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Project Title: Fast, Efficient Phenotyping Methods for FHB Resistance using Imagery and Imputation

PROJECT 2 ABSTRACT

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Phenotyping FHB resistance is time consuming process requiring a large amount of skilled manual labor during a narrow time window. The time sensitive nature of phenotyping FHB resistance in an FHB evaluation nursery puts a limit how many breeding lines can be evaluated for FHB resistance in a cost-effective manner. To address these constraints on labor, breeding programs currently limit phenotyping for FHB resistance at relatively advanced stages of breeding and they may only score one visual FHB resistance trait. Evaluation of DON is also usually limited to more advanced breeding material. This is a missed opportunity because if labor was not a limiting factor, all FHB resistance traits could potentially be evaluated on all breeding lines even at early stages of breeding. Development of field-based high-throughput phenotyping methods for visual symptoms of FHB resistance would allow breeding programs to expand and improve the accuracy of their FHB evaluation efforts even given their resource constraints, thereby improving their ability to develop FHB resistant varieties.

The objective of this project is to develop faster and more efficient phenotyping and selection methods for FHB resistance so that breeding programs can select for FHB resistance, including DON levels, on a larger scale, in a timely manner, with greater accuracy, and at a lower cost. This project is well-aligned with VDHR action plan goal 3, 'evaluate and implement new breeding technologies…. to enhance short term and long-term improvement of FHB resistance….'.

Stakeholders of this work include wheat farmers, millers, as well as other breeding programs and researchers. Because this work will improve FHB resistance breeding efficiency, it will ultimately lead to faster improvements in FHB resistance among varieties available to farmers. More FHB resistant varieties will reduce DON levels in the grain supply to the benefit of millers. Other breeding programs and researchers will also benefit from the methods we develop because they will be able to improve their efficiency.