USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY09 Final Performance Report
July 15, 2010

Cover Page

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Fiscal Year:	2009
USDA-ARS Agreement ID:	59-0790-6-068
USDA-ARS Agreement Title:	Starch Degradation by Gibberella zeae and Its Role in Fueling Development.
FY09- USDA-ARS Award Amount:	$ 37,073

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
PBG	Use of Airulent Strains for Protection against Head Scab and for Increased Yield.	$ 37,073
	Total Award Amount	**$ 37,073**

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Principal Investigator Date

* MGMT – FHB Management
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GDER – Gene Discovery & Engineering Resistance
PBG – Pathogen Biology & Genetics
BAR-CP – Barley Coordinated Project
DUR-CP – Durum Coordinated Project
HWW-CP – Hard Winter Wheat Coordinated Project
VDHR – Variety Development & Uniform Nurseries – Sub categories are below:
SPR – Spring Wheat Region
NWW – Northern Winter Wheat Region
SWW – Southern Sinter Wheat Region

Project 1: *Use of Airulent Strains for Protection against Head Scab and for Increased Yield.*

1. **What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?**

   New strategies to eliminate or reduce DON in grain are essential as we only have tools that are partially effective and none that are completely effective. We investigate the use of avirulent strains of *F. graminearum* to act as protective endophytes to reduce toxin and increase yields.

2. **List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):**

   Accomplishment: We have shown that resistant cultivar Alsen has higher capacity to harbor avirulent endophytic strains of *Fusarium graminearum* than either of the susceptible cultivars Wheaten or Bobwhite. Furthermore, the three avirulent strains we tested appear to have different abilities to colonize each of the cultivars. We are in the process of identifying the genes associated with the avirulence phenotypes.

   Impact: This work has two impacts. First, if the presence of specific endophytes can affect disease impact, as has been shown in many other systems, then it should be used as another tool in the fight against scab. Second, since *F. graminearum* has evolved an intimate relationship with wheat, use of an attenuated strain as an endophyte may have some benefits for survival and colonization of the endophytic strain.

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.

Peer-reviewed publications (this year) funded by USWBSI:
Baldwin, T., I. Gaffoor, J. Antoniw, C. Andries, J. Guenther, M. Urban, K. Hammond-Kosack, F. Trail. 2010. A partial chromosomal deletion caused by random plasmid integration resulted in a reduced virulence phenotype in *Fusarium graminearum.* Molecular Plant-Microbe Interactions, *In press.*

Guenther, JC, Hallen-Adams, HE, Bucking, H, Shachar-Hill, Y and F. Trail 2009. Triacylglyceride metabolism by *Fusarium graminearum* during colonization and sexual development on wheat. 2009. Molecular Plant-Microbe Interactions 22:1492-1503.

Reviews and presentations:

Trail, F. 2009. For Blighted Waves of Grain: *Fusarium graminearum* in the post-genomics era. Plant Physiology 149: 103-110

Trail, F. 2009. Head Blight of Wheat: Integration of two life cycles. Seoul National University, November. Invited seminar.

Cavinder, B., Hallen-Adams, H., Trail, F. The role of calcium signaling in ascospore discharge and spore shape. Mycological Society Meeting, Lexington, KY. July 2010.

Hallen-Adams, H., Guenther, J., Trail, F. The role of lipids in successful overwintering and subsequent perithecium production by *Fusarium graminearum.* Mycological Society Meeting, Lexington, KY. July 2010.