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PROJECT 1 ABSTRACT

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No single management tool has been fully effective against FHB and DON. Therefore, implementing an integrated strategy utilizing numerous management tools is necessary. The goal of this research project is to look at the role host resistance and a post-anthesis fungicide application (Feekes 10.51 + 4-5 days) serve in reducing FHB and DON levels in multiple market classes of wheat and spring barley. Hard red spring wheat trials will be established at four locations in North Dakota, hard red winter wheat trials at three locations in North Dakota, Durum at one location, and spring barley at two locations. At each location, at least three varieties differing in levels of susceptibility will be used.

Experimental design will vary slightly by location, depending on equipment and space available (RCBD or CRD with split-plot arrangement). Four replicates will be standard. Plots will be established on university research farms or in farmers' fields 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. A mixture of isolates of *Fusarium graminearum* endemic to the region will be used in the inoculated trials. Plots will be divided into sub-plots, one treated with Prosaro (6.5 fl oz/A + 0.125%) and the other non-treated. A single fungicide application will be made at the time of post-anthesis (Feekes GS 10.5.1 + 4-5 days) for each variety using a sprayer equipped with 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. FHB intensity will be assessed in each plot at the soft dough growth stage, Feekes 11.2. At each assessment, FHB severity will be determined visually, and incidence, diseased head severity, and index will be determined. The presence and flag leaf severity (as a percentage) of any foliar diseases also may be determined. Plots will be harvested with a plot combine and yield and test weight determined. Grain from all plots will be rated to determine the percentage of *Fusarium* damaged kernels (FDK). Grain samples from each plot will be sent to the NDSU Veterinary Toxicology Laboratory for DON analysis.

By performing experiments at multiple locations and multiple grain classes in ND, and by using multiple varieties with different levels of resistance at each location, we expect epidemics of different intensities to develop. We will be able to determine the degree to which genotype resistance and fungicide application interact to reduce FHB and DON across locations and grain classes, under both natural infection and artificial inoculation. Due to interactions among variety maturity (time of anthesis), genetic resistance, fungicide application, and weather conditions during anthesis and early grain fill (the location effect), we anticipate that the level of suppression of FHB or DON with the fungicide may be comparable among varieties with different levels of resistance or different among varieties with similar levels of resistance in some situations. These are desired effects that would allow us to quantitatively evaluate different permutations in the associations among variety trails, fungicide treatment, weather conditions, FHB, and DON.