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PROJECT 1 ABSTRACT

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The overall objective of this project is to develop new and improved winter barley cultivars with enhanced Fusarium head blight (FHB) resistance and lower deoxynivalenol (DON) accumulation that are adapted to the mid-Atlantic and southeastern United States. Currently, a majority of the most widely grown winter barley cultivars are moderately susceptible or susceptible to FHB; hence, there is need for new winter barley cultivars with improved FHB resistance and lower DON accumulation that are acceptable to growers and to those who process the grain for feed, malt and other end-uses. FHB epidemics were widespread in Virginia in 1998 and devastated much of the crop in 2003, 2009, and 2013 in Virginia and the southeastern U.S. In addition to native FHB resistance in Virginia's winter barley program, resistance identified in spring barley lines is being incorporated into adapted winter barley backgrounds. However, the spring barley lines are not adapted to our environment and lack resistance to other prevalent diseases and, therefore, need to be top or back crossed to adapted lines. Use of marker assisted selection (MAS) in pyramiding complimentary FHB resistance genes into adapted winter barley backgrounds is a primary goal, and will be more effective once quantitative trait loci (QTL) and diagnostic markers are developed for native as well as non-adapted resistance sources. Increased interest in winter malt barley by several current and new craft brewers has led our program to increase efforts to develop winter malt barley cultivars adapted to the mid-Atlantic and southeastern United States. Demand from a growing number of local and regional malt and craft brewing companies for an increasingly diverse and local supply of malt barley highlights the need for continued research and development of new winter malt barley cultivars. In order to supply these industries with quality raw materials, there is a pressing need for germplasm with genes that confer resistance to FHB and DON in barley, where there are relatively few sources of resistance. Our specific objectives for this proposal are to 1) evaluate available barley germplasm for novel sources of FHB resistance; 2) develop barley cultivars with enhanced resistance to FHB and lower DON and; 3) map and validate QTL for FHB resistance in our native winter barley sources