Project Abstract

Project Title:	Manipulating a Conserved Susceptibility Factor for Developing FHB Resistant Wheat	
Principal Investigator:	Nidhi Rawat	University of Maryland

Genetic resistance is the most sustainable approach for managing Fusarium Head Blight (FHB) in wheat and barley. As most of the resistance genes are sourced from un-adapted germplasm, linkage drag and variable penetrance in different genetic backgrounds limits their deployment in cultivars. The goal of this project is to characterize and manipulate a conserved susceptibility factor present in wheat cultivars for enhancing their FHB resistance. The project builds-up on three-years of work done by PI Rawat (Chhabra et al. 2021), which mapped a susceptibility factor in the peri-centromeric region of wheat chromosome 7AS. In this project, we will fine-map and isolate the susceptibility factor using Radiation Hybrid (RH) mapping. Collaborator Vijay Tiwari is an expert on RH mapping and will be vital in the SF-7AS fine mapping. After fine mapping we will perform VIGS, TILLING, and genome editing to validate the gene function and utilize the loss-of-function variants to enhance the FHB resistance in wheat cultivars. In the fourth year, PI will test the lines in field conditions for yield evaluation and FHB resistance.

Specific objectives of this project are:

1. Fine mapping and isolation of 7AS susceptibility factor using RH mapping.
2. Validation of candidate genes using TILLING and Genome-editing.
3. Transfer of FHB resistant variants in wheat cultivars
4. Field Testing of the variant lines for yield evaluation.

Expected Outcome of this project is identification of a promising FHB susceptibility factor conserved across different wheat species and cultivars and its manipulation to improve the resistance of wheat cultivars. In Year-4 of the project, field analysis of the developed variants in a replicated trial will inform of any associated negative effects.

Approaches that will be used to accomplish project goal(s) within period of proposed work: We have developed a radiation hybrid population with multiple small deletions tiled across the mapped region. Currently, we are phenotyping the RH population in the greenhouse for fine mapping the susceptibility factor. Further, validation will be performed using VIGS, TILLING and gene editing approaches. Out of the three TILLING mutants will be directly usable in wheat breeding programs.