Project Abstract

Project Title:	***Fusarium* Species Diversity within Spikes and Fields: Implications for FHB Management**	
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The goals of this project are to survey the occurrence of minority *Fusarium* pathogens in FHB-symptomatic wheat and barley; understand environmental factors driving higher frequencies of minority species, including emerging mycotoxin producers; and determine how interactions between *F. graminearum* and less aggressive *Fusarium* pathogens impact FHB progression and mycotoxin accumulation.

Objective 1 – Approach: Conduct a broad geographic survey of both *Fusarium* spp. and mycotoxin diversity and assess environmental factors (e.g., weather/climate, crop management) driving *Fusarium* diversity in FHB-symptomatic U.S. wheat and barley spikes.
Expected outcomes – This project will generate: 1) a large, geographically diverse *Fusarium* culture collection for collaborative functional studies (e.g., fungicide sensitivity, comparative genomics); 2) a network of USWBSI scientists documenting, and investigating, the impact of fusarial diversity across US wheat and barley fields; and 3) insights on whether additional mycotoxin monitoring is required.

Objective 2 – Approach: Identify whether less aggressive *Fusarium* spp. reduce FHB caused by the aggressive pathogen *F. graminearum* if inoculated first or co-inoculated.
Expected outcomes – This work will 1) mechanistically show how less aggressive pathogens affect FHB and DON outcomes caused by *F. graminearum* inside wheat and barley spikes and 2) focus on “emerging mycotoxin” producers recently found in high frequencies in some North Carolina wheat fields.

This research will identify the prevalence of *Fusarium* spp. other than *F. graminearum* across a range of regions in the US, shedding light on the distribution of emerging mycotoxins. Further, our techniques will quantify the diversity of mycotoxins and *Fusarium* not only in wheat but also in barley, a crop with less landscape-level data on pathogen dynamics. The geographically diverse *Fusarium* culture collection will be made available for collaborative functional studies via the NRRL in Peoria (e.g., fungicide sensitivity, resistance screening, comparative genomics). Lastly, our work will test whether and how higher frequencies of "emerging mycotoxin" producers affect FHB and DON caused by the strong pathogen *F. graminearum* inside individual grain spikes.

Additionally, one co-PI is a new scientist to the initiative and the research is a collaboration between MGMT and PBG scientists. Our approach represents a novel, integrated approach to 1) determine the prevalence of competing *Fusarium* spp., as well as their emerging mycotoxins, in small grains and 2) experimentally determine the mechanisms generating differential FHB and toxin outcomes when multiple *Fusarium* are present in wheat and barley spikes.