

**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>Grant Title:</b>	<b>Fusarium Head Blight Research</b>
<b>FY01 ARS Award Amount:</b>	<b>\$ 10,708</b>

**Project**

<b>Program Area</b>	<b>Project Title</b>	<b>Requested Amount</b>
Epid/Dis. Mgt.	Fusarium graminearum infection in the morphological components of wheat spikes	\$ 15,000
	<b>Total Amount Requested</b>	<b>\$ 15,000</b>

\_\_\_\_\_  
 Principal Investigator

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 Date

## **Project 1: *Fusarium graminearum* infection in the morphological components of wheat spikes**

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

The single floret inoculation system is commonly used to screen wheat cultivars for FHB Type II resistance in the greenhouse by a visual rating of the spread of fungal hyphae in the spike and spikelets. Studies of this system in our laboratory had shown that these visual ratings may be poorly associated with the *Fusarium graminearum* occurring in infected seeds of the same individual spikelets. Our data also showed that fungal movement in the spike occurred in three ways; localization around the point of inoculation (PI), movement both up and down the spike from the PI and movement primarily downward from the PI. This research was conducted to relate visual spike and spikelet infection following single floret inoculation to *F. graminearum* infection of floral components of all spikelets on each spike. Mature spikes from resistant (Ernie, Roane) and susceptible (SC 921299, VA96W-326) genotypes which ranged from low (7%) to high (100%) greenhouse infection were dissected into each component [rachis (section immediately below spikelet), glume, lemma, palea, seed] of the lowest right floret of all spikelets, plated on a modified PCNB agar and examined for *F. graminearum* infection. Plants of wheat cultivars and breeding lines [Uniform FHB Northern (n = 49) and Southern (n = 29) Screening Nurseries] with variable levels of Type II resistance to FHB were also injected into a single floret of a middle spikelet, dissected into individual spikelets and each seed of the lowest (left) floret of all spikelets on the spike was removed and plated on a modified PCNB agar.

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

Movement of *F. graminearum* into floral components following greenhouse inoculation showed the highest levels of infection in the rachis, which implied movement in vascular tissue. Little difference was observed in the levels of *F. graminearum* among other floral components, except that infection in seeds and glumes was slightly higher than in lemma and palea. Visual estimates of FHB spikelet infection (21 days) in each spike following point inoculation ranged from 5% (infection at PI only) to 100% across all genotypes in the Northern and Southern FHB nurseries. Although the individual spikes of many genotypes showed Type II resistance to FHB with spikelet infection levels of = 10% (n = 110), the mean level of *F. graminearum* infection of seeds from the same spikelets ranged from 0 to 92 % (mean = 25%). Likewise, those susceptible spikes which showed 100% FHB infection of spikelets (n = 92) in the greenhouse averaged from 4 to 92 % (mean = 56%) seed infection in the laboratory. Even those spikes showing moderate levels (40 to 60%) of spikelet FHB infection in the greenhouse had a wide range in seed infection (5 to 90%). These results showed a poor relationship between visual ratings of FHB spikelet infection following point inoculation in the greenhouse and *F. graminearum* infection of seeds and other floral components from the same spikelets. We consistently found greater seed infection below the point of greenhouse inoculation than above this point in both resistant and susceptible cultivars.

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. Argyris, Jason M., Dennis M. TeKrony and David Van Sanford. 2001. Effect of *Fusarium graminearum* infection during wheat seed development on seed quality. Proc. National Fusarium Head Blight Forum. pp. 100-104.
2. TeKrony, Dennis M., Jason Argyris, Marcy Rucker, Cheryl Edge and David Van Sanford. 2001. Relationship between greenhouse estimates of FHB spikelet infection and laboratory seed infection by *F. graminearum*. Proc. National Fusarium Head Blight Forum. pp. 286-290.
3. Argyris, Jason. 2002. Effect of *Fusarium graminearum* infection on wheat seed quality. .M.S. Thesis. University of Kentucky, Lexington, KY.