

**U.S. Wheat and Barley Scab Initiative
Annual Progress Report
September 18, 2000**

Cover Page

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Year:	FY2000
Grant Number:	59-0790-9-062
Grant Title:	Fusarium Head Blight Research
Amount Granted:	\$73,171.00

Project

Program Area	Objective	Requested Amount
Variety Development & Uniform Nurseries	Accelerate development of resistant varieties.	\$70,000.00
	Requested Total	\$70,000.00¹

Principal Investigator

Date

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

Project 1: Accelerate development of resistant varieties.

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

Wheat producers will not grow resistant varieties unless the agronomic performance is at least as good as what is currently being grown. Breeding for scab resistance has to be an integral part of the breeding program. Mist-irrigated greenhouse and field screening nurseries have been established. Breeding materials are evaluated for scab resistance using three generations per year: two generations in the greenhouse and one generation in the field. Both the field and greenhouse nurseries are inoculated with grain spawn (corn and wheat) and conidial suspensions, and mist-irrigation is used to provide a favorable environment for infection. Approximately one third of the breeding populations trace back to Sumai 3 as a source of resistance, one third are from other identified sources of resistance, and one third are from crosses with various “field tolerant” advanced breeding lines. The approach is to steadily recombine different resistance sources and to simultaneously select for resistance and desirable agronomic characteristics.

2. Please provide a comparison of the actual accomplishments with the objectives established.

The objective of the project is “to accelerate the development of scab resistant spring wheat varieties for South Dakota.” This objective is being met. Through greenhouse and field nurseries, three generations per year are being screened for scab resistance. We evaluate 7600 hills in greenhouse screening nurseries and 3,000 rows in field screening nurseries. We have 2,000 ft² of greenhouse soil beds under mist-irrigation and 3 acres of field nurseries under mist-irrigation. Two graduate student research projects are being conducted that address breeding for scab resistance. One student is evaluating the interaction of tanspot resistance and scab resistance. Another student is studying the effect of early season abiotic stress on the development of scab.

3. What were the reasons established objectives were not met? If applicable.

4. What were the most significant accomplishments this past year?

- We continue to see an increase in the number of lines that have good agronomic performance and good scab resistance. 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.

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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. 2000. Bread-Wheat Breeding in the United States. Presentation at the China National Wheat Breeding Conference, May 11-14, 2000, Jinan, Shandong Province, China.

Devkota, R.N., R.C. Rudd, J.C. Rudd, and Y. Jin. 1999. Diallel analysis of FHB and tombstone kernels in spring wheat evaluated under greenhouse and field conditions. p. 78. In *Agronomy Abstracts*. ASA, Madison, WI.

Devkota, R.N., R.C. Rudd, J.C. Rudd, and Y. Jin. 1999. Diallel analysis of FHB and tombstone kernels in spring wheat evaluated under greenhouse and field conditions. p. 152. In *Proceedings 1999 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative*, Sioux Falls, South Dakota, December 5-7, 1999.

Jin, Y., R. Xhang, R. Rudd, J. Rudd. 1999. A point inoculation method for evaluating scab resistance in wheat. p. 128. In *Proceedings 1999 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative*, Sioux Falls, South Dakota, December 5-7, 1999.

Rudd, Jackie and Robert Hall. 1999. Ingot hard red spring wheat. *SD Agric. Exp. Sta. B-730*.

Rudd, J.C., R.W. Stack, R.D. Horsley and A.L. McKendry. 1999. Host plant resistance genes in wheat, barley, and their relatives: I. Sources, mechanisms, and utility in conventional breeding systems. p. 83. In *Agronomy Abstracts*. ASA, Madison, WI.

Rudd, R.C., R.N. Devkota, B.G. Farber, J.C. Rudd, Y. Jin. 1999. Yield and Fusarium head blight resistance of hard red spring wheat cultivars. p. 78. In *Agronomy Abstracts*. ASA, Madison, WI.

Rudd, R.C., R.N. Devkota, B.G. Farber, J.C. Rudd, Y. Jin. 1999. Yield and Fusarium head blight resistance of hard red spring wheat cultivars. p. 183. In *Proceedings 1999 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative*, Sioux Falls, South Dakota, December 5-7, 1999.

Yen, Yang, Denghui Xing, Jackie C. Rudd, and Yue Jin. 1999. Exploring the molecular mechanism of Fusarium head blight resistance and developing breeder-friendly DNA markers to FHB for wheat improvement. p. 40. In *Proceedings 1999 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative*, Sioux Falls, South Dakota, December 5-7, 1999.

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Zhang, X., Y. Jin, R. Rudd, J. Rudd, and H. Bockelman. 1999. Screening of spring wheat scab resistance from the USDA germplasm collection. p 140. In Proceedings 1999 National Fusarium Head Blight Forum, U.S. Wheat and Barley Scab Initiative, Sioux Falls, South Dakota, December 5-7, 1999.