

PI: Jessica Rutkoski

PI's E-mail: jrut@illinois.edu

Project ID: FY20-NW-004

ARS Agreement #: 59-0206-8-205

Research Category: VDHR-NWW

Duration of Award: 1 Year

Project Title: Development of Scab Resistant Soft Red Winter Wheat Varieties

PROJECT 1 ABSTRACT

(1 Page Limit)

Breeding for resistance to Fusarium head blight (FHB) as well as yield, test weight, and appropriate maturity needs to continue and gain momentum in order for wheat to remain profitable in Illinois and neighboring states. In line with research priorities one and three of USWBSI Action Plan, this project aims to:

- 1) Increase and document the number of varieties with improved FHB resistance and high grain yield and grain quality that are tested in statewide variety trials and available to farmers, and
- 2) Implement new and underutilized breeding techniques/technologies to further enhance short term and long-term improvement of both FHB resistance and grain yield.

To achieve these objectives, this project will continue the FHB resistance breeding efforts already underway at the University of Illinois to continue providing wheat farmers in Illinois and surrounding states with varieties that are resistant to FHB, higher yielding and with appropriate maturity and end-use quality. This project will also implement new and underutilized breeding techniques/technologies to make the breeding program even more effective. These techniques/technologies include partially replicated trial designs, multi-trait best linear unbiased prediction (BLUP), genomic selection, selection indices, and male-sterile facilitated recurrent selection. To support this work, we will utilize a new web-based breeding data management system developed by The Triticeae Toolbox (T3) project. The tangible outcomes of this project during FY20-21 include:

- 1) Release of 10 new wheat lines with FHB resistance, high yield, and test weight to the private seed sector for potential variety release.
- 2) Release of at least 8 new wheat breeding lines with FHB resistance, high yield, and test weight to cooperative nurseries.
- 3) Continued improvement of a diverse recurrent selection population to serve as a novel source of FHB resistance.
- 4) Data on FHB resistance and DON levels of varieties released for Illinois disseminated to farmers.
- 5) All new breeding program data, including FHB resistance, made available to the public on the T3 database.
- 6) Computer code for new breeding techniques/technologies being implemented made available in an online repository.

Stakeholders of this work include wheat farmers, millers, other breeding programs, and researchers. Wheat farmers in Illinois and surrounding states will benefit because they will have access to better and more FHB resistant wheat varieties. More FHB resistant varieties being grown by farmers will benefit millers by reducing DON in the wheat supply. Other breeding programs will benefit from using our breeding lines as parents and also from the computer code for implementing new breeding techniques/technologies. Lastly, researchers will benefit because they may use our data to develop and validate new analysis methods