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Research Category: **MGMT** **Duration of Award: 1 Year**

Project Title: Integrating Multiple Strategies to Minimize Losses due to FHB and DON in Wheat.

PROJECT 1 ABSTRACT

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The objectives of this study are to **1)** evaluate the integrated effects of fungicide treatment, genetic resistance and grain harvesting strategies on FHB, FDK, and DON and **2)** evaluate the effects of post-anthesis fungicide treatments of FHB and DON as influenced by cultivar resistance. To accomplish these objectives, two separate field experiments will be conducted. For experiment 1, the design will be a randomized complete block, with a split-split-split plot arrangement of combine configuration (two levels, Configuration 1 and Configuration 2) as whole plot, cultivar (four levels, two moderately resistant [Truman and Malabar] and two susceptible [Cooper and Hopewell] SRWW cultivars) as sub-plot, inoculation treatment (two levels, with and without spray inoculation of 40,000 spores/ml at early anthesis) as sub-sub-plot, and fungicide treatment (two levels; with and without the application of Prosaro at 6.5 fl oz./acre + 0.125% NIS at anthesis) as the sub-sub-sub plot. Plots of each fungicide x cultivar x inoculation treatment combination will be harvested using an ALMACO SPC20 plot combine set at 2 different configurations. Prior to harvesting the plots, the combine will be calibrated on non-inoculated, disease-free plots to minimize removal of healthy kernels (Configuration 1). The settings will then be modified to increase the speed and volume of air flowing through the combine (Configuration 2). For experiment 2, the methodology will be similar to that described for experiment 1, with the exception of the combine configuration. The design will be a randomized complete block, with a split-split-plot arrangement of cultivar (a moderately resistant [Malabar] and a susceptible [Hopewell]) as the whole-plot, application timing (an untreated check, plus applications at anthesis, and 2, 4 and 6 days after anthesis) as the sub-plot, and inoculation treatment (1, 2.5, 5, and 10 x 10^4 spores/ml) as sub-sub-plot. There will be four replicate blocks in both experiments. FHB, DON, FDK, yield, and test weight data will be collected in both experiments and analyzed to determine the effect of fungicide treatments, cultivar resistance, and in the case of experiment 1, grain harvesting strategy on each of the response variables. In addition, data from both trials will be compiled with those from other MGMT CP trials and a technique called meta-analysis will be used to conduct a quantitative synthesis of the effects of the integrated management approach on all measured response variables (FHB, DON, yield etc). Meta-analysis is an objective approach for integrating and interpreting results, and drawing conclusions, from multiple individual studies, and will allow us to perform a statistical evaluation of study-specific characteristics (wheat type, weather conditions, residue levels, previous crop etc.) likely to influence the overall effect of the integrated management approach. From our analyses, we would be able to identify combinations of cropping practices, fungicide treatment, and cultivar resistance strategies likely to minimize losses due to FHB/DON in each region and grain class, the so-called "*best management practices*". These practices will be recommended to producers.