

PI: Mark Sorrells

PI's E-mail: mes12@cornell.edu

Project ID: FY14-NW-010

ARS Agreement #: New Agreement (Expiring Agreement # 59-0206-9-059)

Research Category: VDHR-NWW

Duration of Award: 1 Year

Project Title: Implementing Genomic Selection for FHB Resistance in Soft Winter Wheat (SWW) Adapted to the Corn Belt.

PROJECT 4 ABSTRACT

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Genomic selection (GS) is a new technology that uses marker selection to select nearly all the genes that affect FHB resistance, including those with small effects. Genomic selection uses a training population of lines that is phenotyped and genotyped. A prediction model is built using the phenotypic and genotypic data from the training population. That model can then be used to predict the value of other genotyped individuals that are related to the training population even without phenotyping those individuals.

Objectives:

1. To implement GS for FHB resistance in soft winter wheat by completing two cycles of GS.
2. Initiate evaluation of the effectiveness of GS.

Over the past three years we have phenotyped a training population of 649 lines. This includes 600 RILs (100 from each of six breeding programs, each phenotyped at the breeder's location only) and 49 checks (phenotyped by all six breeders at all locations and years). We have planted the best lines from the training population and have made crosses among them. We will self them and have F2 seed by August of 2014. We will isolate DNA from 940 F2 and genotype them using genotyping-by-sequencing at the Institute for Genomic Diversity (Cornell University). The genotype data from the F2 and the GS model developed from the training population will be used to predict the value of each F2 plant for each trait. The best F2 plants at each location will be crossed to one another to generate F1s in December/January of 2014/2015. That will complete the first cycle of GS. The 10 best, 10 worst, and 10 random F2 plants will also be selfed to produce 30 F2:3. This will be repeated for two cycles and evaluated in the 2015-16 FHB nursery.