

**PI:** Xiwen Cai

**PI's E-mail:** xiwen.cai@ndsu.edu

**Project ID:** FY18-DU-006

**ARS Agreement #:** 59-0206-7-002

**Research Category:** DUR-CP

**Duration of Award:** 1 Year

**Project Title:** Introgression and Characterization of Hexaploid-Derived FHB Resistance in Durum Wheat

### PROJECT 1 ABSTRACT

(1 Page Limit)

The complex inheritance of FHB resistance genes in the durum background has limited the deployment of FHB resistance in durum germplasm and varieties. In addition, the wheat D genome may play a role in the expression of FHB resistance genes. Our preliminary results indicate that the hexaploid-derived FHB resistance genes exhibit different inheritance patterns in durum. Also, we have observed significant variation in FHB resistance among the durum D-genome chromosome substitution and addition lines, suggesting the effect of D-genome chromosomes on FHB resistance. Here, we propose to understand the effects of the durum background and wheat D-genome chromosomes on the hexaploid-derived FHB resistance (Sumai 3 and PI 277012). Meanwhile, we will manipulate the genetic background to incorporate the hexaploid-derived FHB resistance genes into durum for germplasm development. The specific objectives of this proposed project are to:

- 1) Understand the effects of the durum background and wheat D-genome chromosomes on FHB resistance;
- 2) Incorporate the hexaploid-derived FHB resistance genes into durum for germplasm development;
- 3) Develop and validate user-friendly molecular markers useful in breeding for FHB resistance in durum.

We will perform molecular mapping of the hexaploid-derived FHB resistance genes and the genetic factors influencing the expression of the FHB resistance in the two large RIL populations ( $n > 200$ ) developed from the crosses of Sumai 3 and PI 277012 and Langdon durum. In addition, we will characterize the D-genome chromosomes in each of the RILs. We expect to reveal novel insights into the expression and inheritance of the hexaploid-derived FHB resistance genes in durum and to select RILs with enhanced FHB resistance and potentially reduced DON accumulation in this proposed research project. Meanwhile, we will continuously make effort toward FHB resistance gene introgression from hexaploids into durum for germplasm development. Ultimately, this research project will facilitate introgression and deployment of the hexaploid-derived FHB resistance genes into durum for germplasm and variety development.