

PI: Clay Sneller

PI's E-mail: sneller.5@osu.edu

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PROJECT 4 ABSTRACT

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Phenotypic selection for resistance to Fusarium Head Blight requires screening germplasm in a nursery designed to promote FHB. While we can control the inoculation and to some degree, canopy moisture in such nurseries, we can not control temperature or humidity. Wheat in the Great Plains is susceptible to FHB but breeders have difficulty screening their germplasm even in local FHB nurseries due to low humidity, high winds that dry the canopy quickly, and high temperature. Screening Great Plains hard red winter wheat (HRW) germplasm in Eastern USA FHB nurseries could lead to better selection for FHB resistance in the Great Plains. Most breeders in the Eastern USA have already filled their FHB nurseries with their own germplasm thus providing little space to screen large amounts of HRW germplasm. A solution would be to screen a limited population of HRW in the Eastern USA. Then use that data to build a genomic selection model. That model could then be used to predict the FHB resistance of 1,000s of HRWs lines that were NOT phenotyped in the Eastern USA. In addition, the use of genomic selection can cost less than phenotypic selection. If successful, the plan could facilitate evaluating 1,000 of HRW lines for FHB resistance and at a low cost per line.

Our goal is to develop HRW cultivars that are resistant to Fusarium head blight and that accumulate reduced levels of DON following infection. This will be done by genotyping and 400 lines from the Nebraska and South Dakota breeding programs (200 lines from each). The 400 lines will be phenotypically evaluated by The Ohio State University who routinely attains a high level of FHB pressure in its FHB nursery: past screening of Nebraska germplasm in Ohio shows that the germplasm is well adapted to Ohio in terms of plant height, heading date, and maturity. The 400 lines will also be evaluated in their respective states of origin. The genotypic and phenotypic data will be used in future years to further develop genomic selection algorithms. We will also determine if the Ohio phenotypic data is relevant to the Nebraska environment.