USDA-ARS / USWBSI
FY04 Final Performance Report
July 15, 2005

Cover Page

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Year:	**FY2004** (approx. May 04 – April 05)
FY04 ARS Agreement ID:	**59-0790-4-108**
FY04 ARS Agreement Title:	**Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.**
FY04 ARS Award Amount:	**$ 39,024**

USWBSI Individual Project(s)

USWBSI Research Area*	**Project Title**	**ARS Adjusted Award Amount**
VDUN	Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.	$ 39,024
	Total ARS Award Amount	**$ 39,024**

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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

Project 1: ***Enhancement of Scab Resistant Wheat Cultivars Adapted to the Southeast.***

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

In recent years, the Fusarium head blight (FHB) epidemic have occurred in Georgia and the Southeast. Numerous producers had difficulty in marketing their grain due to high DON concentrations. The problem being resolved is the lack of scab resistant cultivars with resistance to other diseases such as leaf rust and stripe rust. We are resolving the problem by the identification and incorporation of resistance to FHB in elite lines using conventional and double-haploid breeding along with marker assisted selection to accelerate the development of adapted FHB resistant cultivars. SSR markers are being used to assist in the selections within populations containing 3BS and 5AL. Wheat breeding lines from both the southern and northern uniform scab nurseries for resistance are being screened in the field.

2. What were the most significant accomplishments?

Scab resistant cultivars that have combined resistance to leaf and stripe rust have been lacking in the southeast. Several wheat sources from diverse origin with FHB resistance have been transferred into elite lines that are adapted to the Southeast. Therefore, several breeding lines, GA941318E22, GA941320E24, GA941470E18, and GA941523E21, have been identified with adequate scab and rust resistance. These breeding lines and cultivars were crossed with our adapted scab resistant lines and will be backcrossed to recurrent parent. About 120 $F_{4:8}$ wheat elite lines and the two uniform FHB nurseries will be evaluated for Type II resistance to FHB. The resistant lines will be used as parents in the breeding program. Five lines from our elite nursery were identified in 2005 with good FHB resistance. SSR markers have recently been identified with linkage to scab resistance. SSR markers were employed to investigate the transferring of QTLs from donor parents, W14 and Futai 8944, to elite lines. Breeding lines containing known QTLs for scab resistance in their pedigrees will be evaluated for appropriate SSR markers. SSR markers will also be used on backcross and F_2 populations to identify FHB resistance derived from exotic sources (Sumai 3 and N7840 on 3BS (*Xgwm* 533, *Xgwm* 493, *XBARC* 133), 5AL (*Xgwn* 156, *BARC* 100 and *BARC* 186) and native sources.

The use of marker assisted selection with the SSR markers will promote pyramiding major QTL's and accelerate the development of releases of scab resistant wheat cultivars to growers.

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 you grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

J.W. Johnson and Z. Chen. 2004. Enhancement of Soft Red Winter Wheat with Fusarium Resistance. 2nd International Symposium on Fusarium Head Blight, Orlando, Florida USA