

**USDA-ARS / USWBSI
FY04 Final Performance Report
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Cover Page

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Year:	FY2004 (approx. May 04 – April 05)
FY04 ARS Agreement ID:	59-0790-3-082
FY04 ARS Agreement Title:	G. zeae Population on Leaves and Effect of Inoculum Levels on FHB Development.
FY04 ARS Award Amount:	\$ 19,512

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Adjusted Award Amount
EDM	G. zeae Population on Leaves and Effect of Inoculum Levels on FHB Development.	\$ 19,512
	Total ARS Award Amount	\$ 19,512

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: *G. zeae* Population on Leaves and Effect of Inoculum Levels on FHB Development.

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

Fusarium head blight (FHB) of wheat has caused multiple disease epidemics and significant economic loss in North Dakota over the last thirteen years. Wheat breeders and plant pathologists have shifted more of their resources to the development of resistant cultivars and various other disease management strategies to combat this disease. The regional farming community has adopted an integrated approach to managing the disease using: cultivars with the best available tolerance or resistance; crop rotation; and fungicide protection.

Fungicides are available to manage FHB, but there are two major constraints for their use: 1) increase in cost of production; and 2) appropriate timing of application when needed. A decision support system is needed to accurately predict when an economic threshold of disease will occur. Epidemiology researchers based at Indiana, Ohio, North Dakota, Pennsylvania, and South Dakota land grant universities are collaborating to provide growers and agricultural industry with timely and reliable disease forecasts for Fusarium head blight (FHB). Knowledge about sources of inoculum, inoculum levels, and weather conditions favorable for FHB development is crucial in devising a reliable disease forecaster. In 2004, effect of inoculum levels on wheat head scab under North Dakota field conditions was explored. One hard red spring cultivar Argent (early flowering) and one white wheat spring cultivar Granite (late flowering) were planted at NDSU experimental Research area at Fargo. Three inoculum levels, 0, 80, and 100 percent) were applied, using *G. zeae* infested corn kernels, at 6-leaf stage. The disease incidence and severity data were recorded in all treatments. The fungal population present on heads in all inoculum level treatments were assayed daily. Placing one Burkard cyclone air sampler in each inoculum level treatment also monitored *G. Zeae* population present in the air. One hundred wheat heads from each treatment were monitored from Feeks scale 10-11.2 three times a week to observe the synchrony of heads development.

FHB incidence was significantly different among the inoculum level treatments. The disease incidence range was 19 to 40 %. The disease severity was not different among the inoculum level treatments, perhaps because weather conditions did not favor continued FHB development following initial infections. High inoculum levels generally resulted in increased number of *G. zeae* colony units (CFU) recovered from both head washes and air samples.

2. What were the most significant accomplishments?

The following information has been accomplished from the second year (2004) project. The results indicate that, under favorable weather for FHB, locally available *G. zeae* inoculum could play a significant role in disease development under North Dakota condition. On average, wheat heads take 3-4 days to begin and complete flowering, a crucial stage for scab infection. Incorporating information about local sources and levels of pathogen inoculum may increase disease forecasting model performance.

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 were presented at the 2nd International Symposium on Fusarium Head Blight in Orlando, Florida.

Ali, S., M. Mc Mullen, and T. Adhikari 2004 Effect of inoculum levels on head scab under field conditions in North Dakota In: Proceedings of the 2nd International Symposium on Fusarium Head Blight in Orlando, Florida. Pp 431.

Molineros, J.E., L. Madden, P. Lipps, G. Shaner, L. Osborne, S. Ali, and L. J. Francl 2004. Comparison of methods for developing Fusarium head blight forecasting models. In: 2nd International Symposium on Fusarium Head Blight in Orlando, Florida. Pp 475