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PROJECT 2 ABSTRACT

(1 Page Limit)

Fusarium graminearum Schwabe (teleomorph *Gibberella zeae* (Schwein.), the pathogen known to cause Fusarium head blight (FHB) or scab, is an increasingly important problem for wheat production in the North-Central United States. Host plant resistance provides the most economical solution to this problem and the identification of different sources of resistance and their incorporation into adapted wheat varieties is critical to continued improvement in FHB resistance in winter wheat. Combining various sources and types of resistance to FHB is expected to generate lines with higher levels of resistance, more effective resistance under high inoculum loads, and/or varieties in which resistance is more stable over broad geographic areas. The efficiency of using molecular markers to combine these sources is well documented but is limited by the identification of markers associated with genetically different sources of type II resistance and by the lack of markers associated with known sources of type I resistance, low DON and kernel quality retention. Truman soft red winter wheat was developed and released by the University of Missouri in 2003. It is among the best sources of FHB resistance in US winter wheats combining good levels of types I and II resistance with low DON and good kernel quality retention under disease pressure. The type II resistance in Truman is comparable to that in Sumai 3 but appears to be conditioned by different genes based on genetic diversity and haplotype information. The type I resistance in Truman is better than that in Sumai 3 and thus it is expected that we will advance knowledge in the area of type I resistance by mapping type I resistance in this population. Markers associated with low DON and kernel quality retention are limited and thus, this population would add to those markers and at the same time, establish any linkages that may exist between genes for these two types of resistance and type I field resistance. The objectives for this research are: to identify QTL associated with types I and II resistances as well as low DON and kernel quality retention under FHB disease pressure in a set of 239 F_8 recombinant inbred lines developed from the cross Truman/MO 94-317. Field phenotyping will be done in collaboration with Drs. Sneller (Ohio State), Ohm (Purdue) and Van Sanford (University of Kentucky). MO 94-317 is a highly inbred (in excess of F_{15}), highly susceptible (type II FHBI = 80-90%; field FBHI = incidence x severity ranges from 60-80%) breeding lined developed in the MU wheat breeding program. It served as our susceptible parent in a mapping population developed with Ernie and serves as the susceptible check in both the Missouri greenhouse and field nurseries. During this research project, we expect that we will identify QTL associated with all four types of resistance in Truman. Given haplotype results, we anticipate that we may identify QTL that differ from those in Sumai 3 and perhaps other known sources of resistance.