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Project Title: Enhancing Resistance to Fusarium Head Blight in Wheat Using Alien Species.

PROJECT 2 ABSTRACT
(1 Page Limit)

Fusarium head blight (FHB) has caused significant economic losses for wheat and barley production in the United States and threatened the safety of wheat and barley grains for human and animal consumption. Effective measures need to be developed to control FHB in wheat and barley as quickly as possible. Host resistance has been the most practical and effective means to combat diseases in plants. However, lack of effective resistance sources to FHB has hindered the development of cultivars highly resistant to the disease. Extensive efforts have been made to identify sources of FHB resistance within common wheat (*Triticum aestivum* L.) and durum wheat (*T. turgidum* L.). Relatively little research has been done to identify novel sources of FHB resistance from relatives of wheat and utilize the resistance to develop wheat cultivars within the U.S. Wheat and Barley Scab Initiative. The ultimate goal of this research project is to allow wheat to gain novel resistance genes to FHB from relatives of wheat and enhance resistance of wheat to FHB. The specific objectives of this project are to:

- 1) Identify novel sources of FHB resistance from wheat-alien species derivatives.**
- 2) Determine chromosome constitutions of the wheat-alien species derivatives resistant to FHB.**
- 3) Develop wheat lines that are resistant to FHB and carry least alien chromatin.**

We have identified over 100 wheat-alien species derivatives showing resistance to FHB and have been producing and collecting more wheat-alien species lines. This project will continue screening wheat-alien species derivatives for resistance to FHB and identify novel sources of the resistance. In the meantime, this project will analyze chromosome constitutions of the wheat-alien species derivatives identified to be resistant to FHB using molecular cytogenetic techniques and eliminate unwanted alien chromosomes in the resistant derivatives through chromosome manipulation. This will allow for identification of alien chromosomes carrying FHB resistance genes. The alien chromosomes carrying FHB resistance genes will be manipulated to reduce linkage drag and wheat lines carrying novel FHB resistance genes will be developed. Both conventional and molecular cytogenetic techniques, such as C-banding and fluorescence *in situ* hybridization (FISH), will be used to characterize and manipulate wheat and alien chromatin in this project. Accomplishment of this project will result in production of wheat lines carrying novel FHB resistance genes. Pyramiding of the novel resistance genes identified from wild species with the resistance currently existing in wheat will enhance FHB resistance of wheat and make the resistance of wheat to FHB more durable.