

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

Cover Page

PI:	Jackie Rudd
Institution:	South Dakota State University
Address:	Plant Science Dept. Box 2140C Brookings, SD 57007
Email:	jackie_rudd@sdstate.edu
Phone:	605-688-4769
Fax:	605-688-4452
Year:	FY2000 (approx. May 00 – April 01)
Grant Number:	59-0790-9-079
Grant Title:	Fusarium Head Blight Research
2000 ARS Award Amount:	\$64,390

Project

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

 Principal Investigator

 Date

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

PI: Jackie Rudd

Grant: 59-0790-9-079

Project 1: Winter wheat breeding for scab resistance in South Dakota.

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

Resistant varieties will be the main component of an integrated strategy to control scab. We will continue to simultaneously select for resistance and desirable agronomic characteristics. The objective is to use traditional breeding techniques to develop scab resistant hard winter wheat cultivars. Breeding efforts for improved head scab resistance in winter wheat will initially be focused to address:

- i) characterization of scab resistance or tolerance among commercially grown cultivars and elite and preliminary lines from SDSU and regional breeding programs.
- ii) identification of winter wheat germplasm sources that show a high level of scab resistance.
- iii) development of populations segregating for scab resistance and desirable agronomic traits.

Mist-irrigated greenhouse and field screening nurseries will be used to evaluate the material. The winter wheat cultivars and germplasm will be screened for scab resistance in the same field nursery as the spring wheats. Nurseries that should have winter hardiness are planted in the fall and evaluated the following summer. Nurseries that include entries from programs that do not have strong winter hardiness are vernalized in the early spring and then transplanted into the field at the same time the spring wheats are planted.

2. What were the most significant accomplishments?

- A research assistant was hired to manage the winter wheat scab resistance breeding program.
- The following nurseries were screened for scab resistance in 2001:
 - Northern Regional Performance Nursery (NRPN)
 - Winter Wheat Regional Scab Nursery
 - Southern Regional Performance Nursery (SRPN)
 - Regional Germplasm Observation Nursery (RGON)
 - South Dakota Crop Performance Trials (commercial varieties)
 - SDSU Advanced Hard Red and Hard White Yield Trials
 - SDSU Preliminary Hard Red and Hard White Yield Trials
 - SDSU Early Hard Red and Hard White Yield Trials
- Approximately 6000 plants were evaluated for scab resistance during the 2000 season. 1500 of the plants were kept and were planted into the 2001 field (planted Fall 2000) as $F_{3:4}$ progeny rows. Scab resistance sources included in the selected populations included adapted spring wheats from the SDSU breeding program, Sumai 3 derived spring wheat lines, eastern European winter wheat lines, entries from the 1998 regional winter wheat scab nursery, and adapted hard red and hard white breeding lines. The best of these 1500 lines will be selected this year based on agronomic performance and will be planted in September 2001 in the early yield trial nursery (as $F_{3:5}$ lines). Heads will also be picked from the best promising $F_{3:4}$ progeny rows for planting in the mist-irrigated nursery to get scab reaction data prior to line entry in the preliminary yield trials next year.

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.

Magnuson, A., A.Ibrahim, J.Rudd, Y.Jin. 2000. Winter wheat breeding for scab resistance in South Dakota. Page 280. *In Proc. 2000 National Fusarium Head Blight Forum*. Dec. 10-12, 2000, Erlanger, KY.

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.

Zhang, X., Y.Jin, and J.Rudd. 2000. Inheritance of scab resistance in Sapporo Haru Komugi Jugo. Pages 98-99. *In Proc. of the International Symposium of Wheat Improvement for Scab Resistance*. May 5-11, 2000. Suzhou and Nanjing, China.