

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:	Host and Pathogen Genetics of Fusarium Head Blight.
FY03 ARS Award Amount:	\$ 48,293

USWBSI Individual Project(s)

USWBSI Research Area *	Project Title	ARS Adjusted Award Amount
EDM	Genetic Mapping of Aggressiveness and Fertility Barriers in Gibberella zeae.	\$ 48,293
	Total Amount Recommended	\$ 48,293

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: *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?**

Relatively little is known about the genetic basis of pathogenicity and aggressiveness in *Gibberella zeae*. Understanding of the genetic basis of these characters could open new approaches to controlling Fusarium head blight. For example, fungicides or transgenic resistance mechanisms can be targeted toward the pathogen genes that control pathogenicity or aggressiveness. It also can help to understand the potential for evolution of more virulent strains either by selection on resistant cultivars and/or by crossing with exotic strains.

2. What were the most significant accomplishments?

We and our cooperators in Germany used a wide cross between a strain of *G. zeae* lineage 7 from Kansas and *G. zeae* lineage 6 from Japan to map loci controlling pathogenicity and aggressiveness. A locus controlling pathogenicity mapped to the region of TOX1, a gene that controls amount of trichothecene toxin. Trichothecenes have previously been shown to be required for pathogenicity in *G. zeae*. A quantitative trait locus (QTL) controlling aggressiveness mapped to the region of the trichothecene biosynthesis cluster. The locus controlling the production of deoxynivalenol vs. nivalenol is in this region. Progeny that produced deoxynivalenol were, on average, twice as aggressive as those producing nivalenol. No transgressive segregation for aggressiveness was detected in this cross. The rather simple inheritance of both traits suggests that relatively few loci for pathogenicity or aggressiveness differ between lineages 6 and 7.

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.

Abstract:

Cumagun, C. J. R., Bowden, R. L. Jurgenson, J. E. Leslie, J. F. and T. Miedaner. 2003. Mapping of quantitative trait loci associated with pathogenicity and aggressiveness of *Gibberella zeae* (*Fusarium graminearum*) causing head blight of wheat. *Phytopathology* 93:S19 (abstract)

Refereed journal article:

Cumagun, C. J. R., Bowden, R. L. Jurgenson, J. E. Leslie, J. F. and T. Miedaner. 2004. Genetic mapping of pathogenicity and aggressiveness of *Gibberella zeae* (*Fusarium graminearum*) toward wheat. *Phytopathology* 94:520-526.