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Project Title: Characterization of New Sources of Resistance to Fusarium Head Blight of Wheat.

PROJECT 3 ABSTRACT

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The objective of this project is to identify and characterize additional sources of resistance, investigate their inheritance, determine if they contain resistance genes not found in Sumai 3, and to select lines with superior resistance from among progeny of crosses between different resistant lines. Other genes for resistance may provide genetic diversity and augment currently used resistance.

We have characterized several selections of wheat for both type II and type I resistance. Preliminary molecular marker characterization indicates most of these lines do not have the major QTL on 3BS. We are beginning to investigate the inheritance of resistance in these lines. Crosses have been made between these resistant lines and between them and Sumai 3 or Ning 7840. Recombinant inbred populations, at the F₅ generation or beyond, will be characterized for type II resistance. A major goal of these studies is to find transgressive segregants that show a high degree of resistance. These will be evaluated for type I resistance. We are in the process of evaluating Chokwang (resistant) × Clark (susceptible) recombinant inbred lines for both type II and type I resistance. In this project, we will evaluate a recombinant inbred population (F₆) from the cross Chowkang × Ning 7840.

Our new sources of resistance were selected mainly on the basis of type II resistance. We have already tested these lines for type I resistance, but will continue this work to obtain reliable estimates of their degree of type I resistance and its stability over environments. We will also plate surface-sterilized seeds on a selective medium to determine the frequency of kernel infection after both point and spray inoculation. When seed supply permits, we will test grain from inoculated plants for DON.

We have been evaluating progeny of 3-way crosses for type II resistance. In these crosses, two or all three parents are resistant. We will select the most resistant F₄ lines and evaluate their progeny for both type I and type II resistance. Parents will be included in these tests to identify lines that have enhanced resistance. The best lines will be tested again in the F₅ for degree and uniformity of resistance. They will also be evaluated for grain quality, low incidence of kernel infection, and low levels of DON.