Project Abstract

Project Title:	**Characterization and expression of plant transporters to reduce FHB and mycotoxins**	
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Our recent study found that transgenic *Arabidopsis* seedlings expressing the Tri101 from *Fusarium graminearum* (FgTri101) can efficiently convert deoxynivalenol (DON) to 3-acetylated DON (3-ADON) and excrete over 95% 3-ADON to the media. We hypothesize that transporters in *Arabidopsis* excrete 3-ADON out of plant cells, however, these transporters are absent or nonfunctional in wheat and barley heads. To reduce FHB and DON contamination, we propose the following objectives:

1) Identification of transporters responsible for 3-ADON excretion using transgenic *Arabidopsis* expressing FgTri101.

We will conduct transcriptomics on Tri101 transgenic *Arabidopsis* plants supplemented with DON and identify transporter candidates upregulated by DON. After identifying the transporter candidates, we will generate transporter mutants by CRISPR/Cas9 gene editing in Tri101 transgenic background and confirm its function of 3-ADON excretion. The identified transporters will be used to search wheat and barley genomes and determine if the homologs are present in wheat and barley genomes. The expression of these transporter homologs will be determined in FHB susceptible and moderately resistant varieties.

2) Generation of transgenic wheat expressing FgTri10 and determine if transgenic wheat expressing FgTri101 can excrete 3-ADON.

Since transgenic wheat and barley expressing FsTri101 from *F. sporotrichioides* did not show significant FHB reduction, we speculate that FsTri101 transgenic wheat and barley either cannot convert DON to 3-ADON efficiently or excrete 3-ADON efficiently. Therefore, we will generate transgenic wheat expressing FgTri101 and determine the efficacy of DON to 3-ADON conversion and 3-ADON excretion. If FgTri101 transgenic wheat can convert DON to 3-ADON efficiently but could not excrete 3-ADON, we will pursue objective 3.

3) Stacking FgTri101 and the *Arabidopsis* transporter in transgenic wheat and evaluate transgenic lines for DON detoxification and resistance to FHB.

We will construct the vector and generate transgenic wheat expressing both FgTri101 and the *Arabidopsis* transporter. We will determine whether expression of FgTri101-transporter in wheat improve DON conversion and FHB resistance.