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Project Title: Developing FHB-resistant Hard Red Winter Wheat for Texas and the S. Great Plains

PROJECT 1 ABSTRACT

(1 Page Limit)

Texas is one of the largest hard red winter wheat (HRW) growing states, where five million acres of HRW have been planted annually over the past 5 years. In 2015 and 2019, western Kansas, Oklahoma, and the Texas Panhandle reported *Fusarium* Head Blight (FHB) in the commercial wheat crop, likely due to an increase in corn acres in the wheat rotation. The 2015 Texas Uniform Variety Trial (UVT) at Sunray, TX was planted into corn residue, a common commercial practice, resulting in significant levels of FHB. In that trial, TAM 112 and two TAM 112 derived breeding lines averaged less than 5% disease (incidence x severity) while many popular varieties averaged over 50%. With this information, Texas A&M began a fledgling FHB breeding program and we are now ready to expand our efforts. The **overarching goal** of this proposal is to use traditional breeding techniques and marker-assisted selection (MAS) to develop FHB-resistant HRW cultivars adapted to Texas and the Southern Great Plains. **Our specific objectives** are to 1) develop, screen, and release HRW that combine superior yield and end-use quality with tagged or native FHB resistance, 2) use MAS to complement traditional breeding methods and improve gain from selection, and 3) enter promising FHB-resistant lines into regional nurseries to facilitate development of resistant cultivars. New FHB-resistant HRW cultivars with high yield, tolerance to other stresses, and superior quality will provide **effective means of resistance not only in Texas but in other areas of the central and southern Great Plains** where TAM wheat is adapted and where FHB levels require adequate host plant resistance. This proposal addresses **Research Priorities** 1) Increase and document cultivars with known improved FHB resistance; 2) Increase efficiency of coordinated project breeding programs and, 3) Evaluate and implement new breeding technologies and germplasm. **First year's efforts will be accomplished within the period of proposed work**, and will focus on testing recent releases and most advanced breeding lines in the Regional Hard Winter Wheat FHB nurseries and establishing FHB screening nurseries in Texas. Advanced lines represented by the Texas Elite Trial (TXE), UVT, Southern Regional Performance Nursery (SRPN), and Northern Regional Performance Nursery (NRPN) will be evaluated in a misted, inoculated nursery at College Station, TX and a pivot-irrigated nursery planted into heavy corn residue in the Texas Panhandle. **Future work** will expand to include screening of doubled-haploid lines from populations with known tagged and native FHB resistance.