

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:	59-0790-3-082
FY03 ARS Agreement Title:	Effect of Inoculum Level on FHB Development and Determination of G. zeae Population on Leaves.
FY03 ARS Award Amount:	\$ 17,314

USWBSI Individual Project(s)

USWBSI Research Area *	Project Title	ARS Adjusted Award Amount
EDM	Effect of inoculum level on FHB development and determination of G. zeae population on leaves.	\$ 17,314
	Total Amount Recommended	\$ 17,314

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: *Effect of inoculum level on FHB development and determination of G. zeae population on leaves.*

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

Fusarium head blight (FHB) has become a serious threat to wheat production during the last decade in North Dakota. At present, the state wheat growers are primarily depending on fungicides and cultural practices to combat FHB because of scarcity of resistant cultivars. This project is a collaborated effort of epidemiology groups based at PA, OH, IN, ND, and SD state universities. The central goal of this project is to provide growers and agricultural industry with timely and reliable disease forecasts for Fusarium head blight. Knowledge of sources of inoculum and its level, and weather conditions for FHB development is crucial in devising a handy and reliable disease forecaster. In the year 2003, effect of inoculum levels on FHB development and role of leaves as a carrier of *Fusarium* species associated with FHB, under fungicide sprayed and unsprayed regimes were studied. Two hard red spring cultivars, Grandin (early flowering) and Granite (late flowering) were planted at NDSU experimental area at Fargo. Three inoculum levels were applied at 6-leaf stage in all treatments. The disease incidence and severity data were recorded in all treatments. The fungal population present on heads in all three inoculum treatments were assayed daily. Also, *G. zeae* population present in the air was assayed by placing one Burkhard cyclone air sampler in each inoculum level treatment. Additionally, Two hundred wheat heads from each treatment were monitored from Feeks scale 10 to 11.2 thrice a week to observe the synchrony of heads development.

Two wheat cultivars Grandin (FHB susceptible) and Alsen (resistant) were planted in plots with and without wheat residue. Half of the treatments were sprayed with foliar fungicide and half of them were left unsprayed to see if the leaves from different treatments differed in carrying *Fusarium* species associated with FHB.

FHB incidence was not different among inoculum levels except for one cultivar-planting date (Grandin-late). Weather was not favorable at flowering for FHB development in other planting date treatments. In Grandin-late planting date treatment, FHB incidence was 5.6, 9.0, and 14.89 percent under low, medium, and high inoculum levels, respectively. Twelve out of 18 days, wheat heads from low and high inoculum levels treatments produced low and high numbers of *G. zeae* colonies.

Non-sprayed and non-surface disinfected leaves samples from a residue plot had high number of *Fusarium graminearum* colonies; whereas, the fungus was not recovered from sprayed and surface disinfected leaves samples. The fungal recovery range varied among sampling dates, cultivars, residue, and non-residue treatments.

2. What were the most significant accomplishments?

The following important information has been accomplished from the first year (2003) project results; 1) Inoculum levels under favorable weather for FHB development do have a significant role in the disease incidence and severity, 2) leaves can act as an additional source of inoculum and management of foliar diseases with fungicides could significantly reduce FHB pathogen population occurs on leaves, and 3) three to four days are needed for the heads from beginning to end flowering, a crucial stage for FHB infection. It is believed that incorporating information about local sources of pathogen inoculum and weather events that trigger its development, and dispersal may enhance the model accuracy.

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PI: Ali, Shaukat

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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.

Results of the 2003 and 2004 experiments will be presented at the 2nd International Symposium on Fusarium Head Blight in Orland, Florida this year in December.