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Project ID: FY14-DU-008

ARS Agreement #: 59-0206-4-010

Research Category: DUR-CP

Duration of Award: 1 Year

Project Title: Identify Sources of Resistance to Fusarium Head Blight in Durum Wheat.

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 zea* (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 cultivars. Although the recently released cultivars Divide (2005), Alkabo (2005), Grenora (2005), Tioga (2010), Carpio (2012), and Joppa (2013) 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 8,000 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 4,527 accessions from ICRADA in Nanjing, China and after several screening three accessions were identified to have less than 30% disease severity. In 2013, 1,000 accessions were sent Jiangsu Academy of Agricultural Sciences, Nanjing, China to be screened for FHB resistance. Accessions with less than 30% disease severity will be re-evaluated in greenhouse and field screening nurseries in North Dakota. Resistant accessions will be haplotyped in collaboration with Dr. S. Chao at the USDA-ARS genotyping center in Fargo, ND. Accessions with novel resistance will be crossed to adapted cultivars and experimental lines. A new set of 1,000 accessions will be screened for FHB resistance in 2014 and 2015 Nanjing, China.

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 Nanjing, 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) Determine whether the new sources of resistance carry novel resistant loci by marker haplotyping for 3BS, 6B, 5A, and 3AS regions.
- 4) Pre-breeding: make crosses using the resistant lines and distribute them to durum wheat breeders.