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Project ID: FY12-HW-010   **ARS Agreement #:** NA

Research Category: HWW-CP   **Duration of Award:** 1 Year

Project Title: Single Kernel Sorting Technology for Enhancing Scab Resistance and Grain Quality.

PROJECT 1 ABSTRACT
(1 Page Limit)

The goal of this research is to support breeding programs in the development of wheat cultivars that are resistant to Fusarium head blight and reduced DON levels by selecting specific kernels with specific characteristics from within breeding lines. The specific objectives are to use automated visible and near-infrared (NIR) spectroscopy instrumentation to sort scab-damaged kernels from asymptomatic kernels, to sort kernels with no measurable DON from this with high DON levels, and sort hard from soft kernels in lines where breeders are attempting to introduce scab resistant traits from soft wheat into hard wheat. This process is especially needed as the soft winter wheat germplasm with native resistance is currently some of the best winter wheat germplasm and there are no markers for the presumed QTLs.

We will improve our NIR calibration to enhance our ability to separate FHB infected kernels from healthy kernels. The current calibration was developed by visibly selecting damaged and healthy kernels and training the system to recognize those fractions. Thus kernels that are not visibly damaged but may have measurable DON may not be removed. To improve the calibration we will measure DON in specific kernels and use this value as in the calibration. A range of DON values including at least 100 kernels 0 to 100 ppm will be included in the calibration.

We will also work with breeders to evaluate current hard and soft lines that we have sorted into FHB infected and healthy fractions to determine if our sorting leads to heritable changes in the populations.

Finally, we will continue evaluating samples for the percentage of FHB infected kernels to aid breeders in rapidly screening samples for FHB resistance.