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Project Title: Identify and Develop Durum Wheat Resistant to Fusarium Head Blight.

PROJECT 2 ABSTRACT

(1 Page Limit)

Durum wheat is very susceptible to Fusarium head blight (FHB) caused by the fungus *Fusarium graminearum* Schwabe (telomorph *Gibberella zeae* (Schw.) Petch. Fungicides may reduce the disease, but the most environmentally safe and economical way to control the disease is with genetic resistance. Breeding FHB resistance is a major strategy for reducing the impact of FHB on durum wheat. However, lack of good resistance resources in durum wheat has hindered the development of FHB resistant durum wheat varieties. Although the recently released cultivars Divide (2005), Alkabo (2005), Grenora (2005), and Belzer (1997) have less disease severity and DON levels than the older cultivars, the level of resistance in these cultivars is much lower than that found in hexaploid wheat germplasm. Attempts to introduce resistance genes from FHB resistant hexaploid wheat varieties such as Sumai 3 and its derivatives have been challenging because of genetic linkage drag of undesirable traits and other complex issues. Therefore, identification of a high level of FHB resistance resources in durum wheat germplasm has become a number one priority. In the past years, approximately 8000 durum accessions from worldwide collections have been screened for reactions to Fusarium head blight (FHB), but only a small number of accessions were found to be moderately resistant. Screening other durum sources for a higher level of resistance is needed. There are 15,000 accessions at ICARDA that should be screened for FHB resistance. To date we have screened 3,000 accessions from ICARDA in Hangzhou, China and after several screening 17 accessions were identified to have less than 30% disease severity. These lines will be reevaluated in 2010 greenhouses and FHB field screening nursery at Carrington, Langdon, and Prosper ND. Selected lines will haplotyped and crosses will be initiated with the novel sources of resistance.

Our overall goal is to screen the ICARDA durum wheat germplasm in order to identify good resistance sources of durum wheat and ultimately introgress the resistance genes into the cultivated durum wheat varieties to reduce the threat of the FHB disease. Therefore, the specific objectives of this project are:

- 1) Screen diverse durum accessions from ICARDA for reaction to FHB in a FHB screening nursery located at Hangzhou, China
- 2) Re-evaluate the accessions exhibiting high levels of resistance in the preliminary screening test in the greenhouse and field in North Dakota
- 3) Make crosses using the resistant lines and distribute them to durum wheat breeders
- 4) Determine whether the new sources of resistance carry novel resistant loci by marker haplotyping for 3BS and 3AS regions.

This is a joined project (FY10-DU-002) with Dr. Shaobin Zhong. The Co-PI (Shaobin Zhong) will assist in screening the germplasm for FHB resistance (Objectives 1 and 2) and the PI (Elias Elias) will haplotype and incorporate the FHB resistance identified into his breeding program (Objectives 3 and 4). The proposed research addresses the following research priorities in the Action Plan: increase efficiency of individual breeding programs to develop FHB resistant varieties, and efficiently introgress effective resistance genes into breeding germplasm.