## FY07 USWBSI Project Abstract

PI: Abebe, Tilahun PI's E-mail: Tilahun.Abebe@uni.edu

Project ID: FY07-AB-050 FY06 ARS Agreement #: 59-0790-6-057

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

Disease.

Research Area: **GET** 

## PROJECT 1 ABSTRACT

**Duration of Award: 1 Year** 

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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 antifungal 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 T<sub>1</sub> and T<sub>2</sub> 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  $T_1$  and  $T_2$  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.