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Project ID: FY18-DU-007

ARS Agreement #: *N/A*

Research Category: DUR-CP

Duration of Award: 1 Year

Project Title: Evaluation and Characterization of Einkorn Wheat Germplasm for Scab Resistance

PROJECT 2 ABSTRACT

(1 Page Limit)

The diploid einkorn wheat, including *Triticum monococcum* and *T. urartu* ($2n = 2x = 14$, AA genome), are ancestors of durum (*T. turgidum* subsp. durum, $2n = 4x = 28$, AABB) and bread wheat (*T. aestivum*, $2n = 6x = 42$, AABBDD). The einkorn wheat germplasm collections are useful sources of unique genes for resistance to several major diseases in wheat. In searching for useful sources of resistance to Fusarium head blight (FHB), the world core collections of einkorn wheat preserved in the major gene banks have been extensively evaluated for FHB resistance by several research groups around the world. A number of FHB-resistant accessions and a major resistant QTL (quantitative trait loci) have been identified from einkorn wheat. In the United States, approximately 1,276 einkorn wheat accessions (857 *T. monococcum* subsp. *aegilopoides*, 203 *T. monococcum* subsp. *monococcum*, and 216 *T. urartu* accessions) are maintained in USDA-ARS National Small Grain Collection (NSGC) in Aberdeen, Idaho. All these accessions have not been evaluated for FHB resistance. The overall goal of this project is to identify new sources of FHB resistance that can be used for improving durum wheat from these valuable germplasms. The specific objectives are to identify the einkorn accessions carrying FHB resistance by screening the einkorn wheat collection at USDA-ARS NSGC for reactions to FHB and to introgress the resistance to durum wheat. In the current FY17 funding period, we are screening all the accessions for Type II resistance in the greenhouse without replication. In the proposed project for FY18-19 funding period, we will further evaluate the accessions exhibiting an overall average of less than 30% disease severity using a randomized complete block design (RCBD) with three replications in greenhouse for two seasons and in field nurseries in two locations (Fargo and Prosper, ND) for two years. Meanwhile, we will initiate introgression of the resistance into durum wheat by crossing and backcrossing 2-3 einkorn wheat accessions having a high level of resistance with two new ND durum varieties 'Grano LCd' and 'Riveland LCd' and two new breeding lines D09555 and D111068. By implementation of this project, we expect that a number of FHB-resistant einkorn wheat accessions will be identified and will be utilized to develop adapted durum wheat germplasm for the U.S. durum breeding programs. Therefore, the outputs of this project meet the overall goal of the USWBSI.