USDA-ARS / USWBSI
FY04 Final Performance Report
July 15, 2005

Cover Page

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Year:	**FY2004**
FY04 ARS Agreement ID:	**NA**
FY04 ARS Agreement Title:	**Transfer of Scab Resistance from Wild Relatives into Durum Wheat.**
FY04 ARS Award Amount:	**$ 28,462**

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
GIE	Transfer of Scab Resistance from Wild Relatives into Durum Wheat.	$ 28,462
	Total ARS Award Amount	**$ 28,462**

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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: ***Transfer of Scab Resistance from Wild Relatives into Durum Wheat.***

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

There is no reliable source of Fusarium head blight (FHB) resistance in durum wheat cultivars (average infection above 70%). We have, therefore, been using wild relatives of wheat, in the secondary gene pool, as donors of FHB resistance. Thus, diploid wheatgrasses, *Lophopyrum elongatum* (2*n* = 14; EE genome) and *Thinopyrum bessarabicum* (2*n* = 14; JJ genome) show high resistance (98%) that we are transferring to durum cultivars via hybridization coupled with manipulation of chromosome pairing in the durum hybrids.

By crossing durum Langdon disomic substitution 5D(5B) line with *Th. bessarabicum* followed by a series of backcrossing (with durum cultivars) and selfing, we have produced several fertile hybrid derivatives. The lack of sufficient pairing between the durum and alien chromosomes, that we encountered earlier, was resolved by the use 5D(5B) substitution.

We have isolated some stable alien chromosome additions (involving *L. elongatum* chromosomes) with 80-93% resistance and their seed is being increased.

2. What were the most significant accomplishments?

From durum × *Th. bessarabicum* hybridization we have produced BC_2 progeny that are *Ph1*-deficient to help promote chromosome pairing.

From durum × *L. elongatum* crosses, we isolated several fertile hybrid derivatives. Of these, 30 lines were screened for FHB resistance in the Field Scab Nursery in Prosper, North Dakota. Some of these lines showed as low as 7% infection, and by using Fl-GISH, we have confirmed the integration of alien chromatin in the durum genome. We are increasing the seed of these promising lines. Disomic addition lines, with resistance levels of 79% or higher, were stabilized and we are increasing their seed. We plan to give this seed to breeders for use in their breeding programs.

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.

Jauhar, P.P., M. Doğramacı, and T.S. Peterson. 2004. Synthesis and cytological characterization of trigeneric hybrids of durum wheat with and without *Ph1*. Genome 47: 1173-1181.

Satyavathi, V.V., P.P. Jauhar, E.M. Elias, and M.B. Rao. 2004. Effects of growth regulators on *in vitro* plant regeneration in durum wheat. Crop Sci. 44: 1839-1846.

Jauhar, P.P**.** and S.S Xu. 2004. Multidisciplinary approaches to breeding Fusarium head blight resistance into commercial wheat cultivars: Challenges ahead. In: Canty, S.M., T. Boring, J. Wardwell, and R.W. Ward (Eds.) Proceedings Second International Symposium on Fusarium Head Blight, Orlando, Florida, December 2004. pp. 77-81.

Jauhar, P.P. 2004. Modern biotechnology as an integral supplement to conventional plant breeding**:** the prospects and challenges. Agronomy Abstracts, Crop Science Society of America meetings, Seattle, Oct. 30 – Nov. 4, 2004. (Abstract of invited symposium paper)

Jauhar, P.P. 2005. Classical cytogenetics and modern biotechnology: an alliance for crop improvement. Keynote presentation at the "National Symposium on Classical Cytogenetics and Modern Biotechnology," Calcutta University, India, January 2005 (Abstract)