Project Abstract

Project Title:	Breed FHB resistant hard winter wheat cultivars and germplasm via doubled haploid	
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This proposal fits objective 2 of the HWW-CP priorities. *Fusarium* damaged kernels (FDK) and Deoxynivalenol (DON) are mainly controlled by quantitative trait loci (QTL) with minor effects in locally adapted hard winter wheat (HWW) cultivars. Traditional breeding techniques based on bulk selection with one generation per year for HWW are slow and not very effective when pyramiding multiple genes. The PI has established and integrated DH procedures into TAMU wheat breeding and genetic research. We have developed more than 3,000 DHLs in the past three years using established procedures and customized facility for wheat-maize pollination, haploid embryo dissection and culture, chromosome doubling, etc. The soft winter wheat (SWW) and barley breeding programs in the U.S. have successfully integrated DH in the development of FHB resistant cultivars and germplasm lines using publicly available resources. It is important to integrate the DH in HWW regions to shorten the breeding cycles and increase genetic gains in developing low FDK and DON wheat.

With 20 seeds from each cross, we plan to produce a total of 1,000 lines (4 programs * 2 crosses each program * 125 lines per cross or more breeding programs with 1-2 crosses) in the first year. Seeds of DHLs will be increased and distributed to the participants. Pure lines with
FHB resistance confirmed by both gene/loci-linked markers and phenotypic evaluation can be integrated into their breeding pipelines, especially those with low FDK and DON. Novel major FHB resistance QTL in DHL populations may be identified. Markers linked to QTL can be developed and used to introgress the new major loci in the following year by the breeders or geneticists. Graduate and undergraduate students will be trained on DH procedures. Farmers will get benefit from planting FHB resistant HWW cultivars.