U.S. Wheat and Barley Scab Initiative
FY00 Final Performance Report (approx. May 00 – April 01)
July 30, 2001

Cover Page

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Year:	**FY2000 (approx. May 00 – April 01)**
Grant Number:	**59-0790-9-062**
Grant Title:	**Fusarium Head Blight Research**
2000 ARS Award Amount:	**$73,171**

Project

Program Area	Project Title	Requested Amount
Variety Development & Uniform Nurseries	Spring wheat breeding for scab resistance in South Dakota.	$70,000.00
	Requested Total	$70,000.00[1]

Principal Investigator Date

[1] Note: The Requested Total and the Award Amount are not equal.

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?

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 generations of breeding materials are evaluated for scab resistance: two generations in the greenhouse and one generation 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 infected corn and conidial suspensions. A mist-irrigation system is used to provide a favorable environment for infection and disease development. The breeding population contains sources of resistance that can be traced back to Sumai 3, from other introduced sources, and advanced breeding lines that have various "field tolerance" qualities. The off-season nursery aids in the simultaneous selection for resistance and desirable agronomic characteristics.

2. What were the most significant accomplishments?

- A continuous increase in the number of lines that have good agronomic performance along with good scab resistance can be seen. Eighteen lines in our 2000 advanced yield trials had scab resistance equal to Sumai 3. Ten of the eighteen lines had superior grain yield under heavy scab pressure compared to our best yielding commercial cultivars (Russ and Oxen). Six of the eighteen lines had grain yield equal to Russ and Oxen in replicated yield trials grown under natural conditions.
- A new variety, "Walworth" (SD3348) was released in March 2001. Walworth has high grain yield and good bread-making characteristics and has improved scab resistance.
- Two lines (SD3496 and SD3506) with good scab resistance and good agronomic characteristics were increased this winter and will be available for possible release in 2003.
- A full time research associate was hired to assist in the efforts of breeding for scab resistance. This research associate will also aid the breeding program by conducting independent research projects.
- A M.S. graduate student completed studies on the effect of early season abiotic stress on the development of scab. Findings suggest that influences of drought and heat stress prior to anthesis significantly reduced the development of FHB.

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.

Rudd, J.C., R.D. Horsley, A.L. McKendry, and E.M. Elias. 2001. Host plant resistance genes for Fusarium head blight: Sources, mechanisms, and utility in conventional breeding systems. Crop Sci. 41:620-627.

Xing, D.H., Y. Yen, J.C. Rudd, and Y. Jin. 2000. Identification, cloning and sequencing of ESTs related to FHB resistance of wheat. Pages 62-63. *In* Proc. 2000 National Fusarium Head Blight Forum. Dec. 10-12, 2000, Erlanger, KY.

Yen, Y., D.H. Xing, Y. Jin, and J.C. Rudd. 2000. Differentially expressed genes in Fusarium-inoculated wheat spikes during scab development. Pages 239-244. *In* Proc. of the International Symposium of Wheat Improvement for Scab Resistance. May 5-11, 2000. Suzhou and Nanjing, China.

Zhu, L., J .Rudd, Y. Jin. X. Zhang, R. Rudd, and T. Shumacher. 2000. The effect of drought stress on scab development of spring wheat. Pages 303-305. *In* Proc. 2000 National Fusarium Head Blight Forum. Dec. 10-12, 2000, Erlanger, KY.