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(1 Page Limit)

Scab of wheat is a disease that has recently increased in wheat grown in the U.S. mid-Atlantic. Scab or head blight is caused by fungi of the genus *Fusarium*. Wheat scab reduces grain yield, decreases grain quality, and can produce toxins that are a potential health threat when the infected wheat is used for food. Alleles of resistance to scab exist in current soft red winter wheat cultivars, therefore screening of advanced lines of breeding programs may allow identification of lines with tolerance to scab. The **first objective** of this project is to screen elite lines in the Maryland breeding program for resistance to scab as well as screen the Uniform Northern and Uniform Southern Scab nurseries. This is a practical way to identify potential cultivars with tolerance to scab before their release. The **second objective** of this project is as part of the breeding program to rapidly develop soft red winter wheat germplasm and cultivars adapted to the mid-Atlantic region with increased resistance to scab in a backcross approach as well as pyramiding scab resistance from adapted genotypes in 3-way crosses. Special screening nurseries will be artificially inoculated and resistance to scab will be evaluated. Molecular marker assisted selection will also be utilized to accelerate and improve the efficiency of selection (genotyping will be carried out at the USDA genotyping center at Raleigh, NC). Sumai3 scab resistance alleles present in wheat genotype Ning 7840 have been widely used by U.S. wheat breeders but that it also can lead to increased shattering as well as increased susceptibility to other diseases. An aspect that has not been extensively investigated is the effect of using Sumai 3 or Ning 7840 on baking and milling quality of soft red winter wheat. The **third objective** of this research project is to investigate the effect on baking and milling quality of introducing resistance genes from Ning 7840 into soft red winter wheat. To test this, 60 recombinant inbred lines derived from two crosses with Ning 7840 will be used: one with a soft red winter wheat with strong gluten (Pioneer 2643) and one with soft gluten (Pioneer 2684). Scab resistance scoring, genotyping of 3BS SSR markers, and quality analyses of the recombinant inbred lines will allow us to estimate the effect of this chromosomal region of Ning 7840 on milling and baking quality of soft red winter wheat. These objectives support the overall goal of enhancing the resistance to scab and quality of new wheat cultivars in the mid-Atlantic region. The proposed research is relevant to the U.S. Wheat and Barley Scab Initiative because publicly available cultivars will be developed from this project with enhanced resistance to scab for the mid-Atlantic region of the U.S.