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Project Title: Characterization and Pre-Breeding of Novel Fusarium Head Blight Resistance Sources.

PROJECT 1 ABSTRACT

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Through systematic field and greenhouse screening of the USDA spring wheat germplasm, we have selected a large set with FHB resistance. Those selections compose a diversified FHB resistant gene pool based on origin, pedigree, and differences in field and greenhouse Type II test results. The best novel FHB resistant lines are being deployed into breeding programs, and lines at variable breeding stages have been developed. However, the utilization of the selections is not satisfactory due to the lack of adequate information on the novelty, and the multiple generations of recombination and selection necessary to introgress the FHB resistance. The objectives of this proposal are to:

1) Characterize identified sources of FHB resistance in spring wheat by evaluating the types of resistance and by haplotyping with DNA markers linked to resistance QTL.
2) Introgress and pyramid novel sources of FHB resistance into an adapted spring wheat background.
3) Identify germplasm with high levels of FHB resistance using multi-environment field-based screening.

Accessions identified as highly resistant to FHB after three years of field testing will be characterized for Type II reaction in greenhouse point inoculation tests. The newly identified FHB resistant germplasm from this funding period and the putative sources of resistance identified prior to this funding period (about 80 lines) will be genotyped with DNA markers closely linked to FHB resistant QTL.

The best resistant PIs will be used as pre-breeding parents. The priority will be given to putative novel resistant sources, i.e. lines with strong Type I resistance but weak Type II resistance or lines with Type II resistance without the *Fhb1* (Syn. *Qfhs.ndsu-3BS*) or 5AS genes. The best two FHB resistant selections will be crossed with the moderately resistant cultivar Alsen, and FHB susceptible spring wheat cultivar Wheaton. The agronomically best, FHB resistant RILs will be selected, genotyped with FHB QTL markers as appropriate, and backcrossed to their respective recurrent parents. FHB resistant RILs derived from the second round of crossing will be released as new germplasm.