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PROJECT 2 ABSTRACT
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Germplasm is the foundation of the breeding for FHB-resistant varieties. Through USWBSI's efforts, materials with promising FHB resistance have been selected and used in breeding. Nevertheless, these studies have provided no information about the novelty of these newly identified FHB resistance sources. We do not know if they contain novel resistance genes or the same resistance genes we are using in our breeding programs. Genetic analysis is necessary to answer this question. However, conventional genetic analysis requires segregating populations between Sumai 3 (the currently most used FHB-resistance source) and the newly identified FHB resistance sources. Obviously, this task is very time- and resource-consuming. Molecular study can help ease the difficulty. In the FY2003 grant period, we conducted SSR fingerprinting of 94 newly identified FHB resistance sources from USDA germplasm collection. The data we obtained through this study warrant further exploration into the novelty of the newly identified FHB resistance sources with more precise molecular tools, particularly for those accessions that are genetically distinct from Sumai 3. Therefore, we'd like to carry out our novelty study further in FY2004 by comparing gene expression profiles of the newly identified FHB resistance source with those of Sumai 3. Particularly we will focus our work on accession Abura from Brazil. Abura is a Brazilian landrace that has shown similar low FHB index as Sumai 3 and is geographically distant from East Asia where Sumai 3 came from. Therefore, it is highly possible that Abura contains major FHB resistance QTLs other than *Qfhs.ndsu-3BS*. Our objective for this grant period is to construct subtractive FHB-resistance-related cDNA libraries for Abura and Sumai 3 for functional genomic confirmation of the novelty of the FHB resistance in Abura, which is to follow. Identifying the novelty of the newly selected FHB resistance sources is needed to avoid unnecessary efforts of incorporating duplicated FHB resistance genes into varieties. Broadening our FHB resistance sources will not only strengthen our ability to control FHB epidemics but also reduce risk of the potential disaster caused by a sudden lose of Sumai 3-derived FHB resistance. Achieving the goal of this project will determine the novelty of the FHB resistance of Abura. It also will result in cDNAs that are associated with the newly identified FHB resistance studied. These cDNAs will be the foundation for marker development and gene isolation. Therefore, this proposed project will help achieving the following USWBSI's goal set for the Germplasm Introduction and Enhancement research area: "Genetic analyses of newly identified and/or acquired sources of resistance"; and the following goals set for the Biotechnology research area: "Map new and/or novel sources of resistance genes in wheat and barley germplasms" and "Characterize molecular mechanisms of host-pathogen interactions and identify potential resistance/virulence genes".