

BARLEY (*Hordeum vulgare*, 'Pinnacle')
 Fusarium head blight (scab); *Fusarium graminearum*
 Spot blotch; *Bipolaris sorokiniana*
 Net blotch; *Pyrenophora teres*
 Leaf rust; *Puccinia hordei*
 Powdery mildew; *Blumeria graminis* f. sp. *hordei*
 Scald; *Rhynchosporium commune*

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Evaluation of organic foliar fungicides for control of Fusarium head blight and foliar diseases of spring malting barley in New York, 2017.

The fungicide trial was conducted at the Musgrave Research Farm in Aurora, NY in a Lima silt loam soil planted with the two-row, spring malting barley variety 'Pinnacle' sown at 100 lb/A with a no-till grain drill into a terminated hay field on 31 Apr. Six foliar treatments were arranged in a randomized complete block design with four replicates. Plots were 20 × 10 ft including 15 rows with 7.5-in. row spaces. The plots were fertilized at planting (200 lb/A of 10-20-20) and topdressed on 23 May (60 lb/A of urea, providing an additional 27.6 lb/A of nitrogen). Fungicides were applied on 16 Jun at Feekes growth stage (FGS) 9 (ligule of flag leaf just visible), and on 28 Jun at FGS 10.5 (head emergence), depending on the treatment. All plots were inoculated with a conidial suspension of *Fusarium graminearum* (40,000 conidia/ml) on 28 Jun and 5 Jul, after fungicide applications were completely dried, to augment natural inoculum for initiation of Fusarium head blight (FHB). Treatments and *F. graminearum* inoculum were applied by a tractor-mounted sprayer with TJ-AI3070 nozzles, 18-in. apart, pressurized at 32 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 18 Jul and used to calculate FHB Index, where FHB index = (FHB severity * FHB incidence)/100. Primarily spot blotch, caused by *Bipolaris sorokiniana*, and some net blotch, caused by *Pyrenophora teres*, were rated collectively as 'leaf blights' on 18 Jul as percent disease severity on flag leaves and one leaf below the flag leaf (average rating for whole plot). Leaf rust, caused by *Puccinia hordei*, powdery mildew, caused by *Blumeria graminis* f. sp. *hordei*, and scald, caused by *Rhynchosporium commune* were similarly rated on 18 Jul. Grain was harvested on 9 Aug from a 20 × 5 ft area in each plot using an Almaco plot combine. Grain moisture, grain yield, and test weight for individual plots were recorded and yield and test weights were recalculated to bu/A and lb/bu, respectively, at 14.5% moisture. Deoxynivalenol (DON) concentration (ppm) in grain was analyzed in the Mycotoxin Analysis Laboratory at the University of Minnesota, St. Paul, MN. Treatment means were calculated, subjected to analysis of variance, and separated by Tukey-Kramer HSD test ($P = 0.05$).

The 2017 growing season was conducive for moderately low levels foliar diseases, FHB, and DON, with the exception of a moderately high level of leaf rust in this trial. All treatments were effective at significantly reducing powdery mildew, as compared with the non-treated control, except for Nutrimag and Trichoderma. Only the two conventional treatments, Prosaro and Caramba, significantly reduced leaf rust, and only Prosaro significantly reduced leaf blights, as compared with the non-treated control. All treatments resulted in a significant reduction in scald. None of the organic treatments had any effect on FHB, and Prosaro was the only treatment that resulted in a significantly lower FHB index than the non-treated control. Under the conditions of this trial, none of the treatments had any effect on DON, test weight or yield. The DON results did not closely match the FHB index, indicating that for malting barley, visual ratings of FHB incidence and severity may not be adequate predictors of DON in the final grain. None of the treatments resulted in grain below the acceptable DON level of 1.0 ppm for malting barley.

Product, amount/A, Feekes growth stage at application	Powdery mildew (%) ^z	Leaf rust (%)	Scald (%)	Leaf blights (%)	FHB Index	DON (ppm)	Test Weight (lb/bu)	Yield (bu/A)
Non-treated Control	3.3 ab	45.0 a	1.1 a	18.3 a	3.9 ab	1.7	43.3	52.9
Caramba 0.75EC, 17 fl oz FGS 10.5	0.5 de	9.3 b	0.1 b	15.0 ab	1.6 bc	1.5	43.4	62.6
Champion 50 WP, 1.5 lb FGS 9, followed by Champion 50 WP 1.5 lb FGS 10.5	1.8 cd	38.8 a	0.3 b	15.0 ab	4.1 ab	2.4	43.7	53.7
Nutrimag 2 gal, FGS 10.5	2.0 bc	42.5 a	0.3 b	10.5 ab	4.3 a	1.7	44.2	61.4
Proprietary Trichoderma FGS 9, followed by proprietary Trichoderma FGS 10.5	3.5 a	43.8 a	0.3 b	10.5 ab	3.6 abc	2.2	43.1	52.4
Prosaro 421SC, 8.2 fl oz FGS 10.5	0.4 e	6.3 b	0.3 b	6.8 b	1.1 c	2.1	43.6	66.8
HSD ($P=0.05$)	1.31	12.59	0.84	10.29	2.68	NS	NS	NS
CV (%)	71.3	59.3	125.9	51.3	52.2	35.4	3.1	23.8

^zColumn means are not significantly different at $P=0.05$ as determined by Tukey-Kramer HSD