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Research Category: **GDER** **Duration of Award: 1 Year**

Project Title: Response of Transgenic Wheat Altered in Defense Metabolites to Head Scab.

PROJECT 1 ABSTRACT

(1 Page Limit)

The goal of this proposed research is to identify Fusarium head blight (FHB) resistance in transgenic wheat lines overexpressing genes involved in lignin biosynthesis. Lignin provides structural support to plant cell walls and can accumulate during pathogen attack. Other phenolic products of lignin biosynthesis also can inhibit pathogens. We have previously shown increased resistance to *Fusarium* grain pathogens and elevated phenolic metabolites in sorghum lines with alterations in lignin biosynthesis. Four sorghum genes, one a regulatory factor for lignin biosynthesis and three for lignin biosynthesis enzymes, were individually overexpressed in wheat using transformation. These transgenic lines are ready to be analyzed for FHB resistance. The first objective of this proposal is to screen transgenic wheat overexpressing genes from the lignin biosynthesis pathway for resistance to initial infection (called Type I), to spread within the head after infection (Called Type II), and for reduced mycotoxin (deoxynivalenol or DON) production following infection with the FHB pathogen. The second objective is to identify changes in levels of phenolic metabolites that could enhance disease resistance in transgenic wheat.

We have demonstrated success in identifying resistance to *Fusarium* grain pathogens in sorghum and assessing changes in levels of phenolic metabolites. Additionally, our team includes those with proven expertise in wheat inoculations with the FHB pathogen. Therefore, it is likely the research proposed will identify resistance in these wheat lines and, further, identify phenolic compounds that are involved in this resistance.

This proposal addresses the Gene Discovery and Engineering Resistance Research Area by: 1) Identifying candidate genes for resistance against FHB and/or reduced DON accumulation (research priority #2); and 2) Developing effective FHB resistance and/or reduced DON accumulation through transgenic strategies (research priority #3).