

Project FY22-IM-011: Integrated Management of FHB and DON in Barley in New England

1. What are the major goals and objectives of the research project?

Fusarium head blight (FHB) is currently the most significant disease impacting organic and conventional grain growers in New England, resulting in loss of yield, shriveled grain, and, most notably, mycotoxin contamination. New England farmers need more information on agronomic practices for preventing or controlling fusarium infection to produce high quality malting barley. This project evaluated integrated management strategies with the goal of minimizing the loss of yield and quality from FHB.

The project objectives were:

1. Evaluate spring and winter barley varieties to identify those that are suitable for malting and adapted to the Northeast.
2. Evaluate the efficacy of using fungicides to control *Fusarium* head blight infection of spring malting barley.

2. What was accomplished under these goals or objectives? (For each major goal/objective, address these three items below.)

What were the major activities?

Objective 1: Winter and spring malting barley variety trials were conducted in Alburgh, Vermont. A trial to evaluate 22 winter barley cultivars was established on September 22, 2023. These varieties were evaluated for yield, quality, and DON concentrations. The spring barley variety trial evaluating 15 varieties was established on April 23, 2023. The spring barley varieties were evaluated for yield, quality, and DON concentrations.

Objective 2: A field experiment was established in Vermont on April 23, 2023, to investigate the effects of cultivar resistance, fungicide efficacy, application timing on FHB and DON infection in spring malting barley. The experimental design was a randomized complete block, with a split-plot arrangement of cultivar as the whole-plot and fungicide+timing treatments as the sub-plots. The fungicide treatments and rates are listed in Table 1. Fungicides were applied at heading for 4 to 6 days following the heading treatment. In 2024, fungicides were trialed individually and in combinations. The organic fungicide Champ ION was applied in two timing combinations: at heading and at both heading and post-heading. The six-row cultivar (Robust) was approximately 5 days ahead of the two-row cultivar (ND Genesis) resulting in separate applications of each treatment at the appropriate timing for each cultivar. Fungicides were applied between June 17 and 20th for the heading treatments and the 4 to 6 days after heading between June 22 and June 26.

Table 1. Plot treatments-fungicide application rates.

Treatments	Application rate
Control	Water
Caramba	14 fl oz ac ⁻¹ +.125% Induce ac ⁻¹
ChampION	1.5 lbs ac ⁻¹
Miravis Ace	13.7 fl oz ac ⁻¹ + .125% Induce ac ⁻¹
Prosaro Pro	10.3 fl oz ac ⁻¹ +.125% Induce ac ⁻¹
Sphaerex	7.3 fl oz ac ⁻¹ +.125% Induce ac ⁻¹
<i>Fusarium graminearum</i>	100,000 spores/ml

What were the significant results?

Objective 1: In 2023, winter barley yields ranged from 1645 to 4169 lbs ac⁻¹, with a trial average of 2674 lbs ac⁻¹. DON concentrations ranged from 0.00 to 0.50 ppm. Spring barley yields ranged from 2648 to 3990 lbs ac⁻¹, with a trial average of 3418 lbs ac⁻¹, and DON levels from 0.20 to 0.90 ppm. These results indicate the importance of variety selection especially for those that may confer some tolerance to FHB.

Objective 2: Most treatments and timings, including the control and the *Fusarium* inoculated plots, had average DON concentrations below the 1 ppm threshold recommended by the FDA. All the treatments and timings, including the control and the *Fusarium* inoculated plots, had DON concentrations above the 1 ppm threshold recommended by the FDA. The highest DON concentrations in the trial was the Prosaro treatment applied at heading at 19.7 ppm. The lowest DON concentration was the dual application of Miravis Ace and Prosaro Pro at 7.86 ppm. This was statistically similar to Sphaerex at post-heading (9.81 ppm), the control (10.7 ppm), Miravis Ave at heading (11.8 ppm), and the dual treatment of Miravis Ace and Sphaerex (12.2 ppm). With high Fusarium pressure fungicides were not able to reduce DON infection to acceptable levels.

List key outcomes or other achievements.

The primary achievement is that 223 of farmer and stakeholders attended the Crop and Soil Field Day and were able to learn about the Scab Initiative, disease identification and management.

3. What opportunities for training and professional development has the project provided?

None at this time.

4. How have the results been disseminated to communities of interest?

The UVM Annual Crop and Soil Field Day was held on July 25th, 2023. There were 223 attendees that were able to see the variety trials and fungicide trials. In addition, a barley intensive was held that included information on how barley is malted, quality requirements, and problematic diseases such as Fusarium head blight.

5. What do you plan to do during the next reporting period to accomplish the goals and objectives?

During the next reporting period the project team will complete the assessment of grain heads in the fungicide trial. The trials will be harvested yield, moisture, and test weight will be recorded at the time of harvest. Subsamples will be taken for DON and other quality analysis. Reports will be written and submitted. Annual meeting abstract, paper, and/or presentation will be completed.