PI: Carl Griffey **PI's E-mail: cgriffey@vt.edu**

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PROJECT 1 ABSTRACT

(1 Page Limit)

FHB epidemics were widespread in Virginia in 1998 and devastated much of the crop in 2003 and 2009 in Virginia and the southeastern U.S. Renewed interest in barley exports and new potential demand (30 million bushels per year) for winter barley in ethanol production has heightened needs of our program to provide growers and end users with superior cultivars having high yields, desirable quality, and especially FHB resistance. Dried distillers grains with solubles (DDGS) are a valuable byproduct of ethanol production and are rapidly becoming a significant component of nutrient-rich food and feed products. Development and production of FHB resistant varieties having low DON is critical to ensure that barley DDGS have low DON content. 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 lines. Each year hulled and hulless winter barley entries in Virginia's state variety trial are evaluated for resistance to FHB and DON in an inoculated and mist irrigated scab nursery. Data from these tests are reported to producers in extension publications and online. Single and top crosses between superior hulled and hulless winter barley parents with parents having FHB resistance have and will be produced each year in our program. Molecular markers previously identified in known resistance sources will be used to haplotype parents and progeny and to enrich breeding populations. FHB breeding populations in the F_2 and higher generations are evaluated each year in a scab nursery. Heads selected from F_3 and higher generation populations comprised of FHB resistance parents will be screened with molecular markers in our lab and evaluated in headrow nurseries to identify desirable FHB resistant pure lines. Superior lines will be evaluated and advanced sequentially in replicated preliminary, advance, state, and regional trials as well as in FHB nursery tests prior to release. Prior testing of our winter barley genotypes in scab nurseries indicates that a number of lines possess native resistance to FHB and DON. Tests conducted at two locations in 2010 and 2011 identified three lines having FHB indices significantly less than the test average in both testing environments. The hulless cultivar Eve had an FHB index of 3.5 in Mt. Holly and 13.8 in Blacksburg and a DON concentration of 2.5 ppm in 2010. The hulless line VA06H-48 had an FHB index of 5 in Mt. Holly and 8.6 in Blacksburg and a DON concentration of 3.5 ppm in 2010. One hulled cultivar, Nomini had an FHB index of 5.5 in Mt. Holly and 12 in Blacksburg and a DON concentration of 2.6 ppm in 2010. These results indicated that resistance to FHB is present in the Virginia Tech barley breeding program. DON data and FDK data for the 2010-2011 growing season is currently being collected. Barley genotypes included in this study will be screened using known markers linked to FHB resistance in an effort to further understand FHB resistance in Virginia winter barley. Mapping populations including the FHB resistant hulled cultivar Nomini and hulless cultivar Eve are being developed to identify and map novel FHB resistance genes that occur in the Virginia Tech barley germplasm. An association analysis utilizing the single nucleotide polymorphism (SNP) data and platform generated through the Barley Coordinated Agricultural Project (CAP) will be utilized for mapping. Initial data on a small subset of winter barley lines indicates the presence of putative quantitative trait loci on chromosome 6H for DON concentration and chromosome 7H for FHB incidence, severity and DON concentration.