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Project ID: FY07-AB-050

FY06 ARS Agreement #: 59-0790-6-057

Research Area: GET

Duration of Award: 1 Year

Project Title: Engineering Barley with Anti-Fungal Gene Gastrodianin for Resistance to Scab Disease.

PROJECT 1 ABSTRACT

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The proposed project is a continuation of the work initiated in FY06 to enhance resistance of barley to *Fusarium graminearum* by over-expressing the anti-fungal gene *GAFP* (gastrodianin anti-fungal protein). In the FY06 grant period (5/1/06 – 4/30/07) we have started transforming barley with an expression plasmid containing the coding region of *GAFP*. Expression of *GAFP* is expected to be localized to the spike tissue because of the use of a tissue-specific *Lem2* promoter we cloned from Morex barley (Abebe *et al.*, 2005). *GAFP* was isolated from an orchid *Gastrodia elata*, which leads a symbiotic relationship with the fungus *Armillaria mellea*. The fungus can grow in older corms but infection of new corms is prevented by *GAFP* and other anti-fungal proteins. *In vitro* tests have demonstrated that *GAFP* effectively inhibits growth of saprophytic fungi, including *F. graminearum*. The objectives for the FY07 grant period are: 1) to characterize integration, expression and inheritance of *GAFP* in transgenic plants and 2) to test transgenic barley expressing *GAFP* for resistance against *F. graminearum*. Integration of *GAFP* to the genome of transgenic plants will be determined by Southern analysis of T₁ and T₂ plants. Expression will be monitored both at the mRNA level (by northern blotting and real-time PCR) and the protein level (using enzyme-linked immunosorbent assay). To test transgenic plants for their resistance to scab disease, spikes of T₁ and T₂ plants will be infected with *F. graminearum* in a growth chamber and greenhouse. The project will address the USWBSI Genetic Engineering and Transformation (GET) goal of developing transgenic barley with anti-*Fusarium* genes to limit *Fusarium* infection and early stages of growth and spread.