

USDA-ARS / USWBSI
FY03 Final Performance Report (approx. May 03 – April 04)
July 15, 2004

Cover Page

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Year:	FY2003 (approx. May 03 – April 04)
FY03 ARS Agreement ID:	59-0790-9-037
FY03 ARS Agreement Title:	Uniform nursery for SRWW and evaluation of marker-assisted selection for scab resistance.
FY03 ARS Award Amount:	\$ 72,195

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Uniform nursery for SRWW and evaluation of marker-assisted selection for scab resistance.	\$ 72,195
	Total Amount Recommended	\$ 72,195

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: *Uniform nursery for SRWW and evaluation of marker-assisted selection for scab resistance.*

1. **What major problem or issue is being resolved and how are you resolving it?** While the genetics of FHB resistance in Chinese varieties has been elucidated, little is known about the genetics of FHB resistance that is found in SRWW adapted to the eastern US. It is important to determine this so we can see how resistance from exotic sources can compliment the resistance inherent to our SRWW genetic base and how to further exploit this resource. This requires extensive phenotyping of lines as well as molecular markers.
2. **What were the most significant accomplishments?** We have made progress in backcrossing (BC1F1 obtained) QTL from exotic sources (Sumai 3, Frontana, Wuhan) into resistant and susceptible SRWW lines. Polymorphic markers have been identified that will allow us to carry this to the next generation.

We mapped key regions in a double haploid population derived from the cross FHB148 (a resistant DH line from Frontana/Harus) by Augusta. The 3BS region of FHB148 is derived from Frontana but had no effect on FHB resistance. We could not assess the 3A centromere region reported to have a major QTL for resistance from Frontana, as FHB148 has Harus marker alleles in this region. The other assayed regions included 6B (significant), 4B (not significant, and 2AS (not significant).

We assessed nearly 1,100 SRWW lines for FHB resistance in 2003-04. These lines were from the OSU program as well as uniform tests. Nearly 74% of the OSU lines had equal or superior resistance than “Freedom” (moderately resistant check) and only 6% were similar to the susceptible check. Using more stringent criteria, perhaps 40% of the OSU had better resistance than Freedom. “Resistant” lines were derived from 78% of the crosses we evaluated, while susceptible lines were generated from only 40% of the crosses. Certain lineages were superior to others for generating resistant progeny. The results suggest that there is considerable FHB resistance in SRWW and the recurrent selection would be effective at using this resource.

One moderately resistant SRWW is Freedom. Mapping has suggested that Freedom has a major QTL for FHB resistance on 2AS. Studies with NIL failed to confirm this as both NILs with and without Freedom markers at 2AS were resistant. All NILs though had Ning7840 marker alleles at 3BS and this may have hampered evaluation of the Freedom 2AS. We also genotyped 18 lines from the cross Freedom/ZM108724//30589-AC-1/OH526 and selected for excellent FHB resistance. Of these, 83% had Freedom marker alleles at 2AS indicating that this region has QTL alleles that are important for resistance. We have phenotypes a set of 142 RIL from the cross Freedom/OH546 with the intent to further map the 2AS region. Greenhouse and field screening have both uncovered considerable segregation for FHB resistance in this cross.

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

Sneller, C. H., P. Lipps, and L. Herald. 2003. Summary report on the 2003 northern uniform winter wheat scab nursery (NUWWSN). Pages 283-287 in: 2003 National Fusarium Head Blight Forum Proceedings, Bloomington, MN. Dec. 13-15, 2003

Sneller, C. H., and P. Lipps. 2003. Observations from SRWW variety development nurseries with severe FHB pressure. Pages 279-282. in: 2003 National Fusarium Head Blight Forum Proceedings, Bloomington, MN. Dec. 13-15, 2003