 10 Oct and 2 May. Six spelt, nine emmer, and twenty-four wheat varieties were evaluated during the spring trial. The winter trial consisted of 40 wheat varieties. No inoculum or fungicides were applied. Data was collected on 26 Jun for the winter wheat and on 20 Jul for the spring grains. Disease severity was measured on flag leaves or spikes and averaged across entire plots. The Fusarium head blight (FHB) index is a composite measure of disease incidence and severity (percent infected plants * percent spike severity / 100). Data for each variety were averaged, the means were subjected to ANOVA, and significant differences were identified using Tukey's HSD test ($p=0.05$).

Overall, disease pressure in winter wheat plots was low. The variety ARS08-1059 had the greatest incidence of leaf blotch, Yorkwin and Pride of Genesee had the greatest levels of leaf rust, and Jaggar had the greatest rating for glume blotch. Of the spring wheats, Louise had a significantly greater FHB index than the other varieties. Mida and Thatcher had the greatest levels of glume blotch. The emmer varieties displayed uniformly low disease symptoms. Although some varieties of wheat and spelt exhibited moderate levels of leaf and glume blotch, the emmer had a low incidence of these diseases. Additionally, their low scab ratings are encouraging. The spelt variety AC Boveria had no detectable FHB or glume blotch while Red Chaff and 94-288 had the greatest FHB index and incidence of leaf blotch. The emmer, spelt, and heritage wheat varieties included in this study are grown primarily for use in value-added products, which require a high quality grain and often an organic certification. Growing varieties with demonstrated disease resistance is an important component of integrated disease management in these crops.

Spring Wheat	FHB Index	Glume Blotch	Emmer	FHB Index	Glume Blotch	Leaf Blotch	Leaf Rust
AC Barrie (HR) ^z	0.53 b ^y	6.67 ^x c	Bowman	0.08	3.00	1.67	0.00
Ada (HR)	0.28 b	1.67 c	Common-H	0.04	2.33	1.67	0.17
Ceres (HR)	0.53 b	6.00 c	Common-ND	0.09	0.67	5.00	0.00
Dylan (HR)	0.33 b	1.00 c	Common-M	0.14	1.67	3.00	0.00
Glenn (HR)	0.31 b	3.00 c	Common-MC	0.13	0.67	4.00	0.00
Grandin (HR)	1.01 b	1.00 c	Common-R	0.04	0.67	1.67	1.00
Louise (SW)	9.67 a	7.67 bc	Red Vernal	0.16	0.67	5.00	0.00
Marquis (HR)	0.43 b	1.00 c	Vernal	0.10	2.00	3.00	0.00
McNeal (HR)	2.88 b	3.00 c	Yaroslav	0.06	3.00	3.00	0.00
Mida (HR)	0.76 b	16.67 a	HSD ($P=0.05$)	0.25	3.69	6.25	1.67
MN00261-4 (HR)	0.29 b	3.00 c	CV (%)	97.3	79.3	69.6	476
MN06078W (SW)	0.33 b	6.67 c	Spelt	FHB Index	Glume Blotch	Leaf Blotch	Leaf Rust
MN06079W (SW)	0.30 b	1.67 c	94-288	2.07	1.67	13.33 a	0.00
ND735 (HR)	0.70 b	2.33 c	AC Boveria	0.00	0.00	0.50 b	0.33
RB07 (HR)	0.20 b	6.00 c	CDC Zorba	0.17	3.00	1.00 b	0.67
Red Fife (HR)	0.71 b	8.33 bc	Forage Spelt	0.10	3.33	0.83 b	0.67
Reed (SW)	0.74 b	3.67 c	Red Chaff	1.71	4.67	16.67 a	0.33
Rollag (HR)	0.33 b	1.67 c	SK3P	0.11	2.67	0.67 b	0.67
Sabin (HR)	0.34 b	1.00 c	HSD ($P=0.05$)	2.54	7.28	7.28	1.21
Steele (HR)	1.85 b	1.00 c	CV (%)	133.6	103.94	48.30	99.22
Stoa (HR)	3.16 b	3.67 c					
Thatcher (HR)	1.14 b	15.00 ab					
Tom (HR)	0.59 b	1.00 c					
Ulen (HR)	0.12 b	3.67 c					
HSD ($P=0.05$)	4.85	7.55					
CV (%)	134.37	54.12					

^z Wheat type: Hard/Soft, White/Red

^y Numbers within a column followed by the same letter are not significantly different from each other according to Tukey's HSD Test ($P=0.05$)

^x All ratings are mean presented as percentages with the exception of FHB Index

Winter Wheat	FHB Index		Leaf Blotch		Leaf Rust		Glume Blotch	
AC Morely (HR)	0.17	bc	1.00	b	1.00	b	1.00	c
Alauda	0.07	c	1.00	b	1.00	b	1.00	c
American Banner (SW)	0.13	bc	1.67	b	2.33	b	1.67	bc
Appalachian White (HW)	0.23	bc	1.00	b	1.00	b	1.00	c
Arapahoe (HR)	0.09	c	3.67	b	0.67	b	1.00	c
Arrow (SW)	0.21	bc	2.33	b	1.00	b	1.00	c
ARS05-1044 (HW)	0.07	c	6.67	ab	1.00	b	1.67	bc
ARS07-0785 (HR)	0.13	bc	1.00	b	2.33	b	2.33	bc
ARS07-1214 (HR)	1.33	ab	1.00	b	1.00	b	1.00	c
ARS08-0161 (HR)	0.38	abc	1.00	b	0.67	b	1.67	bc
ARS08-1059 (HR)	0.02	c	12.67	a	1.00	b	1.67	bc
ARS09-173 (HR)	0.11	bc	2.33	b	0.67	b	5.33	ab
Clark's Cream (HW)	0.15	bc	1.67	b	1.00	b	2.33	bc
Expedition (HR)	0.14	bc	2.33	b	2.33	b	1.67	bc
Forward (SR)	0.74	abc	1.00	b	6.33	ab	1.00	c
Frederick (SW)	0.42	abc	1.00	b	1.00	b	1.00	c
Fulcaster (SR)	0.14	bc	5.00	ab	1.00	b	1.00	c
Genesee (SW)	0.14	bc	1.00	b	1.00	b	1.00	c
Genesee Giant (SW)	0.16	bc	2.33	b	4.33	ab	2.33	bc
Gold Coin (SW)	0.31	abc	1.00	b	1.00	b	2.33	bc
Golden (SW)	0.12	bc	1.00	b	1.33	b	4.33	abc
Grandprize (SR)	0.07	c	1.00	b	2.33	b	5.00	abc
Harvard (HR)	0.29	bc	1.00	b	2.33	b	1.67	bc
Honor (SW)	0.28	bc	1.00	b	4.33	ab	3.67	abc
Jaggar (HR)	0.20	bc	3.00	b	1.00	b	6.67	a
Jensen (SW)	0.23	bc	3.00	b	1.00	b	1.67	bc
Maxine (HR)	0.71	abc	2.00	b	1.00	b	1.00	c
NuEast (HR)	0.24	bc	6.00	ab	0.67	b	4.33	abc
NXO4Y2107 (SW)	0.70	abc	1.00	b	1.00	b	1.67	bc
NXO5M4180-6 (SW)	0.73	abc	3.00	b	1.00	b	2.33	bc
Pride of Genesee (SW)	0.56	abc	2.33	b	11.67	a	3.67	abc
Red Fife (HR)	0.27	bc	1.67	b	1.00	b	2.33	bc
Redeemer (HR)	0.14	bc	3.00	b	1.00	b	1.00	c
Susquehanna (SR)	0.20	bc	1.00	b	1.00	b	1.00	c
Valprize (SW)	0.14	bc	1.00	b	1.00	b	1.00	c
Vermont Winter Reeds (SW)	0.17	bc	1.67	b	2.33	b	1.67	bc
Warthog (HR)	1.53	a	6.00	ab	1.00	b	1.00	c
Yorkstar (SW)	0.83	abc	1.00	b	1.00	b	3.00	abc
Yorkwin (SW)	0.37	abc	1.00	b	9.33	ab	2.33	bc
Zorro (HR)	0.17	bc	1.67	b	1.00	b	1.67	bc
HSD ($P=0.05$)	1.23		8.98		8.94		4.19	
CV (%)	114.29		117.07		138.87		60.55	