

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY05 Final Performance Report (approx. May 05 – April 06)
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Cover Page

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Fiscal Year:	2005
FY05 ARS Agreement ID:	59-0790-4-121
Agreement Title:	Spring Wheat Breeding for Scab Resistance in South Dakota.
FY05 ARS Award Amount:	\$ 75,773

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Spring Wheat Breeding for Scab Resistance in South Dakota.	\$ 75,773
	Total Award Amount	\$ 75,773

Principal Investigator

Date

* BIO – Biotechnology
CBC – Chemical & Biological Control
EDM – Epidemiology & Disease Management
FSTU – Food Safety, Toxicology, & Utilization
GIE – Germplasm Introduction & Enhancement
VDUN – Variety Development & Uniform Nurseries

(Form – FPR05)

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 become 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 2007 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 to producers

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 2007 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.

- Draper, M.A., K.R. Ruden, **K.D. Glover**, S.M. Thompson, D.S. Wittmeier, and G. Lammers. 2005. "2005 Uniform Fungicide Performance Trials for the Suppression of Fusarium Head Blight in South Dakota". In: Canty, S.M., Lewis, J., Siler, L., and Ward, R.W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2005, December 11-13; Milwaukee, WI., East Lansing; Michigan State University, p. 188.
- Kadariya, M., L. Peterson, M. Mergoum, R. Stack, and **K. Glover**. 2005. Progress from Five Years of Selecting for Resistance to Fusarium Head Blight In Spring Wheat. In: Canty, S.M., Lewis, J., Siler, L., and Ward, R.W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2005, December 11-13; Milwaukee, WI., East Lansing; Michigan State University, p. 50.
- Kirby, C.M., L.J. Peterson, L.E.. Osborne, J.M. Stein, and **K.D. Glover**. A Comparison of Type I and Type II Resistance within a Collection of Elite Spring Wheat Genotypes. In Spring Wheat. In: Canty, S.M., Lewis, J., Siler, L., and Ward, R.W. (Eds.), Proceedings of the National Fusarium Head Blight Forum; 2005, December 11-13; Milwaukee, WI., East Lansing; Michigan State University, p. 51