USDA-ARS / USWBSI
FY04 Final Performance Report
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Cover Page

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Year:	**FY2004** (approx. May 04 – April 05)
FY04 ARS Agreement ID:	**59-0790-4-121**
FY04 ARS Agreement Title:	**Spring Wheat Breeding for Scab Resistance in South Dakota.**
FY04 ARS Award Amount:	**$ 68,658**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Spring Wheat Breeding for Scab Resistance in South Dakota.	$ 68,658
	Total ARS Award Amount	**$ 68,658**

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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

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 the wheat production threat caused by FHB, 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 that have improved FHB resistance and desirable agronomic traits. Established off-season nurseries and mist-irrigated greenhouse and field screening nurseries are being 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. What were the most significant accomplishments?

The goal of our program is to provide elevated levels of resistance to FHB in the form of released Hard Red Spring Wheat (HRSW) varieties and germplasm that are available to others wishing to utilize the resistance. 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. Within the past several years, two varieties have been released to growers by our program. We anticipate the release of a third prior to the 2006 growing season. Over three years of testing, the FHB disease index ratings recorded for ‘Briggs’, ‘Granger’, and SD3687 were 39.1, 34.1, and 25.8, respectively, compared to ‘Sumai 3’, (14.9) the resistant check. Elevated resistance levels in germplasm is more often utilized by a less apparent benefactor group; HRSW breeders. Through utilizing both germplasm and released varieties, other breeding programs strive to increase FHB resistance that will eventually be released as varieties to producers.

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 you 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. Schilling, D.S. Wittmeier, and G. Lammers. 2004 Uniform Fungicide Performance Trials for the Suppression of Fusarium Head Blight in South Dakota. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 296.

- Draper, M.A., B. Bleakley, K.R. Ruden, **K.D. Glover**, S.M. Schilling, D.S. Wittmeier, and G. Lammers. 2004 Uniform Trials for the Performance of Biological Control Agents in the Suppression of Fusarium Head Blight in South Dakota. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 297.

- D. Liu, **K.D. Glover**, and Y. Yen. MAS Efficiency in Improving Scab Resistance in Spring Wheat: A Look from the Reverse Angle. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 94.

- Kadariya, M., L. Peterson, M. Mergoum, R. Stack, and **K. Glover**. Progress from Five Years of Selecting for Resistance to Fusarium Head Blight in Spring Wheat. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 83.

- Kadariya, M., L. Osborne, **K. Glover**, M. Mergoum, and L. Peterson. Correlation of Seed Size to DON Accumulation in Spring Wheat Grain. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 465.

- Peterson, L.J., and **K.D. Glover**. Similarity of Fusarium Head Blight Resistance Ratings Collected over Multiple Years. In: Canty, S.M., Boring, T., Wardwell, J., and Ward, R.W. (Eds.), Proceedings of the 2nd International Symposium on Fusarium Head Blight; incorporating the 8th European Fusarium Seminar; 2004, 11-15 December; Orlando, FL., USA. Michigan State University, East Lansing, MI. p. 148.