

**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 Title:	Fusarium Head Blight Research
FY01 ARS Award Amount:	\$ 53,410

Project

Program Area	Project Title	Requested Amount
Epid/Dis. Mgt.	Genetic Mapping and Fertility Barriers in Gibberella Zeae	\$ 54,866
	Total Amount Requested	\$ 54,866

 Principal Investigator

 Date

Project 1: Genetic Mapping 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*. These will help us confirm and extend the results of our first mapping cross (North American by Asian) and to compare genomes of different lineages.

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

Objective 3: Determine chromosome number and physical sizes for each parent of crosses. Correlate genetic linkage groups to physical chromosomes.

Objective 4: Test the mapping populations for segregation of aggressiveness. If these are, in fact, phylogenetically distinct lineages, then there is a very good chance of finding segregation for aggressiveness. This variation would allow us to locate the genes that control aggressiveness on our genetic map.

2. What were the most significant accomplishments?

We have made two supplemental mapping crosses. In the first case, we crossed the two most commonly used research strains of *F. graminearum* (Z-3639 x PH-1). In the second case, we crossed two Kansas strains (Z-3639 x Z-3634). For each new cross, progeny have been collected and AFLPs have been run for at least 30 primer combinations. We are currently beginning linkage analysis.

For interlineage fertility analysis, we obtained GFP labeled *MAT-2* knock-out heterothallic strains that greatly facilitate making crosses of this homothallic fungus. We were able to cross representative strains of each of the seven described lineages back to three tester strains from lineage seven. Fertility of the crosses was variable. However, this confirmed that gene flow between all lineages and lineage seven is possible. This could have important ramifications for introduction of foreign strains to the USA.

The mapping populations are a very valuable resource for analyzing quantitative traits like fertility and aggressiveness. Our collaborator, Thomas Meidaner at the University of Hohenheim, recently obtained preliminary growth chamber data that aggressiveness is indeed segregating in our original mapping cross. There appears to be one major gene and some minor genes segregating. In addition, there is a good chance that aggressiveness will segregate in other wide crosses. This will allow us to locate the genes that control aggressiveness on our genetic map.

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.

Alexander, N. J., Plattner, R. D., Bowden, R. L. and Leslie, J. F. 2001. Linkage of molecular markers with trichothecene chemotypes in *Gibberella zeae*. XXI Fungal Genetics Conference. Fungal Genetics Newsletter, Vol. 48- Supplement. Page 158.

Jurgenson, J. E., R. L. Bowden, K. A. Zeller, J. F. Leslie, N.J. Alexander, and R. D. Plattner 2002. A Genetic Map of *Gibberella zeae* (*Fusarium graminearum*). Genetics 160:1451-1460.