

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY06 Final Performance Report (approx. May 06 – April 07)
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Cover Page

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USDA-ARS Agreement ID:	NA
USDA-ARS Agreement Title:	Fusarium Head Blight Research.
FY06 ARS Award Amount:	\$ 25,483

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Award Amount
HGR	Identification and Utilization of Scab Resistance in Tetraploid Wheat Germplasm.	\$ 25,483
	Total Award Amount	\$ 25,483

Principal Investigator

Date

* CBCC – Chemical, Biological & Cultural Control
 EEDF – Etiology, Epidemiology & Disease Forecasting
 FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
 GET – Genetic Engineering & Transformation
 HGR – Host Genetics Resources
 HGG – Host Genetics & Genomics
 PGG – Pathogen Genetics & Genomics
 VDUN – Variety Development & Uniform Nurseries

Project 1: Identification and Utilization of Scab Resistance in Tetraploid Wheat Germplasm.**1. What major problem or issue is being resolved and how are you resolving it?**

Durum wheat (*Triticum turgidum* L. subsp. *durum*) is an important cereal crop for making pasta products. Since the 1990s, durum wheat production in the United States has been seriously threatened by epidemics of Fusarium head blight (FHB). The progress in developing FHB-resistant durum wheat cultivars has been hindered by a lack of effective sources of resistance in durum wheat. In this project, we tried to identify resistance sources within the primary gene pool of durum wheat and then transfer the resistance to the durum cultivars adapted to the Northern Great Plains. To identify useful sources of FHB resistance for durum wheat breeding, we evaluated approximately 413 *T. t. dicoccum* and *T. t. turgidum* accessions in one greenhouse season using a non-replicated experiment. We then selected 120 accessions with putative Type II resistance for evaluation using a randomized complete block design with three replicates in the 2nd season in the greenhouse and field nurseries in two locations. We have hybridized five FHB-resistant *T. t. carthlicum* accessions and four *T. t. dicoccum* accessions, which were previously (2005) identified to be resistant to FHB, with four major ND durum cultivars: Ben, Lebsock, Mountrail, and Maier. The F₁ hybrids have been used for doubled haploid (DH) production and have also been backcrossed once to the durum cultivars. The BC₁ individuals are being advanced towards BC₁F₅ generation and the DH lines are being increased and evaluated for FHB resistance.

2. List the most important accomplishment and its impact (how is it being used?). Complete all three sections (repeat sections for each major accomplishment):

Accomplishment: Evaluation data showed that 18 *T. t. dicoccum* accessions exhibited consistent Type II resistance to FHB. For developing FHB-resistant durum germplasm, approximately 591 BC₁F₃ and 500 DH lines have been developed from the F₁ hybrids of five *T. t. carthlicum* and four *T. dicoccum* accessions with ND durum cultivars. A preliminary evaluation on 132 of the DH lines in one greenhouse season showed that seven DH lines were resistant or moderately resistant to FHB.

Impact: This study is a continuation of the effort to search for sources of FHB resistance that can be used in durum wheat breeding. The newly-identified 18 FHB-resistant *T. t. dicoccum* accessions may be utilized to enhance FHB resistance of durum wheat. The seven DH lines with putative Type II FHB are potential new durum germplasm with FHB resistance.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

The part of results was presented in the 2006 USWBSI Alien Introgression Workshop. Durum wheat breeders showed strong interest to use the resistant tetraploid wheat accessions in their breeding programs. Introgression of the FHB resistance from *T. t. carthlicum* and *T. t. dicoccum* to major ND durum cultivars is currently being conducted in a close collaboration with the ND durum wheat breeder.

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.

Xu, S.S., R.E. Oliver, X. Cai, T.L. Friesen, S. Halley, R.W. Stack, and E.R. Elias. 2006. Identification and utilization of FHB resistance in tetraploid wheat germplasm. *In: The USWBSI Alien Introgression Workshop, August 14, 2006.* North Dakota State University, Fargo, ND.

Oliver, R.E., X. Cai, T.L. Friesen, S. Halley, R.W. Stack, and S.S. Xu. 2007. Evaluation of Fusarium head blight resistance in tetraploid wheat (*Triticum turgidum* L.). *Crop Sci.* 47 (in press).