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**Project Title: Breeding FHB Resistant Six-rowed Varieties.**

### **PROJECT 1 ABSTRACT**

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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 overall goal of this project is to develop malting barley varieties with enhanced resistance to FHB and lower concentration of the mycotoxin deoxynivalenol (DON). To accomplish this goal, we propose a comprehensive FHB breeding effort utilizing greenhouse for crossing and single-seed advance, extensive field trials for FHB evaluation, off-season nurseries for additional FHB evaluation and rapid generation advance and seed increases, and collaborative regional nurseries to evaluate elite breeding lines. Thus our specific objectives for the FY07 funding period are to 1) Develop breeding populations segregating for FHB resistance; 2) Evaluate early generation (F5), preliminary, intermediate, and advanced breeding lines in replicated field disease nurseries. Field disease trials will be conducted at three locations in Minnesota and in an off-season nursery in Hangzhou, China. Each year we plant, inoculate and evaluate over 11,000 plots to collect FHB data on breeding material. The most promising lines, based on field evaluation are harvested and the grain sent for DON analysis. FHB and DON data enable us to identify resistant lines that will be used as parents in advanced cycle crosses, or evaluated in advanced disease, yield and quality trials as new resistant variety candidates. We will evaluate populations derived from crosses among resistant and susceptible lines with favorable trait combinations for agronomic performance and malting quality. We will also make crosses among resistant lines tracing to different sources of resistance to attempt to pyramid resistance genes and increase overall levels of resistance. We are currently using lines that trace back to at least 15 different sources of resistance. In selected crosses, we will utilize marker assisted selection for FHB QTL that we have identified and validated on chromosomes 2H and 6H. These activities should contribute directly to the development of FHB resistant barley varieties that can become components of an integrated strategy to minimize economic losses due to FHB.