

**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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<b>FY01 ARS Award Amount:</b>	<b>\$ 38,939</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Epid/Dis. Mgt.	Genomics of Gibberella zeae, the head scab fungus	\$ 101,500
	<b>Total Amount Requested</b>	<b>\$ 101,500</b>

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Principal Investigator

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Date

## **Project 1: Genomics of *Gibberella zeae*, the head scab fungus**

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

To better understand the wheat scab fungus, it is important to identify virulence or pathogenicity factors in *Gibberella zeae*. One of our objectives for 2001 is to sequence additional ESTs (expressed sequence tags) from different cDNA libraries. To date, we have sequenced over 11,000 cDNA clones and accumulated over 9,700 ESTs from four cDNA libraries with RNAs isolated from *G. zeae* strain PH-1 developing perithecia, mycelia grown in complete medium, and mycelia starved for carbon or nitrogen sources. All the sequences (original and processed) and BLAST search results are available at the web site (<http://data.genomics.purdue.edu/cgi-bin/stackpack/project.py>). Contigs and clusters were assembled with both CAP3 and StackPack (<http://www.genomics.purdue.edu/~jxu/Fgr>). A manuscript on analyzing these ESTs has been submitted.

We have also sequenced over 2000 random clones from three subtraction libraries enriched for genes expressed during fungal infection. These subtraction libraries were constructed with the PCR-Select kit by using cDNA from infected wheat heads as the driver and cDNA from un-inoculated wheat heads as the tester. Sequences and BlastN/BlastX search results are available at <http://www.genomics.purdue.edu/~jxu/Fgr/S1> or S2 or S3. Many of these clones are homologous to genes known to be involved in disease resistance reactions.

In addition, we have generated ~6000 REMI (restriction-enzyme mediated integration) mutants by transforming pCB1003 or pCX12 into PH-1. A corn-silk infection assay was used to screen for mutants reduced in virulence. Nine tagged mutants have been identified after screening ~3000 REMI mutants. Three of them have been confirmed by wheat head infection assays to be significantly reduced in virulence. We also generated targeted gene knockout mutants for two selected genes. The *mgv1* mutants are dramatically reduced in virulence and DON production. (*MGVI* encodes a MAP kinase homologous to *MPS1* in *Magnaporthe grisea*)

### **2. What were the most significant accomplishments?**

In the past year, we sequenced additional ESTs from three different cDNA libraries. To date, we have established an EST database containing over 9,700 ESTs from *G. zeae*. We also sequenced over 2000 clones from three subtraction libraries that are enriched for genes expressed during wheat head infection.

In addition to accomplish the objectives proposed in 2001, we have generated ~6000 REMI mutants and devised a corn-silk infection assays for efficiently screening for mutants defective in plant infection. Three REMI mutants significantly reduced in virulence were identified. We also generated and characterized *mgv1* knockout in *G. zeae*.

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. Zhanming Hou, Chaoyang Xue, Talma Katan, H. Corby Kistler, and **Jin-Rong Xu**. 2002. A MAP kinase gene (*MGVI*) in *Fusarium graminearum* is required for female fertility, heterokaryon formation, and plant infection. *Mol. Plant-Microbe Interact.* Accepted
2. Frances Trail, **Jin-Rong Xu**, Phillip San Miguel, Rob Halgren, and H. Corby Kistler. 2002. Analysis of Expressed Sequence Tags from *Gibberella zae* (anamorph *Fusarium graminearum*). Submitted to *Fungal Genetics and Biology*.
3. Miles Trace, Zhanming Hou, H. Corby Kistler, and **Jin-Rong Xu**. 2002. REMI mutagenesis in the wheat scab fungus *Fusarium graminearum*. Abstract for 2002 APS meeting.