Project FY22-IM-004: FHB Integrated Management: Minnesota Component of the Coordinated Project

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1. **What are the major goals and objectives of the research project?**
This proposal is part of the larger Fusarium head blight (FHB) management coordinated project, established with the goal of examining the efficacy of fungicides for the control of FHB. Information on the efficacy of fungicides provides additional and effective options for the control of FHB and/or on the reduction of *Fusarium*-associated mycotoxins in small grain cereals. Demethylation inhibitor (DMI) fungicides have been proven to be the most effective for FHB and deoxynivalenol (DON) management, providing more than 70% reduction of both FHB index and DON. Single ingredient demethylation inhibitor (DMI) fungicides are those that are most widely used for FHB control, and these are likely at a higher risk from fungicide resistant *Fusarium*. This research project examined the efficacy of Miravas Ace®, which is one of a new class of fungicides (succinate dehydrogenase inhibitors) and also examined combinations of active ingredients, and especially fungicides that include one of the succinase-dehydrogenase inhibitors as one of the active ingredients in addition to the DMI. Combination fungicides are considered to be at a reduced risk of developing fungicide resistance. Given that the cost of the combination fungicides is generally higher than the current industry standards for FHB (Prosaro and Caramba), data from this project also provided information allowing producers to judge the efficacy of these new products and determine a cost/benefit analysis of their use in their production system(s).

   The specific objectives were to:

   1) Evaluate the integrated effects of fungicide treatment and genetic resistance on FHB and DON in all major grain classes, with emphasis on the new DMI fungicides (Miravis Ace) and combination fungicides, Prosaro PRO and Sphearex, comparing the efficacy of Miravis Ace, Prosaro PRO and Sphaerex to that of the current industry standards; Prosaro and Caramba
   2) Generate data to further quantify the economic benefit of FHB and DON management programs
   3) Develop more robust "*best-management practices*" for FHB and DON

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

   What were the major activities?
   We participated annually in the two nationally coordinated experiments in the MGMT-CP, the integrated management (IM) and uniform fungicide (UF). In combination, the data from these trials contributed to the national efforts of the USWBSI to test Miravis Ace, Prosaro PRO and Sphearex across grain market classes and growing conditions. In each year experiments were established at two locations (St Paul and Crookston) and including hard red spring wheat. The experiments were completed following the experimental design as established by the coordinating group.

   What were the significant results?
   In each year of the project we generated significant levels of FHB and obtained data. The data from all completed trials was compiled and submitted to the project coordinator. The data

demonstrated that Miravis Ace, Prosaro PRO and Sphaerex are effective in in the control of FHB and DON in hard red spring wheat.

List key outcomes or other achievements.

Our data from the 2021 and 2022 field seasons supported the use of Miravis Ace in the management of FHB and DON and provide a rationale for how we best use this new chemistry effectively. The results of the most recent experiments (2023 and 2024) allowed us to determine that Prosaro PRO and Sphaerex are effective against FHB and DON but indicated they were not consistently better than the Prosaro, Caramba, or Miravis Ace. This has provided producers with additional information when deciding how best to manage FHB.

Summary results from these studies were published as part of a collaborative/national publication on integrated management guidelines for FHB and DON at the 2022, 2023 and 2024 National FHB Forums and was prepared for publication in a peer-reviewed journal.

3. **What opportunities for training and professional development has the project provided?**
   No graduate students worked on this project. Undergraduate student researcher and summer interns utilized this project to gain experience in field-based research techniques, data entry and analysis.

4. **How have the results been disseminated to communities of interest?**
   The results of these studies will be published as part of a national publication on integrated management guidelines for FHB and DON. Regionally, results have be delivered to growers, dealerships, county extension educators and others in the wheat and barley production industries through extension programs. In addition, data from these trials will be used to advance the development and validations of FHB and DON risk assessment models.

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
   This is a final report and no additional studies are planned.