

Project Abstract

Project Title: A Double Haploid Initiative to Speed Development of FHB Resistant Soft Winter Wheat

Principal and Co-Investigator(s):

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Co-Investigator #1: Richard Boyles

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Co-Investigator #2: Nonoy Bandillo

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Co-Investigator #3: Vijay Tiwari

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Co-Investigator #4: Nicholas Santantonio

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Co-Investigator #5: Mohamed Mergoum

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Co-Investigator #6: Shuyu Liu

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Co-Investigator #7: Ehsan Shakiba

Institution: University of Arkansas

The goal of this project is to extend the highly successful regional Double Haploid (DH) initiative among eight universities that facilitates rapid development and release of high-yielding varieties that contain an effective FHB resistance pyramid. Specific Objectives are: 1) Develop DH lines that combine multiple effective FHB resistance genes/QTL. 2) Share new DHs with all VDHR-SWW breeders after the initial culling such that each breeder evaluates over 1,000 new DHs each year.

Expected Outcome:

This highly collaborative DH project will result in the release of productive FHB resistant varieties several years quicker than could be accomplished using conventional breeding methodology. The VDHR-SWW DH program has been very successful at developing FHB-resistant cultivars and this effort enhances the group of that effort by increasing the number of DHs developed and facilitating region-wide evaluation of DHs at an early stage.

Approaches:

Each participating breeder will identify combinations that pyramid FHB-resistance QTL in an adapted, high-yielding background. Marker haplotypes of parents for validated FHB resistance QTL and other traits of importance will be used to ensure that crosses in the DH pipeline combine several effective QTL and offer the greatest probability of developing an adapted, high-yielding, FHB-resistant cultivar. MAS will be utilized at the F1 stage for three-way crosses and after the initial DH head-row stage for other crosses to verify that desired genes are present in a line.

Each program will produce about 450 new DHs yearly. Selection for qualitative traits in the initial headrow stage will reduce numbers by about 75+% such that each breeder selects and harvests ~100 new DHs each year, collectively ~800 DHs yearly. The originating breeding program will advance harvested DHs to observation yield plots in year 2 and send all other programs 10 grams of seed for evaluation in replicated headrows. Each breeder can select and advance any of the shared DHs but must retain the line designation used by the originating breeder, with new state initials added, to enable tracking DHs, to avoid duplicate releases, and ensure proper sharing of royalties.

Statement of Mutual Interest:

Stakeholders will have access to wheat varieties with superior FHB resistance and agronomic characteristics. The collaborative nature of this project facilitates magnified return of DH production cost by providing breeders across the region with access to the DHs for selection and variety development.

