Project FY22-MG-005: Continued Deployment of Prediction Models for Fusarium Head Blight of Wheat & Barley

Note: Report must cover the *entire* duration of the project period of performance, May 1, 2022-July 30, 2026.

1. **What are the major goals and objectives of the research project?**
   We are addressing the risk of scab development during the critical flowering stage when the growers can ameliorate the risk with treatment. This project leverages various atmospheric data networks, including the finest scale and most accurate gridded observational data set (URMA and RTMA), gridded weather model data and a host of regression based epidemiological models on a user-friendly graphic interface to assist growers in decision making in protecting their fields from scab. Using hourly reports of temperature and moisture from finely gridded data, each day the risk is assessed anew with the most recent observations and is available by mid-morning.

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

   What were the major activities?
   A successful daily prediction using various scab risk models have been run throughout the wheat growing season during the period of performance (May 2022-Aug 2022; Feb 2023-Aug 2023;Feb 2024-June 2024; Feb 2025-June 2025; Feb 2026-July 2026) from winter wheat in the southern Plains to late spring wheat in the Dakotas. Additional expert commentary is included from plant pathologists in most states to augment the utility of the interface. A new framework for the website was built and delivered a more robust and reliable system for the period of performance.

   In addition, new epidemiological models were incorporated into the tool for the 2025 (experimental) and 2026 seasons. Work continued on implementing and ensemble-based approach to display data but more investigation is needed to determine which models should be incorporated and how to easily disseminate the information to growers.

   What were the significant results?
   Growers utilized the interface and modeling technique to assist crucial decisions about the risk of disease growth in their particularly locality or region. When any breaks in data stream or interface occurred, we received immediate response.

   List key outcomes or other achievements.
   The user interface for Fusarium Head Blight risk assessment was upgraded to a new user experience just prior to the start of the 2022 growing season and was implemented for the beginning of this grant's period of performance.
   A new graphical tool feature when clicking on the map was implemented during the 2023 and 2024 growing seasons that allows the user to view relevant meteorological data and historical/forecast risk values from the various forms of the epidemiological models. Display of this information along with the underlying model equations were refined during the latter half of this grant period during the 2024, 2025, and 2026 growing seasons.

Work continues with respect to proper dissemination of ensemble methodologies for epidemiological model information. Model developers were still refining which models to use and how many versions as of the start of the 2026 growing season.

3. **What opportunities for training and professional development has the project provided?**
   Nothing to report.

4. **How have the results been disseminated to communities of interest?**
   The target audience of growers and extension personnel that advise grower consortiums receive information through the web interface. Experts provide commentary within the interface that report status of the wheat/barley crops as well as an assessment of disease risk. The interface is located at: http://www.wheatscab.psu.edu/ .

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
   Not applicable, this is the final report for the agreement.