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Project Title: Expand FHB Screening Capacity for Durum Wheat

PROJECT 2 ABSTRACT

(1 Page Limit)

Field disease nurseries are essential for identification of FHB resistant germplasm, development of FHB resistant cultivars, and mapping of QTL for FHB resistance in durum wheat. In the past years, the PI has established a misted disease nursery on NDSU campus at Fargo location to screen durum materials from multiple durum wheat researchers (Dr. Shaobin Zhong, Dr. Xiwen Cai, Dr. Steven Xu, Dr. Xuehui Li, Dr. Elias Elias) whose projects are funded by the Scab Initiative. However, only a small number of durum wheat lines could be included in the Fargo nursery for FHB evaluation due to limited capacity of the nursery and lack of fund for managing larger field plots. Furthermore, having only one nursery is risky because it may not able to provide good quality FHB data in some years due to unexpected weather or environmental conditions (too dry, too hot, flooding and so on). Having another FHB nursery with optimum conditions for disease development is crucial for ensuring the success of FHB screening for the durum CP each year. Langdon, ND, is an excellent location for FHB screening because the weather conditions are conducive for FHB development. We propose to expand the Fargo nursery and establish a new nursery at Langdon with the overall goal of increasing the capacity and efficiency of FHB screening for durum wheat. The specific objectives of the proposal are to:

- Expand the Fargo nursery to include more durum germplasm for FHB screening.**
- Establish a new nursery at the Langdon location to screen advanced breeding lines and new germplasm generated by the durum CP.**

We will plant advanced breeding lines, introgression lines, and mapping populations from multiple researchers of the durum CP in the FHB nurseries at Fargo and Langdon in each summer. Fusarium-infested corn inoculum will be applied at the boot stage and overhead misting system will be set up to keep enough moisture for disease development in the disease nurseries. FHB ratings will be conducted at 21 days after anthesis. These two FHB nurseries will meet the needs of the durum CP for screening breeding lines, introgression lines, and mapping populations. **This research addresses the following research priorities/objectives of the DUR-CP for FY20-21:** 1. Search for novel sources of resistance to FHB in durum and its relatives. 2. Identify, map, and validate FHB resistance QTL in the newly identified sources of resistance and develop user-friendly molecular markers to assist selection in durum breeding and germplasm development. 3. Incorporate FHB resistance QTL from diploid, tetraploid and hexaploid wheat accessions into adapted durum backgrounds and develop elite durum germplasm with the assistance of molecular markers in selection.