Project FY22-DU-001: The Value of Genetic Resistance and Fungicides on the Control of FHB in Durum in ND

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

The major goal of this research project is to provide North Dakota farmers the data they need to improve FHB management in their durum crop. Primary objectives are:

1. Evaluate yield and DON levels in durum variety by fungicide trials under misted and dryland conditions at Langdon and Prosper, respectively.
2. Extend the information learned from these trials at annual grower meetings.

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 we planted and managed 2 field trials in Prosper (dryland location) and Langdon (misted location), ND.

Prosper: seeded 5/10/2024, corn spawn inoculum applied 6/30 and 7/5, grain harvested 8/20/2024

Langdon: seeded 5/13/2024, corn spawn inoculum applied 7/2 and 3, grain harvested 9/5/2024

What were the significant results?

Moderate levels of FHB infection were observed in Prosper (trial averages for FHB incidence 28, severity 8, and index 3). These were higher levels than observed at this location in previous years and resulted in the following:

Fungicide treated plots averaged 91.2 bushels/ ac yield while untreated plots averaged 83.9 bushels/ ac, a difference of 7.3 bushels more with the use of fungicide ($p<0.01$). Carpio was the highest yielding variety in no fungicide conditions while the newer releases ND Riveland and ND Stanley were the top yielders with the use of fungicide.

DON levels averaged 3.4 ppm in fungicide treated plots and 5.8 ppm in untreated plots, a difference of 2.3 ppm less DON with fungicide use ($p<0.01$).

Severe FHB infection levels were observed in Langdon (trial averages for FHB incidence 34, severity 16, and index 11). These levels were some of the highest observed during the time of my involvement in this work and resulted in the following:

Fungicide treated plots averaged 92.7 bushels/ ac yield while untreated plots averaged 54.5 bushels/ ac, a difference of 38.1 bushes more with the use of fungicide ($p<0.01$). ND Riveland was the highest yielding variety without fungicide and Carpio was the highest yielding variety with the use of fungicide.

DON levels averaged 21.3 ppm in untreated plots and 1.7 ppm in plots treated with fungicide, a difference of 19.7 ppm ($p<0.01$)

There was also a large difference in test weight observed with a test weight of 53.9 lb/ bushel in untreated plots and 61.2 lb/ bu when a fungicide was used ($p<0.01$).

List key outcomes or other achievements.

The dramatic differences observed in 2024 have added valuable data points to a long-term data set quantifying the benefit of combining fungicide use and variety selection as an integrated management approach to controlling FHB in durum. 2024 results show the largest difference in yield and DON accumulation between treatments with and without fungicide that I have encountered and will provide a useful upper bound for future conversations on the potential of fungicides to suppress DON production and protect yield in durum wheat.

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

My graduate student Jose Bais who worked primarily with spring wheat during his dissertation research assisted with management of these trials and gained familiarity with durum, an important crop in North Dakota.

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

2024 results were shared directly with durum growers at 2 winter extension meetings: the Hard Spring Wheat Show held in Williston, ND on 1/28/2025 and at the Best of the Best in Wheat Research meeting held in Minot, ND on 1/29/2025. Combined, these presentations reached an audience of 225 durum growers in the largest durum production regions of the state.

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

I will proceed with conducting the 2025 durum variety by fungicide trials at Prosper and Langdon using the same methods as in previous years. I will work on compiling a summary of the now multi-year data set created by these trials to include in the annual NDSU Durum variety trial results and selection guide extension bulletin.