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Project Title: Identification and Deployment of Novel FHB Resistance QTL in Spring Wheat.

PROJECT 2 ABSTRACT

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In previous studies, we identified and mapped two major QTL for FHB resistance on 5A of PI 277012, a wheat line with a high level of resistance comparable to Sumai 3 but coming from a different source. Then, we generated 1052 recombinant inbred lines (F2:7) from the PI 277012/Grandin, and identified highly resistant and susceptible RILs for fine mapping of the FHB resistance QTL derived from PI 277012. SNP-markers closely linked to the two QTL have been identified and are being used in marker-assisted selection during introgression of the FHB resistance into adapted spring wheat cultivars. We also generated BC3F1 materials using Grandin and Wheaton as recurrent parents and PI 277012 as resistance donor. In this proposal, we will produce near-isogenic lines by backcrosses to Grandin and Wheaton and marker-assisted selection. In the meantime, we aim to identify novel QTL in PI 185843, another wheat line exhibiting a high level of FHB resistance but with different origin of resistance from known sources of FHB resistance. Therefore, the specific objectives of this project are to:

- 1) Introgress and pyramid the two major QTL for FHB resistance derived from PI 277012 into adapted spring wheat varieties through backcrosses and marker assisted selection.
- 2) Identify novel QTL for FHB resistance in PI 185843 by genotyping and phenotyping a population consisting of 200 recombinant inbred lines from the cross between PI 185843 and Wheaton.
- 3) Develop user-friendly DNA markers for the novel QTLs and deploy them in selection of FHB resistance in wheat breeding programs.

We will backcross the resistant BC3F1 materials to Grandin and Wheaton. The progenies will be subjected to marker selection and FHB evaluation. Two more cycles of backcrosses and selection will be conducted. Eventually, near-isogenic lines with the FHB resistance QTL from PI 277012 will be generated and provided to spring wheat breeders for variety development. To map the FHB resistance QTL in PI 185843, we will genotype the 200 recombinant inbred lines (F2:7) from the cross between PI 185843 and Wheaton using the 90K wheat SNP chips and phenotype them for reactions to FHB in greenhouse and field. Eventually, we will map the FHB resistance, develop PCR-based markers closely linked to the QTL, and introgress the QTL into ND spring wheat varieties by FHB testing and marker-assisted selection.