

PI: Steven Xu**PI's E-mail:** Steven.Xu@ARS.USDA.GOV**Project ID:** FY18-SP-005**ARS Agreement #:** *N/A***Research Category:** VDHR-SPR**Duration of Award:** 1 Year**Project Title:** Identify and Introgress Scab Resistance from Synthetic Wheat into Spring Wheat**PROJECT 3 ABSTRACT**

(1 Page Limit)

Synthetic hexaploid wheat (SHW), derived from the hybrids between tetraploid wheat (*Triticum turgidum* L.) and *Aegilops tauschii* Coss., has been broadly used as a source of useful genes for improving modern wheat varieties for resistance to pests, pathogens, and abiotic stresses. We recently developed over 250 SHW lines using durum and other six tetraploid subspecies (*Triticum turgidum* subsp. *carthlicum*, *dicoccum*, *dicoccoides*, *polonicum*, *turgidum*, and *turanicum*). We are currently evaluating this set of SHW lines and their tetraploid parents for resistance to Fusarium head blight (FHB). So far, we have identified 13 SHW lines having the resistance level of the resistant check, 'Sumai 3', across different environments. Several FHB-resistant SHW lines including SW91 (Citr 14133/Ciae 26), SW93 (Citr 14133/PI 268210), SW183 (PI 191091/Ciae 26), and SW187 (PI 272527/Ciae 26) were derived from FHB-resistant *T. dicoccum* accessions Citr 14133, PI 191091, and PI 272527. The SHW lines derived from *Ae. tauschii* Ciae 26 and PI 268210 had average 21.7% and 17.3% of decreases, respectively, in FHB severities over their tetraploid parents. These results suggested that the three *T. dicoccum* accessions and two *Ae. tauschii* accessions may have quantitative trait loci (QTL) for FHB resistance. The objectives of proposed project are to identify and map the FHB-resistance QTL from these *T. dicoccum* and *Ae. tauschii* accessions and transfer the QTL into hard red spring wheat (HRSW) varieties by using the SHW lines. To identify and map the FHB-resistance QTL, a population of 190 recombinant inbred lines (RILs) previously developed from the cross between HRSW line ND495 and Largo (Langdon/PI 268210) will be used to map the FHB-resistant QTL from PI 268210 and a new RIL population will be developed by crossing SHW line SW91 and HRSW variety 'Wheaton'. For developing adapted HRSW germplasm, the FHB-resistant QTL in three SHW lines SW93, SW183 and SW187 will be transferred into three HRSW varieties 'Barlow', 'Vitpro', and 'Grandin' using backcross method assisted with disease evaluation and/or DNA markers. By implementation of this project, we expect that we will identify several new FHB-resistant QTL derived from *T. dicoccum* and *Ae. tauschii*, develop new PCR-based SNP markers linked to the QTL, and develop a number of adapted HRSW germplasm lines carrying the new QTLs that can be used in the HRSW breeding programs in the spring wheat region. Thus, the outputs of this project meet the overall goal of the USWBSI.