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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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Wheat breeders in North America have concentrated on Sumai 3 and its derivatives as sources of resistance to *Fusarium* head blight. Other sources of resistance that may be more effective than Sumai 3's resistance or that would enhance Sumai 3's resistance need to be identified. Creation of genetic diversity for resistance among cultivars of wheat to avoid genetic vulnerability is also critical.

In my program, we have identified high levels of resistance within several accessions of hexaploid wheat. We have selected resistant lines from these accessions and have begun a crossing program to characterize genetic control of their resistance. We hypothesize that these lines contain genes different from those in Sumai 3 and Ning 7840, and that these genes will act additively with those in Sumai 3 and Ning 7840 to confer a higher degree of resistance than is currently available.

We will carry out several experiments:

1) Continue phenotypic evaluation of the resistant selections in response to spray and point inoculation in the greenhouse with macroconidia of *Fusarium graminearum*, including evaluation of the effects of different inoculum concentrations. These experiments are designed to quantify the various types of resistance in these new selections and to determine how stable this resistance is within and across environments.

2) Phenotypically evaluate F3 progeny of crosses between new resistant selections, between new resistant selections and Sumai 3, and between new resistant selections and susceptible cultivars Norm or Clark. These experiments will provide information on the inheritance of resistance in these new selections and whether they contain genes for resistance not found in Sumai 3 and related cultivars.

3) Evaluate progeny from tested F1 plants from 3-way crosses or backcrosses. These experiments should result in highly resistant selections that contain genes from 2 or more sources, and will also provide information on the reliability of single-plant selection in early segregating generations and later generations of selfing.

This work will result in germ plasm that may be used by wheat breeders, and the associated information on genetics of resistance in this germ plasm.