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**Project ID: FY12-RA-007**

**ARS Agreement #: NA**

**Research Category: GDER**

**Duration of Award: 1 Year**

**Project Title: Development and Testing of Improved Enzymes for Transgenic Control of FHB.**

#### **PROJECT 4 ABSTRACT**

(1 Page Limit)

The primary goal of this proposal is to develop improved enzymes for the inactivation and degradation of fungal mycotoxins associated with Fusarium head blight and test their efficacy in barley.

Thus the specific aims of the project are:

1. to apply protein engineering to the trichothecene 3-*O*-acetylase (Tri101) from *F. sporotrichioides* and *F. graminearum* to improve the function and stability of the enzyme and the expression level *in planta*.  
This is the first priority, since *Tri101* has been shown to provide partial protection against the spread of *F. graminearum* in transgenic wheat.
2. to test the efficacy of the new enzymes in providing resistance to FHB in barley. The improved genes will be transformed into barley by *Agrobacterium* and particle bombardment to create transgenic strains. These will be tested for resistance to FHB once homozygous lines are identified.
3. to correlate the structure and function of the Tri101 protein produced in *E. coli* with that isolated directly from transgenic barley. This will ascertain the level of activity of the enzyme expressed in transgenic barley and establish a connection between the *in vitro* and *in vivo* studies of Tri101. This will establish a biochemical foundation for assessing the efficacy of Tri101 as a protective agent against FHB.