Project Abstract

Project Title:	Developing FHB Resistant Soft Red Wheat Cultivars for Maryland	
Principal Investigator:	Vijay Tiwari	University of Maryland College Park

Development and release of improved FHB resistant soft red winter wheat cultivars are critical to profitable wheat production for the growers and stakeholders in Maryland and the broader mid-Atlantic region. This proposal will combine several integrated approaches to speed up the development and release of improved FHB resistant wheat cultivars adapted to Maryland and the Mid-Atlantic environment. To accomplish the overall goals, three objectives are proposed:

1. Breeding soft red winter wheat adapted to the Mid-Atlantic environment with resistance to scab and increasing the adaptation of FHB resistant lines by the wheat growers in the Mid-Atlantic region.
2. Map and integrate new sources for FHB resistance into breeding germplasm and enhance the collaborations with regional breeders.
3. Evaluation of advanced MD lines in Uniform Scab nurseries, Maryland State Test and Uniform Regional Nurseries and release of improved MD cultivars.

This project will enable availability locally adapted soft red winter wheat cultivars with improved FHB resistance, good yield, and resistance to important diseases and insects for Maryland and broader mid-Atlantic wheat growers and stakeholders.

The project will include screening for scab resistance includes evaluating lines in the field and with genetic markers, as well as to find new sources of resistance using forward and reverse genetics screens of the mutant populations. Integration and pyramiding several known QTL including Fhb1, 5AS, 2DL, 1B, 6A, 1A, 4A, 2B, 3B, and 3BL into soft red winter wheat background will be performed using adapted and moderately resistant FHB lines. To speed up the germplasm development and reduce the generation time, we will employ Speed Breeding, double haploid production and genomics selection approaches. Bi-parental, 3-way/4-way crosses will be made between MD lines and the FHB resistance sources. Segregating populations will be evaluated and advanced to select adapted lines with improved FHB, high yield, and resistances against other biotic stresses. Our initial results have shown that combining QTL from Fhb1, 2DL, 5AS provide higher FHB resistance and increased grain yields. Excellent collaborative platforms are available through Southern VDHR group. MD wheat breeding program has joined ongoing collaborative efforts for enhancing the efficiency of the breeding programs to develop and release FHB resistant varieties and is collaborating with the SUNGRAINS, Virginia Tech, University of Kentucky, and the USDA Genotyping Center, NC.