Project FY22-IM-020: Integrated Management of Fusarium Head Blight of Small Grain Crops in Kentucky

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1. **What are the major goals and objectives of the research project?**
   The major objectives of the project are: i) evaluate integrated effects of fungicide treatment and genetic resistance on FHB and DON in wheat and barley; ii) compare efficacy of new fungicide products vs. existing "standards"; iii) generate data to quantify the economic benefit of FHB management programs; and iv) generate data to validate 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?

   Two trials were conducted on both soft red winter wheat and winter barley during the 2023/2024 growing season. The trials included a non-irrigated "integrated management" trial and a mist-irrigated "uniform fungicide trial". The trials were conducted at the University of Kentucky Research and Education Center in Princeton, KY. The integrated management trials evaluated different fungicide application timings on different cultivars of soft red winter wheat and winter barley, and the uniform fungicide trials evaluated several fungicides and application timings on FHB-susceptible cultivars of soft red winter wheat and winter barley in mist-irrigated environments to encourage high FHB pressure.

   What were the significant results?

   Integrated management trial in soft red winter wheat for 2023/2024 growing season: Mean FHB incidence, FHB severity, FHB index values, and DON values ranged from 3 to 47%, 2.4 to 25.2%, 0.2 to 12.2, and 1.4 to 3.5 ppm, respectively. FHB index and DON values were lowest in the moderately-resistant cultivar. The lowest DON values were observed in the moderately-resistant cultivar with fungicides applied. All fungicide treatments evaluated (Prosaro, Miravis Ace, Prosaro Pro, Sphaerex and A23751) were effective in managing FHB and DON.

   Uniform fungicide trial in soft red winter wheat for 2023/2024 growing season: Mean FHB incidence, FHB severity, FHB index values, and DON values ranged from 3 to 36%, 4.4 to 21.9%, 0.2 to 6.5, and 2.1 to 3.5 ppm, respectively. In total 15 different treatments were evaluated against a non-treated check. All 15 treatments resulted in FHB index values that were significantly less than the non-treated check (alpha = 0.05), but no differences among treatments were observed for DON.

   Integrated management trial in winter barley for 2023/2024 growing season: Mean DON values ranged from 2.2 to 6.6 ppm. All fungicide treatments resulted in DON values significantly less than the non-treated check (alpha = 0.05); however, DON values were above 2 ppm for all treatments.

Uniform fungicide trial in winter barley for 2023/2024 growing season: Mean barley yields ranged from 36.9 to 55.4 bu/A. Only the treatment, Prosaro Pro followed by A23751, had a significantly greater yield than the non-treated check (alpha = 0.05).

List key outcomes or other achievements.

The key outcomes included identifying the best treatments for management of FHB and DON in both soft red winter wheat and winter barley. These results are used to educate farmers, crop consultants, and others, in the state of Kentucky and surrounding states. Data from the wheat trials were sent to Dr. Pierce Paul's program (Ohio State University) for meta-analysis using data from multiple locations across several states and wheat grain classes. Having such a large set of data can help lead to national outcomes. Both results from local Kentucky trials and the results of the national meta-analyses are used to show stakeholders the importance of choosing the correct fungicide and application timing for FHB and DON management, and even more importantly that the best control of FHB and DON occurs when integrated management is used by planting the most resistant cultivars and applying the best fungicides at the best application timing.

3. **What opportunities for training and professional development has the project provided?**
   This research provided training for 2 graduate students and an undergraduate summer intern.

4. **How have the results been disseminated to communities of interest?**
   Results have been disseminated to local stakeholders through winter meeting presentations and field day presentations. In addition, results were summarized in USWBSI National FHB Forum Proceedings articles.

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
   Data were just recently collected from the trials conducted for the 2024/2025 growing season in Kentucky. During the next reporting period, these data will be analyzed and summarized. The results of the 2024/2025 growing season trials will also be disseminated to stakeholders through winter meetings in the next reporting period.