USDA-ARS/
U.S. Wheat and Barley Scab Initiative
FY06 Preliminary Final Performance Report (approx. May 06 – April 07)
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Cover Page

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Fiscal Year:	2006
USDA-ARS Agreement ID:	59-0790-5-080
USDA-ARS Agreement Title:	Detoxification of the Mycotoxin, Deoxynivalenol, by Expressing UDP-Glucosyltransferase in Barley.
FY06 ARS Award Amount:	$ 34,890

USWBSI Individual Project(s)

USWBSI Research Area*	Project Title	ARS Award Amount
GET	Detoxification of the Mycotoxin, Deoxynivalenol, by Expressing UDP-Glucosyltransferase in Barley.	$ 37,890
	Total Award Amount	**$ 34,890**

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Principal Investigator Date

* CBCC – Chemical, Biological & Cultural Control
EEDF – Etiology, Epidemiology & Disease Forecasting
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain
GET – Genetic Engineering & Transformation
HGR – Host Genetics Resources
HGG – Host Genetics & Genomics
PGG – Pathogen Genetics & Genomics
VDUN – Variety Development & Uniform Nurseries

Project 1: *Detoxification of the Mycotoxin, Deoxynivalenol, by Expressing UDP-Glucosyltransferase in Barley.*

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

Fusarium head blight (FHB) in barley is a major disease of devastating economic impact. The fungus produces the mycotoxin deoxynivalenol (DON) in infected grains which poses safety concerns for human and livestock. Currently, there are no reports of barley genotypes that are resistant to FHB. Resistant sources to FHB in barley are limited with only a few sources providing partial resistance. Our goal is to produce transgenic barley expressing an anti-toxin gene, DOGT1 encoding UDP-glucosyltransferase. DOGT1 may detoxify DON and limit FHB infection.

2. List the most important accomplishment and its impact (how is it being used?). Complete all three sections (repeat sections for each major accomplishment):

Accomplishment:

A six-rowed barley cultivar, Lacey, was successfully transformed with DOGT1 gene from *Arabidopsis*. Three to four weeks old nodal calli, isolated from immature embryos cultured on Murashige and Skoog medium (MS) containing 2 mg/L 2,4-dichlorophenoxyacetic acid, were co-bombarded with vectors pBP1319 and pAHC25. pBP1319 contain deoxynivalenol-glucosyltransferase (DOGT1) driven by 2X35S promoter, and terminated by nopaline synthase (*nos*). pAHC25 contain the selectable marker gene, *bar* (bilaphos-resistant gene). After 3-4 weeks of culture in the callus induction medium (CIM) containing bialaphos (3 mg/L), the resistant calli were transferred to the regeneration medium (RM) containing 0.2 mg/L benzylaminopurine (BA), and 3 mg/L bialaphos. Putative transgenic plants, which were regenerated after 4-5 weeks of culture on RM, transferred to MS medium with 3 mg/L bialaphos for rooting. Rooted plants were transferred to peat pellets first and subsequently to the growth chamber. Molecular analyses indicated the presence of DOGT1 and *bar* genes in T_0 plants. Transgenic lines are being grown for seed for progeny and DON analyses.

Impact:

Successful development of transformation protocol for the first time in six-rowed barley has paved the way for the expression of DOGT1 for reducing DON and improving resistance to FHB.

As a result of that accomplishment, what does your particular clientele, the scientific community, and agriculture as a whole have now that they didn't have before?

The scientific community now has access to the protocol for the transformation of six-rowed barley for the first time. In addition, the scientific community now has transgenic lines containing DOGT1 that may detoxify 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.

No publication at this time