

PI: Eric Olson

PI's E-mail: eolson@msu.edu

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Project Title: Development of Scab Resistant Wheat Varieties for Michigan and the Great Lakes Region.

PROJECT 1 ABSTRACT

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Michigan State University Wheat Breeding and Genetics aims to develop soft winter wheat varieties and germplasm with high levels of resistance to Fusarium Head Blight that are adapted to Michigan and the Great Lakes region. Disease promoting conditions are present annually in Michigan placing the entire wheat value chain at risk. Through the proposed work, resistant varieties will be made available to Michigan wheat and Michigan milling industry will be supplied with a more consistent supply of high quality grain. The development of FHB-resistant varieties will help support a critical part of the Michigan agricultural economy.

To accomplish the goal of developing FHB-resistant wheat varieties and germplasm, the following objectives will be completed:

1. Two crossing cycles will be completed annually to develop 400 to 500 populations per year focused on FHB resistance. Selection for resistance to grain colonization will be applied in early generations by inoculating 700 F₂ breeding populations with grain spawn. Populations will be produced that segregate for both FHB resistance and agronomic traits. Directly applying selection pressure in the F₂ will result in higher frequency of resistance alleles in advanced inbred lines.
2. A total of 1100 preliminary and advanced yield trial entries will be evaluated in an irrigated disease nursery. Lines will be identified that have optimum combinations of FHB resistance and yield potential.
3. Marker-assisted selection will be performed for QTL known to be present in the pedigrees of lines in yield testing. This will identify genotypes carrying known resistance QTL from Chinese and native sources. Resistant genotypes carrying selectable QTL are cycled into the crossing program.
4. Resistant germplasm will be disseminated through regional FHB nurseries. This will ensure that work completed by MSU-WBG will have regional impact in support USWBI objectives.
5. Generate and communicate data on FHB resistance in varieties available to Michigan wheat growers. Contrasting resistant varieties with high-risk susceptible varieties will enable growers to make informed planting decisions and increase the acreage planted to resistant varieties.