Project 1: Continued Deployment of Prediction Models for Fusarium Head Blight of Wheat & Barley

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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), gridded weather model data (NBM and NDFD) 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 2023-Aug 2023; Feb 2024-April 2024) 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. The tools are accessible on mobile devised due to upgraded mobile-friendly interface and risk in non-growing regions is being masked to prevent misinterpretation of the risk tool.

   In 2023, extensive work was undertaken to transition computing resources from older, unsupported software and hardware to virtual machines and a new data server for storage. In addition, graphing features were developed for use during the 2024 growing season and work continues on additional epidemiological model development for ensembling techniques to be used in future growing seasons.

   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.

   Graphing feature development was finalized during the 2023 growing season that was launched at the beginning of the 2024 growing season. Utilizing newly-developed epidemiological models, background investigation is ongoing regarding model accuracy and ensemble technique displays. Work will continue to refine the models and determine the best way to display data for expert users and separately for the general public. As of the start of the 2024 growing season, the tool has been fully migrated from older computing resources that were reaching end-of-life to new data servers and the utilization of several virtual machines for increased reliability and resiliency. The research team will continue to make improvements to the tool based on user feedback.

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?
Over the next year, the project team will work on displays of epidemiological model ensemble output. We plan to display ensemble data in two forms – a more detailed analysis that will be available for technical users and a consensus (or summary) output that will be displayed for the general public. Work will continue on refining data display techniques so the tool remains user-friendly and understandable.

In addition to ensemble techniques, we will continue to work on improvements to the expert commentary system and to displays of data on the existing tool, including the newly-developed graphing feature when users click on the map.