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Fusarium head blight (FHB) has caused significant economic losses for wheat production in the United States and threatened the safety of wheat grains for human and animal consumption. Effective measures need to be developed to control this devastating disease in wheat as quickly as possible. Host resistance has been the most practical and effective means to manage diseases in crops. However, lack of effective resistance sources to FHB has hindered development of wheat cultivars highly resistant to this disease. Relatives of wheat represent an invaluable gene pool for wheat improvement. A number of genes conferring desirable traits, such as disease and insect resistance and tolerance to adverse conditions, have been identified from alien species and transferred to wheat. We have selected 31 resistant wheat-alien species derivatives as sources of resistance for gene transfer based on their reaction to the spread of FHB infection (Type II) and agronomic characteristics. This project will characterize chromosome constitutions of these resistant derivatives using C-banding and fluorescent genomic *in situ* hybridization (FGISH). Meanwhile, we will continue making efforts to eliminate unwanted alien chromatin from these derivatives and to induce wheat-alien chromosome translocations via chromosome manipulation. This will allow for identification of alien chromosomes carrying FHB resistance genes and production of wheat-alien chromosome translocation lines that are resistant to FHB and do not carry a significant linkage drag. The ultimate goal of this project is to allow wheat to gain novel resistance genes from relatives of wheat and enhance resistance of wheat to FHB. The specific objectives of this project are to:

- 1) Characterize chromosome constitutions of the wheat-alien species derivatives resistant to FHB;**
- 2) Eliminate unwanted alien chromatin from the wheat-alien species derivatives resistant to FHB;**
- 3) Develop breeder-friendly germplasm lines resistant to FHB.**

Accomplishment of this project will provide breeders an access to the alien resistance genes in the relatives of wheat. Pyramiding of the alien resistance genes and the resistance genes currently existing in wheat will enhance resistance of wheat and make the resistance of wheat to FHB more durable.