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Project Title: Managing FHB and DON with Fungicide, Resistance, and Grain Harvesting Strategies.

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 and disease intensity. 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, C1 and C2) 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 100,000 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 (C1). The settings will then be modified to increase the speed and volume of air flowing through the combine (C2). In experiment 2, the design will be a randomized complete block, with a split-split-plot arrangement of inoculation density (2, 6, 10, and 14 x 10^4 spores/ml) as the whole-plot, fungicide application timing (an untreated check, plus applications at anthesis, and 2, 4 and 6 days after anthesis) as the sub-plot, and cultivar (a moderately resistant [Malabar] and a susceptible [Hopewell]) as sub-sub-plot. There will be three 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. Data from both experiments will be combined with data from other MGMT CP experiments, and a technique called meta-analysis will be used to conduct a quantitative synthesis of the effect of integrated management on all measured response variables (FHB, DON, yield etc). The influence of study-specific characteristics (wheat type, weather conditions, residue levels, cropping sequence, and FHB and DON levels) on percent FHB and DON control will be determined. In addition, data from all experiments will be used to conduct an economic analysis of FHB/DON management. Ultimately, the most effective and economically sound combinations of cropping practice, fungicide treatment, and cultivar resistance strategies for minimizing losses due to FHB/DON in each region and grain class will be determined. These practices will be recommended to producers and other stakeholders by way of Scab Smart.