

PI: Herbert Ohm

PI's E-mail: hohm@purdue.edu

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Research Area: VDUN

Duration of Award: 1 Year

Project Title: Breeding Soft Winter Wheat for FHB Resistance by Phenotype and Marker-Assisted Selection.

PROJECT 2 ABSTRACT

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Fusarium head blight (FHB) is a devastating disease of winter wheat in Indiana and adjacent regions. This immediate and severe threat to wheat production warrants accelerated breeding research including efficient selection technologies with the goal of combining enhanced resistance to FHB with superior agronomic performance, grain quality and resistance to other important biotic and abiotic stresses.

The objectives of this research are:

- 1) develop FHB resistant and low-FHB incidence wheat cultivars that are adapted in Indiana,
- 2) develop screening methods to identify type I resistance (reduced initial infection),
- 3) determine whether pyramiding resistance QTL Qfhs.ndsu-3BS with other reported FHB resistance QTLs results in more effective resistance, and
- 4) develop two wheat lines; one that has Qfhs.ndsu-3BS in coupling with *Sr2*, and one that has *Stb2* in coupling with QSng.sfr-3BS.

Testing of lines and populations will be carried out in multiple locations in Indiana and in cooperative regional nurseries to ensure effective testing for FHB each season. Nurseries will be seeded in disced cornstalks and certain nurseries will be artificially misted to enhance FHB disease severity for efficient screening for resistance. Certain lines/populations will be tested in controlled conditions in a greenhouse. DNA markers already identified as being associated with specific resistance QTLs will be used to more efficiently identify resistant plants and genotyping parental lines for FHB resistance QTLs.

Efficient screening methods will be developed to reliably identify plants that have type I resistance to combine type I resistance with type II resistance and low-FHB incidence already being utilized in the breeding program, with the goal of achieving enhanced resistance.

Four resistance loci conditioning resistance to four globally important diseases; FHB, stem rust, Septoria leaf blotch, and nodorum leaf and glume blotch, are closely linked on 3BS. We will identify recombinant plants in which the resistance alleles/QTL Qfhs.ndsu-3BS and *Sr2*, and *Stb2* and QSng.sfr-3BS are linked in coupling.