USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY05 Final Performance Report (approx. May 05 – April 06)
July 14, 2006

Cover Page

PI:	**Gina Brown-Guedira**
Institution:	**USDA-ARS**
Address:	**Plant Science Research Unit** **840 Main Campus Dr. Rm 3570** **North Carolina State University** **Raleigh, NC 27606**
E-mail:	**gina_brown-guedira@ncsu.edu**
Phone:	**919-424-4715**
Fax:	**919-856-4816**
Fiscal Year:	**2005**
FY05 ARS Agreement ID:	**NA**
Agreement Title:	**Developing FHB Resistant Soft Wheat Varieties by Accelerated Backcrossing.**
FY05 ARS Award Amount:	**$ 20,000**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Developing FHB Resistant Soft Wheat Varieties by Accelerated Backcrossing.	$ 20,000
	Total Award Amount	**$ 20,000**

July 12, 2006
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

(Form – FPR05)

Project 1: *Developing FHB Resistant Soft Wheat Varieties by Accelerated Backcrossing.*

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

Fusarium head blight (FHB) is a devastating disease of wheat that causes reduction in grain yield and quality in the eastern US where soft wheat is grown. Host resistance is the best method to control losses. Although moderate FHB resistance has been found in soft red winter wheat germplasm in the eastern US, the high levels of resistance needed against this pathogen are not currently available in these cultivars. We are rapidly addressing the needs of the eastern US soft wheat growers using technology at the USDA-ARS Genotyping lab at Raleigh, NC to combine native resistance in soft red winter wheat cultivars and breeding lines with resistance genes from Chinese sources that are tagged with DNA markers. We are attempting to complement the moderate resistance of soft wheat lines with these exotic resistance genes in an accelerated backcrossing scheme using high-throughput genotyping that should provide timely release of backcross derived varieties in the eastern wheat region and rapidly supply improved parents for forward breeding.

2. List the most important accomplishment and its impact (how is it being used?). Complete all three sections (repeat sections for each major accomplishment):

Accomplishment: We are complimenting the level of resistance to FHB that is present in soft red winter wheat cultivars in the eastern US using genes derived from Chinese wheat lines having high levels of resistance. From a marker screening of 4000 backcross progeny from crosses between the soft red winter wheat cultivars McCormick and Nuese with the highly FHB resistant lines Ning7840 and VA01W476 (Roane/W14), plants having up to 3 resistance genes from the exotic sources were identified. Individuals with 65-75% of the background of the adapted soft wheat parent were selected using markers distributed throughout the genome. These plants were used as parents to produce more than 2000 F1 seed for the next backcross generation. The plants with 2-3 pyramided resistance QTL and high levels of recurrent parent background were also used as parents in forward breeding by crossing to elite breeding lines adapted to the region. These crosses will be a source of cultivars having high levels of FHB resistance.

Impact: This project brings together the resources of multiple wheat breeding programs and the Eastern USDA genotyping lab to rapidly address the need of soft wheat growers in the eastern US. The application of high-throughput marker screening for accelerated backcrossing is allowing us to deploy exotic FHB resistance genes in adapted soft red winter wheat varieties. The plants selected with markers are already being used as parents for developing improved varieties.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?:
This is the first regional project to deploy FHB resistance genes using molecular markers. The germplasms being developed represent not only potential new FHB resistant varieties, but also improved parents for forward breeding. The use of the selected plants in crossing is an important technology transfer event since breeders now have access to a pyramid of exotic resistance genes in an adapted soft winter wheat background.

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.

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