

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY09 Final Performance Report
July 15, 2010**

Cover Page

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Fiscal Year:	2009
USDA-ARS Agreement ID:	59-0206-9-061
USDA-ARS Agreement Title:	Identify and Develop Durum Wheat Resistant to Fusarium Head Blight.
FY09- USDA-ARS Award Amount:	\$ 135,575

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.	\$ 43,541
	Total Award Amount	\$ 135,575

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
 DUR-CP – Durum 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. The acreage of Divide increased from 7.6 % in 2008 to 20.6% in 2009 of the total durum acreage in North Dakota.

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

- 8 lines were evaluated in the Uniform Regional Nursery
- 21 lines were evaluated in the Elite Advanced Yield Trials
- 84 lines were evaluated in the Advanced Yield Trials
- 790 lines were evaluated in the Preliminary Yield Trials
- 90 populations were screened in the field and greenhouses
- 31 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 70% 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 and current grown acreage will generate additional 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 3,526 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 522 accessions were selected and to be evaluated for the second time in the greenhouse.
- Seventy-five ICARDA lines that were selected in the 2008 were further evaluated in The 2009 Prosper Scab Nursery. Fifteen of these lines were selected and further evaluated in the 2010 spring greenhouse. Of these three were selected and are currently grown in Langdon as observation head rows and for making crosses next fall.
- Nine lines from crosses with Tunisian lines were selected from Advanced Yield Trials to be evaluated in Elite Advanced Yield Trials.
- One hundred-seventeen lines from crosses with Tunisian lines were evaluated in preliminary yield trials in 2009.

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.

FY09 (approx. May 09 – May 10)

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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.

None

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