

**PI: Bai, Guihua**

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**Research Area: VDUN**

**PI's E-mail: bai@mail.pss.okstate.edu**

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**Project Title: Utilization of High-throughput Markers to Improve Scab Resistance in Wheat.**

PROJECT 2 ABSTRACT

(1 Page Limit)

Epidemics of wheat scab can significantly reduce wheat grain yield and quality. Breeding resistant cultivars is the most effective measure to control the disease. Because large environmental variation associates with disease evaluation and the disease screening procedure is laborious, progress in breeding for resistant cultivars has been slow with conventional methods. Our objective in this proposal is to speed up the wheat breeding processes by deploying and developing high-throughput molecular markers linked to the quantitative trait locus (QTL) for scab resistance on chromosome 3BS from Sumai 3. We will collaborate with wheat breeding programs nationwide to conduct marker-assisted selection (MAS) for the major QTL using the USDA high-throughput genotyping facility. Breeding populations segregating for 3BS QTL will be provided by breeding programs. Several simple sequence repeats (SSRs) and one sequence tagged site marker on 3BS will be evaluated for polymorphism between parents for each population and three selected polymorphic markers will be evaluated in segregating progenies of these crosses with 3BS QTL in one of the parents. Meanwhile, advanced breeding materials from Northern and Southern Uniform soft red winter (SRW) wheat Scab Nurseries and from the USDA-ARS Uniform Eastern and Southern SRW wheat nurseries will be fingerprinted with the 3BS markers. In addition, we will further evaluate relationship between SSR markers and the 3BS QTL in diverse breeding populations, and explore new strategies for MAS. The outputs of this research will facilitate marker-assisted breeding to minimize scab damage and lead to release of scab resistant germplasm and cultivars as well as high-throughput MAS protocols to public breeding programs. These will lead to *developing as quickly as possible effective control measures that minimize the threat of scab to the producers, processors, and consumers of wheat* as proposed by USWBSI.