

PI: Esten Mason

PI's E-mail: esten@uark.edu

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ARS Agreement #: *NEW*

Research Category: VDHR-SWW

Duration of Award: 1 Year

Project Title: Development of FHB-Resistant Wheat Cultivars for the Midsouth.

PROJECT 1 ABSTRACT

(1 Page Limit)

The Arkansas Wheat Breeding Program has a strong history of developing wheat lines with a high level of resistance to Fusarium head blight (FHB). Notable lines identified in 2016 include ARLA06146E-1-4 which finished 2nd for grain yield in the SunWheat Nursery across six regional locations and is moderately resistant to FHB (avg. 19% severity) and ARLA07084C-10-1 which finished 5th for grain yield in the SunWheat Nursery across six locations and is moderately resistant to FHB (Avg. 16% severity). Breeder's seed of both were produced in 2016-2017. Overall, the Arkansas program had the 5th, 7th, 10th and 12th most resistant entries for DON accumulation in the 2016 USSN.

The specific objectives of this proposal are; 1) Develop and release high yielding, FHB resistant cultivars adapted to Arkansas and the mid-south, 2) Increase breeding efficiency through collaborative phenotyping, marker development and introgression of new genes using marker assisted selection (MAS) and genomic selection, and 3) Screen and report the reactions of breeding lines and currently grown commercial cultivars to FHB using misted inoculated nurseries.

To meet objective 1 and 2, 300-400 crosses or top crosses will be made each year which directly target FHB resistance. MAS will be used on the most promising populations that have known QTL with diagnostic markers (2DL, 3BS and 5AS_{Ning}, 3BSc, 5A_{Emie}) and new QTL (derived from Jamestown, Neuse and Bess). We will continue to evaluate new sources of resistance, in particular lines which have been developed through the USWBSI funded project "Double Haploids to Expedite Cultivar Development and Enhance FHB Resistance in SRW Wheat" that have 3+ known QTL/genes for resistance to FHB. All material will be evaluated for resistance in an inoculated, misted FHB nurseries at both Fayetteville and Newport for FHB incidence, severity, FDK and DON level (Objective 3). We continue to work on developing and improving our in house MAS pipeline in order to select for known QTL/genes more efficiently. In fall 2015, a graduate student began working on an association mapping and genomic selection project for FHB resistance within the Arkansas breeding program.

Future work will focus on releasing identified lines as varieties and a more targeted focus on introgression and pyramiding of genes and QTL for FHB resistance for continued development of resistant germplasm and cultivars.