USDA-ARS / USWBSI
FY04 Final Performance Report
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Cover Page

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Year:	**FY2004** (approx. May 04 – April 05)
FY04 ARS Agreement ID:	**59-0790-0-064**
FY04 ARS Agreement Title:	**Developing new SRWW germplasm with resistance to scab.**
FY04 ARS Award Amount:	**$ 22,433**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Screening and Developing SRWW Germplasm with Resistance to Scab.	$ 22,443
	Total ARS Award Amount	**$ 22,433**

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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: ***Screening and Developing SRWW Germplasm with Resistance to Scab.***

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

The major problem is addressing the need to develop rapid and effective incorporation of resistance to scab (Fusarium Head Blight) from exotic sources into adapted soft red winter wheat (SRWW) germplasm. The approach to address this problem is to use backcrossing, three-way crossing of the Sumai 3 allele and other exotic alleles into adapted wheat lines and varieties. Marker-assisted selection (MAS) is being used to rapidly incorporate Sumai 3 resistance into SRWW lines such as McCormick, that have wide adaptation in the Southern and Eastern US wheat growing regions and moderate resistance to scab. Ning 7840 resistance alleles are being backcrossed (BC) into McCormick. The BC-1 seedlings will be screened for SSR markers at the USDA in Raleigh (NC) in collaboration with Dr. Gina Brown-Guedira at that National Genotyping Center.

Additionally, screening of advanced lines and varieties is conducted under field conditions at Salisbury (MD). Conditions favorable for disease development are aided with daily misting before and during wheat flowering. The Southern wheat scab and Northern Uniform Scab Screening nurseries that include new experimental lines are screened for resistance at Salisbury (MD) with artificial inoculation and misting.

2. What were the most significant accomplishments?

Field screening of advanced lines and varieties of wheat was conducted in the 2003-2004 growing season in Maryland. The Northern Uniform Winter Wheat Screening Nursery (NUWWSN, results available at http://www.scabusa.org/pdfs_dbupload/04_NUWWSN_FHB-Nur_Report.pdf) and the Southern Uniform Soft Red Wheat FHB Nursery (results available at http://www.scabusa.org/pdfs_dbupload/04_ussrww_fhb_report.pdf) were grown under field conditions in Salisbury (MD) and the level of scab incidence, severity, percentage of tombstones, Deoxynivalenol (DON), heading date, and kernel weight were assessed. A total of ninety-seven genotypes were tested and the incidence of the disease was fairly uniform across the nursery. There were significant genotypic differences for all disease measures. Several genotypes such as X00-1051, MO10789, AR857-1-1, and ARGE97-1033-10-2 showed good levels of resistance to scab with low percentage of tombstones and low DON levels. On the other hand, several advanced wheat lines were identified that had very high levels of tombstones and DON. This ranking was consistent with other evaluations of resistance in other states.

Marker-assisted selection (MAS) is being used to rapidly incorporate Sumai 3 resistance (in Ning 7840) into the widely adapted SRWW McCormick. More than 1,000 seeds of BC-1s will be screened for SSR markers at that NC Genotyping Center for Sumai 3 resistance alleles as well as background favorable alleles from the SRWW recurrent parent, to select the best lines for the next round of backcrossing.

Impact: It is important to screen experimental lines of soft red winter wheat for scab resistance because this is useful for immediate use by wheat growers as well as for future breeding of highly resistant varieties. The set of over 1,000 BC1 seeds of Ning7840/McCormick are a necessary resource to develop BC lines rapidly with the integration of MAS.

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.

Scab Screening Of Soft Red Winter Wheat Genotypes in Maryland. Costa, J.M., Sikora, T., Grodofsky, S., Liberator, K., and Cooper, A. 2004. 2nd International Symposium of Fusarium Head Blight.