

Project FY22-IM-012: Integrated Management of Fusarium Head Blight of Barley in Pennsylvania

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

- Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in all major grain classes, with emphasis on new combination fungicides, Prosaro Pro and Sphaerex.
- Compare the efficacy of Prosaro Pro and Sphaerex to that of Prosaro, Caramba, and Miravis Ace.
- Generate data to further quantify the economic benefit of FHB and DON management programs.
- 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?

During this reporting period, evaluation and harvest of the 2022 Integrated Management (IM) and Uniform Fungicide Trials (UFT) barley studies was conducted and analysed.

A second year of IM and UFT were planted at two locations (the Penn State Southeast Agricultural Research and Extension Center (SEAREC) in Lancaster County and the Russell E. Larson Agricultural Research & Education Center (Rock Springs) in Centre County) in fall of 2023. The IM were designed with three different barley varieties of differing FHB resistance levels such that Prosaro Pro, Sphaerex, Prosaro, and Miravis Ace could be applied and efficacy compared when paired with crop resistance and application timing (for Sphaerex only). A Uniform Fungicide Trial (UFT) was also established to evaluate these chemistries and multipass fungicide programs on a single variety of barley. The fungicide applications and *F. graminearum* inoculations were applied according to the shared protocols.

What were the significant results?

The crop in 2022 experienced environmental conditions that were antagonistic to the development of FHB, and subsequently DON. However, a weather-delayed harvest period allowed for the development of sooty molds, and therefore we were able to rate the utility of the fungicide and integrated management programs on grain quality in the absence of high FHB pressure.

Data analysis is now underway for the 2023 harvest.

List key outcomes or other achievements.

In November and December 2023, and January 2024, intensive workshop/group discussions were conducted with high-intensity wheat and barley producers representing the majority of managed small grains in central and south central PA, northern MD, and West Virginia. These growers have taken very deliberate actions to carefully manage their crops to reduce FHB and DON contamination and maximize quality and yield. They continually engage the PIs to help tweak their approaches to production utilizing the most current research generated by this project and the projects of other USWBSI-sponsored researchers. The group of growers engaged in this way has expanded from approximately six to over 300 reached in the 23/24 winter season.

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

While students are not being directly funded by this award, five undergraduate research assistants and one postdoctoral scholar are participating in the establishment, maintenance, evaluation, and analysis of the field trials. This is providing exposure to experimental design and execution to these students (enrolled at Penn State, Millersville, Delaware Valley, and Susquehanna Universities), increasing their scientific literacy and likelihood of choosing a related career path.

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

During the spring of 2024, PIs provided commentary to the FHB Risk Tool and published newsletter articles bringing attention to FHB Risk Tool and fungicide options, including:

Sooty Mold on Small Grains
Heads Up, Barley Heads Are Out!

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

We will wrap up analysis for the results of the 23/24 barley growing season and establish new plots in Fall 2024, again, according to the shared group protocols and reflecting any changes necessitated. A renewed interest in mycotoxins in general, and DON in particular, will likely spark speaking and other educational requests and the PIs are currently preparing educational materials to meet this need.