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

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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 12, 2024. These varieties were evaluated for yield, quality, and DON concentrations. The spring barley variety trial evaluating 25 varieties was established on April 23, 2024. The spring barley varieties were evaluated for yield, quality, and DON concentrations.

Objective 2: A field experiment was established in Vermont on April 23, 2024, 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 fungicides ChampIon and Double Nickle were 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 13 and 17th for the heading treatments and the 4 to 6 days after heading between June 17 and June 24.

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}
Double Nickle	6 qts 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}
Fusarium graminearum	100,000 spores/ml

What were the significant results?

Objective 1: In 2024, winter barley yields ranged from 945 to 4477 lbs ac^{-1}, with a trial average of 2335 lbs ac^{-1}. DON concentrations ranged from 0.00 to 0.50 ppm. Low winter barley yields were related to poor winter survival. Spring barley yields ranged from 2161 to 4059 lbs ac^{-1}, with a trial average of 3130 lbs ac^{-1}, and DON levels from 0.50 to 4.18 ppm. These results indicate the importance of variety selection, especially for those that may confer some tolerance to FHB.

Objective 2: The DON concentration for the trial averaged 3.49 ppm well above 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 were the ChampIon treatment applied at heading at 6.07 ppm. The lowest DON concentration was the dual application of Miravis Ace and Sphaerex at 1.53 ppm. This was statistically similar to Sphaerex at post-heading (2.59 ppm), the control (1.72 ppm), Miravis Ace at heading (2.38 ppm), Prosaro Pro at heading (2.36 ppm) and the dual treatment of Miravis Ace and Prosaro Pro (2.45 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 356 farmers and stakeholders attended the Northern Grain Growers Winter Conference and the UVM 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 23rd, 2024. There were 221 attendees that were able to see the variety trials and fungicide trials. In addition, there was an IPM session held that included information on Fusarium head blight and management. The Northern Grain Growers Conference was held on March 13, 2025, with 135 attendees present from 5 states and 2 provinces. There were three one-hour sessions focused on small grain quality and disease management.

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.