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

PROJECT 2 ABSTRACT

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No single management strategy has been fully effective against FHB and DON. The effects of fungicide, genetic resistance, and residue management (crop rotation or tillage) are highly variable and strongly influenced by the environment. Under favorable conditions, moderately resistant cultivars may become infected, and even if the level of visual symptoms is low relative to that of susceptible cultivars, DON contamination may still exceed critical threshold levels. In the case of fungicides, even when standard protocols are used, efficacy varies from one trial to another. Fungicides are generally most effective against FHB and DON under moderate disease pressure and when applied to moderately resistant cultivars than to susceptible cultivars. These findings clearly suggest that integrating cultivar resistance and fungicide application should be more effective at reducing FHB and DON than either strategy used in isolation.

The ultimate goal of this collaborative effort is to increase growers' adoption of an integrated management approach for FHB and DON. Growers' willingness to adopt technology in agriculture is often driven by the effectiveness, convenience, practicality and economic benefit of using such technology. With support from the USWBSI and 12 years of data from wheat Uniform Fungicide Trials (UFT's), we have quantified the overall efficacy of fungicides against FHB/DON in wheat and the overall yield and quality responses to several fungicides; developed preliminary yield and quality loss models due to FHB/DON in wheat; and we are developing models to evaluate the economics of fungicide use for FHB/DON management. We believe that a thorough economic analysis of fungicide use for FHB management and a comparative evaluation of the economic benefit of an integrated approach, as opposed to an approach based on fungicide application alone, will be invaluable for successful adoption of integrated management strategies. More data are needed from integrated management trials conducted under moderate to high disease pressure to expand efficacy analyses, yield and quality response models, and economic analyses to an integrated management system. To achieve this, we propose adding artificial inoculations at anthesis to this coordinated project. Inoculations will increase infection potential and result in a more diverse data set with moderate to high levels of disease.

The specific objectives of this FHB Integrated Management (IM) Coordinated Sub-Project are to:

- 1) Evaluate the integrated effects of fungicide and genetic resistance on FHB and DON in wheat and barley
- 2) Contribute data to be used in 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.