

**U.S. Wheat and Barley Scab Initiative
 FY01 Final Performance Report (approx. May 01 – April 02)
 July 15, 2002**

Cover Page

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Grant Number:	N/A
Grant Title:	Fusarium Head Blight Research
FY01 ARS Award Amount:	\$ 14,602

Project

Program Area	Project Title	Requested Amount
Germplasm	Transfer of Fusarium head blight resistance from wild relatives into durum wheat	\$ 62,800
	Total Amount Requested	\$ 62,800

Principal Investigator

Date

Project 1: Transfer of Fusarium head blight resistance from wild relatives into durum wheat

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

Current durum cultivars have little resistance to FHB. We found earlier that a diploid wheatgrass (*Lophopyrum elongatum*) could prove an excellent source of FHB resistance. Our main objective was to produce scab-resistant durum germplasm by crossing durum cultivars (Lloyd, Langdon, and Monroe) with diploid wheatgrass, using the embryo rescue technique. We raised F₁ hybrids and hybrid derivatives by backcrossing these hybrids to their respective durum parents and selfing in alternating generations. As a result of pairing between durum and grass chromosomes, we have produced interchanges that confer scab resistance. Several plants with the translocations have shown low infection. We will continue to use homoeologous pairing as a means of transferring alien chromosome segments into the durum genome and try to stabilize these integrations.

We plan to adopt another strategy of inducing durum-alien chromosome translocations. We are developing disomic addition lines (with a pair of grass chromosomes), which may be stable. Once stable lines are produced and low infection is correlated to a single grass chromosome in double dose, we will attempt to translocate parts of this chromosome into the durum genome using radiation treatments.

2. What were the most significant accomplishments?

We have produced semi-fertile hybrid derivatives between durum cultivars and diploid wheatgrass, using their F₁ hybrids as female parents. Some of these hybrid derivatives appear promising from the point of view of scab resistance. We also found some hybrid derivatives having one grass chromosome, i.e., monosomic addition, which had some scab resistance. However, such monosomic additions are not stable and the unpaired alien chromosome is lost and goes with it the scab resistance. To stabilize the alien chromosome, disomic additions have to be produced.

By screening 300 plants derived from previous generations that showed low infection (33% or less), we have obtained one disomic addition line. This addition line had an average infection of 9.6% two weeks after inoculation and 14.3% three weeks after inoculation, whereas the Langdon check showed infections ranging from 66–100%. Of the 300 plants scored, 68 had 29 chromosomes, 7 had 30+ chromosomes, and the remainder had 28 chromosomes. Only one of the 7 plants with 30+ chromosomes has been verified as disomic addition with one fragment. These derivatives are being studied. Seed increases of the disomic addition are underway. We will adopt methods such as chromosome-specific markers to identify the alien chromosome in the derived disomic addition line.

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.

Jauhar, P. P., and Peterson, T. S. 2000. Progress in producing scab-resistant germplasm of durum wheat. Proc. International Symposium on Wheat Improvement for Scab Resistance, Nanjing Agricultural University, Nanjing, China, pp. 77-81.

Jauhar, P. P., and Peterson, T. S. 2001. Hybrids between durum wheat and *Thinopyrum junceiforme*: Prospects for breeding for scab resistance. Euphytica 118: 127-136.

Jauhar, P. P. 2001. Problems encountered in transferring scab resistance from wild relatives into durum wheat. Proc. of the 2001 National Fusarium Head Blight Forum, Cincinnati, December 8-10, 2001. pp 188-191.