

Project Abstract

Project Title:	Integration of major FHB-resistant QTL into modern durum wheat varieties	
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Fusarium head blight (FHB) is one of the most destructive diseases of durum wheat (*Triticum durum*) and common wheat (*T. aestivum*). In the past two decades, several major FHB-resistant quantitative trait loci (QTL), including seven formally designated QTL (*Fhb1* through *Fhb7*) and two PI 277012-derived 5A QTL, have been identified in common wheat and its wild relatives. Some QTL such as *Fhb1* have been deployed in many common wheat varieties. However, none of these major QTL have been deployed in the modern durum varieties. The objectives of this project are to: 1) continue current effort in developing elite durum germplasm with improved FHB resistance, 2) transfer and pyramid multiple major FHB-resistance QTL from Chinese wheat landrace 'Wangshuibai' into the new durum varieties, and 3) transfer and pyramid *Fhb7* derived from tall wheatgrass species *Thinopyrum elongatum* ($2n = 2x = 14$) and *Th. ponticum* ($2n = 10x = 70$) with other major QTL into durum varieties. For continuing development of elite durum germplasm with improved FHB resistance, we will develop approximately 600 adapted durum lines carrying *Fhb1*, two PI 277012-derived 5A QTL, low cadmium, and good agronomic traits in the current on-going FY20-21 project. In the next funding cycle, all the lines will be evaluated for their FHB resistance in FHB nurseries and greenhouse. The lines with a high level of FHB resistance will be evaluated for their yield and quality in a yield trial in the multiple locations. To further improve durum for the FHB resistance, we will transfer and pyramid 6 - 7 major QTL, including *Fhb1*, *Fhb2*, *Fhb4*, *Fhb5*, *Fhb7* and PI 277012-derived 5A QTL into new durum varieties and breeding lines. We will simultaneously transfer *Fhb1*, *Fhb2*, *Fhb4*, and *Fhb5* from Wangshuibai and *Fhb7* derived from wheat-tall wheatgrass introgression lines into durum variety ND Riveland, any newly released varieties, and breeding lines carrying two PI277012-derived 5A QTL by five consecutive backcrosses. New STARP markers will be developed and validated for marker-assisted backcrosses. By implementation of this project, we expect that 16 - 20 elite durum lines (4-5 lines/year) carrying multiple major FHB resistant QTL with accepted yield and quality will be developed and they will be used by breeders and geneticists to develop new durum germplasm and varieties with improved FHB resistance, yield, and quality and low cadmium accumulation. Thus, the outputs of this project meet the overall goal of the USWBSI.