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Research Category: GDER
Duration of Award: 1 Year

Project Title: Wheat Variants Deficient in a FHB Susceptibility Factor

PROJECT 2 ABSTRACT

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Project Goals: The goal of this project is to identify native wheat gene variants that improve FHB resistance and reduce DON accumulation. Wheat genes that contribute to susceptibility by facilitating fungal growth, development and virulence provide excellent targets for controlling disease. With previous support from the USWBSI, the PI's lab identified wheat 9-lipoxygenases (9-LOXs) as susceptibility factors, which when knocked-down by RNA-interference (RNAi) in the cv Bobwhite, limit spread of *Fusarium graminearum* infection and limit DON accumulation. The goals of the proposed work are to establish whether (i) the FHB resistance promoting effect of *Lpx3* knockdown is also effective in wheat backgrounds other than Bobwhite, (ii) one or more *Lpx3* homeolog(s) in wheat contribute towards susceptibility to *Fusarium graminearum*, and (iii) nonsense and/or missense *Lpx3* variants can provide a non-GMO strategy that in the future can be utilized by breeding programs to enhance FHB resistance in wheat. As a first step in this direction, several TILLING mutants that cover all three *Lpx3* homeologs on chromosomes 4A, 4B and 4D have been identified in the hexaploid and tetraploid wheat varieties Cadenza and Kronos, respectively. Mutations in these TILLING lines are predicted to yield prematurely truncated Lpx3 protein, or strong missense alleles. The specific objectives of this project are to:

1. Characterize the response to *Fusarium graminearum* in backcrossed progeny of *Lpx3* variants.
2. Develop wheat lines containing mutant combinations at more than one *Lpx3* homeologous loci and characterize their response to *Fusarium graminearum*.

Expected Outcome: The proposed work addresses GDER's priority to 'Identify native and induced wheat and barley gene variants that improve FHB resistance and/or reduce DON accumulation'. The completion of this work will identify hexaploid and tetraploid wheat lines with variations at the *Lpx3* loci that confer enhanced resistance to FHB. Our approach, and the wheat gene targeted in this study, complement the activity of other USWBSI sponsored projects.

Plan to Accomplish Project Goals within Period of Proposed Work: PCR-based co-dominant markers that distinguish wild-type from mutant alleles will facilitate this work.

Statement of Mutual Interest: The non-GMO FHB resistant wheat variants developed as a result of this work will provide novel genetic material that can be integrated into wheat breeding programs.