USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY08 Final Performance Report (approx. May 08 – April 09)
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Cover Page

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Fiscal Year:	2008
USDA-ARS Agreement ID:	59-0790-4-098
USDA-ARS Agreement Title:	Identify and Develop Durum Wheat Resistant to Fusarium Head blight.
FY08 USDA-ARS Award Amount:	$ 135,436

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
DUR-CP	Develop Durum Wheat Resistant to Fusarium Head Blight.	$92,034
DUR-CP	Identify Sources of Resistance to Fusarium Head Blight in Durum Wheat.	$ 43,402
	Total Award Amount	**$ 135,436**

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Principal Investigator Date

* MGMT – FHB Management
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
BAR-CP – Barley Coordinated Project
HWW-CP – Hard Winter Wheat Coordinated Project
VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
SPR – Spring Wheat Region
NWW – Northern Winter Wheat Region
SWW – Southern Sinter Wheat Region

Project 1: *Develop Durum Wheat Resistant to Fusarium Head Blight.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

Fusarium head blight (FHB) caused by the fungus *Fusarium graminearum* Schwabe (telomorph *Gibberella zea* (Schwein.) Petch. has been seriously attacking durum wheat. Since 1993, it is estimated that FHB has cost over $3 billion in direct and indirect losses in North Dakota. Although fungicides may reduce FHB, using genetic resistance is the most environmentally safe and economical way to control the disease. The objective of this project is to incorporate identified sources of resistance into the currently susceptible durum wheat germplasm in order to develop resistant cultivars.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

Accomplishment:

The cultivar Divide that have some level of resistance to FHB is gaining acreages in North Dakota.

- ***Sumai , Wangshuibai, and Tunisian sources of resistance:***

- 8 lines were evaluated in the Uniform Regional Nursery
- 2 lines were evaluated in the Elite Advanced Yield Trials
- 86 lines were evaluated in the Advanced Yield Trials
- 985 lines were evaluated in the Preliminary Yield Trials
- 44 populations were screened in the field and greenhouses
- 36 new population were developed

Impact:

The above developed material is the only known improved durum germplasm with Fusarium head blight resistance. This germplasm is vital for the survival of the Midwest durum producers. Since the Midwest produces over 75% of the US durum, this germplasm has a major impact on the pasta industry and the US economy. Divide, based on its FHB resistance and yield advantage it could replace up to 30% of the acreage of the current grown cultivars in the Midwest which would generate millions of dollars into the economy.

Project 2: *Identify Sources of Resistance to Fusarium Head Blight in Durum Wheat.*

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

Durum Wheat is very susceptible to Fusarium head blight (FHB) caused by the fungus *Fusarium graminearum Schwabe* (teleomorph *Gibberella Zeae* (Schw.) Petch. Sources of resistance to FHB in durum wheat that are equivalent to the Chinese spring wheat Sumai 3 are not available yet. Our objective is to identify sources of resistance that can be utilized by durum plant breeders to develop FHB resistant cultivars. To date we have screened all the durum wheat accessions in the National small grain Collection, Aberdeen, ID. There are 15,000 durum wheat accessions at the International Center of Agricultural Research in the Dry Areas (ICARDA) and International Maize and Wheat Improvement Center (CIMMYT). We are in the process of evaluating these accessions in field nurseries in China and greenhouses in North Dakota.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

Accomplishment:

- To date we have evaluated 3,000 accessions from ICARDA. After several evaluations in the field and greenhouses four accessions maintained disease severity less than 30%. These accessions will be used as parents in crosses.
- Nine hundred seventy-nine new accessions were evaluated in China. Of these 75 accessions were selected and evaluated for the second time in the greenhouse. Of the 75 accessions 55 were selected for further FHB evaluations in the field and the greenhouse.
- Ten lines from crosses with Tunisian lines were selected from Advanced Yield Trials to be evaluated in Elite Advanced Yield Trials.
- The diversity study on the Tunisian lines was completed. Tunisian 7 appears to be significantly different than Tunisian 18, 34, 36, and 108. A preliminary study to haplotype these sources of resistance indicated that these sources of resistance are different from Sumai #3 and *T. dicoccoides* 3A. Additional studies are needed to confirm these findings.

Impact:

Any resistant germplasm that is identified above could potentially lead into the development of FHB resistant durum cultivars. Resistant durum cultivars will generate million of dollars to the farm economy in the Midwest and will insure the stability of the durum industry in the United States.

Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

None

If your FY08 USDA-ARS Grant contained a VDHR-related project, include below a list all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance. If this is not applicable (i.e. no VDHR-related project) to your FY08 grant, please insert 'Not Applicable' below.

No cultivars or germplasm were released in FY08.