U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

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Year:	**FY2001 (approx. May 01 – April 02)**
Grant Number:	**59-0790-9-062**
Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 78,704**

Project

Program Area	Project Title	Requested Amount
Variety/Uniform	Spring wheat breeding for scab resistance in South Dakota	$ 80,850
	Total Amount Requested	**$ 80,850**

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Principal Investigator Date

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 or scab is a serious disease of wheat and continues to poses a threat to wheat production in South Dakota. To reduce the threat in wheat production due to scab, developing scab resistant varieties became a top priority in 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 scab 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 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. We continue to make a large number of crosses to introduce new resistance genes and to generate new combinations of resistance genes. Sources of resistance used in the crosses include materials from the Uniform Regional Scab Nursery for spring wheat, new resistant germplasm provided by the Germplasm Introduction and Evaluation for Scab Resistance in spring wheat, other introduced sources, and advanced breeding lines that have various scab tolerance. The off-season nursery aids in the simultaneous selection for resistance and desirable agronomic characteristics.

2. What were the most significant accomplishments?

   The overall scab resistant level in the current breeding lines (from early generations to advanced yield trials) has been improved substantially. A continuous increase in the number of lines that have good agronomic performance along with good scab resistance can be seen.

   A new variety, "Briggs" (SD3367) was released in March 2002. Briggs is an early maturing variety with improved scab tolerance (similar to “Ingot”), higher yield and protein and better leaf rust resistance than the popular varieties “Russ” and “Oxen”. Three lines (SD 3540, SD3546, and SD3623) with good scab resistance and good agronomic characteristics were recommended for increase in 2003 with intent to release in 2004.

   A Ph. D. graduate student has completed studies on the inheritance and interactions of Fusarium head blight and tan spot resistance in spring wheat. The results of this study indicated that additive inheritance is more important than non-additive for both diseases. Resistance to scab and tan spot in these germplasm are not related; thus improvement for both traits can be made independently and simultaneously.

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.

Jin, Y., X. Zhang, and J. Rudd. 2001. Germplasm screening approach and sources of Fusarium head blight resistance identified from the USDA spring wheat collection. Pages 53-57 In: Can. Workshop on Fusarium Head Blight, Nov. 3-5, 2001, Ottawa, Canada.

Rudd, J.C., R.D. Horsley, A.L. McKendry, and E.M. Elias. Host plant resistancegenes for Fusarium head blight: sources, mechanisms, and utility in conventional breeding systems. Crop Sci. 41:20-627.

Xing, D., Y. Yen, J. Rudd, and Y. Jin. 2001. ESTs probably related to virulence or avirulence genes of *Fusarium graminearum*. Page 39. In: Proc. 2001 National Fusarium Head Blight Forum. Dec. 8-10, 2001, Erlanger, KY.

Zhang, X., Y. Jin, J. Rudd, and H. Bockelman. 2001. Evaluation of USDA spring wheat germplasm for Fusarium head blight resistance. Pages 220-224. In: Proc. 2001 National Fusarium Head Blight Forum. Dec. 8-10, 2001, Erlanger, KY.

Zhu, L., J. Rudd, and Y. Jin. 2001. Pre-anthesis drought and heat stress on Fusarium head blight development in spring wheat. Page 293. In: Proc. 2001 National Fusarium Head Blight Forum. Dec. 8-10, 2001, Erlanger, KY.

Zhu, L., J. Rudd, and Y. Yen. 2001. Applying simple sequence repeat (SSR) marker in screening Fusarium head blight resistant parents. Page 292. In: Proc. 2001 National Fusarium Head Blight Forum. Dec. 8-10, 2001, Erlanger, KY.