Project FY22-IM-013: Integrating Strategies to Mitigate Fusarium Head Blight and DON in Winter Wheat

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

The overall goal of this research is to integrate cultivar resistance with fungicide application to effectively manage FHB and DON in winter wheat. The specific objectives are:

1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in winter wheat, with emphasis on new combination fungicides, Prosaro Pro and Sphaerex.
2) Compare the efficacy of Prosaro Pro and Sphaerex to that of Prosaro, Caramba, and Miravis Ace.
3) Generate data to further quantify the economic benefit of FHB and DON management programs.
4) Generate data to validate and advance the development of FHB risk prediction models.

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

What were the major activities?

In 2024, a field experiment was conducted to investigate the effects of cultivar resistance and fungicide application on FHB and DON in winter wheat. The experiment was located at the University of Nebraska Havelock Research Farm in Lincoln, Nebraska. The experimental design was a split plot in randomized complete blocks with four replications, with cultivars as main plots and fungicide x inoculation treatments as sub-plots. Four cultivars adapted to Nebraska were used: Overland (moderately resistant), Zenda (moderately resistant), Siege (susceptible), and Wesley (susceptible). The fungicide x inoculation treatments were 1) untreated, non-inoculated check; 2) untreated, inoculated check, 3) Prosaro (6.5 fl. oz.) at anthesis, inoculated; 4) Miravis Ace (13.7 fl. oz.) at anthesis, inoculated; 5) Prosaro Pro (10.3 fl. oz.) at anthesis, inoculated; and 6) Sphaerex (7.3 fl oz) at anthesis, inoculated. Fungicides were applied with a CO_2-powered backpack sprayer set at 35 psi, equipped with four Teejet 800-1 VS nozzles, and calibrated to deliver 20 gallons of fungicide-water mixture per acre. In treatments 2 to 6, plots were spray-inoculated with spores of *Fusarium graminearum* (1×10^5 spores/mL) 24 hours after fungicide application at anthesis. To enhance inoculum buildup in the plots as well as disease development, corn kernel inoculum was spread weekly on the soil surface starting at three weeks before anthesis. FHB intensity was assessed at the soft dough growth stage. At and following harvest, yield, *Fusarium*-damaged kernels (FDK), and DON concentration were determined. A weather station at the experiment site recorded weather data starting in mid-April through harvest.

What were the significant results?

In the 2024 wheat growing season, the amount and timing of rainfall were not optimal for FHB development at Havelock Research Farm. As result, FHB did not develop.

List key outcomes or other achievements.

Although FHB did not develop due to unfavorable environmental conditions, weather data were collected and provided to the FHB forecasting team.

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

The PI attended the 2024 National FHB Forum as part of his professional development. Undergraduate student workers gained research training and experience working on the project.

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

There were no results from the 2024 growing season to disseminate because FHB did not develop due to unfavorable environmental conditions. We usually disseminate results and FHB management information through Nebraska Extension programs (field days, crop production clinics) and UNL's CropWatch newsletter.

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

The experiment was repeated in 2025. We harvested on July 3, 2025. Grain samples will be analyzed for FDK and prepared for submission to a DON testing lab. Data analysis will be performed and FHB, DON, FDK, yield, and weather data will be submitted to Dr. Pierce Paul later in 2025.