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Research Area: **GET** **Duration of Award: 1 Year**

Project Title: Developing and Characterizing Transgenic Wheat for Scab Resistance.

PROJECT 1 ABSTRACT

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Fusarium head blight (FHB, scab), a fungal disease of small grain crops caused by *Fusarium graminearum*, threatens to reduce wheat and barley to economically unviable crops in the United States. To complement the current breeding efforts, my lab is developing transgenic wheat carrying genes with potential to confer resistance to FHB. Our overall goals are to develop transgenic wheat lines with increased FHB resistance. There are three major objectives in the proposed work including: (1) develop transgenic wheat carrying genes for potential resistance to FHB; (2) characterize transgenic wheat for transgene expression and resistance to FHB; and (3) combine proven transgenes into a common background and with an elite wheat line.

We plan to continue to develop novel transgenic wheat and to test these lines against FHB. We will use standard protocols in my laboratory to transform wheat with a gene encoding a barley oxalate oxidase. By the middle of the funding period we will develop at least 10 transgenic wheat lines carrying the barley oxalate oxidase transgene. We are currently testing lines in the greenhouse containing a lipid transfer protein (LTP) and a glutathione-S-transferase (GST). We will be finished with the molecular characterization and greenhouse testing of these lines by spring of 2008.

We plan to continue to field test promising lines. My laboratory has identified 29 lines carrying a variety of transgenes that exhibit statistically significant reductions in FHB severity compared to non transgenic controls in multiple greenhouse screens ($P<0.05$). In collaboration with Dr. R. Dill-Macky, we conducted two field screens, (one screen contained 7 lines and the other screen contained 21 lines) and we identified eight lines exhibiting reduced severity compared to non transgenic controls ($P<0.05$). We will test 22 of the 29 lines in the field in 2007.

We will combine proven transgenes into a common genetic background and with the type II resistant wheat cultivar Alsen. We have and will continue to cross or transform transgenes encoding differing modes of action into a common genetic background and test the lines for FHB resistance in the greenhouse and field. We have crossed five transgenic lines exhibiting reduced severity in the field trials into Alsen. We have selected progeny from these crosses that contain the chromosome 3BS Alsen-derived resistance and the transgene. We will finish greenhouse testing of these lines by winter 2008. We will develop additional Alsen lines containing transgenes by spring 2008.

The proposed research meets the objectives of the USWBSI and fits within the genetic engineering and transformation area. The proposed research has specific reference to the priority of transforming wheat to demonstrate the effectiveness of anti-Fusarium genes, and the priority to test transgenes in elite cultivars.