

**U.S. Wheat and Barley Scab Initiative
 FY02 Final Performance Report (approx. May 02 – April 03)
 July 15, 2003**

Cover Page

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Year:	FY2002 (approx. May 02– April 03)
Grant Number:	NA
Grant Title:	Fusarium Head Blight Research
FY02 ARS Award Amount:	\$ 48,796

Project

Program Area	Project Title	USWBSI Recommended Amount
EDM	Genetic mapping of aggressiveness and fertility barriers in <i>Gibberella zeae</i> .	\$50,016
	Total Amount Recommended	\$50,016

Robert L. Bowden

July 15, 2003

Principal Investigator

Date

Project 1: Genetic mapping of aggressiveness and fertility barriers in *Gibberella zeae*.

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

Our long-term goals are: 1) to understand the evolutionary potential of *Gibberella zeae* (*Fusarium graminearum*) either to change in aggressiveness or to adapt to control measures such as fungicides, biocontrol agents, and cultivar resistance; and 2) to study the genetic basis of ecologically or agriculturally important traits of the pathogen such as toxin production or aggressiveness in the hope it will lead to improved control strategies.

The objectives of this research are:

Objective 1: Create several new mapping populations and genetic maps among different lineages of *G. zeae*.

Objective 2: Determine the degree of interfertility between different lineages.

Objective 3: Locate the genes or chromosome regions that control lineage interfertility on our genetic map.

Objective 4: Locate the genes that control aggressiveness on our genetic map.

2. What were the most significant accomplishments?

First, we created a second genetic map of *Gibberella zeae*, the pathogen which causes Fusarium head blight. This narrow-cross map was needed to resolve some questions raised by our earlier wide-cross map. It has lower polymorphism, but is free of the segregation distortion observed in the first map. The new genetic linkage map is being tied to the old map and to the genomic sequence of *G. zeae* using common cloned AFLP markers. This will help validate the assembly of the sequence and allow comparison of physical and genetic distances and possible chromosome rearrangements.

Second, using our previously published wide-cross linkage map, we mapped a major locus controlling pathogenicity to linkage group 4 of *G. zeae*. Two additional quantitative loci controlling aggressiveness were mapped near the trichothecene cluster on linkage group 1. The fact that only three pathogenicity/aggressiveness loci were segregating in this wide cross was surprising. It was also noteworthy that no progeny were more pathogenic than the parent strain from Kansas.

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.

1. Jurgenson, J.E., R. L. Bowden, K. A. Zeller, J. F. Leslie, N. A. Alexander, and R. D. Plattner. 2002. A genetic map of *Gibberella zeae* (*Fusarium graminearum*). *Genetics* 160:1451-1460.
2. R.L. Bowden, J.E. Jurgenson, J.K. Lee, Y.-W. Lee, S-H Yun, K. Zeller, and J.F. Leslie. 2002. A second genetic map of *Gibberella zeae*. (abstract). Page 133. *2002 National Fusarium Head Blight Forum Proceedings*.
3. Cumagun, C. J. R., Bowden, R. L., and Miedaner, T. 2002. Segregation of aggressiveness in a crossing population of *Fusarium graminearum*. *J. Appl. Genet.* 43A:39-44.
4. C. J. R. Cumagun, R. L. Bowden, J. E. Jurgenson, J. F. Leslie, and T. Miedaner. 2003. Mapping of quantitative trait loci associated with pathogenicity and aggressiveness of *Gibberella zeae* (*Fusarium graminearum*) causing head blight of wheat. (abstract). *Phytopathology* 93:S19.