PI: Shaobin Zhong
PI's E-mail: Shaobin.Zhong@ndsu.edu

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PROJECT 2 ABSTRACT

(1 Page Limit)

In previous studies, we identified and mapped two major QTL for FHB resistance on chromosome 5A in PI 277012, a wheat line with a high level of resistance comparable to Sumai 3 but coming from a different source. Further fine mapping of the major QTL on 5AL has delimited it in a genomic interval of 1.2 Mb flanked by two SNP markers based on the reference genome of Chinese Spring. In the meantime, we attempted to identify novel QTL for FHB resistance in PI 185843, a Brazil cultivar (named Surpresa) exhibiting a high level of FHB resistance but with different origin from known sources. A mapping population consisting of 200 recombinant inbreed lines (F2:7) from the cross between PI 185843 and Wheaton have been phenotyped in one greenhouse season and one field experiment for FHB. Our overall goal is to characterize novel FHB resistance in spring wheat at both genetic and molecular levels. Therefore, the specific objectives of this proposal are to 1) clone and characterize the major FHB resistance QTL on chromosome 5AL in wheat line PI 277012, 2) identify novel QTL for FHB resistance in PI 185843, a Brazil wheat cultivar with a higher level of FHB resistance, and 3) develop user-friendly DNA markers for the novel QTLs and deploy them in selection of FHB resistance in wheat breeding programs. We will clone the major FHB resistance QTL in PI 277012 by map-based cloning approach. First, we will use PCR-based markers to screen a non-gridded BAC library constructed from PI 277012 and identify individual BACs to cover the 1.2 Mb genomic region carrying the FHB resistance QTL. The identified BACs will be sequenced by the PacBio sequencing method. Then, we will build up a BAC contig for the QTL region, identify, and characterize candidate genes for the FHB resistance. The RILs from the cross between PI 185843 and Wheaton will be genotyped using the 90K wheat SNP chips, the QTL for FHB resistance will be identified, and PCR-based markers closely linked to the QTL will be developed. Cloning and characterization of the gene/QTL for FHB resistance will facilitate our understanding the mechanisms of FHB resistance and accelerate the development of wheat varieties with improved FHB resistance by marker assisted selection and gene pyramiding. The improved germplasm and the DNA markers will be provided to the wheat breeders for developing FHB resistant varieties.