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Project Title: Accelerated Development of Fusarium Resistant Barley Varieties.

PROJECT 4 ABSTRACT

(1 Page Limit)

Fusarium Head Blight (FHB) or scab, caused by the fungus *Fusarium graminearum*, has emerged as the major factor limiting barley production in the Midwestern United States. The primary goals of this project are to enhance our understanding of the biology/genetics of resistance to Fusarium head blight (FHB) in barley, develop and evaluate methodologies that improve our ability to screen and select for resistance, and release FHB resistant malting barley varieties adapted to the region. To accomplish these goals, we propose a comprehensive FHB breeding effort utilizing greenhouse for crossing and single-seed advance, extensive field trials for FHB evaluation, and off-season nurseries for additional FHB evaluation and rapid generation advance and seed increases. Field trials will enable us to identify resistant lines that will be used as parents in advanced cycle crosses to develop resistant varieties, or be evaluated in advanced disease, yield and quality trials as new resistant variety candidates. In addition to breeding activities, we will investigate the relationships among disease severity, grain protein, accumulation of DON in grain, days to anthesis, spike morphology and maturity. We will evaluate populations derived from crosses among resistant and susceptible lines that segregate for some or all of these other traits. We will also make crosses among resistant lines tracing to different sources of resistance. We are currently using lines that trace back to at least 15 different sources of resistance. We will continue to collect spectral data using a FOSS 6500 NIRS instrument to develop a calibration for use in estimating DON concentrations in whole grain samples. These activities should contribute directly to the development of FHB resistant barley varieties and enhance our understanding of resistance to FHB. Both of these outcomes are necessary to integrate FHB resistant varieties as part of an overall strategy to minimize the impact of FHB on barley production and utilization.