

PI: Frances Trail

PI's E-mail: trail@msu.edu

Project ID: FY12-TR-019

ARS Agreement #: 59-0206-1-120

Research Category: PBG

Duration of Award: 1 Year

Project Title: Elucidating Alsen Resistance to Fusarium Ingress.

PROJECT 2 ABSTRACT

(1 Page Limit)

Building resistance to head blight into wheat and barley is the main strategy for improving the disease outcome. The most powerful resistance source currently available is derived from Sumai 3. We currently use the spring wheat variety Alsen, which carries Sumai3 based resistance. Our previous work, compared the expression of *Tri5* during the course of head infection by *F. graminearum* in susceptible cultivar Wheaten and resistant cultivar Alsen. The data suggested that the kernels of Alsen are cured of living fungus during maturation. Symptoms are still present in the kernels, but no fungus is detected using qRT-PCR. This, together with other results supports the statement that Alsen resistance limits colonization of the seed, supports high *Tri5* expression without the spread of the fungus, and cures kernels of fungal infection late in grain development. This proposal focuses on teasing apart these stages of resistance to understand the fungal-plant interaction that results in resistance.

We propose the following objectives aimed to better understand the mechanism of resistance in Alsen:

- (1) Examine the progress of infection and DON production to determine the precise interval of resistance activity. Upon completion of this objective, we will know where infecting hyphae are at each timepoint (tissues) and when they recede in the later timepoints
- (2) Analysis of individual kernels for DON and glucosylated DON. Since the presence of DON assists in pathogen spread, it could also be that DON is somehow detoxified in Alsen. One possibility is that the DON is glucosylated. Here we propose to investigate whether or not glucosylation is important to Alsen resistance.
- (3) Compare developing grain at the infection front in susceptible Wheaten, to that of Alsen. Both types of kernels will be harvested and analyzed histologically to see the location of mycelia at the infection front of asymptomatic grain in both cultivars. The analysis will reveal important differences in colonization and spread of the fungus through susceptible and resistant kernels.

This project addresses both PBG 2012-2013 priorities. It characterizes the plant-fungal interactions in one of the predominant sources of resistance used in building resistant cultivars (Priority 1). The proposed work would result in our ability to use this resistance to reduce FHB and DON in novel and more effective ways (Priority 2).

The work proposed here will provide the preliminary data for a proposal to the USDA-NIFA program.