Project FY22-IM-003: Fungicide Combinations and Genetic Resistance for FHB and DON Management in Maryland

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

FHB has been a major challenge to small grain farmers in the state of Maryland due to several compounding factors. Maryland has wet spring seasons, which is the time of highest susceptibility to Fusarium graminearum infections. Farmers practice No-Tillage agriculture, and often follow corn: wheat or corn: barley rotations. The overall project goal is to analyze and compare different chemistries, their combinations, and timings, as well as the effect of genetic resistance on the overall efficacy of FHB and DON management in wheat and barley.

Project Objectives:
1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in soft red winter wheat and barley, 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.

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

What were the major activities?

Field evaluation of efficacy of Prosaro-Pro and Spaherex and a standard fungicide with different genetic resistance levels of wheat and barley cultivars was performed in 2023 at two locations, one with artificial misted nursery and the other in natural inoculation conditions. The experiments were conducted in randomized complete block design (RCBD), with a split-plot arrangement having moderately resistant and a susceptible cultivar as the whole-plot, and fungicide treatment in wheat and barley as the sub-plot. The other experiment was done with different combinations and timings of these new fungicides as compared to the standard fungicides on a susceptible variety as RCBD in 5 reps. All treatments were applied with NIS @ 0.125 v/v. Experiments were done in five replicate blocks following corn with No-Till. The data on FHB incidence, severity, DON content, yields and grain weight was collected and presented to the regional stakeholders. The results were also shared with the IMCP coordinator Dr. Pierce Paul as part of the network for his overarching analysis.

What were the significant results?
The new fungicides Prosaro-Pro and Sphaerex were found to be effective in reducing FHB severity, incidence as well as DON contamination significantly as compared to the untreated control. The new test fungicides performed equally good as the standard FHB fungicides.

List key outcomes or other achievements.

We were able to provide recommendations to Maryland wheat and barley farmers about the efficacy of Sphaerex and Prosaro-Pro, and the effect of different genetic resistance levels on the fungicide efficacy. In addition, the results were also shared with IM team led by Dr. Pierce Paul, who will be able to determine the degree to which baseline FHB and DON levels influence the efficacy of the tested fungicide treatments and treatment x cultivar combinations across locations and grain classes.

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

Two graduate students (1 PhD and 1 Masters students) plus 5 undergraduate students were involved in the field work in 2023. All the trainees worked with the PI to conduct the nursery, collect and analyze data. The graduate students also presented the results to the stakeholders in commodity board meetings.

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

The PI presented the results in oral presentations. The graduate students in the team presented the results as posters and handouts to the stakeholders in commodity board meetings. The results were also disseminated via the UMD extension system to the broader grower community.

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

Over the next reporting period, we will complete our planting in October at two locations in multiple replications in the state. We will conduct experiments as per our timelines in the project description. Misted nursery will be set up in March in Beltsville. FHB severity and incidence data will be recorded in May and DON data will be generated in June. The data will be made available to the IMCP team and the growers as soon as it is available.