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PROJECT 5 ABSTRACT

(1 Page Limit)

Fusarium Head Blight (FHB) causes economic losses in wheat by reducing grain yield due to *Fusarium* Damaged Kernels (FDK) and accumulation of the toxin deoxynivanenol (DON). Other FHB traits used by breeders in selection for resistance to FHB are the spike traits Incidence (INC), severity (SEV) and index (IND) that are easily assessed visually in FHB nurseries. Much early stage selection is based on these spike traits. Unfortunately, those traits are not highly correlated to FDK or DON, and FDK and DON are not well correlated to each other. It appears that DON levels are somewhat independent of the other FHB traits. Analysis of data from the 1996-2018 uniform FHB nurseries show that the percentage of lines with INC, SEV, IND, and FDK less than that of the moderate resistant checks has increased significantly since 1996. But this is not true for DON. The spike traits and FDK are indirect estimates of the degree of *Fusarium graminearun* (*Fg*) infection and are all just moderately correlated to DON. Regression analyses show that Index ($r^2 = 0.275$) and FDK ($r^2 = 0.375$) accounted for a small portion of the DON variation (Figure 2): lines with less DON than predicted by Index or FDK were prevalent.

DON levels are influenced by many factors including the degree of kernel infection by *Fg* and weather. It would be useful to have a more accurate estimate of the degree of fungal kernel infection to better understand the relationship of FDK, DON, and actual kernel infection by *Fg*. This can be obtained by using quantitative PCR. We propose to assess the degree of Fg infection of grain from the 2019-20 and 2020-21 P+NUWWSN. Grain will be collected from 4-5 locations each tear, assessed for FDK, DON and fungal biomass. Phenotypic data will be regressed on the estimated fungal biomass using data 1) from all locations and 2) by location. We will assess the repeatability of the degree of resistance to toxin accumulation (eg residuals from the regressions) from the 4-5 locations. We will collaborate with Michigan State University for imaging approaches to estimate FDK as well as any other NWWCP program interested in similar projects.