U.S. Wheat and Barley Scab Initiative
FY01 Final Performance Report (approx. May 01 – April 02)
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Cover Page

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Grant Title:	**Fusarium Head Blight Research**
FY01 ARS Award Amount:	**$ 38939**

Project

Program Area	Project Title	Requested Amount
Epid/Dis. Mgt.	Host specialization and genetic diversity in Gibberlla zeae from corn, wheat & rice in Nepal	$ 61,972
	Total Amount Requested	**$ 61,972**

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Principal Investigator Date

(Form – FPR01)

Project 1: Host specialization and genetic diversity in Gibberlla zeae from corn, wheat & rice in Nepal

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

This project is part of a larger collaborative effort that is characterizing a population of *Gibberella zeae* from a 25-km^2 area in Nepal. Previous studies found that Nepal contains multiple lineages of *G. zeae* that have the potential to hybridize. Characterization of collections made from 1993 to 2000 found that *G. zeae* populations in Nepal fell into three to five groups that differed in toxin production, virulence and host specialization. Therefore, Nepal represents an area where new genetic combinations of *G. zeae* could form. These new combinations pose a threat to our efforts to control wheat and barley scab.

The goal of the research funded by USWGSI is to characterize molecularly the Nepal collection to: 1) determine the amount and pattern of genetic variability of *G. zeae*, 2) assess the potential for hybridization among lineages, and 3) assess the risk of new combinations of *G. zeae* arising in Nepal and spreading throughout the world.

2. What were the most significant accomplishments?

We have nearly completed molecularly characterizing 150 isolates using Amplified Fragment Length Polymorphisms (AFLPs). Our data indicate that the Nepal population is composed of three distinct lineages that correspond roughly to the sequence characterized (SCAR) groupings reported by Carter, Rezanoor, Desjardins and Nicholson in 2000. Based on our AFLP data, SCAR groups 1 and 2 are indeed distinct lineages, but groups 3 and 5 are part of a single interbreeding lineage (hereafter referred to as lineage 3/5). The three lineages differ in toxin production, virulence on wheat, and perhaps host specialization. Isolates from lineage 1 produce DON exclusively, isolates from lineage 2 only produce NIV, while lineage 3/5 isolates produce either DON or NIV. Isolates from lineages 1 and 3/5 are, on average, more virulent on wheat than isolates from lineage 2. However, isolates from Nepal are generally less virulent on Nepalese wheat and the American cultivar Wheaton than *G. zeae* isolates collected in Illinois. Lineage 2 may be specialized on corn since it was isolated infrequently from wheat but was the most common isolate from corn.

All lineages are delimited by differences in the frequency of informative AFLP bands, and not the presence or absence of bands. This pattern is consistent with the hypothesis that lineages are hybridizing to some degree. However, it may also indicate that the lineages have only recently diverged. We are currently characterizing standard strains from the collections of Dr. Anne Desjardins and Dr. Bob Bowden to determine if our lineages match up to previously characterized lineages. In particular, we want to determine if our lineages corresponds to the lineages characterized by O'Donnell, Kistler, Tacke and Casper 2000. Lineages in the O'Donnell et al. study were geographically separated and displayed a high amount of genetic differentiation. If our three lineages correspond to those found by O'Donnell et al., then our data would indicate that Nepal is an area where major lineages intermingle and occasionally hybridize.

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.

Desjardins, AE, RD Plattner and AM Jarosz. 2002. Biological diversity of Gibberella zeae from Nepal: genotypes, virulence, and toxins. Phytopathology 92: S19