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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Fiscal Year:	2006
USDA-ARS Agreement ID:	58-0790-5-078
USDA-ARS Agreement Title:	Screening and Developing Wheat Germplasm with Resistance to Scab.
FY06 ARS Award Amount:	$ 21,275

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Award Amount
VDUN	Screening and Developing Wheat Germplasm with Resistance to Scab.	$ 21,275
	Total Award Amount	**$ 21,275**

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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: *Screening and Developing Wheat Germplasm with Resistance to Scab.*

1. What major problem or issue is being resolved and how are you resolving it?

The major problem being addressed is the need to develop rapidly and effectively host resistance to scab (Fusarium Head Blight) from exotic sources into adapted soft red winter wheat (SRWW) germplasm. The approach to address this problem is to backcross, and to three-way cross the Sumai 3 allele and other exotic resistance alleles into adapted SRWW lines and varieties. Marker-assisted selection (MAS) is being used to rapidly incorporate Sumai 3 (from Ning7840) resistance into SRWW lines such as McCormick, that have wide adaptation in the Southern and Eastern US wheat growing regions and moderate resistance to scab. Over 400 Backcross 2 F1 seedlings were screened for SSR markers at the USDA in Raleigh (NC) in collaboration with Dr. Gina Brown-Guedira at that National Genotyping Center. Of these, a single BC2F1 plant was selected that had Ning7840 alleles at the 3BS, 5A and 2DL genomic regions. 340 F2 progenies are being screened in the summer of 2007, selected homozygous BC2F3s will be planted in the field in the fall of 2007. Additionally, selected BC-1F1s were crossed with a wheat line (GA96229-3A41) that has wide adaptation as well as leaf and stripe rust resistance. The BC1 F1 seeds were screened with markers in 2007 and the BC1-F2s selected progenies are being advanced in the growth chamber. The selected homozygous BC1F3s for the 3BS, 5A and 2DL genomic regions, will be planted in the field in the fall of 2007.

Furthermore, screening of MD (University of Maryland) wheat advanced lines and check varieties was conducted under field conditions in an inoculated nursery at Salisbury (MD). Conditions favorable for disease development were aided with daily misting before and during wheat flowering. The scab inoculum was scabby corn grain spread in the field a month before flowering. The Southern wheat scab and Northern Uniform Scab Screening nurseries that include new experimental lines were also screened for resistance at Salisbury (MD) with artificial inoculation and misting. Data for all nurseries was obtained for scab incidence, scab severity, Fusarium damaged kernels, seed weight, plant height, heading date, and DON levels.

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: Incorporation of the 3BS, 5A and 2DL quantitative trait loci (QTL) of resistance to scab from Sumai3 into adapted soft red winter wheat germplasm.

Impact: the availability of these germplasm with resistance will reduce scab negative effects in years favorable to scab development.

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?

Plant breeders will have homozygous F3 seed for the 3 QTL of adapted soft red winter wheat germplasm available in the fall of 2007 for crossing.

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.

Costa, José M., Aaron Cooper, Julia Crane, Neely Gal-Edd, Erin Wenger, and Gina Brown-Guedira. Effect of the 3BS Region of Ning 7840 on Agronomic Traits in Soft Red Winter Wheat. 2006 Scab Forum. Raleigh, NC.

Costa, Jose M., Leila Al-Tukhaim, Neely Gal-Edd, Erin Wenger, Gina Brown-Guedira, and David Van Sanford. Development of Scab Resistant Soft Red Winter Wheat Germplasm (SRWW) Using Marker-Assisted Selection (MAS). 2007 Eastern/Southern Wheat Workers Conference, Quincy, FL.