

## Project FY22-IM-017: Integrated Disease Management for FHB and DON in Missouri

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

**Objective A)** Integrated Management: Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB, wheat yield, and DON in soft red winter wheat in Missouri.

**Objective B)** Uniform Fungicides: Compare the efficacy of standard fungicide applications to wheat with focus on different timings, 1-pass versus 2-pass application, and new products.

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

#### **Objective A)**

##### **What were the major activities?**

Two trial sites had been planted in the previous funding cycle of November 2022 with three wheat varieties: Truman and Bess, which are classified as moderately resistant to FHB, and 25R40, which is a susceptible variety. Fungicide applications for 10.3, 10.5.1, and 4 to 6 days after 10.5.1 were carried out between May 8 and May 20, 2023, depending on location and wheat variety as Truman is a later-maturing variety. Both trials were inoculated with 50,000 spores of a field isolate of *Fusarium graminearum* one day after the 10.5.1 application. Trials were rated for FHB incidence and severity at 21 days after the last application and harvest occurred the last week of June.

In November of 2023, two trial locations were selected and planted with two wheat varieties: Truman, which is classified as moderately resistant to FHB, and the FHB-susceptible variety 25R40 for 2024 fungicide applications and analysis.

##### **What were the significant results?**

No disease was observed at either trial site in 2023. Both locations were experiencing drought at the time of fungicide application through to harvest. According to the U.S. Drought Monitor, one location was classified as “Moderate Drought” and the second as “Extreme Drought” at fungicide applications. Both locations were classified as “Extreme Drought” by harvest. Deoxynivalenol (DON) was detected in wheat seed from 42 of 72 samples at one location and 11 of 72 samples at the second location. Levels ranged from 0.11 to 2.3 ppm at the first location and from 0.11 to 0.49 ppm at the second location. The combination of wheat variety 25R40 with a Miravis Ace application at 10.3 corresponded to the highest DON levels at both locations, with average values of 0.78 and 0.24 ppm, respectively. Yields were similar across treatments.

##### **List key outcomes or other achievements.**

Missouri wheat producers were provided data to inform their fungicide applications for FHB during drought conditions. The data was also provided to collaborators who are summarizing results across multiple geographies and environmental conditions. Future plans with the data include comparing 2023 results with 2024 results at field days and

winter meetings to demonstrate the importance of including weather and environmental conditions in decision making.

### **Objective B)**

#### **What were the major activities?**

Two trial sites were planted in the previous funding cycle of November 2022 with soft red winter wheat variety 25R40, which is susceptible to FHB. Fungicide applications for 10.3, 10.5.1, and 4 to 6 days after 10.5.1 were carried out between May 12 and May 23, 2023, depending on location. Both trials were inoculated with 50,000 spores of a field isolate of *Fusarium graminearum* one day after the 10.5.1 application. Trials were rated for FHB incidence and severity at 21 days after the last application and harvest occurred the last week of June.

In November of 2023, two trial locations were selected and planted with the FHB-susceptible variety 25R40 for 2024 fungicide applications and analysis.

#### **What were the significant results?**

No disease was observed at either trial site in 2023. Both locations were experiencing drought at the time of fungicide application through to harvest. According to the U.S. Drought Monitor, one location was classified as “Moderate Drought” and the second as “Extreme Drought” at fungicide applications. Both locations were classified as “Extreme Drought” by harvest. DON was detected in wheat seed from 17 of 48 samples at one location and in 12 samples at the second location. At location one, the Miravis Ace application at 10.3 and the late application at 4 to 5 days after anthesis, were associated with the highest DON levels at 0.15 ppm. The susceptible control had the highest level of DON at the second location, which averaged 0.25 ppm. Yields were similar across treatments.

#### **List key outcomes or other achievements.**

Missouri wheat producers were provided data to inform their fungicide applications for FHB during drought conditions. The data was also provided to collaborators who are summarizing results across multiple geographies and environmental conditions. Future plans with the data include comparing 2023 results with 2024 results at field days and winter meetings to demonstrate the importance of including weather and environmental conditions in decision making.

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

1 senior research specialist, 1 high school student, and 3 undergraduate students were trained on all or different aspects of conducting pathology research on wheat. This includes training on culturing *F. graminearum* and inoculating the trials, rating for FHB symptoms, scoring the samples for *Fusarium Diseased Kernels (FDK)*, grinding wheat samples, and analyzing data.

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

Results have been presented at winter grower meetings, crop management conferences, and field days. Results have also been shared with colleagues who are summarizing the data across multiple geographies and environments. A summary of results was published in the Mizzou Crop & Pest Newsletter in April 2024:

[https://ipm.missouri.edu/croppest/2024/4/wheat\\_scab\\_fusarium\\_head\\_blight-mb/](https://ipm.missouri.edu/croppest/2024/4/wheat_scab_fusarium_head_blight-mb/)

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

We have carried out the treatments, rated, and harvested the 2024 trials. We are currently grinding samples for DON analysis. We also plan to analyze the data and distribute results during winter meeting in 2024. We plan to plant wheat for 2025 trials in the fall of 2024.