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Project Title: Breeding Fusarium Head Blight Resistant Spring Wheat

PROJECT 1 ABSTRACT

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The overall goal of this project is to develop spring wheat varieties with improved Fusarium head blight resistance with good adaptation to the North Central region of the U.S. and provide growers with FHB ratings of available varieties. The specific objectives of this research are to:

1) Develop Fusarium head blight resistant wheat germplasm and varieties adapted for commercial production in Minnesota and the surrounding region. The expected outcome of this objective is to release one new variety each year, on average, with at least moderate FHB resistance. In addition, our most advanced germplasm and lines with good FHB resistance are entered into regional nurseries and are made available to other breeders as crossing parents.

2) Characterize the level of FHB resistance of all wheat varieties grown in the region. The expected outcome of this objective is that seed producers and growers will be knowledgeable regarding the FHB reaction of the currently available varieties (approx. 30 viable choices with 6-7 new varieties per year).

3) Utilize genomic selection to improve the efficiency of identifying and discarding FHB susceptible lines.

I expect that the results of this objective will allow us to discard FHB susceptible lines from our breeding program prior to field-based testing. Successful genomic selection for FHB at the F₅ stage should reduce the total number of rows in these nurseries by at least 40%, ultimately resulting in labor savings for our breeding program, but also the pathology programs supporting this research.

We plan to accomplish these objectives by making approximately 300 new crosses per year, and screening advanced progeny for their FHB reaction in two misted, inoculated FHB nurseries. All experimental lines in yield trials and named varieties entered into the Minnesota spring wheat variety trial are tested in these nurseries each year. Varieties nominated for public release must have a FHB rating of 5 (MR/MS) or better. FHB reactions of the named varieties are published in print and electronic form each year. Genomic Selection will be used to discard approximately 1/3 of ~2,500 F₅ lines that are predicted to be too susceptible to FHB. Growers and the entire wheat supply chain benefit from these activities by reducing yield and quality losses due to FHB. Furthermore, other breeders can access our FHB resistant germplasm for use as crossing parents.