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:	**NA**
FY03 ARS Agreement Title:	**Transfer of scab resistance from wild relatives into durum wheat.**
FY03 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 Amount Recommended	**$ 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

(Form – FPR03)

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?

Because of lack of a reliable source of Fusarium head blight (FHB) resistance in durum cultivars (average infection 70%) one has to look for alternative sources of resistance. Wild relatives of wheat, in the primary and secondary gene pools, offer an excellent source of FHB resistance. Diploid wheatgrass, *Lophopyrum elongatum* ($2n = 14$) shows high resistance (average 2% infection) that need to be transferred to otherwise superior durum cultivars. Characterization of alien chromatin conferring FHB resistance would also assist future work.

By crossing durum cultivars with *L. elongatum* followed by a series of backcrossings and selfings, we have produced several fertile hybrid derivatives, which show varying degrees of FHB resistance because of integration of alien chromatin into the durum genome. The stability of alien integration is a problem that we are resolving by selfing. We also plan to use the doubled haploidy technique. Another problem is insufficient pairing between durum and alien chromosomes. We have been resolving this problem by using Langdon disomic substitution 5D(5B) as female parent in crosses with *L. elongatum* and also with *Thinopyrum bessarabicum* that has potential as a source of FHB resistance. We are also studying alien chromosome addition lines to correlate resistance to specific wheatgrass chromosome(s).

2. What were the most significant accomplishments?

We have produced several fertile hybrid derivatives from durum × *L. elongatum* crosses. We have disomic addition lines with less than 30% infection, some with as low as 7% infection. We are currently evaluating 30 hybrid derivatives in the Field Scab Nursery at Prosper, North Dakota. We have also increased seed for further study of these lines.

With a view to evaluate *Th. bessarabicum* as a possible source of FHB resistance, we crossed durum lines (Langdon, Lloyd and Langdon disomic substitution 5D(B)) with this wheatgrass. We have already obtained a BC_2F_2 generation, following the design proposed in our scab project. Once we have established fertility in the hybrid derivatives we will start the screening process in the greenhouse.

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. 2003. Formation of 2*n* gametes in durum wheat haploids: Sexual polyploidization. Euphytica 133: 81-94.

Jauhar P.P. 2003. Haploid and doubled haploid production in durum wheat by wide hybridization. In: *Manual on Haploid and Double Haploid Production in Crop Plants.* (M. Maluszynski, K.J. Kasha, B.P. Forster, and I. Szarejko, eds). Kluwer Academic Publishers, Dordrecht, The Netherlands. pp. 161-166.

Jauhar, P.P. 2003. Genetics of crop improvement: Chromosome engineering. In: *Encyclopedia of Applied Plant Sciences. Volume One* (B. Thomas, D.J. Murphy, and B. Murray, eds.). Elsevier-Academic Press, London. pp. 167-179.

Jauhar, P.P. 2003. Chromosome engineering for scab resistance in durum wheat. XIX International Congress of Genetics, Melbourne, Australia, July 2003. p. 156-157.

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: (In press)