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

Project Title: Evaluation of Integrated Management Strategies against FHB and DON in South Dakota.

PROJECT 1 ABSTRACT

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Objectives: 1) Evaluate the integrated effects of fungicide and genetic resistance on FHB and DON on three major grain classes; 2) Conduct a quantitative synthesis of the integrated effects of fungicide and resistance on FHB/DON and the influence of region-specific factors on the overall efficacy of this integrated approach; 3) Develop "***best-management practices***" for FHB and DON and 4) generate data to advance the FHB and DON risk prediction effort.

To accomplish these objectives, field experiments will be conducted in South Dakota to investigate the effects of cultivar resistance and fungicide application on FHB and DON accumulation in spring wheat, winter wheat and barley with inoculation. All experiments will be conducted with at least two fungicide treatments and at least two varieties with different levels of resistance to FHB. There will be four to six replicate blocks. Plots will be established on university research farms previously planted with a crop that is representative of the typical cropping sequence of each location. All trials will be managed according to the standard agronomic practices for each grain class and location. A single fungicide application will be made at anthesis (Feekes GS 10.5.1) for each cultivar using a sprayer equipped with paired Twinjet or flat fan XR8001 nozzles, mounted at an angle (30^{o} from the horizontal) forward and backward and calibrated to deliver at a rate of 10 to 20 gallons per acre.

Standard disease measurements (FHB, DON, FDK) and agronomic measurements (yield, and test weight data) will be collected in all trials and analyzed to determine the effect of fungicide and cultivar resistance on each of these variables and to determine the extent to which local conditions (residue cover, cropping sequence, weather conditions etc.) affect the overall fungicide x cultivar effect.

Data from all trials will be compiled by collaborating scientists, 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.). This will allow the scientists to integrate results and draw conclusions from multiple individual studies and 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 that will 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.