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(1 Page Limit)

The **goal** of this proposed research is to develop more precise markers for known major FHB-resistant QTLs. Genetic studies have mapped a few major FHB-resistant QTLs in wheat. However, markers developed for those QTL are of linkage indication at the best. Further more little is know about what genes are associated with the mapped QTLs and how they function. In our study of the molecular mechanism of FHB pathogenesis/resistance in wheat with microarray, we have revealed 677 genes that changed expression during FHB pathogenesis/ resistance and led to our conclusion that jasmonates (JA)/ethylene (ET) signaling pathways mediate the FHB resistance in wheat. Our **hypothesis** is that, at least, some of these FHB-associated the JA/ET-signaling-related genes we discovered are associated with or regulated by the mapped FHB-resistance QTLs and thus their DNA sequence can be used as more precise markers for the QTLs they are associated with. We will test our hypothesis in this proposed research by studying the expression of these FHB-associated genes and miRNAs in a near-isogenic pair for *QQfhb1* and a F<sub>2:8</sub> recombinant inbred population that was derived from the cross Sumai 3/Y1192-6. We plan to test our hypothesis in FY10/11 by realize the following two **objectives**: 1) associating known FHB-associated genes with known major FHB-resistant QTLs by functionally studying their differential expression in a pair of near-isogenic lines and 2) validating the candidate genes/miRNAs as markers to FHB resistance/susceptibility by assaying their expression in winter wheat lines/populations (e.g. the SD97060/Jagalene population) that are known to have the QTLs that the genes/miRNAs are associated with. The QTL-associated genes/miRNA also can be the foundation for dissecting FHB-resistance mechanism. This proposed research will develop novel, more precise, reliable markers to FHB resistance QTLs and thus contribute to the following priorities /activities identified by the HWW-CP for FY10-11: "Developing and evaluating FHB host gene resistance pyramids" and "Developing useful populations for identifying and mapping new FHB resistance QTLs." Therefore, this proposed research would help the HWW-CP realize the following VDHR objectives: "Increase efficiency of individual breeding programs to develop and release FHB resistant varieties" and "Develop new breeding technologies and germplasm to further enhance short term and long term improvement of FHB resistance and to efficiently introgress effective resistance genes into breeding germplasm".