Project FY24-IM-002: Advancing Integrated FHB and DON Management Strategies in Virginia

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1. **What are the major goals and objectives of the research project?**
   Objective 1: Integrate varietal resistance with new fungicides to develop a more robust and sustainable FHB management strategy.

   Objective 2: Evaluate new fungicides to help validate the next generation of mitigation tools.

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

   What were the major activities?
   Objective 1: Integrate varietal resistance with new fungicides. A winter wheat Integrated Management (IM) trial was conducted at the Virginia Tech Eastern Shore Agricultural Research and Extension Center (ESAREC) in Painter, VA. The trial evaluated the interaction between four soft red winter wheat varieties—ranging from susceptible commercial standards ('Shirley', Pioneer 26R45) to moderately resistant advanced breeding lines (MASS-13, MASS-14)—and fungicide programs following coordinated protocols. Disease severity, yield, and deoxynivalenol (DON) levels were assessed to determine the efficacy of integrating host resistance with fungicide inputs.

   Objective 2: Evaluate new fungicides. A Uniform Fungicide Trial (UFT) was established at the same location. Multiple new fungicide products were tested and compared to a standard two-application program. Product performance was assessed through FHB severity, yield, and DON data collection, contributing to broader regional validation efforts for improved disease management recommendations.

   What were the significant results?
   Objective 1: Integrate varietal resistance with new fungicides. Under relatively low disease pressure (24% FHB incidence in nontreated, inoculated plots of the susceptible cultivar 'Shirley'), the interaction between fungicide treatment and wheat variety was not significant for FHB incidence ($F = 0.2871$), FHB index ($F = 0.1540$), or yield ($F = 0.9576$). However, significant differences were detected when analyzing the main effects. Fungicide treatments significantly reduced FHB severity (Table 1), and variety selection had a significant effect on disease outcomes (Table 2). These results indicate that while the additive effects of varietal resistance and fungicide use are apparent, they did not interact synergistically under the observed conditions.

   Objective 2: Evaluate new fungicides. FHB pressure in this trial was also low, with 18% of heads showing symptoms in the nontreated control. All fungicide treatments significantly reduced FHB incidence compared to the untreated check (Table 3). Prosaro Pro and Sphaerex performed comparably to current standards (Prosaro, Caramba, and Miravis Ace). Notably, a single application of Miravis Ace was as effective as the two-spray programs involving Tebuconazole, Prosaro Pro, or Sphaerex. While fungicides reduced FHB index relative to the nontreated plots, there were statistical differences among products. However, no significant differences were observed for DON concentration or yield, either among fungicide treatments or relative to the control.

   List key outcomes or other achievements.
   - **Effective Single-Spray Option Identified:** A single application of Miravis Ace was as effective as two-spray programs, indicating a more efficient approach under low to moderate disease

pressure. Prosaro Pro and Sphaerex reduced FHB incidence comparably to existing standards (Prosaro, Caramba, Miravis Ace), supporting their inclusion in future management programs.

- **Integrated Management Validated:**
  While no interaction was observed, both cultivar resistance and fungicide application independently reduced disease, confirming the value of integrated strategies. Inclusion of VT advanced breeding lines (MASS-13, MASS-14) provided useful disease resistance data to support variety selection and advancement.

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

Technical staff attended the National Fusarium Head Blight Forum, Austin, TX, 8-10 Dec, 2024.

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

A range of presentations and written outreach materials were delivered to disseminate findings and management recommendations:

Presentations:

- Higgins, D.S. 2024. *FHB Management 2023/2024 Field Trial Results.* Virginia Ag Expo, Champlain, VA, August 1.
- Higgins, D.S. 2024. *Disease Management in Small Grains.* Virginia Cooperative Extension / Virginia Farm Bureau Mid-Atlantic Wheat Tour, Northern Neck, May 30.
- Higgins, D.S. 2024. *Fusarium Head Blight Management.* Virginia Small Grains Field Day, Warsaw, VA, May 16.

Written Outreach:

- Higgins, D. 2025. *FHB Update for VA, 4/28/2025.* FHB Alert System, U.S. Wheat & Barley Scab Initiative.
- Higgins, D. 2025. *Wheat Growth Stages and Scab Management Update – April 25, 2025.* Virginia Ag Pest and Crop Advisory, Virginia Cooperative Extension.
- Langston, D. and Higgins, D.S. 2024. *Disease and Nematode Management in Field Crops: Small Grains.* In: *2024 Pest Management Guide – Field Crops.* Virginia Cooperative Extension, ENTO-566P.
- Higgins, D. 2024. *On-Farm Wheat Field Trials to Improve Fusarium Head Blight Management Coming to an End. The Stalk* Newsletter, July 2024.

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

Field experiments will be repeated. Plot establishment in October, fungicide applications and inoculation second half of April, disease ratings in May, harvest in July, DON submission (July) and analysis (*TBD*).