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Project ID: FY18-SP-001

ARS Agreement #: *New*

Research Category: VDHR-SPR

Duration of Award: 1 Year

Project Title: Developing FHB Resistant Wheat Cultivars for Idaho and the Western US.

PROJECT 1 ABSTRACT

(1 Page Limit)

This project addresses a disease (Fusarium head blight, FHB) of importance nationally and internationally which became a problem in irrigated and high-rainfall spring wheat production areas in Idaho, Washington, and Montana, because of the increased corn production, reduced tillage, and changing climate. Currently, most virtually grown wheat cultivars are susceptible to FHB and often produced high levels of vomitoxin deoxynivalenol (DON). Developing FHB resistant wheat cultivars will reduce or eliminate future costs of disease control using fungicides, and help growers and industry reduce yield and quality losses when epidemic occurs. The proposed project combines molecular marker-assisted selection in classical breeding to pyramid FHB1 (3BS from W14), FHB3 (5AS from W14), and unknown resistance QTL (from our association mapping) to develop FHB resistant spring cultivars adapting in Idaho, Washington, and PNW. The PI's program just finished an association mapping project in 170 spring wheat lines adapted in the PNW. The results have been published in *Phytopathology*. The FHB resistant lines have been used in crossing and SNP markers are being converted to KASP markers for use in the proposed project. The genotyping work will be conducted in both regional genotyping facility (Dr. Deven See) and breeder in-house lab.

The overall goal of this project is to develop FHB resistant spring cultivars that have high grain yield and good end-use quality and resistance to predominant diseases and insects. The specific objectives are: 1. Develop and release new spring wheat cultivars pyramided *Fhb1* (3BS) and *Fhb3* (5AS) with other FHB QTL and resistance genes to stripe rust, stem rust, cereal cyst nematodes, Hessian fly, and end-use quality; 2. Expand one FHB nursery in WA in addition to the Aberdeen nursery to evaluate cultivars and breeding lines from University of Idaho (UI) and Washington State University (WSU) as well as from the Uniform Regional Scab Nursery; 3. Train one post doc and one graduate student. Newly developed wheat cultivars with improved FHB resistance will be grown in the FHB epidemic areas to increase growers' profitability. The resistant germplasm will be shared with other breeding programs in cultivar development and basic research. The established disease nurseries will be used by extension educators in growers' field day and 4-H programs. The refined software package will help breeders to select FHB resistance more efficiently. Trained post doc and students will work in academic and industry sectors. All information and data being produced from this project will be published in professional meetings, breeding program webpages, and various peer-reviewed and refereed journals. FHB resistance data will be uploaded to T3 database and shared with the USWBSI.

The PI Jianli Chen and CO-PI Mike Pumphrey have extensive working experiences on FHB research, including pathogen isolation, running disease nurseries, developing resistant cultivar and germplasm, and mapping QTL for FHB resistance.