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Project Title: Improvement of Soft Winter Wheat for Resistance to Fusarium Head Blight.

PROJECT 2 ABSTRACT

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Fusarium head blight (FHB) is a devastating disease of winter wheat in Indiana and adjacent regions. This immediate and severe threat to wheat production warrants accelerated breeding research including efficient selection technologies with the goal of combining enhanced resistance to FHB with superior agronomic performance, grain milling and baking qualities, and resistance to other important biotic and abiotic stresses.

Objectives of this research are to:

1) develop soft winter wheat cultivars that have low-FHB incidence and/or type II resistance and that are adapted in Indiana, 2) phenotype and genotype lines with combinations of FHB resistance QTLs to verify preliminary results of enhanced resistance, and 3) verify which of several F₄ lines are recombinants having Qfhs.ndsu-3BS in coupling with *Sr2*; and identify lines having *Stb2* in coupling with QSng.sfr-3BS.

Populations and lines from crosses between elite and moderately adapted parent lines to pyramid multiple FHB resistance QTLs and other important disease resistance and performance traits will be screened. Testing of lines and populations will be carried out in the greenhouse for certain specific traits and in multiple locations in Indiana under conditions that enhance disease establishment, including seeding in disced corn residue, misting, and point and spray inoculation, to generate reliable phenotyping of wheat lines in the breeding program. DNA markers already identified that are associated with specific FHB resistance QTLs will be used to genotype wheat lines with single or multiple resistance factors to augment/verify phenotyping.

Resistance loci that condition resistance to four globally important diseases; FHB, stem rust, Septoria leaf blotch, and nodorum leaf and glume blotch, are closely linked in repulsion phase on wheat chromosome 3BS. We will verify putative recombinant lines having Qfhs.ndsu-3BS and *Sr2* in coupling; and we will phenotype an F₂ population and selected F₃ families to identify lines having *Stb2* and QSng.sfr-3BS in coupling phase.