

**USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY08 Final Performance Report (approx. May 08 – April 09)
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Cover Page

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Fiscal Year:	2008
USDA-ARS Agreement ID:	NA
USDA-ARS Agreement Title:	Field Testing for Transgenic Barley Lines.
FY08 USDA-ARS Award Amount:	\$ 3,724

USWBSI Individual Project(s)

USWBSI Research Category*	Project Title	ARS Adjusted Award Amount
BAR-CP	Transformation and Field Testing of Transgenic Barley Lines.	\$3,724
	Total Award Amount	\$ 3,724

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
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: *Transformation and Field Testing of Transgenic Barley Lines.*

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

Sources of resistance to FHB are limited in barley. We have transformed barley with several antifungal and antitoxin genes. Transgenic Conlon lines containing a rice chitinase plus a rice tlp, the chitinase plus a glucanase from *Fusarium venetatum*, or just the glucanase were evaluated in replicated tests at Langdon, ND and Rosemount, MN.

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:

Two lines showed significant reductions in FHB and DON (compared to Conlon) in the Langdon un-misted nursery and one also showed reduced FHB in the misted nursery. Two different lines showed significant reductions in incidence and severity at Rosemount. All four lines contained rice genes for a chitinase and a thaumatin-like protein. Other lines containing the chitinase and thaumatin-like protein either had higher FHB or DON at one of the locations or showed no differences from wild-type Conlon. The 20 lines containing the *F. venetatum* glucanase gene showed FHB severities and DON contents equal to or greater than wild-type Conlon. At Langdon, even the lines that had significantly less FHB than wild-type Conlon showed significantly more FHB than the resistant check CI4196. The two lines with reduced DON had significantly less toxin than both wild-type Conlon and CI4196, but levels were too high to be acceptable to growers. At Rosemount, the lines with reduced FHB incidence and severity were comparable to the resistant check M122. All 48 lines will be tested again in 2009 to validate the reductions in FHB

Impact:

Results show that the chitinase and a thaumatin-like protein gene combination provides some protection against FHB. Another year of field testing will tell whether the genes are worth further investigation. The glucanase gene does not protect against FHB or DON.

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.

Dahleen, L.S., R. Dill-Macky and S.M. Neate. 2008. 2008 FHB analysis of transgenic barley lines. Proceedings of the 2008 National Fusarium Head Blight Forum, 2-4 Dec 20087, Indianapolis, IN. p. 106.

Dill-Macky, R., A.M. Elakkad, K.J. Wennberg, N.E. Tumer, R. Di, J. Shah and L.S. Dahleen. 2008. Testing transgenic spring wheat and barley lines for reaction to Fusarium head blight: 2008 field nursery report. Proceedings of the 2008 National Fusarium Head Blight Forum, 2-4 Dec 20087, Indianapolis, IN. p. 107.

If your FY08 USDA-ARS Grant contained a VDHR-related project, include below a list all germplasm or cultivars released with full or partial support of the USWBSI. List the release notice or publication. Briefly describe the level of FHB resistance. If this is not applicable (i.e. no VDHR-related project) to your FY08 grant, please insert ‘Not Applicable’ below.

Not applicable