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Project Title: Breeding and Genomics of FHB Resistance in Soft Red Winter Wheat.

PROJECT 1 ABSTRACT

(1 Page Limit)

This project will deploy both conventional methods and DNA technologies to accelerate progress in breeding and genetics research on Fusarium head blight (FHB) resistance. DNA markers associated with diverse types of FHB resistance will be identified and used to select, combine and enhance FHB resistance in wheat. Marker assisted selection (MAS) and breeding strategies using newly identified DNA markers and known diagnostic markers for major genes (QTL) conferring resistance from diverse genetic backgrounds will be used in genetic characterization and selection of parents, progeny and pure lines to implement pyramiding of QTL conferring complementary types of FHB resistance. Several adapted native sources of FHB resistance including the soft red winter wheat varieties Massey, VA00W-38 (VA91-54-343 / Roane"S") and Ernie will be further characterized in genetic mapping studies to identify diagnostic DNA markers for known and novel FHB resistance QTL and genes. Newly available and validated DNA markers tightly linked to major QTL on wheat chromosomes 2B, 3AS, 3BS, 3Bc, 4B, 5AS, and 6BS will be used to select lines and progenies having the desired resistance genes in breeding populations comprised of wheat parents such as Ning7840, Ernie, Freedom, Goldfield, Neuse, Frontana, Roane, Renwood 3260, Tribute, and VA00W-38. These DNA markers as well as those for other critical traits, such as resistance to other endemic diseases and insects, will be used to simultaneously enrich 17 early generation breeding populations for resistance to FHB and other traits mandatory for cultivar release. Promising lines will be evaluated in local, state, regional and uniform nurseries and yield trials as well as in FHB screening nurseries. These studies will facilitate more efficient deployment and selection of specific genes conferring different types of FHB resistance, and will result in the release of FHB resistant cultivars and germplasm. Experiments also will be conducted to determine best management practices for controlling FHB including use of resistant cultivars and fungicides. Results from these studies will provide stakeholders including seedsmen, growers, crop consultants, extension specialists, millers and bakers, and ultimately consumers with a more economical and safer food supply.