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:	59-0790-4-121
USDA-ARS Agreement Title:	Spring Wheat Breeding for Scab Resistance in South Dakota.
FY06 ARS Award Amount:	$ 71,714

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Award Amount
VDUN	Spring Wheat Breeding for Scab Resistance in South Dakota.	$ 71,714
	Total Award Amount	**$ 71,714**

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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: *Spring Wheat Breeding for Scab Resistance in South Dakota.*

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

Fusarium head blight (FHB) is a serious wheat disease that continues to pose as a production threat within South Dakota as well as the North Central region of the USA. In an attempt to alleviate this threat to wheat production, development of resistant varieties has became a high priority within the spring wheat breeding program at South Dakota State University. An aggressive program was initiated to accelerate the development of spring wheat varieties with improved FHB resistance and desirable agronomic traits. Established off-season nurseries and mist-irrigated greenhouse and field screening nurseries are utilized to accelerate breeding efforts in improving resistance along with desirable agronomic characteristics. Three early generations of breeding materials are evaluated for scab resistance each year: two generations in the greenhouse and one in the field. Approximately 8,000 individual hills are evaluated in the greenhouse nurseries and 3,000 rows are screened in the field nurseries. Both the field and greenhouse nurseries are inoculated with infested corn and conidial suspensions. A mist-irrigation system is used to provide a favorable environment for infection and disease development. Each year we make a large number of crosses to introduce new resistance genes and create new resistance gene combinations. Sources of resistance used in the crosses include materials from the Uniform Regional Scab Nursery (URSN) for spring wheat parents, (a cooperative regional effort to identify and utilize sources of scab resistance) newly identified germplasm provided through introduction and evaluation efforts, other introduced sources, as well as both varieties and advanced breeding lines with various levels of resistance. The off-season nursery aids in the simultaneous selection for resistance and desirable agronomic characteristics.

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:

Our program has provided elevated levels of resistance to FHB in the form of Hard Red Spring Wheat (HRSW) varieties and germplasm made available to regional growers and other breeders that wish to utilize the germplasm Within the past several years, three varieties have been released to growers by our program. We anticipate the release of a fourth prior to the 2009 growing season. Over two years of simultaneous testing, the FHB disease index ratings recorded for ‘Briggs’, ‘Granger’, ‘Traverse’, and SD3851 were 37.6, 36.3, 28.9, and 17.8, respectively, compared to ‘Sumai 3’, (14.9) the resistant check.

Impact:

Elevated resistance levels in released varieties are immediately utilized by the most apparent benefactors of our work; HRSW producers. Through utilizing the elevated resistance levels, growers are more able to protect themselves from suffering complete devastation of fields in the presence of a severe FHB epidemic. Elevated resistance levels in germplasm is also quite often utilized by a less apparent benefactor group; HRSW breeders. Through utilizing both germplasm and released varieties, other breeding programs strive to further increase FHB resistance among germplasm pools that will eventually result in the release of improved varieties.

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?

Our efforts have led to the release of three varieties since 2002 that possess some FHB resistance. Prior to the 2009 growing season, a fourth release is planned. This experimental line, (SD3851) has shown itself to be nearly as resistant as Sumia 3 in our replicated tests and is agronomically far superior. These accomplishments have led to the release of several HRSW varieties that possess some resistance to FHB and are specifically adapted to South Dakota and the northern Great Plains region.

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.

Peer-reviewed articles

- M. Kadariya, K. D. Glover, M. Mergoum, and L. E. Osborne. 200X. Biplot Analysis of Agronomic and Fusarium Head Blight Resistance Traits in Spring Wheat. J. of Crop Improvement. (Accepted).

Poster/abstract presentations

- K.R. Ruden, B.E. Ruden, K.D. Glover, S.M. Thompson, K. Maxson-Stein, and M.A. Draper. 2006 Uniform Fungicide Performance Trials for the Suppression of Fusarium Head Blight in South Dakota. In: Canty, S.M., Clark, A., and Van Sanford, D. (Eds.), Proceedings of the 2006 National Fusarium Head Blight Furum; 2006, 10-12 December; Raleigh, NC., USA. Michigan State University, East Lansing, MI. p. 19.

- B.R. Basnet, L.E. Osborne, J. M. Stein, .and K.D. Glover. 2006 Evaluation of Resistance among Adapted Spring Wheat Germplasm to FHB incited by Several Fusarium Species. In: Canty, S.M., Clark, A., and Van Sanford, D. (Eds.), Proceedings of the 2006 National Fusarium Head Blight Furum; 2006, 10-12 December; Raleigh, NC., USA. Michigan State University, East Lansing, MI. p. 83.