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**Project ID:** FY20-HW-005

**ARS Agreement #:** *New*

**Research Category:** HWW-CP

**Duration of Award:** 1 Year

**Project Title:** Breed Scab Resistant and Low DON Hard Winter Wheat Varieties for the Great Plains

## PROJECT 2 ABSTRACT

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Our goal is to develop hard winter wheat cultivars that are resistant to Fusarium head blight and that accumulate reduced levels of DON following infection. Specifically we will address Objective 1, associated activities: 1., 2., and 3.; Objective 2, associated activity 2., and Objective 3. Our plan is to make crosses among lines with minor and major genes (mainly for *Fhb1*) for FHB resistance and low DON accumulation (created through marker assisted backcrossing to elite lines or lines identified in our and the regional FHB nurseries), and integrate improved FHB phenotyping by collaborating with Eastern Wheat Scab researchers (part of another proposal). We intend to expand our ability to screen/select lines through molecular markers and genome wide association studies which will lead to genomic selection strategies. Our long-term goal will be to use genomic predictions to identify the best scab tolerant and low DON lines in our preliminary observation nursery (~1700 lines) and validate these predictions in our preliminary yield trial (~200 lines) which will be phenotyped in Nebraska and Ohio. We presently screen for FHB resistance and DON in our preliminary, advanced and elite trials (~460 lines). This information will be validated in our field and greenhouse FHB tests on the advanced and elite yield trials. The research will be part of the Ph.D. research of Ms. Fang Wang. Because we know genetic improvement may not be sufficient in severe FHB epidemics, we now routinely screen our preliminary, advanced, and elite trial with and without fungicides so we can determine the effect of disease (including FHB) on grain yield and DON. This information will be shared with the MGMT Group as they optimize genotype by fungicide treatments to lessen DON in the supply chain. In addition, we will test public and private lines in our scab screening nurseries. Finally, all of this research will be communicated to our growers, millers, bakers, and consumers through our extension/outreach efforts using field days, conferences, print, radio, and social media. This outreach activity will allow growers to choose the best cultivars and apply the best fungicides to reduce DON.