

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

Cover Page

PI:	Clay Sneller
Institution:	Ohio State University
Address:	Department of Horticulture and Crop Science OARDC 1680 Madison Ave Wooster, OH 44691
E-mail:	sneller.5@osu.edu
Phone:	330-263-3843
Fax:	330-263-3841
Fiscal Year:	2005
FY05 ARS Agreement ID:	59-0790-4-101
Agreement Title:	Uniform Nursery for SWW and Development Scab Resistance Varieties for Ohio.
FY05 ARS Award Amount:	\$ 69,834

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
VDUN	Uniform Nursery for SWW and Development Scab Resistance Varieties for Ohio.	\$ 69,834
	Total Award Amount	\$ 69,834

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: *Uniform Nursery for SWW and Development Scab Resistance Varieties for Ohio.*

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

Host resistance is the best current method to control FHB. There are several sources for FHB resistance, though native resistance in current SRWW varieties is one of the most promising due to the adaptation of the current cultivars. This resistance should be strategically supplemented with a few well characterized exotic genes. The whole process requires recombining genes and phenotypic evaluation of the progeny. An understanding of the genetics of FHB resistance in SRWW would greatly improve the efficiency of the process.

**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:

Objective 1: Based on multiyear data for 219 elite OSU lines, 125 (57%) had a FHB index that was \leq that of Freedom while 193 (88%) were no more than 10% $>$ than Freedom. The 219 lines had all been selected for having at least moderate resistance to FHB prior to the 2004-05 season. The resistance comes primarily from soft red winter wheat. In addition, several of the most resistant lines have excellent yield potential. Three lines had yield 100% or greater than the high yield check but only 35-65% as much FHB as the moderate resistant check 'Freedom'. Of 504 lines in the first year of FHB testing, 295 (58.5%) had an index that was \leq that of Freedom and 121 had an index that was \leq that of Truman. In addition we screened 500 unselected F5:6 families from 4 crosses in the nursery for FHB resistance. Lines with strong FHB resistance and good agronomics were advanced.

Objective 2: We screened two RIL populations for FHB. This was the second year for screening the Freedom/OH546 population and significant segregation was noted. The data was combined with marker data to assess the value of the Freedom 2AS chromosome segment. The analysis indicated a QTL for FHB resistance on 2AS of Freedom, though its effect was considerably smaller than noted in the original study. We also completed the first years of screening RILs from Hopewell/Ernie and also noted significant segregation. This study was replanted for the 2005-06 season for further phenotyping. A population of Cecil/OH904 was advanced to assess MAS for 3BS and 2AS.

Objective 3: The northern uniform scab nursery was expanded to include two tests, and advanced (NUWWSN) and a preliminary (PNUWWSN). Collectively, 83 entries were screened by 12 cooperators. Based on index and DON, 8 NUWWSN entries had Truman-like FHB resistance, though only one had DON $<$ 1 ppm. Five PNUWWSN entries had Truman-like FHB resistance, though none had DON $<$ 1 ppm.

Impact:

Based on the extensive phenotyping of objectives 1 and 3, we have identified many SRWW with high levels of FHB resistance. Several of these also have excellent yield potential. This combination is essential to effectively control FHB in the northern region of SRWW production as growers can not accept FHB resistance without high yield. Information on the

genetics of FHB resistance is being developed in objective 2. The current data indicates that there are multiple FHB resistance genes in SRWW and that recombination is very effective at producing strong FHB resistance. This information can be used to reformulate breeding programs to be more efficient at improving FHB resistance.

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.

C.H. Sneller, P.Lipps, P. Paul, L. Herald, B. Sugerman, and A. Johnston: 2005. Report on the 2004-05 Preliminary (PNUWWSN) and Advanced (NUWWSN) Northern Uniform Winter Wheat Scab Nursery. The Ohio State University, Horticulture and Crop Science Series 690.