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Project Title: Epidemiology of Late FHB Infections in Wheat and Barley.

PROJECT 2 ABSTRACT

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Susceptibility to FHB infection in wheat appears to declines rapidly between 7 and 14 days after anthesis (daa). An improved understanding of the shift from vulnerability to reduced vulnerability should help us understand the relationship between visual disease ratings in the field and mycotoxin accumulation in harvested grain. This understanding will allow us to more accurately forecast scab epidemics, manipulate both host genetics and environmental factors in order to better manage FHB, and shed light on such issues as why fungicide applications vary in effectiveness.

The experiments detailed in this proposal will: i) more precisely characterize the window of wheat and barley susceptibility to FHB, ii) identify how long wheat and barley remain susceptible after anthesis, and how quickly susceptibility declines, iii) relate the decline in susceptibility to growth stage and head physiology of the two cereal species, iv) determine the progression of fungal infection and DON during the period from flowering to harvest and precisely relate each measurement of those variables to growth stage, and v) further our understanding of post-infection precipitation events on toxin accumulation.

To accomplish these goals, an inoculated mist-irrigated field experiment will be conducted in both St. Paul, MN and Raleigh, NC. We will inoculate plots of winter wheat (NC), spring wheat (MN and barley (MN) at 0, 7, 9, 11, 13, 15, 17, 19, 21 and 28 daa. Mist-irrigation, provided for 28 daa, will be used to promote disease development. Heads will be sampled 14 daa and at maturity and used to determine the effect of infection timing on visual kernel damage, *Fusarium* infestation, and DON contamination**.** Growth stage determinations, based on visual and dry weight measurements, will provide the precision to identify the window of susceptibility to infection across locations. As we expect temperature and moisture to influence the window of susceptibility, we will monitor environmental parameters at each location using the local weather stations. Greenhouse experiments are proposed to complement the field study; they will examine the interaction of late infection and post-anthesis moisture on mycotoxin accumulation.

The proposed research is directly aimed at MGMT's core goal of developing effective management practices that reduce FHB severity and DON in harvested grain. Understanding of the effects of infection timing on FHB development and DON accumulation is critical to optimizing forecasting models, management recommendations, and identifying the implications for resistance breeding.