**U.S. Wheat and Barley Scab Initiative**
**FY01 Final Performance Report (approx. May 01 – April 02)**
**July 15, 2002**

## Cover Page

| | |
|---|---|
| **PI:** | **John F. Leslie** |
| **Institution:** | **Kansas State University** |
| **Address:** | **Dept. of Plant Pathology**<br>**4024 Throckmorton Hall**<br>**Manhattan, KS 66506-5502** |
| **Email:** | **jfl@plantpath.ksu.edu** |
| **Phone:** | **785-532-1363** |
| **Fax:** | **785-532-5692** |
| **Year:** | **FY2001 (approx. May 01 – April 02)** |
| **Grant Number:** | **59-0790-1-071** |
| **Grant Title:** | **Fusarium Head Blight Research** |
| **FY01 ARS Award Amount:** | **$ 52,224** |

## Project

| Program Area | Project Title | Requested Amount |
|---|---|---|
| Epid/Dis. Mgt. | Diversity of North and South American and Korean populations of Gibberella zeae | $ 53,648 |
| | | |
| | | |
| | | |
| | | |
| | **Total Amount Requested** | **$ 53,648** |

_____

Principal Investigator Date

(Form – FPR01)

**Project 1: Diversity of North and South American and Korean populations of Gibberella zeae**

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

This research examines the genetic diversity in the Fusarium head blight pathogen, *Fusarium graminearum* (*Gibberella zeae*) in two regions where we suspect diversity to be high. The information will help us understand the strain variability in the pathogen and help estimate the possibility of new highly aggressive types developing from crosses between pathogen lineages from different geographic locations.

The research objectives of this project are to: 1) determine genetic structure of Korean and South American populations, 2) determine the genetic relatedness among populations on different continents, 3) help resolve whether the seven lineages deserve status as separate species, 4) quantify occurrence of hybrid strains, and 5) if hybrids are found, analyze genomic introgression patterns.

We will use amplified fragment length polymorphism (AFLP) technique to fingerprint the isolates. These fragments have previously been mapped and their linkage relationships are known. Genetic diversity will be partitioned into "within" and "between" subpopulations using the $G_{ST}$ statistic (Nei, 1973) using the software package POPGENE 1.21. The effective number of migrants between populations, $N_m$, will also be calculated. If differentiation is found between the populations, hypotheses concerning the relative importance of selection, mutation, migration, or genetic drift can be developed.

2. What were the most significant accomplishments?

We have already obtained 158 isolates of *G. zeae* from our colleague, Dr. Yin-Won Lee at Seoul National University. Both nivalenol and deoxynivalenol producing isolates occur in Korea (Sohn et al., 1999). Our preliminary AFLP analysis suggests that diversity is high. Many isolates are Asian types (lineage 6) and many are North American types (lineage 7). There also is a third, DON-producing group from maize that has yet to be identified to lineage, and which might be hybrids. Therefore, Korea has a diverse population and appears to be a good area to look for natural hybrid strains.

Populations of *G. zeae* from Brazil and Uruguay were dominated by lineage 7. In most cases, lineages 1 and 2 were minor components of the populations. Lineage 6 was a rare component only in two populations. In the only population sampled from Mexico, all isolates were from lineage 3 except one, which was lineage 7. Several populations had a few isolates that were difficult to assign to described lineages. These results could be due to experimental artifacts, or sampling of inter-lineage hybrids, or new lineages. The results in this study contrast with previously reported results from North America in which lineage 7 was the only lineage detected.

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.

Vargas, J. I., R. L Bowden, K. A. Zeller, and J. F. Leslie. 2001. Comparisons of North and South American populations of *Gibberella zeae*. (abstract) Phytopathology 91:s91.

Zeller, K. A., Vargas, J. I., Lee, Y.-W., Bowden, R. L. and Leslie, J. F. 2001. Comparison of populations of *Gibberella zeae* from Korea and North and South America. (abstract). Page 163 IN: 2001 National Fusarium Head Blight Forum Proceedings, Erlanger, KY. Dec. 8-10, 2001.