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Project Title: Integrated Management of FHB and DON in Spring Wheat, Winter Wheat and Barley in South Dakota.

PROJECT 2 ABSTRACT

(1 Page Limit)

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 under natural conditions. Objectives of the proposed research include: 1) Evaluate the integrated effects of fungicide and genetic resistance on FHB and DON 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; and 3) Develop “best-management practices” for FHB and DON. All experiments will be conducted with at least two fungicide treatment and three varieties with different levels of resistance to FHB. The experimental design will be a split plot, with fungicide treatment as the whole-plot and cultivar as the sub-plot. There will be four to six replicate blocks. Each sub-plot will be 10 ft wide x 14 ft long, with 5 ft wide buffer strips of an untreated cultivar separating adjacent sub-plots and whole plots from each other. Plots will be established in areas 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. In each block, there will be whole plot treatments of fungicides, including a ‘best’ fungicide treatment as a positive control, and an untreated as negative control. Each whole plot will be subdivided into sub-plots to which two to four cultivars with different levels of resistance to FHB will be randomly assigned. A single fungicide application will be made on the time of early 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° 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 analyzed by conducting a quantitative synthesis of the effects of the integrated management approach on all measured response variables (FHB, DON, yield etc). 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.