USDA-ARS / USWBSI
FY03 Final Performance Report (approx. May 03 – April 04)
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Cover Page

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Year:	**FY2003 (approx. May 03 – April 04)**
FY03 ARS Agreement ID:	**59-0790-9-073**
FY03 ARS Agreement Title:	**Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.**
FY03 ARS Award Amount:	**$ 43,902**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.	$ 43,902
	Total Amount Recommended	**$ 43,902**

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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: ***Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.***

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

The problem being resolved is the lack of resistance to Fusarium head blight in soft red winter wheat. Most cultivars grown in the eastern wheat region are susceptible to FHB. Wheat growers are therefore at risk for severe economic losses due to this disease. Our approach to solving this problem is to develop FHB-resistant wheat varieties. This is a several stage process that involves: 1) characterizing existing SRW germplasm and breeding lines as parents in terms of their ability to contribute FHB resistance genes to crosses; 2) making crosses with elite, high yielding lines and cultivars, and 3) evaluating resistance in the progeny of the crosses. We are also evaluating populations that contain the Sumai 3 resistance at a low frequency so that resistance is maintained without reducing adaptation and productivity. Evaluation of this material occurs through extensive greenhouse and field screening. For the period covered by this grant, we made approximately several thousand injections in the greenhouse and in the field for Type II resistance to FHB. We also screened hundreds of lines and populations for combined Type I/ Type II resistance using the scabby corn method of inoculation in the field.

2. What were the most significant accomplishments?

Allegiance wheat was released to growers for the first time for commercial planting last fall. Allegiance will show scab symptoms, but has yield good tolerance to FHB.

We have been evaluating three populations which were believed to be segregating for the Sumai 3 resistance allele. In cooperation with the genotyping center at Manhattan Kansas, it was determined that only one of the populations (population 2) had lines which contained the Sumai 3 resistance. Roughly half of the lines in this population have the resistance. We were able to compare the phenotypes of the lines with and without this resistance in 2003. In the case of all scab traits: incidence, severity, index, Fusarium damaged kernels and DON, the lines with the Sumai 3 resistance were more resistant.

In the populations lacking the Sumai 3 resistance, heritability of resistance were 0.31 in population 1 and 0.59 in population 3, based on two locations. These estimates compare with 0.83 and 0.66 for Lexington data in 2001 (Hall, unpublished M.S. thesis). These results are significant because they indicate that non-Sumai 3 resistance is heritable in these populations and should be amenable to selection.

Recurrent selection for low severity was initiated in all populations.

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.

A. J. Stewart and Dave Van Sanford. 2003. Fusarium Head Blight of Wheat: Breeding for Resistance. Presentation at the 2003 Wheat Science Field Day, May 14, Princeton, KY.

A. J. Stewart, C. A. Knott, and Dave Van Sanford. 2003. breeding for Scab resistance in Soft Red Winter Wheat. Proceedings of the 2003 National Fusarium Head Blight Forum, December, 13-15, Minneapolis, MN.

D. A. Van Sanford. 2003. Breeding for scab resistance and reduced DON levels in KY wheat. Presented at the UK Wheat Science Winter Meeting, January 7, Hopkinsville, KY.

D. A. Van Sanford. 2003. Breeding soft red winter wheat for Kentucky. Kentucky Seed Improvement Meeting, Jan. 23, Hopkinsville, KY.

V.L. Verges, D.A Van Sanford, G. Brown-Guedira and G. H. Bai.. 2003. Breeding for Fusarium Head Blight Resistance:Phenotypic vs Marked-Based Screening In Early Generations. Proceedings of the 2003 National Fusarium Head Blight Forum, December, 13-15, Minneapolis, MN.

Hall, M. D. and. D. A. Van Sanford. (2003). Diallel analysis of Fusarium head blight resistance in soft red winter wheat. Crop Sci. 43: 1663-1670.

Argyris, J., D. M. TeKrony, and D. A. Van Sanford. 2003. *Fusarium graminearum* infection during wheat seed development and its effect on seed quality. Crop Sci. 43: 1782-1788.