Progress Report for
South Dakota Wheat Commission FY17 Grant
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Project Data:

Project Title: EVALUATION OF WHEAT FOR RESISTANCE AND RESPONSE TO VIRAL DISEASES IN SOUTH DAKOTA

Reporting Period: July 1, 2016-September 30, 2016

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Report Type: Progress Report

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Research Summary: This project is for the inoculation of the 2017 Wheat Steak Mosaic Virus (WSMV) Winter Wheat Nursery. The nursery has been planted and is emerging. The wheat needs to reach the appropriate growth stage for inoculation. If it does not reach that stage this fall, it will be inoculated in the spring.

Introduction: The *Evaluation of Wheat for Resistance and Response to Viral Diseases in South Dakota* assesses winter wheat lines for susceptibility, tolerance, or resistance to *wheat streak mosaic virus* (WSMV) (Family: *Potyviridae*; Genus: *Tritimovirus*). This grant only provides funding for the inoculation portion of the 2017 WSMV Winter Wheat Nursery in collaboration with the Winter Wheat Breeding project. The nursery is focused on lines being developed by Winter Wheat Breeding and on lines needed for future breeding crosses. Winter wheat cultivar development in South Dakota requires annual evaluation for WSMV effects. Without this process, susceptible materials cannot be eliminated from the breeding program, and previous gains in resistance/tolerance will be lost.

Methods: In the WSMV Winter Wheat Nursery, winter wheat lines from the Advanced Yield Trials (AYT) and Crop Performance Trials (CPT) was planted in four-row plots (three completely randomized blocks). A split plot design was created by inoculating two

rows of each plot with WSMV-infected sap extract [pressed from a macerated mixture (1:10 w:v WSMV-infected Arapaho winter wheat:0.02 M potassium phosphate buffer, pH 7.0) with 1% silica carbide added] using high-pressure spray (80 PSI) to penetrate the wheat's epidermis. The remaining two rows in each plot were not inoculated. Disease severity, WSMV infection levels (as determined by ELISA), yield, test weight and other agronomic measures were collected from both inoculated and non-inoculated rows of each plot. Utilizing split plots for this research greatly reduces the impact of environmental differences of the field on differential comparisons between the WSMV-inoculated and non-inoculated values.

Description of Accomplishments: This grant only provides funding for the inoculation of the WSMV Winter Wheat Nursery. The following are the items that have been accomplished.

- **Objectives that have been accomplished:**
    - 2017 WSMV Winter Wheat Evaluation Nursery
        - Planting and establishing 2017 WSMV Winter Wheat Evaluation Nursery (Winter Wheat Breeding)
        - Production of 60 kg of WSMV-infected wheat
- **Objectives that remain to be accomplished:**
    - 2017 WSMV Winter Wheat Evaluation Nursery
        - Production of 225 liters of WSMV inoculum
        - Inoculation of 2017 WSMV Winter Wheat

Projections: This grant will allow the establishment and inoculation of the 2017 WSMV Winter Wheat Nursery. Winter wheat planting has been delayed, but the nursery is planted and is emerging. The question that remains is whether the wheat will reach the appropriate size to inoculate and have the 10-14 days needed for infection development before consistently freezing temperature arrive. If it does not, inoculation will have to be delayed until the spring. This has the disadvantage of modeling spring infection rather than fall infection.

Publication/Data: None yet

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