## AN RNAI CONSTRUCT OF THE P450 GENE CYP82D109 LEADS TO INCREASED RESISTANCE TO FUSARIUM OXYSPORUM F. SP. VASINFECTUM (FOV11) AND INCREASED FEEDING BY HELICOVERPA ZEA LARVAE Tanya A Wagner USDA, ARS, Southern Plains Agricultural Research Center Department of Plant Pathology, Texas A&M University **College Station, TX** Jinggao Liu **Charles P. Suh Lorraine S Puckhaber** Alois A. Bell USDA, ARS, Southern Plains Agricultural Research Center **College Station, TX Clint Magill** Department of Plant Pathology, Texas A&M University **College Station, TX Robert D. Stipanovic** USDA, ARS, Southern Plains Agricultural Research Center **College Station, TX**

## <u>Abstract</u>

The P450 CYP82D109 gene codes for an early step enzyme in the gossypol pathway in Gossypium. The terminal leaves of RNAi plants had a 90% reduction in hemigossypolone and heliocides levels, and a 70% reduction in gossypol levels compared to wild-type (WT) plants. Previous studies comparing glanded vs. glandless cotton suggests that products of the gossypol pathway are important for protection against insect herbivory. Since plants that contain the RNAi blockage of CYP82D109 are still glanded, these plants make an excellent material to test the importance of gossypol compounds on insect herbivory. Preliminary data confirms that gossypol-related compounds do inhibit the growth of insects. Helicoverpa zea larvae fed on terminal leaves from RNAi-plants for eight days had significantly higher larvae weights than larvae fed on leaves from null segregants. Interestingly, the gossypol and lacinilene pathways are linked in the RNAi plants. In pathogen infected plants, the gossypol pathway is blocked (via the RNAi construct), and a shared intermediate is diverted to the lacinilene pathway. In the present study, homozygous RNAi plants from two independent transgenic lines and the corresponding homozygous nullsegregants were grown in sand and treated with either Fov11 or water via a root-dip assay. Three weeks after inoculation, plants were scored for disease severity. The RNAi lines were significantly more resistant to Fov11; both RNAi lines treated with Fov11 showed greater shoot weight and lower leaf disease score compared to similarly-treated null-segregants. dHG was induced 2X by Fov11 treatment in the roots of WT plants and absent from both treated and control RNAi plants. Instead, the roots of mock-treated RNAi plants contained 26-29X more lacinilenes that WT plants, and lacinilenes were induced 2-5X after Fov11 infection (17-19X more than inoculated WT plants). Thus, lacinilene metabolites may contribute to the seedling resistance toward Fov in RNAi plants.